

#### ERODE SENGUNTHAR ENGINEERING COLLEGE



(An Autonomous Institution, Affiliated to Anna University) PERUNDURAI, ERODE - 638 057

### UG Curriculum and Syllabus (1 to 8 Semesters)

#### **B.E. BIOMEDICAL ENGINEERING**

Choice Based Credit System (CBCS)

(For the students admitted during the Academic year 2020-21 and onwards)

#### **REGULATION 2019**

#### Vision and Mission of the Institute:

#### Vision of the Institute:

**Vision of Erode Sengunthar Engineering College** is to become a World Class Technical Institution and Scientific Research Centre for the Benefit of the Society

#### **Mission of the Institute:**

#### Erode Sengunthar Engineering College will strive continuously to

**IM1:** Create Positive difference to Society through Education

- **IM2:** Impart Value Based Technical Education to the Students from across various Socio Economic backgrounds
- **IM3:** Build World Class Research and Development capabilities on par with the finest in the World and widen students horizons beyond Class Room Education
- **IM4:** Bring out Competent, Ethically Strong and Quality Professionals for the Benefit of the Society

#### **Quality Policy:**

**Erode Sengunthar Engineering College** is committed to impart World Class Technical Know - How to the Students from diverse Socio Economic backgrounds and to transform their lives by nurturing Multi - Skills and facilitating them to develop holistically

#### Vision and Mission of the Department:

#### Vision of the Department:

To provide world class education with Centre of Excellence in the field of Biomedical Engineering through innovative research contributions, Industrial oriented teaching and training for betterment in healthcare for the prosperity of the country, ensuring quality health service delivery, education and research.

#### **Mission of the Department:**

- **DM 1:** To achieve academic distinction in applying engineering principles, science and medicine methods to confront health science challenges,
- **DM 2:** To catalyze interactions between biologists, physical scientists and engineers to benefit medicine and human health,
- **DM 3:** To impart students with skills for research, design and development of biomedical devices and allied integrated systems for betterment of human society,
- **DM 4:** To enable students to be sensitive to the ethical issues pertinent to the biomedical engineering profession.

#### Program Educational Objectives (PEOs) are

- I. To embrace responsible roles of highest cadre in their chosen profession through engineering knowledge, skills and teamwork.
- II. To apply and acquire quantitative, qualitative, analytic and critical thinking skills to solve engineering problems.
- III. To provide self-directed learning with management principles to identify and create professional opportunities in the field of Research and Innovation.
- IV. To prepare graduates capable of upholding and expanding their technical competence through lifelong learning.

#### Program Outcomes (POs)

	Engineering Knowledge: Apply the knowledge of mathematics, science,
PO1	engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7	Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and Team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation,
	make effective presentations, and give and receive clear instructions.
PO11	make effective presentations, and give and receive clear instructions. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

#### Program Specific Outcomes (PSOs):

PSO1	<b>Professional Approach</b> – Specify, architect and prototype health-care solutions by applying signal and medical image processing techniques on modern hardware and software platforms.
PSO2	<b>Interdisciplinary Skill</b> – Investigate, Implement and demonstrate various applications of analog and digital electronic subsystems in designing and building biomedical instrumentation systems.
PSO3	<b>Innovations through ICT</b> – To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions for current societal and scientific issues thereby developing indigenous medical instruments that are on par with the existing technology.

# CURRICULUM

Chaimin - BoS

#### ERODE SENGUNTHAR ENGINEERING COLLEGE, ERODE DEPARTMENT OF BIOMEDICAL ENGINEERING

#### **REGULATIONS – 2019**

#### CHOICE BASED CREDIT SYSTEM

#### I TO VIII SEMESTERS CURRICULUM

Induction Program (Mandatory)	3 weeks duration								
	<ul> <li>Physical activity</li> <li>Creative Arts</li> <li>Universal Human Values</li> </ul>								
Induction program for students to be offered right at the start of the first year	<ul> <li>Literary</li> <li>Proficiency Modules</li> <li>Lectures by Eminent People</li> <li>Visits to local Areas</li> <li>Familiarization to Dept. / Branch &amp;Innovations</li> </ul>								

		B. Min	E. BIOMEDI	ICAL EN	IGIN earr	EERI ned :	NG 160					
124 J.			SEI	MESTER	21	1	1					
THEORY												
0	0	Objec	tive & Outc	omes		-			Max	imum	Marks	Catanami
Code No	Course	PEOs	POs	PSOs			P	C	CA	ES	Total	Category
19BS101	Calculus and its Applications	I, II	1,2,3, 4,12	-	3	1	0	4	40	60	100	BS
19BS102	Engineering Physics	I, II	1,2,4,5, 6,8,9	1,2	2	0	2	3	40	60	100	BS
19BS103	Engineering Chemistry	1, 11	1,2,3,4, 5,7,12	-	3	0	0	3	40	60	100	BS
19HS101	Communicative English	IV	2,3,6, 9,10, 12	-	3	0	0	3	40	60	100	HS
19BS104	Fundamentals of Bio Chemistry	1, 11	1,2,3, 4,12	_	3	0	0	3	40	60	100	BS
19TPS01	Soft Skills – I	ш	8,9,10,12	-	1	0	1	1.5	40	60	100	EEC
PRACTIC	AL			-		1					- 1 · · · ·	
19BS105	Chemistry Laboratory	ľ	1,2,3,4, 5,12	-	0	0	4	2	60	40	100	BS
19BS106	Bio Chemistry Laboratory	Ш	1,2,4	-	0	0	2	1	60	40	100	BS
19ES106	Engineering Graphics	I	1,2,3,5, 10,12	-	0	0	4	2	60	40	100	ES
2	1	j.		TOTAL	15	1	13	22.5	420	480	900	-

			SE	MESTER	. 11							
THEORY	к. К								1			
0		Objective & Outcomes				Ļ	_		Max	cimun	n Marks	0.1
Code No	Course	PEOs	POs	PSOs			P	C	CA	ES	Total	Category
19BS201	Vector Calculus and Complex Variables	1,11	1,2,3,4, 12	-	3	1	0	4	40	60	100	BS
19BS202	Bio Physics	1,1	1,5,7	-	3	0	0	3	40	60	100	BS
	Language Elective		-	-	3	0	0	3	40	60	100	HS
19ES206	Semiconductor Devices and Circuits	II	1,2,3,4, 12	-	3	0	0	3	40	60	100	ES
19ES201	Problem Solving and Python Programming	1,11	1,2,3, 4,12	2	3	0	0	3	40	60	100	ES
19MC201	Environmental Science and Engineering	1,11	1,2,3,4,5, 6,7,8,12	-	3	0	0	0	40	60	100	MC
19TPS02	Soft Skills – II	11-	8,9,10,12	-	1	0	1	1.5	40	60	100	EEC
PRACTIC	AL		5					1				1.
19ES213	Problem Solving and Python Programming Laboratory	1,11	1,2,3,4, 5,12	2	0	0	2	1	60	40	100	ES
19ES217	Devices and Circuits Laboratory	I, III, IV	1,2,3,4, 5,11,12		0	0	2	1	60	40	100	ES
19ES220	Engineering Practices	1	1,3,9,12	-	0	0	2	1	60	40	100	ES
				TOTAL	19	1	7	20.5	460	540	1000	

			SEN	<b>MESTER</b>	Ш							
THEORY	को प्रस्त दियों प्रम									÷.		
Code No	Course	Objective & Outcomes				т	-	-	Maximum Marks			
Code No	Course	PEOs	POs	PSOs			Р	C	CA	ES	Total	Category
19BS301	Applied Linear Algebra	I, II	1,2,3,4	-	3	1	0	4	40	60	100	BS
19EE305	Circuit Theory	II <sup>2</sup>	1,2,3,4,5	-	3	1	0	4	40	60	100	ES
19EC303	Signals and Systems	II, IV	1,2,3,4,5, 6,11,12	-	3	1	0	4	40	60	100	ES
19BM301	Anatomy and Human Physiology	I, IV	1,2, 6,8	1,2	3	0	0	3	40	60	100	PC
19BM302	Pathology and Microbiology	I, IV	1,2,5	1,2	3	0	0	3	40	60	100	PC



			/ 1	TOTAL	18	3	8	22	580	420	1000	
19HS301	Communication Skills	I, IV	1,2,3, 9,10,12		0	0	4	2	60	40	100	EEC
19BM304	Human Physiology Laboratory	I, IV	1,2,3,5,6, 8,9,10,12	1,2	0	0	2	1	60	40	100	PC
19BM303	Pathology and Microbiology Laboratory	I, IV	1,2,3,5,8, 9,10,12	1,2	0	0	2	1	60	40	100	PC
PRACTIC	AL .			,							1	
19TPS03	Quantitative Aptitude and Logical Reasoning – I	IV	1,2,9, 10,12		2	0	0	0	100	0	100	EEC
19MC301	Indian Constitution	IV	6,8,10, 11,12	14	1	0	0	0	100	0	100	MC

			SEN	<b>IESTER</b>	IV							
THEORY												
O a da Na	0	Obje	ctive & Out	comes		T	-	-	Max	imum	Marks	Catagony
Code No	Course	PEOs	POs	PSOs		2	P		CA	ES	Total	Category
19BS401	Probability and Statistics	I, II	1,2,3,4	L.	3	1	0	4	40	60	100	BS
19BM401	Bio Sensors and Measurements	1, 111	1,2,3,4, 5,6	-	3	1	0	4	40	60	100	PC
19BM402	Analog and Digital Integrated Circuits	1, 11	1, 2 , 4	-	3	0	0	3	40	60	100	ES
19BM403	Microprocessors and Microcontrollers	1, 11, 111	1,2,3,4,5 6,11,12	2	3	0	0	3	40	60	100	ES
19BM404	Internet of Things in Medicine	1,11,111	1,2,3, 4,5,12	1,2	3	0	0	3	40	60	100	PC
19HS402	Universal Human Values 2 : Understanding Harmony	I, III	2,3,6,8,5, 11,12		2	1	0	3	40	60	100	HS
19TPS04	Quantitative Aptitude and Logical Reasoning - II	III, IV	1,2,9, 10,12	-	2	0	0	0	100	0	100	EEC
PRACTIC	AL .					-						
19BM405	Analog and Digital IC Laboratory	1, 111	1,2,3,4,5 ,6,11,12	2	0	0	4	2	60	40	100	ES
19BM406	Microprocessor and Microcontroller Laboratory	I, III	1,2,4,8	2	0	0	2	1	60	40	100	ES
			1.17	TOTAL	19	3	6	23	460	440	900	-

- All			SE	MESTER	٧		1					
THEORY											ourien.	
Code No	Course	Objective & Outcomes				т	Б	-	Max	imum	Marks	Catagony
Couesno	Course	PEOs	POs	PSOs	L		P		CA	ES	Total	Category
19BM501	Bio Control System	I, III	2, 6, 8	3	3	0	1	4	40	60	100	PC
19BM502	Biomechanics	1, 11, 111	1,2,4,5,6 7,9,12	-	3	0	1	4	40	60	100	PC
19BM503	Diagnostic and Therapeutic Equipment	I, IV	1,2,4	•	3	0	1	4	40	60	100	PC
19BM504	Biomedical Instrumentation	1, 11	1,2,3,4, 8,11		3	0	0	3	40	60	100	PC
19BM505	Bio Signal Processing	I, III	1,2,3		3	0	0	3	40	60	100	PC
19TPS05	Quantitative Aptitude and Logical Reasoning - III	IV	9,10,11, 12		2	0	0	0	100	0	100	EEC
PRACTIC	AL			1			1			1.1		
19BM506	Diagnostic and Therapeutic Equipment Laboratory	1, 111	1,2,4	-	0	0	2	1	60	40	100	PC
19BM507	Bio Instrumentation Laboratory	I, III	1,2,3,8,9 10,12	-	0	0	2	1	60	40	100	PC
19BM508	Hospital Training	I, III	2,4,6,8,9 10,12		0	0	2	1	60	40	100	EEC
19HS501	Career Skills	í, III	2,3,6,8,5, 11,12	-	0	0	2	0	60	40	100	EEC
-	N	•		TOTAL	17	0	11	21	540	460	1000	

	_ * · · · · ·		SEN	IESTER	VI					0.5	1	
THEORY			11							5		
Code No.	Course	Objective & Outcomes				т	Р		Maximum Marks			Orthogram
Code No	Course	PEOs	POs	PSOs	L		F	C	CA	ES	Total	Category
19BM601	Medical Image Processing	1, 111	1,2,4,6,8 10,11,12	-	3	0	0	3	40	60	100	PC
19BM602	Health Care Analytics	I, III, IV	2,4,5	-	3	0	0	3	40	60	100	PC
19BM603	Pattern Recognition and Neural Networks	I, III, IV	2,4,5	2 <del>-</del>	3	0	0	3	40	60	100	PC
	Professional Elective - I	-	-	-	3	0	0	3	40	60	100	PE
	Professional Elective - II				3	0	0	3	40	60	100	<sup>100</sup> PE

Chairman - Bo

	Open Elective - I	-	-	-	3	0	0	3	40	60	100	OE
19TPS06	Quantitative Aptitude and Logical Reasoning - IV	IV	9,10,11, 12	-	2	0	0	0	100	0	100	EEC
PRACTIC	AL .		1.0									
19BM604	Bio Signal and Image Processing Laboratory	I, III, IV	1,3,5,9	-	0	0	4	2	60	40	100	PC
19BM605	Mini Project	I,IV	2,3	-	0	0	2	1	60	40	100	EEC
		10.51		TOTAL	20	0	6	21	460	440	900	

			SEN	<b>IESTER</b>	VII							
THEORY												
0.1.1		Objec	tive & Outo	comes		T		_	Max	imum	Marks	Catanami
Code No	Course	PEOs	POs	PSOs	1	•	Р		CA	ES	Total	Category
19BM701	Radiological Equipments	1, 111	1,2,3,6,7	-	3	0	1	4	40	60	100	PC
19BM702	Human Assist Devices	I, IV	1,2,4,5,9 11,12	-	3	0	0	3	40	60	100	PC
19BM703	Hospital Management	I, IV	1,2,3,4, 5,8	-	3	0	0	3	40	60	100	PC
19BM704	Rehabilitation Engineering	I, IV	1,2,3,4, 5,8	-	3	0	0	3	40	60	100	PC
	Professional Elective – III	-	-		3	0	0	3	40	60	100	PE
PRACTIC	AL	4	100 17	- 1-								
19BM705	Data Acquisition and Processing Laboratory	I, IV	1,2,4,5,9 11,12	-	0	0	2	1	60	40	100	PC
19BM706	Internship/ Industry Training	III, IV	1,2,3,4,5 ,6,8,10	-	0	0	2	1	60	40	100	EEC
··· ')	\$ 		- A .	TOTAL	15	0	5	18	320	380	700	

Chairman - BoS Dept.of BME - ESEC

3 J-1 -			SEN	IESTER V	VIII					1.		
THEORY	12	-										
0.15.14	-	Object	tive & Outo	omes		т	-		Max	imum	Marks	0
Code No	Course	PEOs	POs	PSOs			P	C	CA	ES	Total	Category
- I	Professional Elective – IV	-	-	-	3	0	0	3	40	60	100	PE
	Professional Elective – V				3	0	0	3	40	60	100	PE
PRACTIC	AL						1					
19BM801	Project Work	II, IV	1,2,3,4,5 ,6,7,8,9, 10,11,12		0	0	12	6	60	40	100	EEC
		2		TOTAL	6	0	12	12	140	160	300	-

	LANG	UAGE ELE	CTIVES	2 <sup>3</sup> 7				
Cada No	Course	Obje	ctive & Out	comes	S   1	т	D	C
Code No	Course	PEOs	POs	PSOs				U
	LANGU	AGE ELEC	TIVE – I					
19HX201	English for Engineers	Ш	9,10,12	3	3	0	0	3
19HX202	Hindi		9,10,12	3	3	0	0	3
19HX203	Japanese	Ш	9,10,12	3	3	0	0	3
19HX204	French	Ш	9,10,12	3	3	0	0	3

CX9

	PROFES	SSIONAL E	LECTIVES	5	17			
Code No	Course	Obj	ective & Outo	omes		T	D	C
Code No	Course	PEOs	POs	PSOs			F	C
	PROFES	SIONAL EI	LECTIVE – I			1		12 2
19BMX01	Total Quality Management	I, IV	1,2,3,11		3	0	0	3
19BMX02	Disaster Management	I, IV	1,2,3,7	1	3	0	0	3
19BMX03	Hospital Waste Management	I, III -	1,6,7,10, 11	1	3	0	0	3
19BMX04	Multimedia Compression and Networks	I, III, IV	2,4,6,8,9 10,12	25 g -	3	0	0	3
19BMX05	Human Body Area Networks	I, II, IV	1,2,3,4,5,6 7,8,9,11	2	3	0	0	3
	PROFES	SIONAL EL	ECTIVE - II		1117			
19BMX06	Mobile Apps Development	- 1, III - <sup>1</sup>	1,2,4,5,6 7,8,10,12	-	3	0	0	3
19BMX07	Telehealth Technology	I, IV	1,6,7,10 11	3	3	0	0	3
19BMX08	Bio Statistics	I, II, III	1,2,3,4,5,7, 8,11,12	2	3	0	0	3
19BMX09	Embedded Systems in Medicine	1, 11, 111	1,2,3	-	3	0	0	3
19BMX10	Virtual Instrumentation	I, IV	1,2,3,7	1	3	0	0	3
	PROFESS	IONAL EL	ECTIVE – III			·	-	
19BMX11	Robotics in Medicine	1, 111	1,2,3		3	0	0	3
19BMX12	Nanotechnology in Medicine	1, 111	1,2,3,4,5 7,10,11,12	2	3	0	0	3
19BMX13	Biometric Systems	I, III, IV	1,2,3,4,5,7 8,11,12	_ 1	3	0	0	3
19BMX14	Biomaterials and Applications	I, III, IV	1,2,3,4,5,6 7,8,9,11	<u>.</u> -	3	0	0	3
19BMX15	Computer Application in Medicine	I, IV	1,2,5,6,7,8 10,11,12	-	3	0	0	3
	PROFESS	IONAL EL	ECTIVE - IV	121	6			
19BMX16	Healthcare Product Development	I, IV 🛓	1,2,3	-	3	0	0	3
19BMX17	Physiological Modeling	I, IV	6,7,8,9,10 11,12	-	3	0	0	3
19BMX18	Medical Ethics and Standards	I, III, IV	1,6,7,10, 11	2	3	0	0	3
19BMX19	Bio MEMS	I, III, IV	1,2,3,4,5,7 8,11,12		3	0	0	3
19BMX20	Research Methodology	I, III, IV	1,2,3,7	-	3	0	0	3



	PROFES	SIONAL EL	ECTIVE – V					
19BMX21	Clinical Engineering	I, IV	1,2,3	-	3	0	0	3
19BMX22	Principles of Tissue Engineering	I, IV	6,7,8,9,10 11,12	- 1-	3	0	0	3
19BMX23	Medical Textiles Fundamentals	I, III, IV	1,6,7,10, 11	2	3	0	0	3
19BMX24	Wearable Systems	I, III, IV	1,2,3,4,5,7 8,11,12	-	3	0	0	3
19BMX25	Medical Optics	I, III, IV	1,2,3,7	-	3	0	0	3

	Μ	ANDATORY CO	DURSES					
Cada Na	Course	Obje	ctives & Out	comes	201	т	Р	~
Code No	Course	PEOs	POs	PSOs	-	1	F	U
19MC201	Environmental Science and Engineering	. 1,11	1,2,5,6, 7, 8,12	-	3	0	0	0
19MC301	Indian Constitution	IV	10,12	- 1 - H	2	0	0	0

CX.9 Chairman - BoS Dept.of BME - ESEC

	OPEN ELECTIVES OFFER	RED BY B	OMEDICAL E	INGINEER	RING			
		Obj	ective & Outc	omes	-	-		
Code No	Course	PEOs	POs	PSOs	L		Р	C
	OP	EN ELEC	TIVE					
19BMY01	Basics of Biomedical Instrumentation	I, IV	1,6,8,9,10		3	0	0	3
19BMY02	Biosensors and Transducers	I, III	1,6,7,10 11	2	3	0	0	3
19BMY03	Biotelemetry & Telemedicine	III, IV	1,2,3,7	-	3	0	0	3
19BMY04	Biomedical Engineering in Fitness	I, IV	6,7,8,9,10 11,12	-	3	0	0	3
19BMY05	Principles of Genetic Analysis	I,IV	1,2,3	4	3	0	0	3
19BMY06	Medical Electronics	III, IV	1,2,3,7		3	0	0	3
19BMY07	Medical Informatics	I,IV	1,2,3		3	0	0	3
19BMY08	Design of Medical Electronic Devices	I,IV	1,2,3,7	- 1	3	0	0	3
19BMY09	Hospital Engineering and Management	I,IV	1,2,3	1	3	0	0	3
19BMY10	MEMS and NEMS	I,IV	1,2,3,7		3	0	0	3

S.No.	Category			Crea	dits Pe	er Sem	ester			Total	Credits	Range Cre	of Total dits
		I	II	Ш	IV	V	VI	VII	VIII	Credit	in %	Min	Max
1	BS	16	7	4	4	0	0	0	0	31	19.4	10%	20%
2	ES	2	9	8	9	0	0	. 0	0	28	17.5	10%	20%
3	HS	3	3	0	3	0	0	0	0	9	5.6	5%	10%
4	PC	0	0	8	7	20	11	14	0	60	37.5	30%	40%
5	PE	0	0	0	0	0	6	3	6	15	9.4	5%	10%
6	OE	0	0	0	0	0	3	0	0	3	1.9	5%	10%
7	EEC	1.5	1.5	2	0	1	1	1	6	14	8.8	5%	10%
1	otal	22.5	20.5	22	23	21	21	18	12	160	100	70%	120%

**BS** -Basic Science **PE** -Professional Elective **MC** - Mandatory course

ES - End Semester Examination

ES -Engineering Science OE-Open Elective

ng Science HS - Humanities and Social Science tive PC - Professional Core CA - Continuous Assessment EEC - Employability Enhancement Course

## SYLLABUS

	BIOMEDICAL ENGINEE	RING		17.5	1010	R 2019	Semester I	BS
Cours	e Course Name	Hou	rs / V	Veek	Credit	Total	Maximu	m
Coue		L	Т	Ρ	С	Tiours	Marks	
19BS10	1 CALCULUS AND ITS APPLICATIONS	3	1	0	4	60	100	
ourse O	bjective(s): The purpose of learning this cours	e is to						
<ul> <li>Interphe</li> <li>Print</li> <li>Print</li> </ul>	rpret the introductory concepts of calculus, this nomena involving continuous change of variab d eigen values and eigen vectors which is one c ing in the field of engineering.	will er les of the p	able oowe	them	n to mod ools to h	el and ana andle prac	alyze physica	ns
<ul> <li>Survari</li> <li>Dev</li> </ul>	nmarize and apply the methodologies involved ables. elop enough confidence to identify surface and	in solv area t	ing p here	roble by so	ms relat	ed to func	tions of seve	ral
ourse O	utcomes: At the end of this course, learners w	ll be a	ble to	):				
<ul> <li>App diffe</li> <li>Ider and</li> <li>Ana</li> <li>Cha</li> <li>Inter</li> </ul>	ly differentiation to solve maxima and minima p rentiation to differentiate functions tify and model the real time problems using firs solve the higher order ordinary differential equilyze lyze the characteristics of a linear system with l racterize the functions of several variables and grate the functions for evaluating the surface ar	t order ations Eigen get th	r linea value e sol	e boti ar diff es and utions	h the lim ferential d Eigen s of the s	it definitio equations vectors. same.	n and rules o s. Recognize	f
•= Inte	grate the functions for evaluating the surface ar	ea and		ime.				
Unit I				INT.				12
the second						1004	2 1000 20	
epresen nd Minin	ation of a function-Limit of a function - Continu	ity - D	eriva	tives	- Differe	entiation r	ules - Maxim	а
epresen nd Minir Unit II	ation of a function-Limit of a function - Continu na of one variable ORDINARY DIFFERENTIAL EQUATIONS	ity - D	eriva	tives	- Differe	entiation r	ules - Maxim	a 12
epresen nd Minin Unit II inear dif quations ariation o	ation of a function-Limit of a function - Continu na of one variable ORDINARY DIFFERENTIAL EQUATIONS ferential equations of second and higher or of higher order with variable coefficients: C f parameters for second order differential equa	ity - D der w auch tions -	eriva ith ce y's lin Vibra	onsta near iting s	- Different ant coef different string - E	entiation r ficients. I tial equa Electrical c	ules - Maxim _inear differe tion - Methe ircuits	a 12 entia od c
epresen nd Minin Unit II near dif quations ariation o Unit III	ation of a function-Limit of a function - Continu na of one variable ORDINARY DIFFERENTIAL EQUATIONS ferential equations of second and higher or of higher order with variable coefficients: Of parameters for second order differential equa MULTIVARIABLE CALCULUS	ity - D der w Cauchy tions -	eriva ith co ⁄'s lii Vibra	onsta near iting s	- Differen ant coef differen string - E	ficients. I tial equa	ules - Maxim _inear differe tion – Methe ircuits	a 12 entia od c 12
epresen nd Minin Unit II near dif quations ariation o Unit III unctions	ation of a function-Limit of a function - Continu na of one variable ORDINARY DIFFERENTIAL EQUATIONS ferential equations of second and higher or of higher order with variable coefficients: C f parameters for second order differential equa MULTIVARIABLE CALCULUS of Two Variables - Total Differential - Derivativ	ity - D der w Cauchy tions - e of in	eriva ith co ⁄'s lin Vibra nplici	tives onsta near ting s	- Differen ant coef differen string - E	entiation r ficients. I tial equa Electrical c Jacobian's	ules - Maxim Linear differention – Metho ircuits	a 12 entia od c 12 ed
epresen nd Minin Unit II near dif quations ariation o Unit III Inctions axima a Unit IV	ation of a function-Limit of a function - Continu na of one variable ORDINARY DIFFERENTIAL EQUATIONS ferential equations of second and higher or of higher order with variable coefficients: Of f parameters for second order differential equa MULTIVARIABLE CALCULUS of Two Variables - Total Differential - Derivativ nd minima. MULTIPLE INTEGRALS	ity - D der w cauchy tions -	eriva ith co ⁄'s lin Vibra nplici	tives onstanear sting s	- Differen ant coel differen string - E	entiation r ficients. I tial equa Electrical c Jacobian's	ules - Maxim Linear differe tion – Methe ircuits s - constraine	a 12 entia od c 12 ed
unit II Unit II inear dif quations ariation o Unit III unctions axima a Unit IV ouble inte Area as c	Cation of a function-Limit of a function - Continu- na of one variable ORDINARY DIFFERENTIAL EQUATIONS Ferential equations of second and higher or of higher order with variable coefficients: Of f parameters for second order differential equa MULTIVARIABLE CALCULUS of Two Variables - Total Differential - Derivativ nd minima. MULTIPLE INTEGRALS egration with constant and variable limits - Reg ouble integral in Cartesian coordinates. Triple	der w Cauchy tions - e of in ion of	eriva ith co y's lin Vibra nplici integ al in (	tives onstanear ting s t fund arteo Cartes	- Different ant coef different string - E ctions - c n - Char sian coo	entiation r ficients. I tial equa Electrical c Jacobian's ge the ord rdinates.	ules - Maxim Linear different tion – Metho ircuits s - constraine der of integra	a 12 entia od c 12 ed 12 tion
International International Internation In	ation of a function-Limit of a function - Continu- na of one variable ORDINARY DIFFERENTIAL EQUATIONS ferential equations of second and higher or of higher order with variable coefficients: C f parameters for second order differential equa MULTIVARIABLE CALCULUS of Two Variables - Total Differential - Derivativ nd minima. MULTIPLE INTEGRALS egration with constant and variable limits - Reg ouble integral in Cartesian coordinates. Triple EIGEN VALUES AND EIGEN VECTORS	der w Cauchy tions - e of in ion of integra	eriva ith co y's lin Vibra nplici integ al in (	tives onstanear iting s t fund ration	- Differen ant coef differen string - E ctions n - Char sian coo	entiation r ficients. I tial equa Electrical c Jacobian's ge the ord rdinates.	ules - Maxim _inear differe tion – Methe ircuits s - constraine der of integra	a 12 entia od c 12 ed 12 tion
epresen nd Minin Unit II inear dif quations ariation o Unit III unctions axima a Unit IV ouble inte Area as c Unit V igen Valu rthogona	ation of a function-Limit of a function - Continu- na of one variable ORDINARY DIFFERENTIAL EQUATIONS ferential equations of second and higher or of higher order with variable coefficients: Of parameters for second order differential equa MULTIVARIABLE CALCULUS of Two Variables - Total Differential - Derivativ nd minima. MULTIPLE INTEGRALS egration with constant and variable limits - Reg ouble integral in Cartesian coordinates. Triple EIGEN VALUES AND EIGEN VECTORS es and Eigen Vectors of a real matrix - Proper I matrix - Diagonalisation - Quadratic form: Rec	ity - D der w Cauchy tions - e of in ion of integra ties of luction	eriva ith co /'s lin Vibra nplici integ al in ( Eige	tives onstanear near ting s t fund Cartes en Va quad	- Differen ant coef differen string - E ctions n - Char sian coo lues - C dratic for	ficients. I ficients. I tial equa Electrical o Jacobian's ge the ord rdinates. ayley - Ha m to a ca	ules - Maxim _inear differe tion – Methe ircuits s - constraine der of integra amilton Theo nonical form.	a 12 entia od c 12 ed 12 tion 12 rem
epresen nd Minin Unit II near dif quations ariation o Unit III unctions axima a Unit IV ouble inte Area as o Unit V gen Valu rthogona EFEREN	ation of a function-Limit of a function - Continu- na of one variable ORDINARY DIFFERENTIAL EQUATIONS Terential equations of second and higher or of higher order with variable coefficients: C f parameters for second order differential equa MULTIVARIABLE CALCULUS of Two Variables - Total Differential - Derivativ nd minima. MULTIPLE INTEGRALS egration with constant and variable limits - Reg ouble integral in Cartesian coordinates. Triple EIGEN VALUES AND EIGEN VECTORS res and Eigen Vectors of a real matrix - Proper I matrix - Diagonalisation - Quadratic form: Rec CE(S):	ity - D der w Cauchy tions - e of in ion of integra ties of luction	eriva ith co y's lin Vibra nplici integ al in C Eige i of a	tives onstanear iting s t fund cartes en Va quad	- Differen ant coef differen string - E ctions n - Char sian coo lues - C dratic for	entiation r ficients. I tial equa Electrical c Jacobian's ge the ord rdinates. ayley - Ha m to a ca	ules - Maxim _inear differe tion - Methe ircuits s - constraine der of integra amilton Theor nonical form.	a 12 entia od c 12 ed 12 tion 12 rem
epresen nd Minin Unit II inear dif quations ariation o Unit III unctions axima a Unit IV ouble inte Area as c Unit V igen Valu rthogona EFEREN 1. Tho	ation of a function-Limit of a function - Continu- na of one variable ORDINARY DIFFERENTIAL EQUATIONS ferential equations of second and higher or of higher order with variable coefficients: C f parameters for second order differential equa MULTIVARIABLE CALCULUS of Two Variables - Total Differential - Derivativ nd minima. MULTIPLE INTEGRALS egration with constant and variable limits - Reg ouble integral in Cartesian coordinates. Triple EIGEN VALUES AND EIGEN VECTORS res and Eigen Vectors of a real matrix - Proper I matrix - Diagonalisation - Quadratic form: Rec CE(S): mas Calculus, 14th Edition by Pearson	ity - D der w Cauchy tions - e of in ion of integra ties of luction	eriva ith co /'s lin Vibra nplici integ al in ( Eige of a	tives onstanear iting s t fund t fund cartes en Va quad	- Differen ant coef differen string - E ctions n - Char sian coo lues - C dratic for	entiation r ficients. I tial equa Electrical o Jacobian's ge the oro rdinates. ayley - Ha m to a ca	ules - Maxim _inear differe tion – Methe ircuits s - constraine der of integra amilton Theo nonical form.	a 12 entia od c 12 ed 12 tion 12 rem
epresen nd Minin Unit II inear dif quations ariation o Unit III unctions axima a Unit IV ouble inte Area as c Unit V igen Valu rthogona EFEREN 1. Tho 2. Erw Delf	<ul> <li>ation of a function-Limit of a function - Continuna of one variable</li> <li>ORDINARY DIFFERENTIAL EQUATIONS</li> <li>Ferential equations of second and higher or of higher order with variable coefficients: Of parameters for second order differential equa</li> <li>MULTIVARIABLE CALCULUS</li> <li>of Two Variables - Total Differential - Derivative nd minima.</li> <li>MULTIPLE INTEGRALS</li> <li>Egration with constant and variable limits - Regouble integral in Cartesian coordinates. Triple</li> <li>EIGEN VALUES AND EIGEN VECTORS</li> <li>es and Eigen Vectors of a real matrix - Proper I matrix - Diagonalisation - Quadratic form: Rec</li> <li>CE(S):</li> <li>mas Calculus, 14th Edition by Pearson</li> <li>n Kreyszig, Advanced Engineering Mathematic i 2015.</li> </ul>	ity - D der w cauchy tions - e of in ion of integra ties of luction	eriva ith cơ /'s lin Vibra nplici integ al in ( Eige of a	tives onstanear near ting s t fund cartes en Va quad	- Differen ant coef differen string - E ctions n - Char sian coo lues - C dratic for , Wiley I	entiation r ficients. I tial equa Electrical o Jacobian's ge the oro rdinates. ayley - Ha m to a ca ndia Priva	ules - Maxim _inear differe- tion - Metho ircuits s - constraine der of integra amilton Theor nonical form.	a 12 ential od c 12 ed 12 ed 12 rem
epresen nd Minin Unit II inear dif quations ariation o Unit III unctions axima a Unit IV ouble inte Area as c Unit V igen Valu rthogona EFEREN 1. Tho 2. Erw Dell 3. Pete	ation of a function-Limit of a function - Continu- na of one variable ORDINARY DIFFERENTIAL EQUATIONS Ferential equations of second and higher or of higher order with variable coefficients: Of parameters for second order differential equa MULTIVARIABLE CALCULUS of Two Variables - Total Differential - Derivativ nd minima. MULTIPLE INTEGRALS egration with constant and variable limits - Reg ouble integral in Cartesian coordinates. Triple EIGEN VALUES AND EIGEN VECTORS res and Eigen Vectors of a real matrix - Proper I matrix - Diagonalisation - Quadratic form: Red CE(S): mas Calculus, 14th Edition by Pearson n Kreyszig, Advanced Engineering Mathematic i 2015. or V. O Neil , Advanced Engineering Mathematic ted, 2018	ity - D der w Cauchy tions - e of in e of in ion of integra ties of luction s, Ter cs, Eig	eriva ith co y's lin Vibra nplici integ al in C Eige of a nth Eo nth Eo	tives onstanear iting s t fund ration Cartes quad dition	- Differen ant coef differen string - E ctions n - Char sian coo lues - C dratic for , Wiley I , Cenga	entiation r ficients. I tial equa Electrical o Jacobian's ge the oro rdinates. ayley - Ha m to a ca ndia Priva	ules - Maxim _inear differe- tion - Methe- ircuits s - constraine der of integra amilton Theor nonical form. ate Limited, N ing India Priv	a 12 entia od c 12 ed 12 ed 12 tion 12 rem
epresen nd Minin Unit II inear dif quations ariation o Unit III unctions axima a Unit IV ouble inte Area as c Unit V igen Valu rthogona EFEREN 1. Tho 2. Erw Dell 3. Pete Limi 4. C. F Hill I	ation of a function-Limit of a function - Continu- na of one variable ORDINARY DIFFERENTIAL EQUATIONS Ferential equations of second and higher or of higher order with variable coefficients: C f parameters for second order differential equa MULTIVARIABLE CALCULUS of Two Variables - Total Differential - Derivative nd minima. MULTIPLE INTEGRALS egration with constant and variable limits - Reg ouble integral in Cartesian coordinates. Triple EIGEN VALUES AND EIGEN VECTORS es and Eigen Vectors of a real matrix - Proper I matrix - Diagonalisation - Quadratic form: Rec CE(S): mas Calculus, 14th Edition by Pearson n Kreyszig, Advanced Engineering Mathematic i 2015. er V. O Neil , Advanced Engineering Mathematic ed, 2018 ay Wylie and C Louis Barrett Advanced Engine Publishing Company Ltd, 2003.	ity - D der w Cauchy tions - e of in ion of integra ties of luction cs, Ter cs, Eig	eriva ith co /'s lin Vibra nplici integ al in ( Eige of a nth Eo nth Eo Math	tives onstanear iting s t fund tration Cartes en Va quad dition dition	- Differen ant coef differen string - E ctions n - Char sian coo lues - C dratic for , Wiley I , Cenga ics, Sixt	entiation r ficients. I tial equa Electrical o Jacobian's ge the oro rdinates. ayley - Ha m to a ca ndia Priva age Learn h Edition,	ules - Maxim _inear differe tion - Methe ircuits s - constraine der of integra amilton Theor nonical form. ate Limited, N ing India Priv Tata McGrav	a 12 entia od c 12 ed 12 ed 12 rem lew ate

Chairman - BoS Dept.of BME - ESEC

Norom

Chairman - BoS Dept. of Maths - \_\_\_\_3

1

Department	BIOWEDICAL ENGIN	EERING				R 2019	Semester	B
Course		Hou	rs / V	Veek	Credit	Total	Maxim	num
Code	Course Name	L	Т	Р	С	Hours	Marl	ks
19BS102	ENGINEERING PHYSICS	2	0	2	3	60	· 100	)
Course Objecti	ve(s): The purpose of learning this co	urse is to						
To enhance	ce the fundamental knowledge in Phys	sics and it	s app	olicatio	ons rele	vant to va	rious strea	msof
Engineerii	ng and Technology		*	_				
Course Outcon	nes: At the end of this course, learners	s will be a	ble to	<b>D</b> :				
Gain know	vledge on the basics of properties of m	natter and	its a	pplica	tions			
Acquire kr	nowledge on the concepts of Ultrasoni	c's and the	neira	pplica	tions	ations		
Get knowl	edge on advanced Physics concepts of In	of quantu	er an		n application	nlications	s in tunneliu	na
microscop	edge on advanced i nysics concepts o	orquantu	in the	ory a	ιά πο αμ	plication	5 m turnen	ing
<ul> <li>understan</li> </ul>	d knowledge on the concepts of therm	nal proper	ties d	of mate	erials ai	nd their a	pplications	in
expansion	of joints and heat exchangers	2 × 4						
Unit I PROF	PERTIES OF MATTER	- 4						
Elasticity - Stres	s-strain diagram and its uses - torsion	nal stress	and	defor	mations	- twisting	g couple - t	orsio
pendulum: theor	y and experiment - bending of beams	- bending	mor	nent -	cantile	er: theor	y and expe	rimei
	ASONICS	nenii - 1-5	lape	u yiru	615.			
ntroduction-Clas	sification of Sound- Ultrasonic's Prod	uction - M	lagne	otostri	ction ac	nerator -	Piezo elect	tric
ntroduction-Clas	sification of Sound- Ultrasonic's Prod	uction - M tive Testi	lagne na- P	etostri ulse e	ction ge	nerator -	Piezo elect	tric issioi
Introduction-Clas generator-cavitat and reflection mo	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruc odes- A, B and C - scan displays- Eng	uction - M tive Testi ineering	lagne ng- P Applie	etostri ulse e cation	ction ge cho sys s-Cuttin	nerator - stem throu g, weldin	Piezo elect ugh transmi g and drillir	tric issioi ng.
Introduction-Clas generator-cavitat and reflection mo Unit III LASE	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruc odes- A, B and C - scan displays- Eng	uction - M tive Testin ineering /	lagne ng- P Applie	etostri ulse e cation	ction ge echo sys s-Cuttin	nerator - stem throu g, weldin	Piezo elect ugh transmi g and drillin	tric issioi ng.
Introduction-Clas generator-cavitat and reflection mo Unit III LASE Lasers: populati	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruc odes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ar	uction - M tive Testin ineering / nd B coef	lagne ng- P Applie	etostri ulse e cation nts de	ction ge echo sys s-Cuttin erivatior	nerator - stem throu g, weldin n – Semio	Piezo elect ugh transmi g and drillin conductor I	tric ission ng.
Introduction-Clas generator-cavitat and reflection mo Unit III LASE Lasers: populati nomojunction an	ssification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruc odes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ar d heterojunction - Industrial application	uction - M tive Testin ineering / nd B coef	lagne ng- P Applie fficier er. Fi	etostri ulse e cation nts de	ction ge echo sys s-Cuttin erivatior otics: pr	nerator - stem throu g, weldin n – Semio inciple, n	Piezo elect ugh transmi g and drillin conductor I umerical ap	tric ission ng. laser pertu
Introduction-Clas generator-cavitat and reflection mo Unit III LASE Lasers: populati nomojunction an and acceptance	ssification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruc odes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ton of energy levels, Einstein's A ar d heterojunction - Industrial application angle - types of optical fibres (mater	uction - M tive Testin ineering / nd B coet ons of las	lagne ng- P Applie fficier er. Fi ctive	etostri ulse e cation nts de iber op index,	ction ge cho sys s-Cuttin erivation otics: pr mode)	nerator - stem throu g, weldin n – Semic inciple, n - fibre op	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors:	tric ission ng. laser pertu
Introduction-Clas generator-cavitat and reflection mo Unit III LASE Lasers: populati nomojunction an and acceptance pressure and dis	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruc odes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ar d heterojunction - Industrial applicatio angle - types of optical fibres (mater splacement.	uction - M tive Testin ineering / nd B coef ons of las- ial, refrac	lagne ng- P Applie fficier er. Fi ctive	etostrie ulse e cation nts de iber op index,	ction ge echo sys s-Cuttin erivatior ptics: pr mode)	nerator - stem throu g, weldin n – Semic inciple, n - fibre op	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors:	tric ission ng. laser pertu
Introduction-Clas generator-cavital and reflection mo Unit III LASE Lasers: populati nomojunction an and acceptance pressure and dis Unit IV QUAN	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruc odes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ar d heterojunction - Industrial application angle - types of optical fibres (mater splacement. NTUM PHYSICS	uction - M tive Testin ineering / nd B coet ons of las- rial, refrac	lagne ng- P Applie fficier er. Fi ctive	etostri ulse e cation nts de iber op index,	ction ge echo sys s-Cuttin erivatior otics: pr mode)	nerator - stem throu g, weldin n – Semic inciple, n - fibre op	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors:	tric ission ng. laser pertu
Introduction-Class generator-cavitat and reflection mo Unit III LASE Lasers: populati nomojunction an and acceptance oressure and dis Unit IV QUAN Black body radia	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruc odes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ar d heterojunction - Industrial applicatio angle - types of optical fibres (mater splacement. <b>NTUM PHYSICS</b> ation - Planck's theory (derivation) - C uality - electron diffraction - conce	uction - M tive Testin ineering / nd B coef ons of las ial, refrac	lagne ng- P Applie er. Fi ctive effective	etostri ulse e cation nts de iber op index,	ction ge echo sys s-Cuttin ptics: pr mode) ory and	nerator - stem throu g, weldin n - Semic inciple, n - fibre op experime	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors: ental verific cal signific	tric ission ng. laser bertu catio
Introduction-Class generator-cavitat and reflection mo Unit III LASE Lasers: populati homojunction an and acceptance pressure and dis Unit IV QUAN Black body radia wave particle d Schrödinger's w	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruc odes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ar d heterojunction - Industrial application angle - types of optical fibres (mater splacement. <b>NTUM PHYSICS</b> ation - Planck's theory (derivation) - C uality - electron diffraction - conce yave equation - time independent a	uction - M tive Testin ineering / nd B coer ons of las ial, refrac Compton ept of wa and time	lagne ng- P Applie er. Fi ctive effec ve fu dep	etostri ulse e cation nts de iber op index, ct: theo unctio ender	ction ge echo sys s-Cuttin erivatior otics: pr mode) ory and n and i nt equa	nerator - stem throu g, weldin n – Semid inciple, n - fibre op experime ts physio tions - p	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors: ental verific cal signific article in a	tric ission ng. laser pertu catio catio
Introduction-Class generator-cavitat and reflection mo <b>Unit III LASE</b> Lasers: populati nomojunction an and acceptance oressure and dis <b>Unit IV QUAN</b> Black body radia wave particle d Schrödinger's w dimensional rigid	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruc odes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ar d heterojunction - Industrial application angle - types of optical fibres (mater splacement. <b>NTUM PHYSICS</b> ation - Planck's theory (derivation) - C uality - electron diffraction - conce vave equation - time independent a box.	uction - M tive Testin ineering / nd B coef ons of las- tial, refrace Compton ept of wa and time	lagne ng- P Applie er. Fi ctive effect ve fu dep	etostrie vulse e cation nts de iber op index, ct: theo unctio ender	ction ge echo sys s-Cuttin privatior otics: pr mode) ory and n and i nt equa	nerator - stem throu g, weldin n – Semid inciple, n - fibre op fibre op experime ts physic tions – p	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors: ental verific cal signific article in a	tric ission ng. laser bertu catio catio catio
Introduction-Class generator-cavitat and reflection mo Unit III LASE Lasers: populati homojunction an and acceptance pressure and dis Unit IV QUAN Black body radia wave particle d Schrödinger's w timensional rigid Unit V THEI	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruc odes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ard d heterojunction - Industrial application angle - types of optical fibres (mater splacement. <b>NTUM PHYSICS</b> ation - Planck's theory (derivation) - C uality - electron diffraction - conce vave equation - time independent a box. <b>RMAL PHYSICS</b>	uction - M tive Testin ineering / nd B coer ons of las rial, refrace Compton ept of wa and time	lagne ng- P Applie er. Fi ctive effect ve fu dep	etostrie cation nts de iber op index, ct: thee unctio ender	ction ge echo sys s-Cuttin ptics: pr mode) ory and n and i nt equa	nerator - stem throu g, weldin n – Semic inciple, n - fibre op experime ts physic tions – p	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors: ental verific cal signific article in a	tric ission ng. laser pertu catio catio catio
Introduction-Class generator-cavitat and reflection mo Unit III LASE Lasers: populati homojunction an and acceptance pressure and dis Unit IV QUAN Black body radia wave particle d Schrödinger's w timensional rigid Unit V THEI Transfer of heat	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruc odes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ar d heterojunction - Industrial application angle - types of optical fibres (mater splacement. <b>NTUM PHYSICS</b> ation - Planck's theory (derivation) - C uality - electron diffraction - conce vave equation - time independent a box. <b>RMAL PHYSICS</b> : energy - thermal expansion of solic	uction - M tive Testin ineering / nd B coer ons of las ial, refrac Compton ept of wa and time	lagne ng- P Applie fficien er. Fi ctive effec ve fu dep	etostrie cation nts de iber op index, ct: theo unctio ender	ction ge echo sys s-Cuttin erivatior otics: pr mode) ory and n and i nt equa	nerator - stem throu g, weldin n – Semid inciple, no - fibre op fibre op experime ts physio tions - p	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors: ental verific cal signific article in a	tric ission g. laser pertu catio catio catio catio catio catio
Introduction-Class generator-cavitat and reflection mo Unit III LASE Lasers: populati homojunction an and acceptance pressure and dis Unit IV QUAN Black body radia wave particle d Schrödinger's w dimensional rigid Unit V THEI Fransfer of heat hermal conduction	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destructodes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ard d heterojunction - Industrial application angle - types of optical fibres (mater splacement. <b>NTUM PHYSICS</b> ation - Planck's theory (derivation) - C uality - electron diffraction - concer /ave equation - time independent a box. <b>RMAL PHYSICS</b> energy - thermal expansion of solition, convection and radiation - heat co	uction - M tive Testin ineering / nd B coef ons of las- rial, refrace Compton ept of wa and time ds and lie onduction	lagne ng- P Applie er. Fi ctive effect ve fu depe	etostrie vulse e cation nts de iber op index, index, ct: theo unctio ender	ction ge echo sys s-Cuttin erivatior otics: pr mode) ory and n and i n and i n equa	nerator - stem throu g, weldin n – Semid inciple, n - fibre op fibre op experime ts physic tions - p joints - I al conduc	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors: ental verific cal signific article in a bimetallic s ctivity - Lee	tric ission ng. laser pertu catio catio catio catio catio catio catio catio
Introduction-Class generator-cavitat and reflection mo Unit III LASE Lasers: populati homojunction an and acceptance pressure and dis Unit IV QUAN Black body radia wave particle d Schrödinger's w dimensional rigid Unit V THEI Transfer of heat hermal conduction method: theory a	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruc odes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ard d heterojunction - Industrial application angle - types of optical fibres (mater splacement. <b>NTUM PHYSICS</b> ation - Planck's theory (derivation) - C uality - electron diffraction - concer- vave equation - time independent a box. <b>RMAL PHYSICS</b> : energy - thermal expansion of solition, convection and radiation - heat con- nd experiment - conduction through con-	uction - M tive Testin ineering / nd B coer ons of las rial, refrace Compton ept of wa and time ds and line onduction	lagne ng- P Applie fficien er. Fi ctive effect ve fu dep quids s in s med	etostrie cation nts de iber op index, ct: thee unctio ender solids ia (se	ction ge echo sys s-Cuttin privatior ptics: pr mode) ory and n and i n and i n and i n equa	nerator - stem throu g, weldin n – Semid inciple, n - fibre op fibre op experime ts physic tions - p joints - l al conduc	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors: ental verific cal signific article in a bimetallic s ctivity - Lee - applicatio	tric ission ng. laser pertu catio catio catio catio catio catio catio catio catio
Introduction-Class generator-cavital and reflection mo Unit III LASE Lasers: populati homojunction an and acceptance pressure and dis Unit IV QUAN Black body radia wave particle d Schrödinger's w dimensional rigid Unit V THEI Transfer of heat hermal conduction method: theory a heat exchangers	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruct odes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ard d heterojunction - Industrial application angle - types of optical fibres (mater splacement. <b>NTUM PHYSICS</b> ation - Planck's theory (derivation) - C uality - electron diffraction - concer vave equation - time independent a box. <b>RMAL PHYSICS</b> : energy - thermal expansion of solition, convection and radiation - heat cond nd experiment - conduction through c s, ovens and solar water heaters.	uction - M tive Testin ineering / nd B coer ons of las- rial, refrace Compton ept of wa and time ds and like onduction	lagne ng- P Applie fficier er. Fi ctive effec ve fu dep quids s in s med	etostrie cation nts de iber op index, ct: theo unctio ender solids lia (se	ction ge echo sys s-Cuttin ptics: pr mode) ory and n and i nt equa	nerator - stem throu g, weldin n – Semid inciple, no - fibre op fibre op experime ts physio tions - p joints - I al conduc I parallel)	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors: ental verific cal signific article in a bimetallic s ctivity - Lee - applicatic	tric ission g. laser pertu catio catio catio catio catio catio catio catio catio catio catio catio
Introduction-Class generator-cavitat and reflection mo Unit III LASE Lasers: populati homojunction an and acceptance pressure and dis Unit IV QUAN Black body radia wave particle d Schrödinger's w dimensional rigid Unit V THEI Transfer of heat hermal conduction method: theory a neat exchangers TEXT BOOK(S):	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destructodes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ard d heterojunction - Industrial application angle - types of optical fibres (mater splacement. <b>NTUM PHYSICS</b> ation - Planck's theory (derivation) - C uality - electron diffraction - concer /ave equation - time independent a box. <b>RMAL PHYSICS</b> : energy - thermal expansion of solition, convection and radiation - heat co nd experiment - conduction through c s, ovens and solar water heaters.	uction - M tive Testin ineering / nd B coef ons of las- tial, refrace Compton ept of wa and time ds and life onduction compound	lagne ng- P Applie er. Fi ctive effect ve fu depe quids s in s med	etostrie vulse e cation ints de iber op index, index, ct: theo unctio ender solids ia (se	ction ge echo sys s-Cuttin erivatior otics: pr mode) ory and n and i n and i nt equa	nerator - stem throu g, weldin n – Semid inciple, n - fibre op fibre op experime ts physic tions - p joints - I al conduc l parallel)	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors: ental verific cal signific article in a bimetallic s ctivity - Lee - applicatio	tric ission ng. laser pertu catio catio catio catio catio catio strips 's dis ons:
Introduction-Class generator-cavitat and reflection mo Unit III LASE Lasers: populati nomojunction an and acceptance oressure and dis Unit IV QUAN Black body radia wave particle d Schrödinger's w dimensional rigid Unit V THEI Transfer of heat hermal conduction method: theory a neat exchangers <b>TEXT BOOK(S):</b> 1. Bhattachary	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destructodes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ard d heterojunction - Industrial application angle - types of optical fibres (mater splacement. <b>NTUM PHYSICS</b> ation - Planck's theory (derivation) - C uality - electron diffraction - concer- vave equation - time independent a box. <b>RMAL PHYSICS</b> c energy - thermal expansion of solition, convection and radiation - heat co nd experiment - conduction through c s, ovens and solar water heaters.	uction - M tive Testin ineering / nd B coer ons of las ial, refrac Compton ept of wa and time ds and like onduction compound	lagne ng- P Applie fficien er. Fi ctive effect ve fu dep quids s in s med	etostrie vulse e cation nts de iber op index, index, ct: thee unctio ender solids lia (se d Univ	ction ge echo sys s-Cuttin privatior ptics: pr mode) ory and n and i n and i n and i n and i n equa	nerator - stem throu g, weldin n – Semic inciple, n - fibre op fibre op experime ts physic tions - p joints - I al conduc l parallel)	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors: ental verific cal signific article in a bimetallic s ctivity - Lee - applicatio	tric ission ng. laser bertu catio catio catio catio catio catio catio catio catio catio catio
Introduction-Class generator-cavitat and reflection mo Unit III LASE asers: populati nomojunction an and acceptance pressure and dis Unit IV QUAN Black body radia wave particle d Schrödinger's w limensional rigid Unit V THEI Fransfer of heat hermal conduction nethod: theory a neat exchangers EXT BOOK(S): 1. Bhattachary 2. Gaur, R.K. & 3 Pandey B K	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruct odes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ard d heterojunction - Industrial application angle - types of optical fibres (mater splacement. <b>NTUM PHYSICS</b> ation - Planck's theory (derivation) - C uality - electron diffraction - concer- vave equation - time independent a box. <b>RMAL PHYSICS</b> : energy - thermal expansion of solition, convection and radiation - heat con- nd experiment - conduction through con- s, ovens and solar water heaters.	uction - M tive Testin ineering / nd B coef ons of las- ial, refrace Compton ept of wa and time ds and like onduction compound hysics  . Con	lagne ng- P Applie fficier er. Fi ctive effec ve fu dep quids s in s med	etostrie cation nts de iber op index, ct: theo unctio ender solids lia (se	ction ge echo sys s-Cuttin ptics: pr mode) ory and n and in n and in t equa pansion - therm ries and rersity F ners, 20	nerator - stem throu g, weldin n – Semid inciple, n - fibre op fibre op experime ts physid tions - p joints - I al conduc I parallel) Press, 201 12 ia 2012	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors: ental verific cal signific article in a bimetallic s ctivity - Lee - applicatio	tric ission ng. laser pertu catio catio catio catio catio catio cance a one strips 's dis ons:
Introduction-Class generator-cavitat and reflection mo Unit III LASE Lasers: populati homojunction an and acceptance pressure and dis Unit IV QUAN Black body radia wave particle d Schrödinger's w dimensional rigid Unit V THEI Transfer of heat hermal conduction method: theory a neat exchangers <b>FEXT BOOK(S):</b> 1. Bhattachary 2. Gaur, R.K. & 3. Pandey, B.K.	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruc- odes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ard d heterojunction - Industrial application angle - types of optical fibres (mater splacement. <b>NTUM PHYSICS</b> ation - Planck's theory (derivation) - C uality - electron diffraction - concer- vave equation - time independent a box. <b>RMAL PHYSICS</b> : energy - thermal expansion of solid on, convection and radiation - heat co nd experiment - conduction through c s, ovens and solar water heaters. a, D.K. &Poonam, T. Engineering P & Gupta, S.L. Engineering Physics  . K. &Chaturvedi, S. Engineering Physics  .	uction - M tive Testin ineering / nd B coef ons of las- rial, refrace Compton ept of wa and time ds and life onduction compound hysics  . Cen	lagne ng- P Applie er. Fi ctive effect ve fu depe quids s in s med Dxfore Rai P gage	etostrie vulse e cation ints de iber op index, index, ct: theo unctio ender solids ia (se d Univ Publish Learr	ction ge echo sys s-Cuttin erivatior otics: pr mode) ory and n and i n and i n and i n equa pansion - therm ries and versity P eers, 20 hing Ind	nerator - stem throu g, weldin n – Semid inciple, n - fibre op experime ts physic tions - p joints - I al conduc parallel) Press, 201 12 ia, 2012	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors: ental verific cal signific article in a bimetallic s ctivity - Lee - applicatio	tric ission ng. laser pertu catio catio catio catio catio catio catio catio catio catio catio catio
Introduction-Class generator-cavitat and reflection mo Unit III LASE Lasers: populati homojunction an and acceptance pressure and dis Unit IV QUAN Black body radia wave particle d Schrödinger's w dimensional rigid Unit V THEI Transfer of heat hermal conduction method: theory a neat exchangers <b>TEXT BOOK(S):</b> 1. Bhattachary 2. Gaur, R.K. & 3. Pandey, B.K <b>REFERENCE(S)</b>	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruc- odes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ard d heterojunction - Industrial application angle - types of optical fibres (mater splacement. <b>NTUM PHYSICS</b> ation - Planck's theory (derivation) - C uality - electron diffraction - concer- vave equation - time independent a box. <b>RMAL PHYSICS</b> : energy - thermal expansion of solid on, convection and radiation - heat co nd experiment - conduction through c s, ovens and solar water heaters. a, D.K. &Poonam, T. Engineering P & Gupta, S.L. Engineering Physics  . K. &Chaturvedi, S. Engineering Physics	uction - M tive Testin ineering / nd B coer ons of las ial, refrace Compton ept of wa and time ds and like onduction compound hysics  . C Dhanpatl sics  . Cen	lagne ng- P Applie fficien er. Fi ctive effect ve fu dep quids s in s med	etostrie vulse e cation ints de iber op index, index, ct: thee unctio ender solids lia (se d Univ Publish	ction ge echo sys s-Cuttin privatior ptics: pr mode) ory and n and i n and i n and i n and i n and i n equa	nerator - stem throu g, weldin n – Semid inciple, ni - fibre op fibre op experime ts physic tions - p joints - h al conduc l parallel) Press, 201 12 ia, 2012	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors: ental verific cal signific article in a bimetallic s ctivity - Lee - applicatio	tric ission ng. laser bertu catio catio catio catio catio strips 's dis ons:
Introduction-Class generator-cavital and reflection mo Unit III LASE Lasers: populati homojunction an and acceptance pressure and dis Unit IV QUAN Black body radia wave particle d Schrödinger's w dimensional rigid Unit V THEI Transfer of heat hermal conduction method: theory a heat exchangers <b>FEXT BOOK(S):</b> 1. Bhattachary 2. Gaur, R.K. & 3. Pandey, B.K. <b>REFERENCE(S)</b> 1. Halliday, D., 2. Senway B.A.	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruc- odes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> fon of energy levels, Einstein's A ard d heterojunction - Industrial application angle - types of optical fibres (mater splacement. <b>NTUM PHYSICS</b> ation - Planck's theory (derivation) - C uality - electron diffraction - concer- vave equation - time independent a box. <b>RMAL PHYSICS</b> tenergy - thermal expansion of solition, convection and radiation - heat co nd experiment - conduction through c s, ovens and solar water heaters. a, D.K. &Poonam, T. Engineering P & Gupta, S.L. Engineering Physics  . K. &Chaturvedi, S. Engineering Physics  . K. &Chaturvedi, S. Engineering Physics  .	uction - M tive Testin ineering / and B coef ons of las ial, refrace Compton ept of wa and time ds and line onduction compound hysics  . Cen sics  . Cen	lagne ng- P Applie fficier er. Fi ctive effec ve fu dep quids s in s med Dxforc Rai P gage	etostrie vulse e cation ints de iber op index, ct: theo unctio ender solids lia (se d Univ vublish Learr	ction ge echo sys s-Cuttin privatior ptics: pr mode) ory and n and i n and i n and i n and i n equa pansion - therm ries and versity F ners, 20 ning Ind 2015	nerator - stem throu g, weldin n – Semid inciple, n - fibre op experime ts physic tions - p joints - I al conduc I parallel) Press, 201 12 ia, 2012	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors: ental verific cal signific article in a bimetallic s ctivity - Lee - applicatio	tric ission ng. laser pertu catio catio catio catio strips 's dis ons:
Introduction-Class generator-cavitat and reflection mo Unit III LASE Lasers: populati homojunction an and acceptance pressure and dis Unit IV QUAN Black body radia wave particle d Schrödinger's w dimensional rigid Unit V THEI Transfer of heat hermal conduction method: theory a neat exchangers <b>FEXT BOOK(S):</b> 1. Bhattachary 2. Gaur, R.K. & 3. Pandey, B.K. <b>REFERENCE(S)</b> 1. Halliday, D., 2. Serway, R.A 3. Tipler P A	sification of Sound- Ultrasonic's Prod tions-ultrasonic cleaning-Non Destruc- odes- A, B and C - scan displays- Eng <b>R AND FIBRE OPTICS</b> ion of energy levels, Einstein's A ar d heterojunction - Industrial application angle - types of optical fibres (mater splacement. <b>NTUM PHYSICS</b> ation - Planck's theory (derivation) - C uality - electron diffraction - concer- vave equation - time independent a box. <b>RMAL PHYSICS</b> : energy - thermal expansion of solition, convection and radiation - heat co nd experiment - conduction through c s, ovens and solar water heaters. a, D.K. &Poonam, T. Engineering P & Gupta, S.L. Engineering Physics  . K. &Chaturvedi, S. Engineering Physics : Resnick, R. & Walker, J. Principles A. & Jewett, J.W. Physics for Scientists ar	uction - M tive Testin ineering / nd B coef ons of las- rial, refrace Compton ept of wa and time ds and life onduction compound hysics  . Cen sics  . Cen	Applia fficien er. Fi ctive effect ve fu depe quids s in s med Dxford Rai P gage cs  . V	etostrie vulse e cation ints de iber op index, index, ct: theo unctio ender solids lia (se d Univ Publish Learr Viley, 2 eers  . 0	ction ge echo sys s-Cuttin erivatior bics: pr mode) ory and n and i n and i n and i n and i n equa bansion - therm ries and versity F eers, 20 hing Ind 2015 Cengag	nerator - stem throu g, weldin n – Semid inciple, n - fibre op experime ts physic tions - p joints - I al conduc parallel) Press, 201 12 ia, 2012 e Learnir	Piezo elect ugh transmi g and drillin conductor I umerical ap tic sensors: ental verific cal signific article in a bimetallic s ctivity - Lee - applicatio 5	tric ission ng. laser pertu catio catio catio catio catio catio catio catio catio catio catio catio

Chairman - BoS Dept. of Physics - ESEC

#### List of Experiments PHYSICS (ANY FIVE) - 30 Hours

- 1. Determination of rigidity modulus Torsion pendulum
- 2. Determination of Young's modulus by non-uniform bending method
- 3. Determination of Young's modulus by uniform bending method
- 4. Determination of wavelength and particle size using Laser
- 5. Determination of acceptance angle and numerical aperture in an optical fiber
- 6. Determination of thermal conductivity of a bad conductor Lee's Disc method
- 7. Determination of velocity of sound and compressibility of liquid Ultrasonic interferometer
- 8. Determination of wavelength of mercury spectrum spectrometer grating
- 9. Determination of band gap of a semiconductor
- 10. Determination of thickness of a thin wire Air wedge method

BoS Dept.of BME - ESEC

Department	BIOMEDICAL ENGINE	ERING	1		2,273	R 2019	Semester I	BS
Course		Hou	rs / W	eek	Credit	Total	Maximu	ım
Code	Course Name	L	T	Р	С	Hours	Marks	3
19BS103	ENGINEERING CHEMISTRY	3	0	0	3	45	100	
Course Object	tive(s):The purpose of learning this course	e is to	2.2	-	1.1.1	· * -	1	5
Underst	and the basic concepts of water characteri	ization	and t	reatn	nent me	thods,		
<ul> <li>Know th</li> </ul>	e fundamental concepts of electrochemistr	ry and	corro	sion,				
<ul> <li>Underst</li> </ul>	and the principles and generation of energ	ly in ba	atterie	s and	d nuclea	r reactors	•	
<ul> <li>Gain kn</li> </ul>	owledge on polymers,							
<ul> <li>Know th</li> </ul>	e types of fuels and the manufacture of so	olid, liqu	uid ar	id ga	seous fu	iels.		
Course Outco	omes: At the end of this course, learners w	vill be a	able to	<b>D</b> :				
<ul> <li>Make th</li> </ul>	e students conversant with water treatmen	nt tech	nique	s, ·	1.22		Lus Barriell	1.1.1.1
<ul> <li>Know th</li> </ul>	e reaction involved in corrosion and corros	sion pr	otecti	on m	ethods,			
<ul> <li>Impart</li> </ul>	knowledge on renewable energy source	s like	nucle	ear a	and to i	mpart kn	owledge on	
energys	torage devices,							
<ul> <li>Aware t</li> </ul>	ne synthesis & industrial application of poly	ymers,						
<ul> <li>Impart k</li> </ul>	nowledge on different types of fuels (solid	liquid	, gas,	prim	ary, sec	condary a	nd synthetic)	) and
combus	tion process.	_		20	0 - 2	Same	1.1.2	
Unit I W	ATER CHEMISTRY			398	3	1 CONTROL		9
Hardness of v	water – types – Estimation of hardness	of wat	ter by	ED.	TA – pr	oblems -	<ul> <li>Domestic v</li> </ul>	vater
treatment-boile	er troubles (scales, sludge, Priming, Foam	ning, C	Causti	cemb	orittleme	mt) – Inte	ernal conditio	oning
(Carbonate, pl	nosphate, sodium aluminate and calgon c	onditic	oning)	. Ext	ernal tre	atment -	Demineraliz	ation
process – Des	alination – Reverse Osmosis.							
Unit II EL	ECTROCHEMISTRYAND CORROSION	فحياله حالي						9
Electrochemic	al cell – redox reaction, electrode poten	ntial –	Nern	st eq	uation (	derivation	n and proble	ems).
Standard hyc	rogen electrode – Calomel Electrode	- C	orros	ion	<ul> <li>facto</li> </ul>	rs – typ	bes – chen	nical,
electrochemic	al corrosion (galvanic, differential aeration)	) – fac	tors in	nflue	ncing co	prrosion –	corrosion co	ontrol
- sacrificial an	ode and impressed current cathodic metho	od.			. Kunst			-
Unit III EN	IERGYSOURCES							9
Introduction –	nuclear energy – nuclear fission – nucle	ear fu	sion -	- nuc	lear cha	ain reacti	ons – light v	vater
reactor – bree	der reactor – solar energy conversion –	solar o	cells -	- win	d energ	y. Batteri	es and fuel of	cells:
Types of batte	ries – alkaline battery – lead storage batte	ry – lit	nium	ion b	attery –	fuel cell h	12 - 02 fuel (	cell.
Unit IV PO	LYMER CHEMISTRY							9
Monomers -	polymers – polymerization – functionalit	ty – c	legree	e of	polyme	rization -	<ul> <li>classificatio</li> </ul>	on of
polymers bas	ed on source and applications. Types	s of p	olym	eriza	tion: ac	dition, c	ondensation	and
copolymerizati	on. Preparation, properties and applicatio	ons of t	therm	osett	ing (epo	oxy resin	and bakelite)	) and
thermoplastics	(poly vinyi chloride, poly tetrafiluoroetnyi	lene a	nd Pi	MIMA	). Rubb	er: SBR.	Compoundir	ng of
plastics (blow	moulding, injection, extrusion).							
Unit V  FUI	ELS AND COMBUSTION					<u>}</u>		9
Fuel: Introduct	ion – classification of fuels – solid fuels-co	pal – pr	oxima	ate a	nd ultim	ate analy	sis – manufa	cture
of metallurgica	al coke (Otto Hoffmann method) – Liquid fi	uels: p	petrole	eum -	<ul> <li>synthe</li> </ul>	etic petrol	Fischer – Tr	ophs
and Bergius p	rocesses – knocking – octane number – C	etane	numb	er –	Gaseou	s fuels: lie	quefied petro	leum
gases (LPG) -	- water gas – bio diesel. Combustion – flue	gas a	nalys	is (O	RSAT M	lethod).	1.5	
TEXT BOOK(	S):							- 2
1. Jain P.C. NewDelh	and Monica Jain, "Engineering Chemist i, 2019	try", D	hanpa	at Ra	ai Publis	shing Cor	mpany (P) Li	td.,
2. Ravikrish Chennai,	nan A., "Engineering Chemistry", Sri k 2019	Krishna	a Hi-t	ech	Publish	ing Com	pany Pvt. L	.td.
	^							1000



#### **REFERENCE(S):**

- 1. Dara S.S, Umare S.S, "Engineering Chemistry", S. Chand & Company Ltd., New Delhi 2016,
- 2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company, Ltd., New Delhi, 2017,
- 3. GowarikerV.R,Viswanatha.N.V,Jayadev Sreedhar-"Polymer Science",Publishing company New Age International Publishers,New Delhi,2015,
- 4. Ozin G. A. and Arsenault A. C., "Nanochemistry: A Chemical Approach to Nanomaterials", RSC Publishing, 2017,
- 5. AshimaSrivastava and Janhavi N N., "Concepts of Engineering Chemistry", ACME Learning Private Limited., New Delhi. 2015.

Chairman - BoS Dept.of BME - ESEC

「「「」」

い。

Chairman - BoS Dept. of Chemistry - ESEC

Chainman, ScS.
 David of Excellet, ESS 01

Chainennado Seal Statistics Statistics

	BIOMEDICAL ENG	GINEER	NG			R 2019	Semester I	HS
Course	Course Name	Hou	rs /W	eek	Credit	Total	Maximu	m
Code	Course Name	L	Т	Р	С	Hours	Marks	
19HS101	COMMUNICATIVE ENGLISH	3	0	0	3	45	100	
Course Objec • Acquire • Develop • Enhance • Improve • Develop	tive(s): The purpose of learning this cou Basic English grammar. listening skills to listen lectures and bas the reading skill to comprehend technic writing skills to express thoughts freely. speaking skills to speak fluently in real of	rse is to ic videos cal writin contexts	s. gs.			7		
Course Outco Improve Develop Acquire Enhance	mes: Upon completing this course stude language usage in LSRW skills. listening skills to comprehend general / the ability to understand different written the writing skills to express the ideas of picate fluently in real time context	ent will b technica texts. f the lear	e fam I talks ners.	iliar v 5.	vith knov	v:	A.	
	GUAGE FOCUS			-		1 - 75	P to hard	9
Parts of speec Tense forms - 3 Unit II LIS Listening for sp Telephone etic lyrics - Clear in	n - Word formation - Sentence types (de Subject - Verb agreement <b>TENING</b> Decific information: Short conversations in puette - Note-taking - Listening for gist dividual sounds - Word stress	/ monolo / intervi	, impe gues ews -	- Ga Liste	e, exclar p filling - ening to	Telephon songs and	e conversation d completing	- 9 ons - the
Unit III RE	ADING		-				1.1	9
Completing the Understanding	sentences - Prediction - Skimming for g text and sentence structure - Close read	gist - Sca ding	inning	for s	specific ir	nformation		0
	ITING					•		9
Unit IV WR		•		Contraction of the Contraction o		CONTRACTOR AND INCOME INCOME.	N D' I	
Unit IV WR Paragraph writi writing - E-mail	ng (descriptive, narrative, expository & - Instructions	persuasi	ve) - l	etter	(formal	and inform	nal) - Dialogu	e
Unit IV WR Paragraph writi writing - E-mail Unit V SPI Self-introductio experiences an disagreement -	ing (descriptive, narrative, expository & - Instructions EAKING n - Giving personal and factual inform d future plans - Mini-presentation - Exp Likes and dislikes	nation - ressing o	ve) - l Talk opinio	ing a	about pre	and inforn esent circ ing opinio	nal) - Dialogu umstances,   ns - Agreeme	9 9 9ast ent
Unit IV WR Paragraph writi writing - E-mail Unit V SPI Self-introductio experiences an disagreement - TEXT BOOK(S 1. Communit 2017.	ing (descriptive, narrative, expository & - Instructions EAKING n - Giving personal and factual inform d future plans - Mini-presentation - Exp Likes and dislikes :): cative English by KN Shoba, Lourdes Jo	mation - ressing o pavaniRa	ve) - l Talk opinio	Letter	about prend justify	and inform esent circo ing opinio mbridge L	nal) - Dialogu umstances, j ns - Agreemo Jniversity	9 9 9ast ent
Unit IV     WR       Paragraph writi     writing - E-mail       Unit V     SPI       Self-introductio     experiences and       disagreement -     TEXT BOOK(S)       1. Communia     2017.       REFERENCE(S)	ing (descriptive, narrative, expository & - Instructions <b>EAKING</b> n - Giving personal and factual inform of future plans - Mini-presentation - Exp Likes and dislikes (): cative English by KN Shoba, Lourdes Jo S):	mation - ressing o pavaniRa	ve) - l Talk opinio yenP	Letter	about prend justify	and inform esent circ ing opinio mbridge L	nal) - Dialogu umstances, j ns - Agreemo Jniversity	9 9 9 9 9 9 9
Unit IV     WR       Paragraph writi     writing - E-mail       Unit V     SPI       Self-introductio     experiences and isagreement -       TEXT BOOK(S     1. Communitized to the second	<ul> <li>ing (descriptive, narrative, expository &amp; j - Instructions</li> <li>EAKING</li> <li>n - Giving personal and factual informed future plans - Mini-presentation - Exp Likes and dislikes</li> <li>i):</li> <li>cative English by KN Shoba, Lourdes Joe</li> <li>S):</li> <li>Raymond. English Grammar in Use - A iate learners Of English .lved. United Kinghn. Oxford Guide to Effective Writing an y Press. 2005.</li> <li>a). Kenneth et al. Study Speaking: A Courtion</li> </ul>	persuasi mation - ressing o pavaniRa Self-Stur ngdom: ( d Speak rse in Sr	ve) - l Talk opinio yenP dy Re Camb ing. li	Letter ing a ns ar ublise ferer ridge ndian	ed by Ca nce and F Univers ed. New	and inform esent circ ing opinio mbridge L Practice Be ity Press. 2 v Delhi: Ox cademic P	nal) - Dialogu umstances, j ns - Agreemo Jniversity ook For 2012. ford Purposes.	9 9 9 9 9 1 9

Sa

Chairman - BoS Dept. of English - ESEC

Yet

	BIOMEDICAL ENGIN	NEER	ING		1	R 2019	Semester I E
Course	Course Name	Hou	rs /W	eek	Credit	Total	Maximum
Code	oourse Name	L	Т	Р	С	Hours	Marks
19BS104	FUNDAMENTALS OF BIOCHEMISTRY	3	0	0	3	45	100
<ul> <li>Extend</li> <li>Unders</li> <li>Know tl</li> <li>Know tl</li> </ul>	ctive(s): The purpose of learning this course their knowledge on biological processes tak tand the mechanism of metabolic pathway on the constitution, composition and analysis of the properties, synthesis and structure of Nuc- tand the concept of enzymes	is to king pl of carb oils a cleic a	ace ir ohyd nd fat icids a	n livin rates s. and p	g organi: roteins.	sms.	
Course Outco Unders Unders Know th Know th To impa	omes: Upon completing this course student and the role of biological process in living o and the biological reaction mechanisms of o he various pathways involved in lipid mechan is significance of synthesis of nucleic acid in art knowledge on catalytic activity of enzyme	will b rganis carbol nism. n hum es.	e fam sms. nydra an bo	iliar v tes. ody.	vith knov	2053- 0583-	(simindo Pall tourito Z
Introduction to Hasselbalch membrane- E Unit II C/	D Biochemistry, water as a biological solve equation, physiological buffers in living lectrolytes - Clinical application of Electrol RBOHYDRATES	nt, we syste ytes a	eak ao ems, nd ra	cid ar Enei diois	nd bases rgy in li otopes.	, pH, buffe ving orga	ers, Handerson nism. Biologic
and a second							
Classification properties of carbohydrates TCA cycle - B	of carbohydrates - mono, di, oligo and p carbohydrates- Isomerism- racemisation ar . Metabolic pathways - Glycolysis, glycoger iochemical aspect of Diabetes mellitus an	oolysa nd mu nesis, d Glyo	cchar tarota glyco coger	ides. Ition. geno n stor	Structur Digestic lysis and age Dise	re, physic on and abs l its hormo ease.	al and chemica sorption of nal regulation.
Classification properties of carbohydrates TCA cycle - B Unit III LIF Classification chemical prop normonal regu Metabolism.	of carbohydrates - mono, di, oligo and p carbohydrates- Isomerism- racemisation ar . Metabolic pathways - Glycolysis, glycoger iochemical aspect of Diabetes mellitus an <b>PIDS</b> of lipids- simple, compound and derived erties of fat. Metabolic pathways: synthes ilation of fatty acid metabolism, ketogenes	oolysa nd mu nesis, d Glyd lipid: sis an sis, Bi	cchar tarota glyco coger s. No d deg osynt	ides. Ition. geno n stor meno grada hesis	Structur Digestic lysis and age Dise clature of tion of f	re, physic on and abs l its hormo ease. of fatty ac fatty acid lesterol. D	al and chemica sorption of nal regulation. id, physical ar (beta oxidation isorders of lipi
Classification properties of carbohydrates TCA cycle - B Unit III LIF Classification chemical prop hormonal regu Metabolism. Unit IV NU Structure of p Watson and coroteins, struc- proteins, struc- protein, Inborn	of carbohydrates - mono, di, oligo and p carbohydrates- Isomerism- racemisation ar . Metabolic pathways - Glycolysis, glycoger iochemical aspect of Diabetes mellitus an <b>PIDS</b> of lipids- simple, compound and derived erties of fat. Metabolic pathways: synthes ilation of fatty acid metabolism, ketogenes <b>ICLEIC ACIDS &amp; PROTEINS</b> urines and pyrimidines, nucleoside, nucle rick model of DNA. Structure of RNA and tural organization of proteins, classification Metabolic error of amino acid metabolism	oolysa nd mu nesis, d Glyd lipid: sis an sis, Bi otide, its typ and p	cchar tarota glyco coger s. No d deg osynt DNA pe. Cl roper	ides. Ition. geno n stor meno grada hesis assif ties o	Structur Digestic lysis and age Dise clature of tion of f of Cho a genetic cation, s f amino a	re, physic on and abs l its hormo ease. of fatty acid lesterol. D c material structure a acids. Sep	al and chemica sorption of nal regulation. id, physical ar (beta oxidation isorders of lipi , chargoffs rule nd properties of aration of
Classification properties of carbohydrates TCA cycle - B Unit III LIF Classification chemical prop hormonal regu Metabolism. Unit IV NL Structure of p Watson and c proteins, struc proteins,	of carbohydrates - mono, di, oligo and p carbohydrates- Isomerism- racemisation ar . Metabolic pathways - Glycolysis, glycoger iochemical aspect of Diabetes mellitus an <b>PIDS</b> of lipids- simple, compound and derived erties of fat. Metabolic pathways: synthes ilation of fatty acid metabolism, ketogenes <b>CLEIC ACIDS &amp; PROTEINS</b> urines and pyrimidines, nucleoside, nucle rick model of DNA. Structure of RNA and tural organization of proteins, classification Metabolic error of amino acid metabolism <b>ZYME AND ITS CLINICAL APPLICATION</b> of enzymes, apoenzyme, coenzyme, ho entenequation. Factors affecting enzymatic oncentration. Inhibitors of enzyme action: Con- n, allosteric and covalent regulation. Clinic	oolysa nd mu nesis, d Glyd lipid: sis an sis, Bi otide, its typ and p oloenz activ Compe- cal en	cchar tarota glyco coger s. No d deg osynt DNA be. Cl roper cyme ity: te stitive zymo	ides. ation. geno n stor meno grada hesis assif ties o and mper non logy.	Structur Digestic lysis and age Dise clature of tion of f of Cho a genetic cation, s f amino a cofactor rature, p - compet	re, physic on and abs l its hormo ease. of fatty ac fatty acid lesterol. D c material structure a acids. Sep rs. Kinetic H, substra itive, irrev	al and chemica sorption of nal regulation. id, physical ar (beta oxidation isorders of lipi , chargoffs rule nd properties of aration of s of enzymes te concentratio ersible. Enzyme

Chairman - BoS Dept. of Chemistry - ESEC

#### **REFERENCE(S):**

- 1. Keith Wilson & John Walker, Practical Biochemistry Principles & Techniques, Oxford University Press, 2009.
- 2. Pamela.C.Champe&Richard.A.Harvey, Lippincott Biochemistry Lippincott's Illustrated Reviews , Raven publishers, 1994.
- 3. Victor Rodwell, David A, benderHarpers Illustrated Bio Chemistry, 31 Edition, 2018
- 4. Albert L. Lehninger, David L. Nelson, Michael M. Cox, Principles of Bio Chemistry, W.H. Freeman,2014.
- 5. Frederick A. Bettelheim (Author), William H. Brown (Author), Mary K. Campbell ,Introduction to general organic & Biochemistry, 11 thEdition, Brooks Cole, 2017.

Chairman - BoS Dept.of BME - ESEC

Chairman - BoS Dept. of Chemistry - ESEC

Department	BIOMEDICAL ENG	INEEF	RING	4	4.1	R 2019	Semester I	EEC
Course Code	Course Name	Ηοι	irs / \	Week	Credit	Total	Maximu	m
19TPS01	SOFT SKILLS - I	L	Т	P	С	nours	Marks	
10111001		1	0	1	1.5	30	100	
Course Objective Develop bas Enhance Sp Improve Ver Develop Co Develop Inte	e(s): The purpose of learning this cours sic grammar knowledge in English. beaking Skills in English. rbal and Non-verbal Communication Sl nfidence and Emotional Intelligence er Personal Skills.	se is to kills.	1 1 1 2 2 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2					
Course Outcome Have compe Speak fluen Have good I Handle any Work in a te Unit I EFFEC Basic rules of Gra	es: At the end of this course, learners we etent knowledge of grammar t English by enriching Vocabulary Know Presentation Skills through verbal and Situation with confidence by being emo am by having team coherence and dea TIVE ENGLISH – WRITTEN ENGLISH mmar - Parts of Speech – Tenses – Ve	vill be a wledge non ve otionall aling wi <b>1</b> rbs. Se	ible to rbal c y sta th pe	o: comm ble cople.	unication	n. Dialogu	ues and	6
Conversations - W	/riting. Exercises to practice and impr	rove th	ese s	skills.				
Unit II EFFEC	TIVE ENGLISH – SPOKEN ENGLISH	1			- 1 B			6
Vocabulary - Idiom	ns & Phrases - Synonyms - Antonyms	. Dialog	gues	and (	Conversa	itions -Wr	iting. Exercis	es
Unit III ART O	F COMMUNICATION & THE HIDDEN	DATA	INV		D			6
Verbal Communic Non Verbal Comm - Dealing with feeli	<b>cation</b> - Effective Communication - Ac nunication - Body Language of self ar ngs in communication.	tive list nd othe	ening rs. In	g -Par nporta	aphrasin nce of fe	g - Feedb eelings in	oack. communicati	on
Unit IV   WORL	D OF TEAMS – PART – 01							6
Self Enhancement	-Importance of developing assertive s	skills -	Deve	loping	self cor	fidence -	Developing	
Init V WORL	Ence		1	8-1-1-	5 1	f les fills		6
	muterk Team ve Croup Attributes	of a cu		oful to	am Par	rioro invo	hund	-
Working with Grou	in work - Team vs. Group - Attributes (	sision M	Aakir		ani - Dai	ners invo	iveu	_
PEEEPENCE(S)	ips - Dealing with reopie- croup Dec	1310111	VIARI	iy.		and the		
<ol> <li>All the bool</li> <li>All the bool</li> <li>Man's sear</li> <li>The greate</li> <li>Goal - Eliya</li> <li>Working with</li> <li>Excel in Ent</li> <li>Developing</li> <li>Essentials</li> <li>Effective Print</li> <li>Strategic in by Wiley Int</li> <li>Effective Communication</li> </ol>	ks in the "Chicken Soup for the Soul" se the for meaning - Viktor Frankl st miracle in the world - OgMandino ahuGoldratt. th Emotional Intelligence - David Goler oglish - Sundra Samuel, Samuel Public Communication Skills by Krishna Moh of Effective Communication, Ludlow ar resentation Skills (A Fifty-Minute Series terviewing" by Richaurd Camp, Mary E adia Pvt. Ltd.	man. cations nan and Pan s Book E. Vielh	I Mee thon; ) by S aber	eraBar Prent Steve	nerji; Ma ice Hall Mandel lack L. S	cMillan In of India imonetti -	dia Ltd., Delh Published	1
Brilhart.		by Gio	na J.	Gaid	ies, rali	lenne Au	anis, juiii K.	



Department		BIOMEDICAL ENGINEE	DMEDICAL ENGINEERING		R 2019	Semester I	BS		
Course		Course Name		Hour Wee	s/ ek	Credit	Total	Maximum	1
Code		Course Name	L	Т	P	С	Hours	Marks	
19BS105	BS105 CHEMISTRY LABORATORY rse Objective(s): The purpose of learning this cours Determination of total, temporary & permanent hard Determination of chloride content of water sample I Estimation of iron content of the given solution usin	0	0	4	2	60	100		
Course Obje	ctive(s)	): The purpose of learning this course	e is to						1
Determin	nation o	of total, temporary & permanent hard	Iness	of wa	ter by	y EDTA m	ethod.		
<ul> <li>Determine</li> </ul>	nation o	of chloride content of water sample b	y arge	enton	netric	method.			*
<ul> <li>Estimation</li> </ul>	on of ire	on content of the given solution using	g pote	ntion	neter.				
<ul> <li>Determi</li> </ul>	nation	of strength of given hydrochloric acid	lusing	рН і	meter	•			
<ul> <li>Conduct</li> </ul>	ometric	c titration of strong acid vs strong bas	se.						
Course Outc	omes:	At the end of this course, learners w	ill be a	able	to	1			2
Make the volume terms of the second sec	e stude	ent to acquire practical skills in the d	etermi	natio	on of v	water qua	lity param	eters through	
Acquire	the kn	owledge about chloride content in w	ater sa	ample	e.				
<ul> <li>Make th</li> </ul>	e stude	ent to acquire practical skills about st	trength	of ir	on us	sing poten	tiometric t	itrations.	
Underst	and the	e how to estimate hydrochloric acid i	n wate	er sar	nple	using pH i	meter.		
Gain the	e knowl	ledge about conductance of ions		141		20.00	1.18		
ist of Exper	iments								
1. Dete	rminati	on of Total. Temporary & Permanen	t hard	ness	of wa	ater by ED	TA metho	d.	
2. Dete	rminati	on of chloride content of water samp	le by /	Arger	ntome	etric metho	od,		
3. Dete	rminati	on of Dissolved oxygen content in w	ater sa	ample	e usir	ng Winkler	s Method	10/2 10-	
4. Dete	rminatio	on of Alkalinity in Water Sample,							
5. Dete	rminatio	on of strength of given hydrochioric a	f acids	sing p		eter, nductivity	meter		
7. Conc	luctome	etric titration of Weak acid vs Weak	base,	Jush	ig coi	lauctivity	motor,	λ.	
8. Estin	nation o	of iron content of the given solution u	sing p	oten	tiome	ter,			
9. Conc	luctom	etric titration of strong acid vs strong	base,		~ .				
10. Dete	rmination	on of Molecular weight of polyvinyl a	Icohol	using	g Ost	wald visco	ometer,		
12. Estin	nation c	of Copper in Brass.	sing s	Jecu	opno	iometer,			
IST OF EQU	IPMEN	π	24	1 Pl	2	1.66		1- 70.8	
	S.No	Description of Equipment	Q re	uant equir	ity ed	a	(uantity) vailable		
1	1	Potentiometer	1	0 No	s		10 Nos		

00/	
High a	
Chairman - BoS Dept.of BME - ESE	C

2.

3.

4.

5.

pH meter

Conductivity meter

Spectrophotometer

Oswald viscometer

M.Or Chairman - BoS Dept. of Chemistry - ESEC

10 Nos.

10 Nos.

2 Nos.

30 Nos.

10 Nos.

10 Nos.

2 Nos.

30 Nos.

	tment	BIOCHEMISTRY LA	BORA	TOR	Y		R 2019	Semester II	B
Cou	urse		Hou	rs / \	Neek	Credit	Total	Maximun	n
C	ode	Course Name	L	Т	Р	C	Hours	Marks	
19BS	106 B	IO CHEMISTRY LABORATORY	0	0	2	1	30	100	
• D( • D( • P( • E	etermination etermination reparation of stimation of	of strength of given solution using of absorption maxima (λmax) of a serum and plasma from blood. Haemoglobin. blood glucose.	pH met given s	, er. olutic	on.				
Course	Outcomes:	At the end of this course, learners	will be a	able t	o:			1-	-
• Mi • Ac • Ur • Gi	ake the stud cquire the kn nderstand ho ain the know	ent to acquire practical skills about owledge about preparation of seru ow to estimate the haemoglobin cor ledge about estimation of blood glu	the abs m and p ntent of ucose.	orptio blasm blood	on ma na. d sam	xima (λn ple.	nax) of a g	iven solution.	
IST OF	EXPERIMEN	ITS	. Is						
4. ( 5. F 6. E 7. E 8. E 9. E 10. E	General tests Preparation of Estimation of Estimation of Estimation of Estimation of	for carbohydrates, proteins and lip of serum and plasma from blood, Haemoglobin from blood, blood glucose from blood, urea from blood, creatinine from blood,	oids,						
	EQUIPIVIEN	cholesterol from blood.	ITS	•					
S.No		cholesterol from blood. IS FOR A BATCH OF 30 STUDEN NAME OF THE EQU	NTS IIPMEN	T				QUANTITY	
<b>S.No</b> 1.	Colorimete	cholesterol from blood. IS FOR A BATCH OF 30 STUDEN NAME OF THE EQU er	NTS IIPMEN	T				QUANTITY 02	
<b>S.No</b> 1. 2.	Colorimete	cholesterol from blood. TS FOR A BATCH OF 30 STUDEN NAME OF THE EQU er otometer	NTS VIPMEN	T				<b>QUANTITY</b> 02 01	
S.No 1. 2. 3.	Colorimete Spectroph pH meter	cholesterol from blood. IS FOR A BATCH OF 30 STUDEN NAME OF THE EQU er notometer	NTS IIPMEN	T				QUANTITY 02 01 01	1
S.No 1. 2. 3. 4.	Colorimete Spectroph pH meter Weighing	cholesterol from blood. TS FOR A BATCH OF 30 STUDEN NAME OF THE EQU er notometer balance	NTS IIPMEN	T				QUANTITY 02 01 01 01 01	
S.No 1. 2. 3. 4. 5.	Colorimete Spectroph pH meter Weighing Refrigerate	cholesterol from blood. TS FOR A BATCH OF 30 STUDEN NAME OF THE EQU er totometer balance or	NTS VIPMEN	T				QUANTITY 02 01 01 01 01 01	
S.No 1. 2. 3. 4. 5. 6.	Colorimete Spectroph pH meter Weighing Refrigerate SDS gel e	cholesterol from blood. <b>IS FOR A BATCH OF 30 STUDEN</b> <b>NAME OF THE EQU</b> er totometer balance or lectrophoresis	NTS VIPMEN	T				QUANTITY 02 01 01 01 01 01 01 01	
S.No 1. 2. 3. 4. 5. 6. 7.	Colorimete Spectroph pH meter Weighing Refrigerate SDS gel e TLC, read	cholesterol from blood. TS FOR A BATCH OF 30 STUDEN NAME OF THE EQU er totometer balance or lectrophoresis y TLC plates	NTS VIPMEN	T				QUANTITY 02 01 01 01 01 01 01 01 01	
S.No 1. 2. 3. 4. 5. 6. 7. 8.	Colorimete Spectroph pH meter Weighing Refrigerate SDS gel e TLC, read Wintrobe's	cholesterol from blood. <b>TS FOR A BATCH OF 30 STUDEN</b> <b>NAME OF THE EQU</b> er totometer balance or lectrophoresis y TLC plates s tube	NTS VIPMEN	T				QUANTITY 02 01 01 01 01 01 01 01 01 02	
S.No 1. 2. 3. 4. 5. 6. 7. 8. 9.	Colorimete Spectroph pH meter Weighing Refrigerate SDS gel e TLC, read Wintrobe's Centrifuge	cholesterol from blood. <b>IS FOR A BATCH OF 30 STUDEN</b> <b>NAME OF THE EQU</b> er totometer balance or lectrophoresis y TLC plates s tube Normal	NTS	T				QUANTITY 02 01 01 01 01 01 01 01 01 02 01	
S.No 1. 2. 3. 4. 5. 6. 7. 8. 9. 10.	Colorimete Spectroph pH meter Weighing Refrigerate SDS gel e TLC, read Wintrobe's Centrifuge Micro Slide	cholesterol from blood. <b>TS FOR A BATCH OF 30 STUDEN</b> <b>NAME OF THE EQU</b> er totometer balance or lectrophoresis y TLC plates s tube Normal es		T				QUANTITY 02 01 01 01 01 01 01 01 02 01 2 Packets	
S.No 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11.	Colorimete Spectroph pH meter Weighing Refrigerate SDS gel e TLC, read Wintrobe's Centrifuge Micro Slide Lancet	cholesterol from blood. <b>IS FOR A BATCH OF 30 STUDEN</b> <b>NAME OF THE EQU</b> er notometer balance or lectrophoresis y TLC plates is tube Normal es		T				QUANTITY 02 01 01 01 01 01 01 01 02 01 2 Packets 5 Boxes	
S.No 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.	Colorimete Spectroph pH meter Weighing Refrigerate SDS gel e TLC, read Wintrobe's Centrifuge Micro Slide Lancet Microscop	cholesterol from blood. <b>TS FOR A BATCH OF 30 STUDEN</b> <b>NAME OF THE EQU</b> er notometer balance or lectrophoresis y TLC plates s tube Normal es		T				QUANTITY 02 01 01 01 01 01 01 01 02 01 2 Packets 5 Boxes 01	
S.No 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13.	Colorimete Spectroph pH meter Weighing Refrigerate SDS gel e TLC, read Wintrobe's Centrifuge Micro Slide Lancet Microscop Neubaur's	cholesterol from blood. <b>TS FOR A BATCH OF 30 STUDEN</b> <b>NAME OF THE EQU</b> er notometer balance or lectrophoresis y TLC plates s tube Normal es e Chamber		T				QUANTITY 02 01 01 01 01 01 01 01 02 01 2 Packets 5 Boxes 01 02	
S.No 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14.	Colorimete Spectroph pH meter Weighing Refrigerate SDS gel e TLC, read Wintrobe's Centrifuge Micro Slide Lancet Microscop Neubaur's Heparinize	cholesterol from blood. <b>IS FOR A BATCH OF 30 STUDEN</b> <b>NAME OF THE EQU</b> er notometer balance or lectrophoresis y TLC plates s tube Normal es e Chamber ed Syringe		T				QUANTITY 02 01 01 01 01 01 01 01 02 01 2 Packets 5 Boxes 01 02 1 Box	
S.No 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15.	Colorimete Spectroph pH meter Weighing Refrigerate SDS gel e TLC, read Wintrobe's Centrifuge Micro Slide Lancet Microscop Neubaur's Heparinize Haemoglo	cholesterol from blood. <b>IS FOR A BATCH OF 30 STUDEN</b> <b>NAME OF THE EQU</b> er notometer balance or lectrophoresis y TLC plates is tube Normal es e Chamber ed Syringe binometer		T				QUANTITY 02 01 01 01 01 01 01 01 02 01 2 Packets 5 Boxes 01 02 1 Box 01	
S.No 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16.	Colorimete Spectroph pH meter Weighing Refrigerate SDS gel e TLC, read Wintrobe's Centrifuge Micro Slide Lancet Microscop Neubaur's Heparinize Haemoglo Elisa reade	cholesterol from blood. <b>TS FOR A BATCH OF 30 STUDEN</b> <b>NAME OF THE EQU</b> er totometer balance or lectrophoresis y TLC plates s tube Normal es e Chamber ed Syringe binometer er		T				QUANTITY 02 01 01 01 01 01 01 01 02 01 2 Packets 5 Boxes 01 02 1 Box 01 02 1 Box 01	

Chairman - BoS Dept.of BME - ESEC

M Chairman - BoS Dept. of Chemistry - ESEC

Department	BIOMEDICAL ENG	GINEE	RINC	3		R 2019	Semester I	E
Course Code	Course Name	Hour	rs / V	Veek	Credit	Total Hours	Maximu Marks	m
19ES106	ENGINEERING GRAPHICS	L	Т 0	P 4	C 2	60	100	-
Course Objective Learn conve Draw orthog Draw the pri Draw the se Draw the iso Course Outcome	<ul> <li>(s): The purpose of learning this contentions and use of drawing tools in matraphic projection of points and lines.</li> <li>bjection of planes and simple solids.</li> <li>ction of solids and obtain the developmetric projection of the given solids.</li> <li>s: At the end of this course, learners</li> </ul>	urse is aking e oment c will be	to engin of su able	rface	ng drawin s of give	igs. n solids.		
<ul> <li>Recognize t</li> <li>Draw the ori</li> <li>Draw the pro-</li> <li>Draw the se</li> <li>Draw the iso</li> </ul>	he conventions and apply dimension hographic projection of points and lin bjection of planes and simple solids. ction of solid drawings and developm metric projection of the given objects	ing con nes. nent of : 5.	surfa	s wh	ile draftin of given :	ig simple o solids.	bjects.	
CONCEPTS AND Importance of grap specifications - Si	CONVENTIONS (Not for Examination oblics in engineering applications – Us ze, layout and folding of drawing sho	<b>on)</b> se of dr eets - L	aftin _ette	g ins ring	truments and dime	s - BIS con ensioning.	ventions and	1
Unit I PLAN	IE CURVES			-				12
Unit II PRO. Orthographic proje straight lines (only lengths and true in	<b>JECTION OF POINTS AND LINES</b> ction- principles-Principal planes-Fir First angle projections) inclined to clinations by rotating line method.	st angl o both	e pro the	ojecti princ	on-proje cipal plar	ction of po nes - Dete	ints. Projection rmination of	11 on o true
Unit III PRO.	ECTION OF PLANES &SOLIDS			1		1.1.2.9		12
Projection of plane simple solids like p the principal plane	es (polygonal and circular surfaces) prisms, pyramids, cylinder, cone and s by rotating object method.	incline trunca	ed to ated	solid	h the pri s when t	ncipal plar he axis is	nes. Projectio	n o e o
Sectioning of abor principal planes ar surfaces of simple	ve solids in simple vertical position and perpendicular to the other – obta and sectioned solids – Prisms, pyra	when t ining tr amids o	the c rue s cylin	uttin shape ders	g plane e of sect and con	is inclined ion. Devel es.	to the one of opment of la	f the tera
Principles of isome	tric projection - isometric scale -lsom	netric n	roied	tions	of simn	le solids -	Prisms	12
pyramids, cylinders	s, cones- combination of two solid ob	jects in	sim	ple v	ertical po	ositions.		1
TEXT BOOK(S):	"A text book of Engineering Graphics	s", Dha	nala s". Ne	kshn ew A	ni Publish ge Intern	ners, Chen ational (P)	nai, 2012. Limited	-
<ol> <li>Natrajan K.V.,</li> <li>Venugopal K. 2008.</li> </ol>	and Prabhu Raja V., "Engineering G	rapinoe					Linned,	

Chairman - BoS

Chairman - BoS Dept. of Chemical Engg. - ESEC

12

97. .

	artment	BIOMEDICAL ENGINEE	ERING	Ň			R 2019	Semester I	I BS
Co	ourse	Course Name	Hou	rs / V	Veek	Credit	Total	Maximu	m
Co	ode	Course Name	L	Т	Р	С	Hours	Marks	•
19B	8S201	VECTOR CALCULUS AND COMPLEX ANALYSIS	3	1	0	4	60	100	
Cours	se Object	tive(s): The purpose of learning this course	is to						
•	Summar	ze problems related to fundamental princip	les of	Vecto	or Cal	culus			
•	Apply the	e methodologies involved in solving problem	ns rela	ited t	o fund	lamental	principle	s Vector	
	Impleme	nt the Complex Analysis an elegant metho	d in th	e stu	dy of	heat flow	fluid dv	namics and	
	electrost	atics.	a in ai	o ota	ay or	nout non	, naid dy	namioo ana	-
•2	Develop	enough confidence to identify and model m	nathen	natica	al patt	erns in re	al world	and offer	
	appropria	ate solutions, using the skills learned in thei	r inter	active	e and	supportir	ng enviro	nment.	
Cours	Denning	a complex function and solving through com	I bo of	nieg					-
Gours	Characte	rize the calculus of voctors	i be at	ne to	•				
	Apply the	a theoretical aspects of vector integral calcu	ulus in	their	corea	areas.			
	Recogniz	the differentiation properties of complex f	functio	ns.					
	Identify th	ne complex functions and their mapping in a	certair	com	plex p	olanes.			а,
•=	Use the o	concepts of integration to complex functions	s in ce	rtain	regior	ns.	a. A. I.		140
Unn		ERENTIATION OF VECTORS	1						12
Vector	r point fui r fields	nction - Directional derivative - Gradient - I Scalar potential	Diverg	ence	ə-Cu	rl - Soler	noidal - Ir	rotational	
Unit				2	-	8. L BY	-		12
Mork		e Integral Surface integral Crean's the	arom	inar	alana	Stokolo	Theorem		12
divera	ence the	prem – Applications involving cubes and pa	rallele	pipeo	d.	- Sloke s	Theorem	III - Gauss	
Unit		LYTIC FUNCTIONS		Takin Schules		19		185	12
Analyt	tic Funct	ions - Necessary and Sufficient condition	ons of	Ana	lytic I	unction	- Prope	rties of Ana	lytic
	on - Deter			psor	meth	nod - App	olications	s to the probl	ary cic
functio		mination of Analytic Function using Milne	Ihom						ems
function of Pot	ential Fl	mination of Analytic Function using Milne	Thom	اللہ ر	2				ems
of Pot Unit	ential Fl IV MAP	mination of Analytic Function using Milne ow. PING OF COMPLEX FUNCTIONS	Thom	ند. جزر					ems
Unctic of Pot Unit Confor valued	ential Flo IV MAP rmal map functior	mination of Analytic Function using Milne ow. <b>PING OF COMPLEX FUNCTIONS</b> ping - Application of transformation: transla is - Linear fractional Transformation (Bilin	tion, r	otatio	on, ma ormati	ignificatio on).	on and in	version of m	ems
functic of Pot Unit Confor valued Unit	ential Flo IV MAP rmal map I functior V CON	mination of Analytic Function using Milne ow. PING OF COMPLEX FUNCTIONS ping - Application of transformation: transla is - Linear fractional Transformation (Bilin IPLEX INTEGRATION	tion, r ear tra	otatio	on, ma ormati	ignificatio on).	on and in	version of m	ems 12 ulti
function of Pot Unit Confort valued Unit Cauch of Sing	ential Flo IV MAP rmal map d function V CON y's Funda gularities	mination of Analytic Function using Milne ow. PING OF COMPLEX FUNCTIONS ping - Application of transformation: transla is - Linear fractional Transformation (Bilin IPLEX INTEGRATION amental Theorem - Cauchy's Integral Form s - Cauchy's Residue Theorem	tion, r ear tra	otatic ansfc Faylo	on, ma ormati or's an	ngnificatio on). d Lauren	on and in t's series	version of m s - Classifica	12 ulti 12 12
functic of Pot Unit Confor valuec Unit Cauch of Sing REFEI	ential Flo IV MAP rmal map d function V CON y's Funda gularities RENCE(S	mination of Analytic Function using Milne ow. <b>PING OF COMPLEX FUNCTIONS</b> ping - Application of transformation: transla is - Linear fractional Transformation (Bilin <b>IPLEX INTEGRATION</b> amental Theorem - Cauchy's Integral Form s - Cauchy's Residue Theorem <b>S):</b>	tion, r ear tra nula - <sup>-</sup>	otatic ansfc Faylo	on, ma ormati or's an	ngnificatio on). d Lauren	on and in t's series	version of m s - Classifica	12 ulti 12 tion
functic of Pot Unit Confor valued Unit Cauch of Sing REFEI	ential Flo IV MAP rmal map d function V CON y's Funda gularities RENCE(S Erwin Kro Delhi 20	mination of Analytic Function using Milne ow. <b>PING OF COMPLEX FUNCTIONS</b> ping - Application of transformation: transla is - Linear fractional Transformation (Bilin <b>IPLEX INTEGRATION</b> amental Theorem - Cauchy's Integral Form s - Cauchy's Residue Theorem <b>S):</b> eyszig , Advanced Engineering Mathematic 15	Thom tion, r ear tra nula - ``	otatic ansfc Faylo	on, ma ormati or's an dition,	ngnificatio on). d Lauren Wiley In	on and in it's series dia Priva	version of m s - Classifica te Limited, N	12 ulti 12 tion
functic of Pot Unit Confor valued Unit Cauch of Sing REFEI	ential Flo IV MAP rmal map d function V CON y's Funda gularities RENCE(S Erwin Kro Delhi 20 C. Ray W Publishin	mination of Analytic Function using Milne ow. <b>PING OF COMPLEX FUNCTIONS</b> ping - Application of transformation: transla is - Linear fractional Transformation (Bilin <b>IPLEX INTEGRATION</b> amental Theorem - Cauchy's Integral Form s - Cauchy's Residue Theorem <b>S):</b> eyszig , Advanced Engineering Mathematic 15 /ylie and C. Louis Barrett, Advanced Engin ng Company Ltd, 2003	Thom tion, r ear tra nula - ` cs, Ter eering	otatic ansfc Γaylo nth E	on, ma ormati or's an dition, hema	ngnificatio on). d Lauren Wiley In tics, Tata	on and in it's series dia Priva a McGrav	version of m s - Classifica te Limited, N v - Hill	12 ulti 12 tion
Unit Unit Conforvalue Unit Dauch of Sing REFEI 1. 2. 3.	ential Fla IV MAP rmal map d function V CON y's Funda gularities RENCE(S Erwin Kro Delhi 20 <sup>-</sup> C. Ray W Publishin J. A. Bro New Dell	mination of Analytic Function using Milne ow. <b>PING OF COMPLEX FUNCTIONS</b> ping - Application of transformation: transla is - Linear fractional Transformation (Bilin <b>IPLEX INTEGRATION</b> amental Theorem - Cauchy's Integral Form s - Cauchy's Residue Theorem <b>S):</b> eyszig , Advanced Engineering Mathematic 15 /ylie and C. Louis Barrett, Advanced Engin ng Company Ltd, 2003 wn and R. V. Churchill, Complex Variables ni, 1996	tion, r ear tra nula - <sup>-</sup> cs, Ter eering and A	otatic ansfo Taylo nth E	on, ma ormati or's an dition, hema ations	d Lauren Wiley In tics, Tata	on and in it's series dia Priva McGrav Edition, M	version of m s - Classifica te Limited, N v - Hill IcGraw Hill,	12 ulti 12 tion
Unit Unit Confor valued Unit Cauch of Sing REFEI 1. 2. 3. 4.	ential Fla IV MAP rmal map d function V CON y's Funda gularities RENCE(S Erwin Kro Delhi 20 C. Ray W Publishin J. A. Bro New Dell Peter V. Private L	mination of Analytic Function using Milne ow. <b>PING OF COMPLEX FUNCTIONS</b> ping - Application of transformation: transla is - Linear fractional Transformation (Bilin <b>IPLEX INTEGRATION</b> amental Theorem - Cauchy's Integral Form <b>s</b> - Cauchy's Residue Theorem <b>5):</b> eyszig , Advanced Engineering Mathematic 15 /ylie and C. Louis Barrett, Advanced Engin ng Company Ltd, 2003 wn and R. V. Churchill, Complex Variables hi, 1996 O. Neil, Advanced Engineering Mathem imited, 2018	tion, r ear tra nula - <sup>-</sup> cs, Ter eering and A natics,	otatic ansfc Taylo th Eigh Eigh	on, ma ormati or's an dition, hema ations	d Lauren Wiley In tics, Tata	on and in t's series dia Priva McGrav Edition, M Cengage	version of m s - Classifica te Limited, N v - Hill IcGraw Hill, Learning Inc	Iia

Chairman - BoS Dept.of BME - ESEC

Josoon

Chairman - BoS Dept. of Maths - ESEC 13

Department	BIOMEDICAL EN	IGINEE	RING	i and	Sec. Co.	R 2019	Semester II	BS
Course Code	Course Name	Ηοι	Irs / \ T	Neek P	Credit C	Total Hours	Maximu Marks	m s
19BS202	BIO PHYSICS	3	0	0	3	45	100	
<ul> <li>Study print</li> <li>Discuss th</li> <li>Explore the</li> </ul>	re(s):The purpose of learning this co ciples and effects of ionizing and no e physics of the senses e effects of radiation in matter and h	ourse is t n-ionizin ow isoto	g rad	liation are pro	in huma	n body		
<ul> <li>Understand</li> </ul>	d various detectors for detecting the	presend	ce of	ionizi	ng radiat	ion.		_
<ul> <li>Explain ab</li> <li>Define and</li> <li>Summarize seen in the</li> <li>Explain the</li> <li>Illustrates t matter.</li> </ul>	es: At the end of this course, learne out non-ionizing radiation, interactio compare intensities of sensory stin es how ionizing radiation interacts w e environment and healthcare fundamentals of radioactivity and r the methods of detecting and record	rs will be n with tis nuli ith the h adioactiv ing the i	e able ssue umar ve isc onizii	e to: and it n body otopes ng rac	s effects. y, how to s liation ar	quantify it	and its levels action with	
Unit I NON	- IONIZING RADIATION AND ITS	MEDICA	LAF	PLIC	ATIONS			9
ntroduction and adiation effects- and its unit- limits	objectives - Tissue as a leaky diele Low Frequency Effects- Higher free of vision and color vision an overvi	ectric - F quency e ew, Ultra	telax effect aviole	ation s. Ph t	processe ysics of	es, Overvie light, Mea	ew of non-ioni surement of	zing light
	ATION DOSE AND ITS EFFECTS							9
elationship betweet to chastic and N	een the dosimetric quantities, Radia onstochastic effects, Radiation Sy	se squa tion biol ndrome	re lav ogy -	w, Ma Effec	ximum p ts of rad	iation, con	exposure, cept of LD 50,	
Unit III PRIN	CIPLES OF RADIOACTIVE NUCLI	DES				Sec. 1		9
ositron decay, e sed in Medicine adionuclide- Re rocessing Equat Unit IV RADIO Spontaneous Fis	lectron capture, Sources of Radiois e and Technology ,Decay series, eactor produced Radio- nuclide-fi ion for Production of Radionuclide's DACTIVE DECAY AND INTERACT sion- Isomeric Transition-Alpha	otopes I Product ssion and radion ionof Decay-Bo	Vatur tion nd el uclide RAD	al and of ra ectro e Gen IATIC Decay	d Artificia dionuclio n Captu erator-Te N WITH /-Positror	I radioacti de's – Cyo re reaction echnetium MATTER n Decay-E	vity, Radionuc clotron produ n, Target and generator.	lide ced l Its 9 ure-
nteraction of c remsstrahlung, ompton Scatteri	harged particles with matter - Annihilation, Interaction of X and ng , Pair production, Attenuation of	Specific Gamm Gamma	ioni a ra a Rad	zatior diatio diatio	n, Linea n with n n, Interac	r energy natter- Ph ction of ne	transfer rar otoelectric eff utron with ma	nge, fect, tter
Ind their clinical s	Ignificance.	dGAS			TECTO	PS		9
cintillation Detectors - illed Detectors - <b>EXT BOOK(S):</b> 1. Gopal B. Si 2. B H Brown, Biomedical	aha, Physics and Radiobiology of R H Smallwood, D C Barber, P V I Engineering 2nd Edition	nma We Counter Nuclear	Aamn II Co rs Med and [	icine∥	y Spect s-Thyroid , 4th Edit ose, <sup>–</sup> Me	trometry-Li d Probe-P ion, Spring edical Phys	iquid Scintilla Principles of G ger, 2013. sics and	tion àas-
EFERENCE(S): 1. S.Webb 7 2. J.P.Woodco 3. HyltonB.Me	The Physics of Medical Imaging∥, Ta bck, Ultrasonic,Medical Physics Ha ire and Pat Farrant Basic Ultrasou	aylor and andbook und   Joh	d Fra serie n Wil	ncis, es 1∥, ey &	1988 Adam H Sons, 19	ilger, Brist 995	ol, 2002	
CK.99	Older Deput				D	Chairm ept. of Ph	an - BoS ysics - ESCC	

14

	BIOME	DICAL ENGINEER	RING				R 2019	Semester II E	
Course	Course Nar	ne	lours	• / W	/eek	Credit	Total	Maximum	
19ES206	SEMICONDUCTOR		L 3	0	Р 0	3	45	100	
Course Objec	tive(s):The purpose of lea	rning this course is	to						
Underst	and the structure of basic e	electronic devices.							
Be expo	sed to active and passive (	circuit elements							
<ul> <li>Eamiliar</li> </ul>	ize the operation and appli	cations of transists	r liko	DIT	ond	CCT			
• Farmar	the characteristics of appli	lifier goin and freque		DJI	anu	Γ⊑Ι,			
<ul> <li>Explore</li> </ul>	the characteristics of ampli	mer gam and rrequ	ency	resp	onse	, ,			
Learn th	e required functionality of p	positive and negati	ve tee	apa	ICK S	/stems.			
Sourse Outco	mes: At the end of this co	urse, learners will i	be ab	le to					
Explain	the structure and working o	operation of basic e	electro	onic	devid	ces,	0.0		
Able to I	dentify and differentiate bo	th active and pass	ive el	eme	nts,				
<ul> <li>Analyze</li> </ul>	the characteristics of differ	rent electronic devi	ces s	uch	as di	odes and	l transisto	rs,	
<ul> <li>Choose</li> </ul>	and adapt the required cor	mponents to constr	ruct a	n an	nplifie	er circuit,			
<ul> <li>Employ</li> </ul>	the acquired knowledge in	design and analys	is of a	oscil	lators	3.			
Unit I Pl	<b>V JUNCTION DEVICES</b>	1	6.5					9	
PN junction d	iode - Structure, operatio	on and V-I charac	teristi	cs,	diffus	sion and	transition	capacitance	
Rectifiers - H	alf Wave and Full Wave	Rectifier, Displa	y dev	/ices	s – I	ED, Las	ser diode	s, Zener diod	
characteristics	- Zener Reverse characte	ristics – Zener as r	egula	tor					
Unit II TF	ANSISTORS AND THYR	ISTORS				100 L A		9	
3JT, JFET, M	IOSFET - structure, oper	ration, characteris	tics a	and	Biasi	ing UJT.	Thyristo	rs and IGBT	
Structure and o	characteristics.					•			
Unit III Al	<b>WPLIFIERS</b>							9	
3JT small sigr	nal model - Analysis of Cl	E. CB. CC amplifi	ers- (	Gain	and	frequenc	v respon	se - MOSEE	
small signal m	odel - Analysis of CS and	Source follower -	Gain	and	l frea	uency re	sponse -	High frequenc	
analysis.	Angles sold service is								
11-14-11/ 8/1									
	ULTISTAGE AMPLIFIERS	AND DIFFEREN	TIAL .	AMF	PLIFI	ER	777	9	
3IMOS cascad	ULTISTAGE AMPLIFIERS le amplifier, Differential am	AND DIFFEREN	TIAL . mode	AMF and	Diffe	E <b>R</b> erence m	ode analy	9 sis – FET inpu	
BIMOS cascad stages – Single	ULTISTAGE AMPLIFIERS le amplifier, Differential am etuned amplifiers – Gain a	AND DIFFEREN Iplifier – Common I Ind frequency resp	rial . mode onse	AMF and – N	PLIFI Diffe eutra	E <b>R</b> erence m lization m	ode analy nethods, p	9 ysis – FET inpu power amplifier	
3IMOS cascad stages – Single - Types	ULTISTAGE AMPLIFIERS le amplifier, Differential am etuned amplifiers – Gain a	AND DIFFEREN Iplifier – Common I Ind frequency resp	TIAL . mode onse	AMF and – N	PLIFI d Diffe eutra	ER erence m lization m	ode analy nethods, p	9 ysis – FET inpu power amplifier	
3IMOS cascad stages – Single - Types Unit V FE	ULTISTAGE AMPLIFIERS le amplifier, Differential am e tuned amplifiers – Gain a EDBACK AMPLIFIERS A	AND DIFFEREN plifier – Common ind frequency resp ND OSCILLATOF	rial mode onse	AMF and - N	PLIFI d Diffe eutra	ER erence m lization m	ode analy nethods, p	9 ysis – FET inpu power amplifier 9	
3IMOS cascad stages – Single - Types Unit V FE	ULTISTAGE AMPLIFIERS le amplifier, Differential am tuned amplifiers – Gain a EDBACK AMPLIFIERS A negative feedback – Vo	AND DIFFEREN plifier – Common and frequency resp ND OSCILLATOF pltage / Current, s	rial mode onse RS series	AMF and - N	PLIFI d Diffe eutra	ER erence m lization m	ode analy nethods, p	9 ysis – FET inpu power amplifier 9 ive feedback	
3IMOS cascad stages – Single - Types Unit V FE Advantages of Condition for o	ULTISTAGE AMPLIFIERS le amplifier, Differential am e tuned amplifiers – Gain a EDBACK AMPLIFIERS A negative feedback – Vo scillations, Phase shift – W	S AND DIFFEREN plifier – Common and frequency resp ND OSCILLATOF pltage / Current, s /ien bridge, Hartley	rial mode onse Sseries	AMF and - N	PLIFI d Diffe eutra hunt and	ER erence m lization m feedback Crystal os	ode analy nethods, p < – Posit scillators.	9 ysis – FET inpu power amplifier 9 ive feedback ·	
BIMOS cascad stages – Single - Types Unit V FE Advantages of Condition for o	ULTISTAGE AMPLIFIERS le amplifier, Differential am e tuned amplifiers – Gain a EDBACK AMPLIFIERS A negative feedback – Vo scillations, Phase shift – W	S AND DIFFEREN plifier – Common and frequency resp ND OSCILLATOF pltage / Current, s /ien bridge, Hartley	rial , mode onse Sseries , Col	AMF and - N	PLIFI d Diffe eutra hunt and	ER erence m lization m feedback Crystal os	ode analy nethods, p < – Posit scillators.	9 ysis – FET inpu power amplifier 9 ive feedback ·	
Onit IV     Min       BIMOS cascad     Stages – Single       - Types     Unit V       Value     FE       Advantages     of       Condition for o     FEXT BOOK(S)       1     David A	ULTISTAGE AMPLIFIERS le amplifier, Differential am e tuned amplifiers – Gain a EDBACK AMPLIFIERS A negative feedback – Vo scillations, Phase shift – W S):	S AND DIFFEREN plifier – Common i and frequency resp ND OSCILLATOF pltage / Current, s /ien bridge, Hartley	rial , mode onse RS series , Col	AMF and - N	PLIFI d Diffe eutra hunt and	ER erence m lization m feedback Crystal os	ode analy nethods, p < – Posit scillators.	9 ysis – FET inpu power amplifier 9 ive feedback	
Onit IV     Min       BIMOS cascad     Stages – Single       - Types     Unit V       Unit V     FE       Advantages of     Condition for o       Condition for O     FEXT BOOK(S       1.     David A. E       2.     Thomas	ULTISTAGE AMPLIFIERS le amplifier, Differential am e tuned amplifiers – Gain a EDBACK AMPLIFIERS A negative feedback – Vo scillations, Phase shift – W 5): Bell, "Electronic devices and LEloyd, —Electronic devices and	S AND DIFFEREN plifier – Common and frequency resp ND OSCILLATOF pltage / Current, s /ien bridge, Hartley d circuitsll, Oxford icesll Conventiona	rial mode onse series , Colj Unive	AMF and - N , Sl pitts	PLIFI d Diffe eutra hunt and y high	ER erence m lization m feedback Crystal or ner educa-	ode analy nethods, p c – Posit scillators.	9 ysis – FET inpu power amplifier 9 ive feedback	
Onit IV     Million       BIMOS cascad       stages – Single       - Types       Unit V     FE       Advantages of       Condition for o       FEXT BOOK(S)       1. David A. E       2. Thomas       Edition, 20	ULTISTAGE AMPLIFIERS le amplifier, Differential am e tuned amplifiers – Gain a EDBACK AMPLIFIERS A negative feedback – Vo scillations, Phase shift – W S): Bell, "Electronic devices and L.Floyd, —Electronic devi	S AND DIFFEREN and frequency resp AND OSCILLATOF Ditage / Current, s /ien bridge, Hartley d circuitsll, Oxford icesll Conventiona	rial mode onse series , Colj Unive	AMF and - N oitts ersity rent	PLIFI d Diffe eutra hunt and y high vers	ER erence m lization m feedback Crystal os ner educa ion, Pea	ode analy nethods, p c – Posit scillators. ntion, 5 <sup>th</sup> e	9 ysis – FET inpu power amplifier 9 ive feedback edition 2008, ntice hall, 10t	
Onit IV     Million       BIMOS cascad     Stages – Single       - Types     Unit V     FE       Advantages     of       Condition for or     Condition for or       FEXT BOOK(S     1. David A. E       2. Thomas     Edition, 20       REFERENCE(E)	ULTISTAGE AMPLIFIERS le amplifier, Differential am e tuned amplifiers – Gain a EDBACK AMPLIFIERS A f negative feedback – Vo scillations, Phase shift – W 5): Bell, "Electronic devices and L.Floyd, —Electronic devi )17. S):	S AND DIFFEREN and frequency resp AND OSCILLATOF Ditage / Current, s /ien bridge, Hartley d circuitsll, Oxford icesll Conventiona	rial mode onse series , Colj Unive il cur	AMF anc – N oitts ersit; rent	PLIFI d Diffe eutra hunt and y high vers	ER erence m lization m feedback Crystal os her educa ion, Pea	ode analy nethods, p c – Posit scillators. ation, 5 <sup>th</sup> e arson pre	9 ysis – FET inpu power amplifier 9 ive feedback - edition 2008, ntice hall, 10t	
Onit IV     Million       BIMOS cascade     Single       Stages – Single     Types       Unit V     FE       Advantages of     Condition for o       Condition for o     FEXT BOOK(S)       1.     David A. E       2.     Thomas       Edition, 20       REFERENCE(I)       1.     Balbir Kur       2014.	ULTISTAGE AMPLIFIERS le amplifier, Differential am e tuned amplifiers – Gain a EDBACK AMPLIFIERS A f negative feedback – Vo scillations, Phase shift – W 5): Bell, "Electronic devices and L.Floyd, —Electronic devi 017. S): nar, Shail.B.Jain, —Electro	S AND DIFFEREN and frequency resp AND OSCILLATOF Ditage / Current, s /ien bridge, Hartley d circuitsII, Oxford icesII Conventiona	rial , mode onse series , Colj Unive il cur	AMF and - No oitts ersit; rent	PLIFI d Diffe eutra hunt and y high vers	ER erence m lization m feedback Crystal os ner educa ion, Pea	ode analy nethods, p c – Posit scillators. ation, 5 <sup>th</sup> e irson pre	9 ysis – FET inpu- power amplifier 9 ive feedback edition 2008, ntice hall, 10t ed, 2nd edition	
Onit IV     Million       BIMOS cascad     Single       Stages – Single     Types       Unit V     FE       Advantages of     Condition for o       Condition for o     FE       T. David A. E     Single       2. Thomas     Edition, 20       REFERENCE(     1. Balbir Kur       2014.     2. Donald A	ULTISTAGE AMPLIFIERS le amplifier, Differential am e tuned amplifiers – Gain a EDBACK AMPLIFIERS A f negative feedback – Vo scillations, Phase shift – W s): Bell, "Electronic devices and L.Floyd, —Electronic devi )17. S): nar, Shail.B.Jain, —Electronic Neamen, —Electronic Circ	S AND DIFFEREN plifier – Common and frequency resp AND OSCILLATOF pltage / Current, s /ien bridge, Hartley d circuitsII, Oxford icesII Conventiona pnic devices and c puit Analysis and D	rial mode onse series , Colj Unive il cur ircuits	AMF and – N bitts bitts ersity rent	PLIFI d Diffe eutra hunt and y high vers HI lea	ER erence m lization m feedback Crystal os ner educa sion, Pea arning pri cGraw H	ode analy nethods, p c – Posit scillators. ation, 5 <sup>th</sup> e irson pre	9 ysis – FET inpu- power amplifier 9 ive feedback edition 2008, ntice hall, 10t ed, 2nd edition lition, 2003.	
Onit IV     Million       BIMOS cascad     Stages – Single       - Types     Unit V     FE       Advantages of     Condition for o       Condition for o     FE       1. David A. E       2. Thomas       Edition, 20       REFERENCE(       1. Balbir Kur       2014.       2. Donald A       3. Robert L.E	ULTISTAGE AMPLIFIERS le amplifier, Differential am e tuned amplifiers – Gain a EDBACK AMPLIFIERS A f negative feedback – Vo scillations, Phase shift – W 5): 3ell, "Electronic devices and L.Floyd, —Electronic devi 017. 5): nar, Shail.B.Jain, —Electronic Neamen, —Electronic Circ 3oylestad, —Electronic De	S AND DIFFEREN and frequency resp AND OSCILLATOF Ditage / Current, s /ien bridge, Hartley d circuitsII, Oxford icesII Conventiona onic devices and c ouit Analysis and D vices and Circuit T	TIAL mode onse onse Series , Colj Unive ircuits resign	AMF and - N bitts ersity rent bill P	PLIFI d Diffe eutra hunt and y high vers HI lea ata M 2002.	ER erence m lization m feedback Crystal os ner educa ion, Pea arning pri cGraw H	ode analy nethods, p c – Posit scillators. ation, 5 <sup>th</sup> e arson pre	9 ysis – FET inpu- power amplifier 9 ive feedback edition 2008, ntice hall, 10t ed, 2nd edition lition, 2003.	
Onit IV     Million       BIMOS cascad     Stages – Single       - Types     Unit V     FE       Advantages     of       Condition for o     Condition for o       TEXT BOOK(S     1.     David A. E       2.     Thomas       Edition, 20       REFERENCE(       1.     Balbir Kur       2014.       2.     Donald A       3.     Robert L.E       4.     Robert B.	ULTISTAGE AMPLIFIERS le amplifier, Differential am e tuned amplifiers – Gain a EDBACK AMPLIFIERS A f negative feedback – Vo scillations, Phase shift – W 5): Bell, "Electronic devices and L.Floyd, —Electronic devi 017. S): nar, Shail.B.Jain, —Electronic Neamen, —Electronic Circo Boylestad, —Electronic De Northrop, —Analysis and A	S AND DIFFEREN plifier – Common and frequency resp ND OSCILLATOF pltage / Current, s /ien bridge, Hartley d circuitsll, Oxford icesll Conventiona pnic devices and c puit Analysis and D vices and Circuit T Application of Anal	rial mode onse series , Colj Unive ircuits esigr rheor og Ele	AMF and – N boitts ersity rent sll P	PLIFI d Diffe eutra hunt and y high vers HI lea ata M 2002. onic (	ER erence m lization m feedback Crystal or her educa- tion, Pea arning pri cGraw H Circuits to	ode analy nethods, p c – Posit scillators. ntion, 5 <sup>th</sup> e irson pre vate limit ill, 3rd Ed	9 ysis – FET inpu- power amplifier 9 ive feedback - edition 2008, ntice hall, 10t ed, 2nd edition lition, 2003.	
Onit IV     Million       BIMOS cascad       Stages – Single       Types       Unit V     FE       Advantages of       Condition for o       Condition for o       TEXT BOOK(S)       1. David A. E       2. Thomas       Edition, 20       REFERENCE(       1. Balbir Kur       2014.       2. Donald A       3. Robert L.E       4. Robert B.       Instrumen	ULTISTAGE AMPLIFIERS le amplifier, Differential am e tuned amplifiers – Gain a EDBACK AMPLIFIERS A f negative feedback – Vo scillations, Phase shift – W S): Bell, "Electronic devices and L.Floyd, —Electronic devi D17. S): nar, Shail.B.Jain, —Electron Neamen, —Electronic Circ Boylestad, —Electronic De Northrop, —Analysis and A tationll, CRC Press, 2004.	S AND DIFFEREN plifier – Common and frequency resp AND OSCILLATOF pltage / Current, s /ien bridge, Hartley d circuitsII, Oxford icesII Conventiona pnic devices and c cuit Analysis and D vices and Circuit T Application of Anal-	TIAL mode onse series , Colj Unive ircuits vesigr Theor og Ele	AMF and – N b) b) tts ersity rent s   P    Ta y  , 2	PLIFI d Diffe eutra hunt and y high vers HI lea ata M 2002. onic (	ER erence m lization m feedback Crystal os her educa- tion, Pea arning pri cGraw H Circuits to	ode analy nethods, p c – Posit scillators. ation, 5 <sup>th</sup> e rson pre vate limit ill, 3rd Ed	9 ysis – FET inpu- power amplifier 9 ive feedback edition 2008, ntice hall, 10t ed, 2nd edition lition, 2003. cal	



Department	BIOMEDICAL ENGIN	IEERING	- b		1	R 2019	Semester II	ES
Course	Course Name	Hou	rs / W	/eek	Credit	Total	Maximur	n
Code		L	Т	Р	C	Hours	Marks	
19ES201	PROBLEM SOLVING AND PYTHON PROGRAMMING	3	0	0	3	45	100	
Course Obje	ctive(s):The purpose of learning this cour	rse is to						
<ul> <li>Unders</li> <li>Unders</li> <li>Python</li> <li>Develop</li> <li>Use Py</li> <li>Do inpu</li> </ul>	tand problem solving techniques, tand why Python is a useful scripting lar programs, p Python programs with conditionals and l thon data structures lists, tuples, dictio ut/output with files in Python.	nguage fo loops, naries,	or dev	velop	ers and t	to read a	and write sim	ple
Course Outc	omes: At the end of this course, learners	will be at	ole to					
<ul> <li>Apply p</li> <li>Recogn</li> <li>Be able</li> <li>Able to</li> <li>Able to</li> </ul>	roblems solving techniques to real world p lize and construct common programming to design, code, and test Python program write code using dictionaries and function read and write data from/to files in Python	problems idioms: v ns using l ns, n Progran	, ariabl List, 7 ns.	es, lo ruple:	op, bran s and Str	ch, and ii ings,	nput/output,	
Unit I PR	OBLEM SOLVING TECHNIQUES							9
Introduction to Operating Sy Introduction to Flowchart / Ps	o components of a computer system: I stem, Compliers, Creating, Compiling o Algorithms: Steps to solve logical and seudo code with examples, Program designed.	Disks, Pr and exe d numerio gn and st	imary cuting cal pr ructui	and ga obler red pr	Second program ns. Repi rogramm	ary mem etc., Nu resentatio ing.	nory, Process umber syster on of Algorith	sor, ns, nm,
Unit II IN7	RODUCTION TO PYTHON	100			11 II II II		Sel on Pitter	9
History - Insta	allation and working with Python – Unders	standing F	ytho	n vari	ables – I	Python ba	asic Operator	s
Declaring and	using Numeric data types: int, float, com	nplex – U	sing s	string	data typ	e and str	ing operation	s –
Methods.	rabaala guraa data da sheer data	1.						
Unit III FL	OW CONTROL, LIST AND TUPLES			n E		Dist	All of the St	9
Conditional bl loops in pytho conditional ar Function and	ocks using if, else and elif – Simple for lo on – Loop manipulation using pass, con nd loops block creating list – Accessing Methods – Creating tuple – Tuple Operat	ops in py itinue, bro g List – ( ions – Fu	thon eak a Opera nctior	- For and el ations	loop usi se – Pro on List d Methoo	ng range ogrammir – Work ds	s – Use of wh ng using Pyth ing with Lists	nile nom s —
	CTIONARIES, FUNCTIONS AND MODUL	LES						9
Creating Dict	ionaries - Accessing values in Dictior	naries –	Work	ing v	vith Dict	ionaries	- Properties	3 -
Functions - I	Defining a Functions – Calling a Functi	ion – Ty	pes d	of Fu	nctions -	- Functio	on Arguments	
Anonymous F	Functions - Global and Local variables	- Modu	les –	Imp	orting M	odule -		s –
Random Mod	ula Daskanas Commercition					oudio	Math Module	s – e –
	ule – Packages – Composition.					ouuro	Math Module	s –
Unit V FIL	ES AND EXCEPTION HANDLING						Math Module	s – e – 9
Unit V FIL Files – Openii	INCLUSION IN THE INFORMATION INTERVIDUAL INTERVIDUAL INFORMATION INTERVIDUAL INTERVIDUAL INFORMATION INTERVIDUAL INTERVIDA INTERVIDUAL INTERVIDA INTE	s – Readi	ng ar	nd Wr	iting File	s – Func	Math Module	s – e – 9 ion
Unit V FIL Files – Openin Handling – Ex	INCOMPOSITION PACKAGES – Composition. IS AND EXCEPTION HANDLING Ing and Closing File – File opening modes Inception – Exception clause – Try, finally of	s – Readi clause us	ng ar er. De	nd Wr efined	iting File I Excepti	s – Func ons.	Math Module	s – 9 ion
Unit V FIL Files – Openin Handling – Ex TEXT BOOK	International Composition. IS AND EXCEPTION HANDLING Ing and Closing File – File opening modes Interception – Exception clause – Try, finally of S):	s – Readi clause us	ng ar er. De	nd Wr efined	iting File I Excepti	s – Func ons.	Math Module	s – 9 jon
Unit V FIL Files – Openin Handling – Ex TEXT BOOK( 1. David Ri Hall/CRC	International Packages – Composition. IS AND EXCEPTION HANDLING Ing and Closing File – File opening modes International Try, finally of S): International This International This I	s – Readi clause us inking for	ng ar er. De	nd Wr efined Mode	iting File I Excepti rn Probl	em Solve	Math Module tions. Except	9 ion
Unit V FIL Files – Openin Handling – Ex TEXT BOOK 1. David Ri Hall/CRC 2. M. Spra NewDelh	International Packages – Composition. IS AND EXCEPTION HANDLING Ing and Closing File – File opening modes International Transformer Solution – Exception clause – Try, finally of S): Itey and Kenny Hunt, "Computational This Composition, 2014. Inkle, "Problem Solving and Programm i, 2011.	s – Readi clause us inking for ning Cor	ng ar er. De the ncept	nd Wr efined Mode s", 9	iting File I Excepti Irn Probl th Editio	em Solve ons. em Solve	Math Module tions. Except er", Chapman	9 9 10 00 00
Unit V FIL Files – Openii Handling – Ex TEXT BOOK 1. David Ri Hall/CRC 2. M. Spra NewDelh REFERENCE	International Composition. IS AND EXCEPTION HANDLING Ing and Closing File – File opening modes International Computational Computational This Is and Kenny Hunt, "Computational This Is and Kenny Hunt, "Computational This Is a computational Computational Computational This Is a computational Computer Computational Computational Computer Co	s – Readi clause us inking for ning Cor	ng ar er. De the ncept	nd Wr efined Mode s", 9	iting File I Excepti rn Probl th Editio	em Solve	Math Module tions. Except er", Chapmar	s – e – j ion n &
Unit V FIL Files – Openin Handling – Ex TEXT BOOK 1. David Ri Hall/CRC 2. M. Spra NewDelh REFERENCE 1. Brian He	Inde – Packages – Composition. IS AND EXCEPTION HANDLING Ing and Closing File – File opening modes Inception – Exception clause – Try, finally of S): Iey and Kenny Hunt, "Computational This , 2014. Inkle, "Problem Solving and Programming i, 2011. (S): Inold," Introduction to Programming Using	s – Readi clause us inking for ming Cou g Python",	ng ar er. De the ncept	nd Wr efined Mode s", 9 nt St.	iting File I Excepti rn Probl th Editio Mary's I	em Solve ons. em Solve on, Pear	Math Module tions. Except er", Chapman son Education y, 2013.	s – e – j ion n &
Unit V FIL Files – Openia Handling – Ex TEXT BOOK 1. David Ri Hall/CRC 2. M. Spra NewDelh REFERENCE 1. Brian Hei 2. Michael D	Inde – Packages – Composition. IS AND EXCEPTION HANDLING Ing and Closing File – File opening modes Index a computational File – File opening modes Index a computational file – File opening modes Index a computational file – File opening modes Index a computation clause – Try, finally of Index a computation clause – Try, finally of Ind	s – Readi clause us inking for ming Con g Python", solute Be	ng ar er. De the ncept	nd Wr efined Mode s", 9 Int St. er", 3r	iting File I Excepti Irn Probl th Edition Mary's I d Edition	em Solve ons. em Solve on, Pear <u>Jniversity</u> , 2010.	Math Module tions. Except er", Chapmar son Education y, 2013.	s – 9 ion n &
Unit VFILFiles – OpeninHandling – ExTEXT BOOK(1. David RiHall/CRC2. M. SpraNewDelhREFERENCE1. Brian Hei2. Michael I3. Allen DowMassach	Lie – Packages – Composition. <u>IS AND EXCEPTION HANDLING</u> Ing and Closing File – File opening modes (S): Ley and Kenny Hunt, "Computational Th 2, 2014. Inkle, "Problem Solving and Programm i, 2011. (S): inold," Introduction to Programming Using Dawson, "Python Programming for the Ab wney, Green Tea Press Needham, "Think usetts.	s – Readi clause us inking for ming Con g Python", solute Be < Python,	ng ar er. De the ncept Mou ginne How	nd Wr efined Mode s", 9 nt St. er", 3r to Th	iting File I Excepti In Probl th Edition Mary's I d Edition ink Like	em Solve ons. em Solve on, Pear Jniversity a Compu	Math Module tions. Except er", Chapmar son Education y, 2013.	s - 9 ion n & on,



	BIOMEDICAL ENGIN	NEERI	NG	~		R 2019	Semester I	M
Course	Course Name	Ηοι	irs /	Week	Credit	Total	Maximu	m
Code	oouroe nume	L	Т	P	С	Hours	Marks	•
19MC201	ENVIRONMENTAL SCIENCE AND ENGINEERING	3	0	.0	0	45	100	
Course Object Study th Finding problem Know th Apply th Study th manage Course Outco Extend preserva Outline future go Explain natural n Find the harvesti Davelon	ENGINEERING ctive(s): The purpose of learning this course he nature and facts about environment. and implementing scientific, technological is ns. he types of natural resources and the individual he knowledge to various social issues by un he integrated themes and biodiversity, nature ement. omes: At the end of this course, learners we their knowledge in maintaining ecological be ation of biodiversity. the role of human being in maintaining a clear enerations. the constituents of environment, precious re- resources. e role of government and Non-Government ing techniques.	e is and ec dual ro dersta ral reso ill be a balance ean en resourc organi Family	conor le in o nding ource ble to e and viron ces in ces in zatio	nic sol conse the e s, pol c: make ment the e n and	lutions to rving the nvironm lution cc use of t and use nvironm explain	b environn e resource lental legis introl and heir know ful enviror ent and co the variou	nental es. slation laws. waste ledge in the nment for the onservation o is rain water	f
extend t Unit I E Invironment: S unction of an ecosystem - s iodiversity - c Threats to bio iodiversity - Ir	their knowledge in role of informative technology COSYSTEMS AND BIODIVERSITY Scope - importance - need for public award ecosystem - Producers, consumers and constructure and functions of forest ecosystem consumptive use-productive use - social - eto odiversity - Habitat loss - poaching of wo n-situ and Ex-situ conservation.	eness decom em an thical - rildlife	- Col pose d riv - aesi and	r and ncepts ers - F er eco thetic man	human h s of an e ood cha osystem values - wildlife o	ecosystem ins - food - Biodive Hotspots conflicts.C	<ul> <li>Structure a</li> <li>webs - type</li> <li>ersity - value</li> <li>of biodiversi</li> <li>Conservation</li> </ul>	10 and s of e of ty of
extend t Unit I E Environment: S unction of an ecosystem - s biodiversity - c Threats to bio biodiversity - Ir Unit II EI	cheir knowledge in role of informative techno COSYSTEMS AND BIODIVERSITY Scope - importance - need for public awar ecosystem - Producers, consumers and c structure and functions of forest ecosyste consumptive use-productive use - social - et odiversity - Habitat loss - poaching of w n-situ and Ex-situ conservation. NVIRONMENTAL POLLUTION	eness decom em an thical - rildlife	- Con pose d riv - aesi and	F and ncepts ers - F er ecc thetic man	human h s of an e ood cha osystem values - wildlife o	ecosystem ins - food - Biodive Hotspots conflicts.C	<ul> <li>Structure a webs - type</li> <li>ersity - value</li> <li>of biodiversi</li> <li>Conservation</li> </ul>	10 and s of e of ty of 8
extend t Unit I E Environment: S unction of an ecosystem - s biodiversity - c Threats to bio biodiversity - Ir Unit II EI Pollution: Caus biollution - Solic Role of an indiv Unit III N	their knowledge in role of informative technology and the second structure and functions of forest ecosystem - Producers, consumers and of structure and functions of forest ecosystem of structure and functions of forest ecosystem of the second structure and functions of forest ecosystem of the second structure and functions of forest ecosystem of the second structure and functions of forest ecosystem of the second structure and functions of forest ecosystem of the second structure and functions of forest ecosystem of the second structure and functions of forest ecosystem of the second structure and functions of the second structure and functions of the second structure and functions of the second structure and structure and structure and the second structure an	eness decom em an thical - ildlife ollution ontrol r nanage	- Col pose d riv - aesi and - Wa meas emer	r and ncepts ers - F er eco thetic man ter po ures c tts - Fl	human h s of an e ood cha osystem values - wildlife o llution - of urban oods - c	and indication in the and in the and in the and industry in the and industry clone- la	n - Structure a webs - type ersity - value of biodiversi conservation tion and Nois trial wastes - indslides.	10 and s of e of ty of 8 e
extend t Unit I E Environment: S function of an ecosystem - s biodiversity - c Threats to bio biodiversity - Ir Unit II EI Pollution: Caus biollution - Solid Role of an indir Unit III NA iorest resource	their knowledge in role of informative technology constraints and the role of informative technology constraints and the role of the role	ologies eness decom em an thical ildlife ollution ontrol r nanage	- Con pose d riv - aesi and - Wa measi emer	r and ncepts ers - F er ecc thetic man ter po ures c nts - Fl	human h s of an e ood cha osystem values - wildlife o llution - of urban oods - use-	and in ealth ecosystem ins - food - Biodive Hotspots conflicts.C Soil pollut and indus cyclone- la	<ul> <li>A - Structure a</li> <li>webs - type</li> <li>ersity - value</li> <li>of biodiversi</li> <li>conservation</li> <li>conservation</li> <li>cons and Nois</li> <li>trial wastes -</li> <li>indslides.</li> </ul>	1( and s of e of ty of 8 e 9 ace
extend t Unit I EQ Environment: S function of an ecosystem - s biodiversity - c Threats to bio biodiversity - Ir Unit II EI Pollution: Caus bollution - Solid Role of an indiv Unit III Nu Forest resource and ground w extracting and griculture - Ei energy sources ndividual in co	their knowledge in role of informative technol <b>COSYSTEMS AND BIODIVERSITY</b> Scope - importance - need for public aware ecosystem - Producers, consumers and co structure and functions of forest ecosyste consumptive use-productive use - social - et odiversity - Habitat loss - poaching of w n-situ and Ex-situ conservation. <b>NVIRONMENTAL POLLUTION</b> ses - effects and control measures of Air pod d waste management - Causes - effects -co vidual in prevention of pollution - Disaster m <b>ATURAL RESOURCES</b> ces - Use-over exploitation-deforestation - rater - conflicts over water - Mineral resources I using mineral resources - Food resour ffects of modern agriculture - fertilizer- per s - solar energy - wind energy. Land resources.	ologies eness decom em an thical - ildlife ollution ontrol r nanago Water ources rces - sticide irces -	- Col pose d riv - aest and - Wa meas emer reso - us worl prob land	r and ncepts ers - F er ecc thetic man ter po ures c ures c ources se-exp d foo lems degra	human h s of an e ood cha osystem values - wildlife of llution - of urban loods - c s - use- loitation d proble - Energy adation -	soil pollut and industry sover utiliz environmens chan y resource	a - Structure a webs - type ersity - value of biodiversi conservation ion and Nois trial wastes - indslides. ation of surfa- nental effects ages caused es - Renewa ion - Role of	10 and s of e of ty of 8 e 9 ace s of by ble an
extend t Unit I E Environment: S unction of an ecosystem - s biodiversity - c Threats to bio biodiversity - Ir Unit II EI Pollution: Caus bollution - Solid Role of an individual in co Unit IV SC	their knowledge in role of informative technology structure and functions of forest ecosystem - Producers, consumers and consumptive use-productive use - social - et odiversity - Habitat loss - poaching of whereitu and Ex-situ conservation. <b>NVIRONMENTAL POLLUTION</b> ses - effects and control measures of Air point waste management - Causes - effects - convidual in prevention of pollution - Disaster matter - conflicts over water - Mineral resources - Food resources - Social resources - Social resources - Social - et or a social in prevention of pollution - Disaster matter - conflicts over water - Mineral resources - Social resources	ologies eness decom em an thical - ildlife ollution ontrol r manago Water ources rces - sticide irces -	- Col pose d riv - aest and - Wa meas emer reso - us worl prob land	r and ncepts ers - F er ecc thetic man ter po ures o ures o tts - Fl ources se-exp d foo lems degra	human h s of an e ood cha osystem values - wildlife of llution - of urban loods - of s - use- loitation d proble - Energy adation -	soil pollut and industry sover utiliz environmens chan y resource soil erosi	a - Structure : webs - type ersity - value of biodiversi conservation ion and Nois trial wastes - indslides. ation of surfa- nental effects ages caused es - Renewa ion - Role of	10 and s of e of ty of 8 e 9 ace s of by ole an 9
extend t Unit I EQ Environment: S function of an ecosystem - s biodiversity - c Threats to bid biodiversity - Ir Unit II EI Pollution: Caus bollution - Solid Role of an indiv Unit III N Forest resources and ground w extracting and griculture - Ef energy sources ndividual in co Unit IV SC Sustainable & limate change Prevention an 12 Principles	their knowledge in role of informative technol <b>COSYSTEMS AND BIODIVERSITY</b> Scope - importance - need for public aware ecosystem - Producers, consumers and co structure and functions of forest ecosyste onsumptive use-productive use - social - et odiversity - Habitat loss - poaching of w n-situ and Ex-situ conservation. <b>NVIRONMENTAL POLLUTION</b> ses - effects and control measures of Air pod d waste management - Causes - effects -co vidual in prevention of pollution - Disaster m <b>ATURAL RESOURCES</b> ces - Use-over exploitation-deforestation - rater - conflicts over water - Mineral resour- ffects of modern agriculture - fertilizer- per s - solar energy - wind energy. Land resour- mineral resources. <b>DCIAL ISSUES AND THE ENVIRONMENT</b> Unsustainable development-Water conse e-global warming - acid rain - ozone la d control of pollution) Act - Water (prevention of Green chemistry - Application of Green	ologies eness decom em an thical - ildlife ollution ontrol r nanago Water ources rces - sticide urces - sticide urces -	- Col pose d riv - aest and - Wa meas emer reso - us worl prob land	rand ncepts ers - F er ecc thetic man ter po ures c ures c ts - Fl ources se-exp d foo lems degra in wa on - I rol of	human h s of an e ood cha osystem values - wildlife of llution - of urban oods - o f urban oods - o s - use- loitation d proble - Energy adation - ter harv Environr pollution	and indicating and indicating and indicating and industry conflicts. Conflict	a - Structure : webs - type ersity - value of biodiversi conservation ion and Nois trial wastes - indslides. ation of surfa- nental effects ages caused es - Renewa ion - Role of of top metho ection act - een Chemistr	10 and s of e of y of 8 e 9 ace an 9 by ble an 9 wd)- Air y
extend t Unit I EQ Environment: S function of an ecosystem - s biodiversity - c Threats to bio biodiversity - Ir Unit II EI Pollution: Caus collution - Solid Role of an individual in co Unit III NA Forest resources and ground w extracting and agriculture - Effect energy sources ndividual in co Unit IV SC Sustainable & climate change Prevention an 12 Principles Unit V HU	their knowledge in role of informative technol <b>COSYSTEMS AND BIODIVERSITY</b> Scope - importance - need for public aware ecosystem - Producers, consumers and consumptive use-productive use - social - eto odiversity - Habitat loss - poaching of we n-situ and Ex-situ conservation. <b>NVIRONMENTAL POLLUTION</b> ses - effects and control measures of Air poon d waste management - Causes - effects - con- vidual in prevention of pollution - Disaster measures <b>ATURAL RESOURCES</b> ces - Use-over exploitation-deforestation - rater - conflicts over water - Mineral resound ffects of modern agriculture - fertilizer- peasing s - solar energy - wind energy. Land resound measures. <b>DCIAL ISSUES AND THE ENVIRONMENT</b> Unsustainable development-Water conse e-global warming - acid rain - ozone laid d control of pollution) Act - Water (prevention of Green chemistry - Application of Green <b>UMAN POPULATION AND THE ENVIRON</b>	ologies eness decom em an thical - ildlife ollution ontrol r manago Water ources rces - sticide urces - sticide urces - <b>F</b>	- Col pose d riv - aesi and - Wa neas emer reso - us worl prob land	rand ncepts ers - F er ecc thetic man ter po ures o tts - Fl ources se-exp d foo lems degra	human h s of an e ood cha osystem values - wildlife of llution - of urban oods - o s - use- loitation d proble - Energy adation - ter harv Environr pollution	and individual and individual and individual and industry clone- la over utiliz -environments changer esting (roment protection) Act - Greent and	a - Structure a webs - type ersity - value of biodiversi conservation ion and Nois trial wastes - indslides. ation of surfa- nental effects ages caused es - Renewa ion - Role of of top metho- ection act - een Chemistr	10 and s of e of ty of 8 e 9 ace s of by ble an 9 od)- Air y 9

Chairman - BoS Dept. of Chemistry - ESEC

17

#### TEXT BOOK(S):

- 1. AnubhaKaushik and C.P. Kaushik, Environmental Science and Engineering, New Age International Publishers, New Delhi (2015)
- 2. Dr. A.Ravikrishan, Envrionmental Science and Engineering., Sri Krishna Hitech Publishing co. Pvt. Ltd., Chennai, 12th Edition (2016)

#### **REFERENCE(S):**

- 1. Masters, Gilbert M, Introduction to Environmental Engineering and Science∥, Second Edition, Pearson Education, New Delhi (2012),
- 2. Santosh Kumar Garg, Rajeshwarigarg, smfRanjniGarg Ecological and Environmental Studies Khanna Publishers, NaiSarak, Delhi (2014),
- 3. R.K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standard", Vol. I and II, Enviro Media,
- 4. Dharmendra S. Sengar, "Environmental law", Prentice Hall of India PVT LTD, New Delhi, 2007. 4. Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press 2005,
- 5. Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2015.

Chairman - BoS Dept.of BME - ESEC

irman - BoS Dept. of Chemistry - ESEC

Department	BIOMEDICAL ENGINE	ERINO	3	- salis A		R 2019	Semester II	ES
Course	Course Name	Ηοι	irs / V	Veek	Credit	Total	Maximun	n
Code		L	Т	Ρ	С	Hours	IVIAINS	
19ES213	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY	0	0	2	1	30	100	
ourse Objec	tive (s):The purpose of learning this cours	se is						
<ul> <li>Apply pr</li> </ul>	roblem solving techniques,							
<ul> <li>Write, te</li> </ul>	est, and debug simple Python programs,							
Impleme	ent Python programs with conditional and i	loops,						
<ul> <li>Use fun</li> </ul>	ctions for structuring Python programs,	<u>ee an</u>	d dicti	onari	20			
Represe     Represe	ad Write data from / to files in Python	es an	u ulcu	onan	,			
• Reau al	mes: At the end of this course learners w	vill be	able	to				-
Write al	gorithm pseudo code and draw flowchart.							
Write te	est, and debug simple Python programs,							
<ul> <li>Impleme</li> </ul>	ent Python programs with conditionals and	loops	5,					
Develop	Python programs step-wise by defining fu	Inctio	ns and	d calli	ng them	۱,		
Use Pyt	hon lists, tuples, dictionaries for representi	ing co	mpou	ind da	ita,		*	
Read an	nd write data from/to files in Python.						1.5	_
_ist of Exper	iments							
1. Write	algorithms and pseudo code to solve real	time p	oroble	ms,				
2. Draw	flow chart.							
3. Worki	ng in Python Interpreter,							
4. Simpl	e python programming using looping and o	condit	ional	stater	nents,			
5. Progr	ams to handle strings,							
6. Progr	ams using list, tuples and dictionaries,							
7. Progr	ams using functions,							
8. Progr	ams using modules and packages,							
9. Progr	am to handle files and exception handling,							
10. Progr	am to draw various charts.							
PLATFORM	NEEDED							
Python 3 Inte	rpreter for Windows / Linux				_			-
TEXT BOOK	(S):	4000y 70	<u> </u>					
1. David R Chapma	iley and Kenny Hunt, "Computational n &Hall/CRC, 2014,	Thin	king	for t	he Moo	dern Prot	olem Solver	,
2. M. Spran NewDelh	nkle, "Problem Solving and Programmin ii, 2011.	g Co	ncept	s", 9t	h Editio	on, Pearso	on Education	n,
REFERENCE	E(S):					The second second		5
1. Brian He	inold, "Introduction to Programming Using	Pytho	on", M	ount	St. Mary	's Univers	sity, 2013,	
2. Michael I	Dawson, "Python Programming for the Abs	solute	Begin	nner",	3rd Edi	tion, 2010	,	, C
3. Allen Do Scientist	owney, Green Tea Press Needham, "Th ",Massachusetts.	hink I	Pytho	n, Ho	ow to T	hink Like	a Compute	ər
THE CALL AND A REAL AND A		uro C		d aditi	an Dear	non 201/		

Chairman - BoS Dept.of BME - ESEC

Chairman - BoS Dept. of CSE - ESEC

Department	Department BIOMEDICAL ENGINEERING					R 2019	Semester II	EEC
Course Code	Course Name	Ηοι	ırs / V	Veek	Credit	Total Hours 30	Maximum	
19TPS02	SOFT SKILLS – II	L	Т	Ρ	С		Marks	
		1	0	1	1.5		100	
<ul> <li>Course Objective</li> <li>Train the Stu</li> <li>Coach the st</li> <li>Develop Pression</li> <li>Develop Bus</li> <li>Teach import</li> </ul>	(s):The purpose of learning this c dents on Group Discussion Do's a udents on Interview Skills. sentation Skills. iness Etiquette. tance of Ethics and Values.	ourse is t and Don't	o s. C					
Course Outcomes Participate G Attend the int Present them Behave very Have good et Unit L GROU	<b>s:</b> At the end of this course, learned roup Discussion with Confidence terview with positive attitude by ha in very well by enhancing their Press well in official gathering and Meet thics and values in their Personal <b>PDISCUSSION</b>	ers will be by knowin wing Moo sentation ing by kno and Profe	able ng the k Inte Skills owing essior	to: erview I Etiqu nal Lif	and Tricl 's uette. e.	<s,< td=""><td></td><td>6</td></s,<>		6
GD skills - Underst Do's & Don'ts - M	anding the objective and skills te ock GD & Feedback.	sted in a	GD -	Gene	eral type:	s of GDs	- Roles in a GI	)-
Unit II INTER	VIEW SKILLS			- Aller				6
Interview handling	Skills - Self preparation checklist	- Groomiı	ng tips	s: do'	s & don'i	ts - mock	interview &	
Unit III PRESI	ENTATION SKILLS				1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1			6
Presentation Skills Engaging the audio	- Stages involved in an effective p ence - Time management - Mock	oresentat Present	ion - s ations	select	ion of to eedback	pic, conte	ent, aids -	<b>I</b>
Unit IV BUSIN	ESS ETIQUETTE							6
Grooming etiquette how to impress.	e - Telephone & E-mail etiquette -	Dining e	tique	tte - d	o's & Do	on'ts in a f	ormal setting -	
Unit V ETHIC	S							6
Ethics - Importance headlines	of Ethics and Values - Choices a	and Dilem	nmas	faced	- Discu	ssions fro	m news	
REFERENCE(S):			1.1	-	1987 - C.			Ť
<ol> <li>The Seven H</li> <li>All the books</li> <li>Man's search</li> <li>The greatest</li> <li>Goal - Eliyah</li> <li>Working with</li> <li>Excel in Engl</li> <li>Developing C</li> <li>Essentials of</li> <li>Effective Presentation</li> <li>Strategic intervence</li> </ol>	abits of Highly Effective People - in the "Chicken Soup for the Soul of for meaning - Viktor Frankl miracle in the world - OgMandino uGoldratt. Emotional Intelligence - David Go ish - Sundra Samuel, Samuel Put Communication Skills by Krishna M Effective Communication, Ludlow sentation Skills (A Fifty-Minute Se erviewing" byRichaurd Camp, Mar Pyt 1 td	Stephen " series. oleman. olications lohan and and Pan ries Book ry E. Viell	d Mee thon; ) by S haber	eraBa Pren Steve	nerji; Ma lice Hall Mandel Jack L. S	cMillan In of India. Simonetti	idia Ltd., Delhi - Published by	
12. "Effective Gro Brilhart.	oup Discussion: Theory and Prac	tice" by C	Gloria	J. Ga	alanes, k	Katherine	Adams , John	K.
Departmen	BIOMEDICAL ENGINEERI	NG				R 2019	Semester II	
---	---	----------------	--------	--------	---------	--------	---	
Course Cor	le Course Name	Hou	rs / V	Veek	Credit	Total	Maximum	
		L	Т	P	С	Hours	Marks	
19ES217	DEVICES AND CIRCUITS LABORATORY	0	0	2	1	30	100	
• Learn th	ective (s): The purpose of learning this course e characteristics of basic electronic devices su and the working of RL,RC and RLC circuits	is to ich a	s Dio	de, B.	JT,FET,	SCR		
ourse Out	comes: At the end of this course, learners will	be a	ble to	:				
<ul> <li>Analyze</li> </ul>	the characteristics of basic electronic devices							
Design	RL and RC circuits							
	Name of Exper	imer	nts			1.18		
1. Study o	f Electronic Components							
2. Measur	ement of AC Signal Parameter using CRO							
3. Charact	eristics of PN Junction Diode							
4. Charact	eristics of Zener Diode							
5. Measure	ement of Ripple factor of FWR& HWR							
6. Charact	eristics Common Emitter Configuration							
7. Charact	eristics Common Base Configuration							
8. FET Ch	aracteristics							
9. SCR Ch	aracteristics							
10. Frequer								
11. Solderin	cy Response of BJT and FET Amplifiers							
	ncy Response of BJT and FET Amplifiers g Practice using general purpose PCB.			Ċ				
ST OF EQU	ncy Response of BJT and FET Amplifiers g Practice using general purpose PCB. IPMENTS FOR A BATCH OF 30 STUDENTS							
ST OF EQU S.No	ncy Response of BJT and FET Amplifiers g Practice using general purpose PCB. IPMENTS FOR A BATCH OF 30 STUDENTS NAME OF THE EQUIPM	IENT					QUANTITY	
ST OF EQU S.No 1. BC	ncy Response of BJT and FET Amplifiers og Practice using general purpose PCB. IPMENTS FOR A BATCH OF 30 STUDENTS NAME OF THE EQUIPM 2 107, BC 148	IENT					QUANTITY 25	
ST OF EQU           S.No           1.           2.           2.	acy Response of BJT and FET Amplifiers og Practice using general purpose PCB. IPMENTS FOR A BATCH OF 30 STUDENTS NAME OF THE EQUIPM 2 107, BC 148 2646	IENT	-				QUANTITY 25 25	
ST OF EQU           S.No           1.           2.           3.	Acy Response of BJT and FET Amplifiers ag Practice using general purpose PCB. IPMENTS FOR A BATCH OF 30 STUDENTS NAME OF THE EQUIPM 2 107, BC 148 2646 W10	IENT					QUANTITY 25 25 25 25	
ST OF EQU           S.No           1.         BC           2.         2N           3.         BF           4.         1N	Acy Response of BJT and FET Amplifiers ag Practice using general purpose PCB. <b>IPMENTS FOR A BATCH OF 30 STUDENTS</b> <b>NAME OF THE EQUIPM</b> 2 107, BC 148 2646 W10 4007	IENT					QUANTITY 25 25 25 25 25	
ST OF EQU           S.No           1.         BC           2.         2N           3.         BF           4.         1N           5.         Ze	Acy Response of BJT and FET Amplifiers ag Practice using general purpose PCB. <b>IPMENTS FOR A BATCH OF 30 STUDENTS</b> <b>NAME OF THE EQUIPM</b> 2 107, BC 148 2646 W10 4007 ner Diodes	<b>NENT</b>					QUANTITY 25 25 25 25 25 25 25	
ST OF EQU           S.No           1.         BC           2.         2N           3.         BF           4.         1N           5.         Ze           6.         Res	Acy Response of BJT and FET Amplifiers ag Practice using general purpose PCB. <b>IPMENTS FOR A BATCH OF 30 STUDENTS</b> <b>NAME OF THE EQUIPM</b> 2 107, BC 148 2646 W10 4007 ner Diodes sistors, Capacitors, Inductors (sufficient quantit	<b>NENT</b>					QUANTITY 25 25 25 25 25 25 25 25	
ST OF EQU           S.No           1.         BC           2.         2N           3.         BF           4.         1N           5.         Ze           6.         Res           7.         Br	Acy Response of BJT and FET Amplifiers ag Practice using general purpose PCB. IPMENTS FOR A BATCH OF 30 STUDENTS NAME OF THE EQUIPM 2 107, BC 148 2646 W10 4007 ner Diodes sistors, Capacitors, Inductors (sufficient quantities ad Boards	<b>TENT</b>					QUANTITY 25 25 25 25 25 25 25 25 25 15	
ST OF EQU           S.No           1.         BC           2.         2N           3.         BF           4.         1N           5.         Ze           6.         Res           7.         Br           8.         CF	Acy Response of BJT and FET Amplifiers ag Practice using general purpose PCB. <b>IPMENTS FOR A BATCH OF 30 STUDENTS</b> <b>NAME OF THE EQUIPM</b> 2 107, BC 148 2646 W10 4007 ner Diodes sistors, Capacitors, Inductors (sufficient quantities ad Boards (O (30MHz)	ties)					QUANTITY 25 25 25 25 25 25 25 15 10	
ST OF EQU           S.No           1.         BC           2.         2N           3.         BF           4.         1N           5.         Ze           6.         Res           7.         Br           8.         CF           9.         Fu	Acy Response of BJT and FET Amplifiers ag Practice using general purpose PCB. IPMENTS FOR A BATCH OF 30 STUDENTS NAME OF THE EQUIPM 2 107, BC 148 2646 W10 4007 ner Diodes sistors, Capacitors, Inductors (sufficient quantities ad Boards 10 (30MHz) nction Generators (3MHz)	ties)					QUANTITY 25 25 25 25 25 25 25 25 15 10 10	
ST OF EQU           S.No           1.         BC           2.         2N           3.         BF           4.         1N           5.         Ze           6.         Res           7.         Br           8.         CF           9.         Fu           10.         Du	Acy Response of BJT and FET Amplifiers ag Practice using general purpose PCB. <b>IPMENTS FOR A BATCH OF 30 STUDENTS</b> <b>NAME OF THE EQUIPM</b> 2 107, BC 148 2646 W10 4007 ner Diodes sistors, Capacitors, Inductors (sufficient quantit ad Boards IO (30MHz) nction Generators (3MHz) al Regulated Power Supplies( 0-30V)	ties)					QUANTITY 25 25 25 25 25 25 15 10 10 10 10	
ST OF EQU           S.No           1.         BC           2.         2N           3.         BF           4.         1N           5.         Ze           6.         Res           7.         Br           8.         CF           9.         Fu           10.         Du           11.         So	Acy Response of BJT and FET Amplifiers ag Practice using general purpose PCB. <b>IPMENTS FOR A BATCH OF 30 STUDENTS</b> <b>NAME OF THE EQUIPN</b> 2 107, BC 148 2646 W10 4007 ner Diodes sistors, Capacitors, Inductors (sufficient quantil ad Boards RO (30MHz) nction Generators (3MHz) al Regulated Power Supplies( 0-30V) Idering Gun	ties)					QUANTITY 25 25 25 25 25 25 25 25 15 10 10 10 10 5	

C .0

C	nent	BIOWEDICAL ENG	INEER	ING			R 2019	Semester II
Cours	e	Course Name	Hou	rs / V	Veek	Credit	Total	Maximum
19ES2	220	ENGINEERING PRACTICES	L	T	P 2	C 1	30	100
Course C Pro equ Ga Dev cor Pro Dev Course C Fab Mal Pre Disi Mal 1. Form 2. Fabri 3. Makin 4. Prepa 5. Cons Gate pipes 6. Prepa	<b>Objective (s</b> ovide hands upment / too in the skills velop the sk nection ovide hands velop the sk <b>Dutcomes:</b> / oricate simple ke fitting join pare green mantle and ke simple m ning of simple ication of a simple are a "V" (or struct a hous way and T s, bend, gate are a green	): The purpose of learning this cours on training for fabrication of compo- ols. for making fitting joints and househo ills for preparing the green sand mo on training for dismantling and asse ills for making wood/sheet metal mo At the end of this course, learners w le components using carpentry, she assemble petrol engines, gear box odels using wood and sheet metal. <b>Name of Exp</b> e object in sheet metal using suitab simple component using thin and th component using carpentry power for ) Half round (or) Square joint from t sehold pipe line connect asse (or) Construct a pipe connect e valve, flanges and foot valve.	se is to onents u old pipe ould an embling odels u vill be a eet meta tions us ehold e and pu erimer ole tools ick plat tools. (I the give pipes, 7	using d to d to g of   sing ble t al an mps lectr mps s (Ex es. ( Exar en m Fee j f ho	carp e conr make petrol suita o: d we suitat ical c	entry, sl nections simple engines ble tools ble tools onnection e: Dust nple: Bo Pen state eel flat. Four wa application	neet meta using suit household s, gearbox uipment/to ons using Pan / Soa ok rack) nd/Tool bo y joint, elk on centrif	I and welding table tools. d electrical a and pumps. ools suitable tools p Box px/ Letter box. pow, union, benc
7. Dism 8. Dism a) b) 9. Mini-l	antling and antling and Preparatior Gas Weldir Project (Fab	assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- join of practice. prication of small components).	t patter p / Gea roke pe ts by E	n. r bo trol e lectr	x. engin ic Arc	e. Welding	g.	
7. Dism 8. Dism a) b) 9. Mini-I ST OF E	antling and antling and Preparatior Gas Weldir Project (Fab	assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- join og practice. prication of small components). S FOR A BATCH OF 30 STUDENT	t patter p / Gea roke pe ts by E TS	n. r bo: trol e lectr	x. engin ic Arc	e. :Weldin(	g.	
7. Dism 8. Dism a) b) 9. Mini- ST OF E S.No	antling and antling and Preparatior Gas Weldir Project (Fab QUIPMENT	assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- join of practice. SFOR A BATCH OF 30 STUDENT NAME OF THE EQUIF	t patter p / Gea roke pe ts by E TS PMENT	n. r bo: trol e lectr	x. engin ic Arc	e. Welding	g.	QUANTITY
7. Dism 8. Dism a) b) 9. Mini-I ST OF E S.No 1.	antling and antling and Preparatior Gas Weldir Project (Fab QUIPMENT Assorted co flexible pipe	assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- join of practice. For A BATCH OF 30 STUDENT NAME OF THE EQUIF Emponents for plumbing consisting as, couplings, unions, elbows, plugs	t patter p / Gea roke pe ts by E TS PMENT of meta s and o	n. r bo: trol e lectr allic p ther	x. ic Arc	e. : Welding , plastic s	g. pipes,	QUANTITY 15 sets
7. Dism 8. Dism a) b) 9. Mini-I ST OF E S.No 1. 2.	antling and antling and Preparatior Gas Weldir Project (Fab QUIPMENT Assorted co flexible pipe Carpentry V	assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- join of practice. S FOR A BATCH OF 30 STUDENT NAME OF THE EQUIP omponents for plumbing consisting es, couplings, unions, elbows, plugs /ice (fitted to work bench)	t patter p / Gea roke pe ts by E TS PMENT of meta s and o	n. r bo: trol e lectr allic p ther	x. engine ic Arc pipes fitting	e. Welding , plastic s	g. pipes,	QUANTITY 15 sets 15 Nos.
7. Dism 8. Dism a) b) 9. Mini-I ST OF E S.No 1. 2. 3.	antling and antling and Preparatior Gas Weldir Project (Fab QUIPMENT Assorted co flexible pipe Carpentry V Standard w	assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- join of practice. brication of small components). <b>S FOR A BATCH OF 30 STUDENT</b> <b>NAME OF THE EQUIF</b> perponents for plumbing consisting es, couplings, unions, elbows, plugs /ice (fitted to work bench) oodworking tools	t patter p / Gea roke pe ts by E TS PMENT of meta s and o	n. r bo: trol e lectr allic p ther	x. engin ic Arc pipes fitting	e. : Welding , plastic s	g. pipes,	QUANTITY 15 sets 15 Nos. 15 Sets.
7. Dism 8. Dism a) b) 9. Mini- <b>ST OF E</b> ( <b>S.No</b> 1. 2. 3. 4.	antling and antling and Preparatior Gas Weldir Project (Fab QUIPMENT Assorted co flexible pipe Carpentry V Standard w Models of ir	assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- join of practice. SFOR A BATCH OF 30 STUDENT NAME OF THE EQUIP omponents for plumbing consisting es, couplings, unions, elbows, plugs vice (fitted to work bench) oodworking tools	t patter p / Gea roke pe ts by E TS PMENT of meta s and o	n. r bo: trol e lectr allic p ther	x. engine ic Arc	e. Welding plastic s	g. pipes,	QUANTITY 15 sets 15 Nos. 15 Sets. 5 each
7. Dism 8. Dism a) b) 9. Mini-I ST OF E S.No 1. 2. 3. 4.	antling and antling and Preparatior Gas Weldir Project (Fab QUIPMENT Assorted co flexible pipe Carpentry V Standard w Models of ir Power Tool	assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- join of practice. brication of small components). <b>S FOR A BATCH OF 30 STUDENT</b> <b>NAME OF THE EQUIF</b> omponents for plumbing consisting es, couplings, unions, elbows, plugs vice (fitted to work bench) oodworking tools ndustrial trusses, door joints, furnitu s: (a) Rotary Hammer	t patter p / Gea roke pe ts by E TS PMENT of meta s and o	n. r bo. trol e lectr allic µ ther	x. engine ic Arc	e. Welding	g. pipes,	QUANTITY 15 sets 15 Nos. 15 Sets. 5 each 2Nos.
7. Dism 8. Dism a) b) 9. Mini-I ST OF EC S.No 1. 2. 3. 4.	antling and antling and Preparatior Gas Weldir Project (Fab QUIPMENT Assorted co flexible pipe Carpentry V Standard w Models of ir Power Tool	assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- join of practice. SFOR A BATCH OF 30 STUDENT NAME OF THE EQUIP omponents for plumbing consisting es, couplings, unions, elbows, plugs vice (fitted to work bench) oodworking tools ndustrial trusses, door joints, furnitu s: (a) Rotary Hammer (b) Demolition Hammer	t patter p / Gea roke pe ts by E TS PMENT of meta s and o	n. r bo. trol e lectr	x. engine ic Arc	e. Welding , plastic s	g. pipes,	QUANTITY 15 sets 15 Nos. 15 Sets. 5 each 2Nos. 2Nos. 2Nos.
7. Dism 8. Dism a) b) 9. Mini-I ST OF E S.No 1. 2. 3. 4. 5.	antling and antling and Preparatior Gas Weldir Project (Fab QUIPMENT Assorted co flexible pipe Carpentry V Standard w Models of ir Power Tool	sand mould using solid pattern/spin assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- join ag practice. brication of small components). <b>S FOR A BATCH OF 30 STUDENT</b> <b>NAME OF THE EQUIF</b> perponents for plumbing consisting of as, couplings, unions, elbows, plugs vice (fitted to work bench) oodworking tools industrial trusses, door joints, furnitu s: (a) Rotary Hammer (b) Demolition Hammer (c) Circular Saw (d) Planer	t patter p / Gea roke pe ts by E TS PMENT of meta s and o	n. r bo. trol e lectr	x. engine ic Arc	e. Welding	g.	QUANTITY 15 sets 15 Nos. 15 Sets. 5 each 2Nos. 2Nos. 2Nos. 2Nos. 2Nos. 2Nos.
7. Dism 8. Dism a) b) 9. Mini-I <b>ST OF E</b> <b>S.No</b> 1. 2. 3. 4. 5.	antling and antling and Preparatior Gas Weldir Project (Fab QUIPMENT Assorted co flexible pipe Carpentry V Standard w Models of ir Power Tool	sand mould using solid pattern/spin assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- join ag practice. prication of small components). <b>S FOR A BATCH OF 30 STUDENT</b> <b>NAME OF THE EQUIF</b> (mponents for plumbing consisting of es, couplings, unions, elbows, plugs vice (fitted to work bench) oodworking tools ndustrial trusses, door joints, furnitu s: (a) Rotary Hammer (b) Demolition Hammer (c) Circular Saw (d) Planer (e) Hand Drilling Machine & Jigsa	t patter p / Gea roke pe ts by E TS PMENT of meta s and o	n. r bo. trol e lectr allic p ther	x. engine ic Arc	e. Welding	g. pipes,	QUANTITY 15 sets 15 Nos. 15 Sets. 5 each 2Nos. 2Nos. 2Nos. 2Nos. 2Nos. Each 2Nos.
7. Dism 3. Dism a) b) 9. Mini <b>ST OF E</b> <b>S.No</b> 1. 2. 3. 4. 5. 6.	antling and antling and Preparatior Gas Weldir Project (Fab QUIPMENT Assorted co flexible pipe Carpentry V Standard w Models of ir Power Tool	sand mould using solid pattern/spin assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- join ag practice. brication of small components). <b>S FOR A BATCH OF 30 STUDENT</b> <b>NAME OF THE EQUIF</b> omponents for plumbing consisting of se, couplings, unions, elbows, plugs vice (fitted to work bench) oodworking tools ndustrial trusses, door joints, furnitu s: (a) Rotary Hammer (b) Demolition Hammer (c) Circular Saw (d) Planer (e) Hand Drilling Machine & Jigsa transformer with cables and holder	t patter p / Gea roke pe ts by E TS PMENT of meta s and o rre joint aw	n. r bo. trol e lectr	x. engine ic Arc	e. Welding	g.	QUANTITY 15 sets 15 Nos. 15 Sets. 5 each 2Nos. 2Nos. 2Nos. 2Nos. 2Nos. 2Nos. 5Nos.
7. Dism 8. Dism a) b) 9. Mini- <b>ST OF E</b> <b>S.No</b> 1. 2. 3. 4. 5. 5. 6.	antling and antling and Preparatior Gas Weldir Project (Fab QUIPMENT Assorted co flexible pipe Carpentry V Standard w Models of ir Power Tool Arc welding Welding boo	sand mould using solid pattern/spin assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- joint of practice. brication of small components). <b>S FOR A BATCH OF 30 STUDENT</b> <b>NAME OF THE EQUIF</b> mponents for plumbing consisting es, couplings, unions, elbows, plugs vice (fitted to work bench) oodworking tools industrial trusses, door joints, furnitu s: (a) Rotary Hammer (b) Demolition Hammer (c) Circular Saw (d) Planer (e) Hand Drilling Machine & Jigsa transformer with cables and holder oth with exhaust facility	t patter p / Gea roke pe ts by E TS PMENT of meta s and o	n. r bo. trol e lectr	x. engine ic Arc	e. Welding	g. pipes,	QUANTITY 15 sets 15 Nos. 15 Sets. 5 each 2Nos. 2Nos. 2Nos. 2Nos. Each 2Nos. 5Nos. 2 Nos. 2 Nos.
7. Dism 8. Dism a) b) 9. Mini- <b>ST OF EC</b> <b>S.No</b> 1. 2. 3. 4. 5. 6. 7. 8.	antling and antling and Preparatior Gas Weldir Project (Fab QUIPMENT Assorted co flexible pipe Carpentry V Standard w Models of ir Power Tool Arc welding Welding boo Welding acc	sand mould using solid pattern/spin assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- join ag practice. brication of small components). <b>S FOR A BATCH OF 30 STUDENT</b> <b>NAME OF THE EQUIF</b> mponents for plumbing consisting a se, couplings, unions, elbows, plugs vice (fitted to work bench) oodworking tools ndustrial trusses, door joints, furnitu s: (a) Rotary Hammer (b) Demolition Hammer (c) Circular Saw (d) Planer (e) Hand Drilling Machine & Jigsa transformer with cables and holder oth with exhaust facility cessories like welding shield, chippi	t patter p / Gea roke pe ts by E TS PMENT of meta s and o Ire joint aw rs	n. r bo. trol e lectr allic p ther s	x. engine ic Arc	e. Welding plastic s	g. pipes,	QUANTITY 15 sets 15 Nos. 15 Sets. 5 each 2Nos. 2Nos. 2Nos. 2Nos. 2Nos. 2Nos. 5Nos. 2 Nos. 5 Sets.
7. Dism 8. Dism a) b) 9. Mini- <b>ST OF E</b> <b>S.No</b> 1. <b>2.</b> 3. 4. 5. 6. 7. 8. 9.	antling and antling and Preparatior Gas Weldir Project (Fab QUIPMENT Assorted co flexible pipe Carpentry V Standard w Models of ir Power Tool Arc welding Welding boo Oxygen and	sand mould using solid pattern/spin assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- join ag practice. brication of small components). <b>S FOR A BATCH OF 30 STUDENT</b> <b>NAME OF THE EQUIF</b> mponents for plumbing consisting es, couplings, unions, elbows, plugs vice (fitted to work bench) oodworking tools ndustrial trusses, door joints, furnitu s: (a) Rotary Hammer (b) Demolition Hammer (c) Circular Saw (d) Planer (e) Hand Drilling Machine & Jigsa transformer with cables and holder oth with exhaust facility cessories like welding shield, chippi l acetylene gas cylinders, blow pipe	t patter p / Gea roke pe ts by E TS PMENT of meta s and o re joint aw rs ing han e and of	n. r bo. trol e lectr	x. engine ic Arc pipes fitting	e. Welding , plastic s	g. pipes, etc.	QUANTITY 15 sets 15 Nos. 15 Sets. 5 each 2Nos. 2Nos. 2Nos. 2Nos. Each 2Nos. 5Nos. 2 Nos. 5 Sets. 2 Nos.
7. Dism 8. Dism a) b) 9. Mini- <b>ST OF EC</b> <b>S.No</b> 1. 2. 3. 4. 5. 6. 7. 8. 9. 10.	antling and antling and Preparatior Gas Weldir Project (Fab QUIPMENT Assorted co flexible pipe Carpentry V Standard w Models of ir Power Tool Arc welding Welding boo Welding acc Oxygen and Centre lathe	sand mould using solid pattern/spin assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- join ag practice. brication of small components). <b>S FOR A BATCH OF 30 STUDENT</b> <b>NAME OF THE EQUIF</b> mponents for plumbing consisting a se, couplings, unions, elbows, plugs vice (fitted to work bench) oodworking tools ndustrial trusses, door joints, furnitu s: (a) Rotary Hammer (b) Demolition Hammer (c) Circular Saw (d) Planer (e) Hand Drilling Machine & Jigsa transformer with cables and holder oth with exhaust facility cessories like welding shield, chippi acetylene gas cylinders, blow pipe	t patter p / Gea roke pe ts by E TS PMENT of meta s and o rre joint aw rs ing han e and of	n. r bo. trol e lectr allic p ther s	x. engine ic Arc pipes fitting	e. Welding plastic s brush, ng outfit	g. pipes, etc. s	QUANTITY 15 sets 15 Nos. 15 Sets. 5 each 2Nos. 2Nos. 2Nos. 2Nos. 2Nos. 5Nos. 5 Sets. 2 Nos. 5 Sets. 2 Nos. 2 Nos. 2 Nos.
7. Dism 8. Dism a) b) 9. Mini- <b>ST OF E</b> <b>S.No</b> 1. <b>2.</b> 3. 4. 5. 6. 7. 8. 9. 10.	antling and antling and Preparatior Gas Weldir Project (Fab QUIPMENT Assorted co flexible pipe Carpentry V Standard w Models of ir Power Tool Arc welding Welding boo Welding acc Oxygen and Centre lathe	sand mould using solid pattern/spin assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- joint of practice. brication of small components). <b>S FOR A BATCH OF 30 STUDENT</b> <b>NAME OF THE EQUIF</b> (mponents for plumbing consisting of es, couplings, unions, elbows, plugs (ice (fitted to work bench)) oodworking tools industrial trusses, door joints, furnitu s: (a) Rotary Hammer (b) Demolition Hammer (c) Circular Saw (d) Planer (e) Hand Drilling Machine & Jigsa transformer with cables and holder oth with exhaust facility cessories like welding shield, chippi acetylene gas cylinders, blow pipe ace, anvil and smithy tools	t patter p / Gea roke pe ts by E TS PMENT of meta s and o re joint aw rs ing han e and of	n. r bo. trol e lectr allic p ther s	x. engine ic Arc pipes fitting	e. Welding , plastic s	g. pipes, etc. s	QUANTITY 15 sets 15 Nos. 15 Sets. 5 each 2Nos. 2Nos. 2Nos. 2Nos. Each 2Nos. 5Nos. 2 Nos. 5 Sets. 2 Nos. 2 Nos. 2 Nos. 2 Nos. 2 Nos. 2 Nos. 2 Sets.
7. Dism 8. Dism a) b) 9. Mini- <b>ST OF EC</b> <b>S.No</b> 1. 2. 3. 4. 5. 5. 6. 7. 8. 9. 10. 11.	antling and antling and Preparation Gas Weldir Project (Fab QUIPMENT Assorted co flexible pipe Carpentry V Standard w Models of ir Power Tool Welding boo Welding boo Welding acc Oxygen and Centre lathe Hearth furna	sand mould using solid pattern/spin assembly of Centrifugal Gear Pump assembly of two-stroke and four-str of butt joints, lap joints and T- join ag practice. brication of small components). <b>S FOR A BATCH OF 30 STUDENT</b> <b>NAME OF THE EQUIF</b> mponents for plumbing consisting a se, couplings, unions, elbows, plugs vice (fitted to work bench) oodworking tools ndustrial trusses, door joints, furnitu s: (a) Rotary Hammer (b) Demolition Hammer (c) Circular Saw (d) Planer (e) Hand Drilling Machine & Jigsa transformer with cables and holder oth with exhaust facility cessories like welding shield, chippi ace, anvil and smithy tools ble, foundry tools	t patter p / Gea roke pe ts by E TS PMENT of meta s and o ure joint aw rs ing han e and of	n. r bo. trol e lectr allic p ther s	x. engine ic Arc pipes fitting	e. Welding plastic s	pipes, etc. s	QUANTITY 15 sets 15 Nos. 15 Sets. 5 each 2Nos. 2Nos. 2Nos. 2Nos. 2Nos. 5Nos. 2 Nos. 5 Sets. 2 Nos. 2 Nos. 2 Nos. 2 Sets. 2 Sets. 2 Sets. 2 Sets.

Dept.of BME - ESEG

Course Code 19BS301		RING			14	R 2019	Semester III	BS
19BS301	Course Name	H	lours Wee	s / k	Credit	Total	Maximun	1
19BS301		L	Т	Р	C	Hours	Marks	
	APPLIED LINEAR ALGEBRA	3	1	0	4	60	100	
<ul> <li>Introduct</li> <li>Introduct</li> <li>Underst</li> <li>Underst</li> <li>Apply th</li> <li>Apply et</li> </ul>	ctive(s): The purpose of learning this course ce the system of linear equations and solve tand the concepts of vector space at and linear transformations and diagonalization he concept of inner product spaces in orthogo eigen values and eigen vectors in real life	e is to numer tion. gonaliz	rically atior	/. 1.			N.	
<ul> <li>Explain</li> <li>Explain</li> <li>Demonsion</li> <li>Demonsion</li> <li>simple f</li> </ul>	the fundamental concepts of system of line advanced algebra and their role in modern strate accurate and efficient use of advance strate their mastery by solving non - trivial p theorems about the statements proven by the	ar equ Mathe ed alge problem ne text.	ation mati braic ns rel	s and cs an tech lated	d their so d applied niques to the co	lutions d contexts ncepts ar	nd by proving	
Underst	tand the applications of eigen values and eigenvalues and eigen	gen ve	ctors	3				12
Direct method LU decompc	l: Gauss elimination method - Gauss-Jordar osition method - Cholesky decomposition m	n methe	od - - Rel	lterat axati	ive meth on Metho	ods: Gau od.	ss-Seidel meth	nod
Unit II V	ECTOR SPACES							12
ector spaces	and subspaces - Linear independence and	d depe	nder	nce -	Basis an	d Dimens	ion - Null	
Unit III L	INEAR TRANSFORMATION			1		and the second second		12
imilarity trans	sformation - Diagonalization - Orthogonal s	pace- i	matri	x of I	inear trai	nsformatio	on-Geometry o	of
Unit IV IN	INER PRODUCT SPACE			-				12
ner product The Cauchy	- Length and orthogonality - Orthogonal se Schwarz Inequality - The Gram Schmidt O ces.	ts - Or rthogoi	thog naliza	onal ation	projectio process	ns - Inner - Applicat	product spac tions of inner	es
roduct spac	PPLICATION OF EIGENVALUES AND EIG	GENVE	сто	ORS				12
roduct spac	igen vectors - Power method - Jacobi meth	nod for	sym	metri	ic matrix	- Quadric	surface.	
oroduct spac Unit V A ieneralized E								

5. Steven Chapra , Numerical Methods for Engineers, Tata McGraw Hill seventh Edition, 2015.

Chairman - BoS Dept.of BME - ESEC

Koom

Chairman - BoS Dept. of Maths - ESEQ3

Departme	It BIOMEDICAL ENG	INEERING	3			R 2019	Semester II	I ES
Course	Course Name	Hou	rs / \	Neek	Credit	Total	Maximu	m
Code	oourse Name	L	Т	Р	С	Hours	Marks	
19EE305	CIRCUIT THEORY	3	1	0	4	60	100	
Course Ob	ective (s):The purpose of learning this	course is to	0					
<ul> <li>Intro</li> <li>Impa</li> <li>Intro</li> <li>Educ</li> <li>Intro</li> </ul>	t knowledge on solving circuit equations uce the phenomenon of resonance in co ate on obtaining the transient response o uce Phasor diagrams and analysis of th	s using net oupled circ of circuits. ree phase	work cuits. circu	theore its	ems	Ľ,	1	
Course Ou	comes: At the end of this course, learned	ers will be	able	to:				_
<ul> <li>Anal</li> <li>Appl</li> <li>Anal</li> <li>Under</li> <li>Designation</li> </ul>	ze electrical circuits circuit theorems ze transients response of RL, RC and R rstand the concepts of single and three p n of tank circuit for given frequency and	LC Circuits phase circu analyze th	s uits ie cou	upled	circuits i	n series a	nd paralle1.	12
	BASIC CIRCUITS ANALYSIS		-					12
Resistive e	ments - Ohm's Law - Resistor, Inducto ant and node voltage-methods of analys	r, Capacito	or - se	eries a	and para	llel circuit	s-Kirchhoff's	laws
Unit II	NETWORK REDUCTION AND THEOR	EMS FOR	DC	CIRCI	UITS			12
Network re and Norton	uction: voltage and current division, so Theorems -Super position Theorem-Ma	ource tran aximum po	sform	nation- transf	-star del er theor	ta convei em- Reci	rsion. Theve procity Theor	enins rem-
Unit III	SINGLE AND THREE PHASE CIRCUIT	TS	-	-				12
three phas phasor diag Unit IV	3-wire and 4-wire circuits with star a am of voltages and currents-power mean RESONANCE AND COUPLED CIRCU	and delta o asurement ITS	conn three	ected e phas	loads, l e circuit	balanced s.	&un balanc	ed - 12
L and C ele and A.C. sir	nents-Transient response of RL, RC and usoidal input.	d RLC Circ	uits u	using I	Laplace	transform	for DC input	
Unit V	RESONANCE AND COUPLED CIRCUI	ITS						12
Series and inductance	arallel resonance-their frequency respo Coefficient of coupling-Tuned circuits-Si	onse-Qualit ingle tunec	ty fac	tor an uits.	d Bandv	vidth-Self	and mutual	
1. Josep 2010 2. Willia McGr 3. Charl McGr 4. Allan	h A. Edminister, MahmoodNahri, "Electr n H. HaytJr, Jack E. Kemmerly and Stev aw Hill publishers, edition, New Delhi, 20 as K. Alexander, Mathew N.O. Sadiku, "F aw Hill, 2013. H. Robbins, Wilhelm C. Miller, "Circuit A	ric circuits" ven M. Dur 013. Fundamen nalvsis Th	, Sch bin, ' tals c eorv	aum's 'Engin of Elec and P	s series, neering C ctric Circ Practice".	McGraw- Circuits Ar uits", Sec	Hill, New De nalysis", ond Edition,	dia.
2013. 2014	Grewal B.S., "Higher Engineering Mathe	ematics", 4	3rd I	Edition	n, Khanr	a Publish	ners, New De	elhi,
REFERENC	E(S):			62				
1. Chal	abarti A, "Circuits Theory (Analysis and	synthesis	), Dha	anpath	nRai& Se	ons, New	Delhi, 1999	1. j. j.
Z. Jega	Antiperson, R., Analysis of Electric Circuits	s, McGraw	v ⊓III, of Ind	ZUID lia Dut	Ltd. No	w Delhi 2	015	
4. Maha 2015	devan, K., Chitra, C., "Electric Circuits A	Analysis," F	Prenti	ice-Ha	all of Indi	a Pvt Ltd.	, New Delhi,	
5. Richa	rd C. Dorf and James A. Svoboda, "Intro Inc. 2015.	oduction to	Elec	ctric C	ircuits",	7th Editio	n, John Wiley	/ &
00113								

nan - BoS BME - ESEC

Department	BIOMEDICAL ENGIN	EERIN	G			R 2019	Semester III	ES
Course		Hou	rs / W	/eek	Credit	Total	Maximu	m
Code	Course Name	L	Т	Р	с	Hours	Marks	
19EC303	SIGNALS AND SYSTEMS	3	1	0	4	60	100	
Course Object     Underst     Apply Fo     Apply Fo     Apply D     Apply D	:tive (s): The purpose of learning this co and the concepts of. different types of s purier Series, Fourier Transform and La purier Transform and Laplace Transform TFT and Z Transform to Discrete Time TET and Z Transform to Discrete Time	ourse is t ignals a place Tr n to Con signals I TL sys	nd sy ansfo tinuo tems	stem: rm to us Tii	s Continuo me LTI s	ous Time ystems	signals	
Course Outco Categor Analyze Analyze Analyze Analyze Analyze	ize different types of signals and System Continuous Time signals using Fourier Continuous Time LTI systems using Fo Discrete Time signals using DTFT and Discrete LTI Systems using DTFT and	s will be ns Series, ourier Tr d Z Tran d Z Tran	able Fouri ansfo sform	to: er Tra rm ar	ansform a nd Laplac	and Lapla e Transfo	ce Transform rm	
Unit I CL	ASSIFICATION OF SIGNALS AND SY	STEMS	5		114 /44			12
Signals: Type	s of continuous and discrete time signa	ls - Clas	sifica	tion c	of CT and	DT signa	als - Basic	
Unit II AN	IALYSIS OF CONTINUOUS TIME SIG	NALS	oution	Turra	proportio			12
ourier series	for periodic signals - Fourier Transform	- prope	rties -	- Lap	lace Trar	sforms a	nd properties	
Unit III LIN	NEAR TIME INVARIANT CONTINUOU	STIME	SYST	EMS	1 Sec.			12
mpulse respon	nse - convolution integrals - Differential	Equation	on - F	ourie	r and Lap	blace tran	sforms in	15
	IALYSIS OF DISCRETE TIME SIGNAL	.S	aner.		1	Steles de	the second second	12
ow Pass Sam	pling Theorem - Fourier Transform of c	liscrete	time s	signa	ls (DTFT)	) - Proper	ties of DTFT -	Z
Unit V LIN	VEAR TIME INVARIANT - DISCRETE	TIME SY	STE	MS	_	1.1		12
mpulse respor Analysis of Red	nse - Difference equations-Convolution cursive & Non-Recursive systems-DT s	sum- Di ystems	screte	e Fou ected	rier Tran in series	sform and and para	l Z Transform llel.	
FEXTBOOK(S	):	1.44						
1. Oppenhei Education	m, Alanv., Willsky, Alan S, and Hamid N , New Delhi, 2014, ISBN :97812920259	Nawab S 102,	6, Sigr	nals &	& System	s, 2nd Ed	ition, Pearson	
2. Haykin, Si 2007, ISB	mon and Barry Van Veen, Signals and N: 9788126512652	System	s, Joh	n Wil	ey & Sor	is, 2nd Ec	lition, NewYor	k,
REFERENCE(	S):		5.8	10	404		al stadio en la	
1. Roberts, M	1.J, Signals And Systems Analysis Usir	g Trans	form	Meth	od and M	latlab, 2nd	d Edition, Tata	6.
McGraw-H		80681						
2 Schaum's	Outline of Signals and Systems 3rd Fo	lition .20	)13					

Doparatione	BIOMEDICAL ENGINEER	ING					R 2019	Semes	ter III	P
Course	Course Name	Ho	ırs ek	1	Cred	it	Total	Ma	ximur	n
Code	Course Name	Ļ.	۲ <sup>©</sup>	Ρ	С		Hours	M	larks	
19BM301	ANATOMY AND HUMAN PHYSIOLOGY	3	0	0	3		45		100	
<ul> <li>Identify</li> <li>Underst</li> <li>Demonst</li> </ul>	all the organelles of an animal cell and their fu and structure and functions of the various typ strate their knowledge of importance of anatol	unction les of s mical f	i. Syst	tem: ures	s of hu and p	ma hys	n body. siology of	human	systei	ns
<ul> <li>Student</li> <li>Student</li> <li>Student</li> <li>Student</li> </ul>	omes: At the end of this course, learners will s would be able to explain basic structure and s would be learnt about anatomy and physiol s would be able to explain interconnect of var	be able d funct ogy of ious s	e to on var /ste	o: s of rious ems	cell s syste	ms	of huma	n body		
Unit I Cl	ELL AND TISSUE STRUCTURE									9
Structure of C	ell - structure and functions of sub organelle ction Potential - Cell to Cell Signaling - Cell I	es - Ce		Viem	ibrane	-I	ransport	ofAcros	ss Cel	l ons
Unit II SI	KELETAL, MUSCULAR AND RESPIRATOR	YSYS	TE	MS	000				unou	9
Skeletal::Type and function - Respiratory S	es of Bone and function - Physiology of Bone Types of cartilage and function. Muscular: P vstems - Types of respiration - Mechanisms	e forma arts of ofBre	atio M ath	on – I uscl	Divisio e -Mo - Regu	n c /en ilat	of Skeleto nents. Re ion of Re	on -Type espirator espiratio	es of jo y: Par n	ts (
Unit III C	ARDIOVASCULAR AND LYMPHATIC SYST	EMS						- Former and		-
Cardiovascula Conducting S ressel - Regula	ar: Components of Blood and functions Blo ystem of Heart - Properties of Cardiac Muse ation of Heart rate and Blood pressure. Lymp	ood Gr cle - C hatic:	ou arc Pai	ps a liac rtsar	nd im Cycle nd Fur	oor - H	tance - S leartBea ons of Ly	Structure t - Type: mphatic	eof He s of B syste	ear loc
Cardiovascula Conducting Sy ressel - Regula Types of Lym Unit IV NE Vervous: Cella Brain: Parts o Merves - Au Drgans: Eve	ar: Components of Blood and functions Blo ystem of Heart - Properties of Cardiac Muse ation of Heart rate and Blood pressure. Lymp phatic organs and vessels ERVOUS AND ENDOCRINE SYSTEMS AND s of Nervous systems - Types of Neuron a f Brain - Spinal Cord - Tract and Pathways tonomic Nervous systems and its functions and Ear	ood Gr cle - C hatic: <b>D SEN</b> nd Sy s of Sp s. End	ou arc Par SE nap	ps a liac rtsar OR oses es - ine-	nd im Cycle nd Fur <b>GANS</b> s - Me Refle Pituit	ctic	tance - S leartBea ons of Ly anisms c lechanis and thy	Structure t - Types mphatic f Nerve m - Clas roid glar	eof He s of B syste impu ssifica nd, Se	9 eart loo ms 9 lse tio ens
Cardiovascula Conducting Sy ressel - Regula Types of Lym Unit IV NE Vervous: Cella Brain: Parts o of Nerves - Au Organs: Eye a Unit V DI	ar: Components of Blood and functions Blo ystem of Heart - Properties of Cardiac Muse ation of Heart rate and Blood pressure. Lymp phatic organs and vessels ERVOUS AND ENDOCRINE SYSTEMS AND s of Nervous systems - Types of Neuron a f Brain - Spinal Cord - Tract and Pathways tonomic Nervous systems and its functions and Ear GESTIVE AND URINARY SYSTEMS	ood Gr cle - C hatic: <b>D SEN</b> nd Sy s of Sp s. End	oup arc Par SE nap bine ocr	ps a liac rtsar OR oses es - ine-	nd im Cycle nd Fur GANS s - Me Refle Pituit	ctic	tance - S leartBea ons of Ly anisms c lechanis and thy	Structure t - Type: mphatic f Nerve m - Clas roid glar	eof He s of B syste impu ssifica	9 eart loo ms 9 lse stio ens 9
Cardiovascula Conducting S vessel - Regula Types of Lym Unit IV NI Nervous: Cella Brain: Parts o ofNerves - Au Organs: Eye a Unit V DI Digestive: Orga Mechanisms EXT BOOK(S 1. Prabhjot P 2. Elaine.N. New Delh	ar: Components of Blood and functions Blo ystem of Heart - Properties of Cardiac Music ation of Heart rate and Blood pressure. Lymp phatic organs and vessels <b>ERVOUS AND ENDOCRINE SYSTEMS AND</b> s of Nervous systems - Types of Neuron a f Brain - Spinal Cord - Tract and Pathways tonomic Nervous systems and its functions and Ear <b>GESTIVE AND URINARY SYSTEMS</b> ans of Digestive system - Digestion and Abso of Urine formation - Regulation of Blood pres <b>S):</b> Kaur. Text Book of Anatomy and Physiology. Marieb , Essential of Human Anatomy and i, 2007	ood Gr cle - C hatic: D SEN nd Sy s of Sp s. End orption ssure I Lotus I Physic	SE Date Date Date Date Date Date Date Date	ps a diac rtsar OR oses es - ine- ine- Urin Urin blish	GANS GANS S - Me Refle Pituit y: Stru ary Sy ers. 20 Eight I	cha cha cha cha cha cha cha cha cha cha	tance - S leartBea ons of Ly anisms c lechanis and thy ure of Kid m- Urina	Structure t - Types mphatic f Nerve m - Clas roid glar ney and ry reflex	eof He s of B syste impu ssifica nd, Se Neph	9 art loo ms 9 lse tio ens 9 ron
Cardiovascula Conducting Sy vessel - Regula Types of Lym Unit IV NE Vervous: Cella Brain: Parts of Stain: Parts of Merves - Au Organs: Eye a Unit V DI Digestive: Orga Mechanisms EXT BOOK(S 1. Prabhjot P 2. Elaine.N. New Delh CEFERENCE(	ar: Components of Blood and functions Blo ystem of Heart - Properties of Cardiac Muse ation of Heart rate and Blood pressure. Lymp phatic organs and vessels <b>ERVOUS AND ENDOCRINE SYSTEMS AND</b> s of Nervous systems - Types of Neuron a f Brain - Spinal Cord - Tract and Pathways tonomic Nervous systems and its functions and Ear <b>GESTIVE AND URINARY SYSTEMS</b> ans of Digestive system - Digestion and Abso of Urine formation - Regulation of Blood pres <b>S</b> : (aur. Text Book of Anatomy and Physiology. Marieb , Essential of Human Anatomy and i, 2007 <b>S</b> ):	ood Gr cle - C hatic: D SEN nd Sy s of Sp s, End orption ssure I Lotus I Physic	SE Daro SE Daro SE Daro SE Daro Daro Daro Daro Daro Daro Daro Daro	ps a diac rtsar OR oses es - ine- ine- Urin Urin	and im Cycle nd Fur <b>GANS</b> s - Me Refle Pituit ry: Stru ary Sy ers. 20 Eight F	chack N ary	tance - S leartBea ons of Ly anisms c lechanis and thy ure of Kid m- Urina	Structure t - Types mphatic f Nerve m - Clas roid glar ney and ry reflex	eof He s of B syste impu ssifica nd, Se Neph	9 arl loo ms 9 lse tio ens 9 ror
Cardiovascula Conducting S vessel - Regula Types of Lym Unit IV NI Nervous: Cella Brain: Parts o of Nerves - Au Organs: Eye a Unit V DI Digestive: Orga Mechanisms EXT BOOK(S 1. Prabhjot H 2. Elaine.N. New Delh EFERENCE( 1. Frederic H Pearson F 2. Gillian Po Sciences	ar: Components of Blood and functions Blo ystem of Heart - Properties of Cardiac Music ation of Heart rate and Blood pressure. Lymp phatic organs and vessels <b>ERVOUS AND ENDOCRINE SYSTEMS AND</b> s of Nervous systems - Types of Neuron a f Brain - Spinal Cord - Tract and Pathways tonomic Nervous systems and its functions and Ear <b>GESTIVE AND URINARY SYSTEMS</b> ans of Digestive system - Digestion and Abso of Urine formation - Regulation of Blood pres <b>S):</b> Kaur. Text Book of Anatomy and Physiology. Marieb , Essential of Human Anatomy and i, 2007 <b>S):</b> d. Martini, Judi L. Nath, Edwin F. Bartholomev Publishers, 2014 cock, Christopher D. Richards, The human B , Oxford University Press, USA, 2013	ood Gr cle - C hatic: <b>D SEN</b> nd Sy s of Sp s. End orption ssure I Physic	SE nappine Docr Dut Put log	ps a diac rtsar OR pses es - ine- rinar Urin Urin blish gy  , I	and im Cycle nd Fur <b>GANS</b> s - Me Refle Pituit y: Stru ary Sy ers. 20 Eight E tals of ductio	chack Mary ctic chack Mary ste	tance - S leartBea ons of Ly anisms of Aechanis and thy ure of Kid m- Urina ion, Pear atomy ar	Structure t - Types mphatic f Nerve m - Clas roid glar ney and ry reflex rson Edu	eof He s of B syste impu ssifica nd, Se Neph ucation	9 earl loo ms 9 lse tio ens 9 ror
Cardiovascula Conducting Syvessel - Regula Types of Lym Unit IV NE Nervous: Cella Brain: Parts of SofNerves - Au Organs: Eye a Unit V DI Digestive: Orga Mechanisms FEXT BOOK(S 1. Prabhjot H 2. Elaine.N. New Delh REFERENCE( 1. Frederic H Pearson F 2. Gillian Poo Sciences 3. William F. 4. Eldra Pea 2015	ar: Components of Blood and functions Blo ystem of Heart - Properties of Cardiac Muse ation of Heart rate and Blood pressure. Lymp phatic organs and vessels <b>ERVOUS AND ENDOCRINE SYSTEMS AND</b> s of Nervous systems - Types of Neuron a f Brain - Spinal Cord - Tract and Pathways tonomic Nervous systems and its functions and Ear <b>GESTIVE AND URINARY SYSTEMS</b> ans of Digestive system - Digestion and Abso of Urine formation - Regulation of Blood pres <b>S):</b> (aur. Text Book of Anatomy and Physiology. Marieb , Essential of Human Anatomy and i, 2007 <b>S):</b> 1. Martini, Judi L. Nath, Edwin F. Bartholomev Publishers, 2014 cock, Christopher D. Richards, The human B , Oxford University Press, USA, 2013 Ganong, Review of Medical Physiology  , 22 rl Solomon, Introduction to Human Anatom	ood Gr cle - C hatic: <b>D SEN</b> nd Sy s of Sp s. End orption ssure I Lotus I Physic w, Fun ody - A 2nd Ed y and	oup arc Par SE Docr Docr Docr Docr Docr Docr Docr Docr	ps a diac rtsar OR pses es - ine- ine- ine- ine- ine- ine- ine- ine	and im Cycle nd Fur GANS s - Me Refle Pituit ry: Stru ary Sy ers. 20 Eight B tals of ductio	cha cha cha cha cha ry nctu ste 014 Edit An n fc v H V.E	tance - S leartBea ons of Ly anisms of lechanis and thy ure of Kid m- Urina ion, Peal atomy ar or Biomed bill, New I 3. Saund	Structure t - Types mphatic f Nerve m - Clas roid glar ney and ry reflex rson Edu dical and Delhi, 20 ers Com	eof He s of B syste impu ssifica nd, Se Neph ucation ology. d Heal	9 eart loo ms 9 lse ens 9 ron

Chairman - BoS Dept.of BME - ESEC

Department	BIOMEDICAL ENGINEE	RING		1		R 2019	Semester III PC
Course	Course Name	Ηοι	irs /	Week	Credit	Total	Maximum
Code	Course Name	L	т	Р	С	Hours	Marks
19BM302	PATHOLOGY AND MICROBIOLOGY	3	0	0	3	45	100
Course Object	tive (s):The purpose of learning this course	e is to		eta, deg de		And a second	
<ul> <li>Attain ki health o</li> <li>Learn th</li> <li>Gain aw</li> <li>Impart k</li> <li>Gain the</li> <li>Gain the</li> <li>Course Outco</li> <li>Illustrate</li> <li>Demons</li> <li>Comprel</li> <li>Explain t</li> <li>Interpret to confin</li> </ul>	nowledge on the structural and functional a f living organisms, e fluid and hemodynamic disturbances in the areness and knowledge of infectious and lif nowledge on microscopy and staining techne knowledge on the immune system and rela- omes: At the end of this course, learners will the different types of Cell degeneration, ho trate the different pathologic conditions rela- hend about the normal flora, structure and id the functioning and use of various microsco the response of human body when a micro- m the presence of microbe.	aspec le boo le style niques ated d l be a l be a ow and ted to dentifi pes a obe e	ts of ly, e dis isord ble to ble to the catio nd st nters	micro eases lers. body f n of b aining the h	organis , ets repa fluids, acteria. , technic iuman s	aired, ques system ar	nterferes with the
			1.4				
Cell Injuryaccumulations, differentiation,Malignant tumoUnit IIFLEdema, Hyper embolism, infa Leukemia's, LyUnit IIIMIStructure of Ba Morphological	Pathological calcification – Dystrophic an Inflammation and Repair including fractur ors, carcinogenesis, spread of tumors Autop UID AND HEMODYNAMIC DERANGEME emia/Ischemia, normal homeostasis, thror rction, shock, Chronic venous congestion mphomas Haemorrhage. CROBIOLOGY acteria and Virus. Routes of infection and features and structural organization of ba	ell inj id Me ie hea osy an NTS mbosi i. Her spre acteria	ury tasta aling, d bio s, di natol ad; e	and I tic. C Neop psy. ssemi ogical endog d viru	nated i disord	s, Apopto adaptation Classifica ntra vasc ers – Blo and exog	ssis, Intracellular ns of growth and tion, Benign and 9 sular coagulation, eeding disorders, 9 enous infections, identification of
bacteria , cultu bacteria, fungi,	re media and its types , culture technique protozoal, virus and helminthes.	s and	obs	ervati	on of c	ulture. Di	sease caused by
Unit IV MI	CROSCOPES						9
Light Microscop Preparation of staining.	pe – Bright field, dark field, phase contrast, samples for electron microscope. Staini	fluore ng m	escer etho	nce, E ds –	lectron simple,	Microsco gram s	pe (TEM& SEM). taining and AFB
Unit V IM	MUNOPATHOLOGY						9
Natural and a opsonization, p Immune disord reactions, imm monoclonal ant	ntificial immunity, types of Hypersensitive hagocytosis and inflammation, Secondary ers: Basic concepts and classification, SLE nunological techniques: immune diffusio ibodies.	vity, a immu E. Ant n, im	node ibodi imun	ody a ficien es an o ele	nd cel cy inclu d its ty ectropho	l mediate ding HIV pes, antig presis, F	ed tissue injury: infection. Auto – gen and antibody IA and ELISA,
TEXT BOOK(S				-			
1. Ananthana 10th editio	arayanan & Panicker, "Textbook of Microbio n, 2017.	logy",	Univ	ersity	press (	India) Pri	vate Limited,
2. Volley Jivi, York, 10th	Edition, 2017		Dest	lology	. McGra	aw Hill Ec	ucation, New
3. Taisi 100	ian, Textbook of Pathology 8th Edition, Ja	ypee	BLOT	iers IV	iedical	Publisher	s (P) Ltd., 2018.



## **REFERENCE(S):**

- 1. Prescott, Harley and Klein, "Microbiology", 10th edition, McGraw Hill, 2017
- 2. Dubey RC and Maheswari DK. "A Text Book of Microbiology" Chand & Company Ltd, 2007.
- Ramzi S Cotran, Vinay Kumar & Stanley L Robbins, "Pathologic Basis of Diseases", 7th edition, WB Saunders Co. 2005.
- 4. Churchill Livingstone "Underwood JCE: General and Systematic Pathology", 3rd edition, 2000.

Chairman - BoS Dept.of BME - ESEC

Department	BIOMEDICAL ENGINE	ERING	G			R 2019	Semester III M
Course		Hou	rs / V	Veek	Credit	Total	Maximum
Code	Course Name	L	Т	Р	с	Hours	Marks
19MC301	INDIAN CONSTITUTION	1	0	0	0	30	100
<ul> <li>Underst perspect</li> <li>Address entitlem Indian n</li> <li>Address and its i</li> <li>Course Outco</li> <li>Discuss Gandhi</li> <li>Discuss social re</li> <li>Discuss the lead adult and</li> </ul>	and the premises informing the twin the tive, is the growth of Indian opinion regarding ent to civil and economic rights as well as ationalism, is the role of socialism in India after the compact on the initial drafting of the Indian Comes: At the end of this course, learners were the growth of the demand for civil rights in Indian politics. the intellectual origins of the framework forms leading to revolution in India. the circumstances surrounding the four- ership of Jawaharlal Nehru and the event	hemes moder s the e commer Constitu will be in Ind of arg dation ual fail	of I rn Incemergencem ution. able to ia for umer of the ure o	iberty dian i lence ent o co: the t the t that e Cor f the	and free ntellectua of nation f the Bo pulk of Ir pulk of Ir t informe ngress S proposal	eedom fro als' const nhood in t shevik Ro ndians be ad the cor ocialist P of direct	om a civil rights itutional role and the early years of evolution in 1917 fore the arrival of nceptualization of arty [CSP] under elections through
<ul><li>adult sut</li><li>Discuss</li></ul>	ifrage in the Indian Constitution. the passage of the Hindu Code Bill of 195	56.					
Unit I IN	TRODUCTION						5
History of India Constitution – I	an Constitution – Drafting Committee, (C Preamble – Salient Features	Compos	sition	& W	'orking) -	- Philoso	phy of the Indian
Unit II CO	ONTOURS OF CONSTITUTIONAL RIGH	TS AN	D DU	TIES			5
Fundamental F of Religion – C State Policy – I	≀ights – Right to Equality – Right to Freed Sultural and Educational Rights – Right t Fundamental Duties.	dom – I o Cons	Right stituti	agair onal l	nst Explo Remedie	itation – I s – Direc	Right to Freedom tive Principles of
Unit III OF	GANS OF GOVERNANCE	and the second s			· · · · · · · · · · · · · · · · · · ·		5
Parliament – 0 President – Go – Powers and I	Composition – Qualifications and Disqu vernor – Council of Ministers – Judiciary, <sup>-</sup> unctions.	ualificat Appoir	tions ntmer	– Po nt and	owers ar d Transfe	nd Functi er of Judg	ons Executive – es, Qualifications
	ATE GOVERNMENT AND ITS ADMINIS	TRATI	ON				5
Governor: Role	and Position, CM and Council of minist	ters, S	tate \$	Secre	tariat: O	rganizatio	on, Structure and
Unit V LO	CAL ADMINISTRATION				10	8	5
District's Admir Representative officials and th (Different depa democracy	istration head: Role and Importance, - Mu , CEO of Municipal Corporation – Pacha neir roles, CEO ZilaPachayat: Position rtments) – Village level: Role of Elected	unicipa ayati ra and ro and A	ilities aj: Int ple – ppoir	Intro roduc Bloc ited c	oduction, otion, PR ok level: officials –	Mayor ar I: ZilaPao Organiza Importar	nd role of Elected chayat – Elected ational Hierarchy nce of grass root
Unit VI EL	ECTION COMMISSION	-		-	and the second	- fin in	
Election Comm	ission: Role and Functioning, Chief Ele	ction (	Comn	nissic	ner and	Election	Commissioners.
State Election (	Commission: Role and Functioning, Instit	tute an	d Bo	dies t	for the w	elfare of	SC/ST/OBC and
women							

Chairman - BoS Dept.of BME - ESEC

# TEXT BOOK(S):

1. "The Constitution of India", 1950 (Bare Act), Government Publication,

2. Dr. S. N. Busi, "Dr. B. R. Ambedkar Framing of Indian Constitution", 1st Edition, 2016.Ava Publishers,

3. M. P. Jain, "Indian Constitution Law", 7th Edn, Lexis Nexis, 2014.

**REFERENCE(S):** 

1. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

d.d Chairman - BoS Dept.of BME - ESEC

Date 4 - Brain To Junio

Department	BIOMEDICAL ENGINE	ERING	G		12.	R 2019	Semester III E	EEC
Course	Course Name	Hou	rs / \	Neek	Credit	Total	Maximum	- C
Code		L	T	Ρ	С	Hours	Marks	
19TPS03	QUANTITATIVE APTITUDE AND LOGICAL REASONING – I	2	0	0	0	30	100	
Course Object	tive (s): The purpose of learning this cou	rse is	to					
<ul> <li>Crack ap</li> </ul>	titude assessment by using speed math o	concep	ts.					
<ul> <li>Solve pro</li> </ul>	blems using fast track method by learning	g simp	lifica	tion a	nd numb	ers.		
Learn the	e basic of ratio and proportion and mixture	e conce	epts.			8	14	
Calculate	e different ways of solving problems on av	erage	and	ages.				
Learn the	e logical skills by analyzing the objects.	will be	able	o to:				
Solve the	ones. At the end of this course, learners	WIII DE	able	3 10.				
Crack the	a question with speed and accuracy.	simplif	icatio	on and	numbe	rs system.		
<ul> <li>Solve mo</li> </ul>	est of the aptitude topics by knowing ratio	and pr	opor	tion to	pics with	allegation	and start the sold	
<ul> <li>Solve the</li> </ul>	problems on average and ages by using	logica	Iway	/ of ap	proach.			
<ul> <li>Develop</li> </ul>	their logical thinking.				her sta	i hiyan	and the state	
UNIT 1 SP	EED MATHS AND NUMBER SYSTEMS		-					6
SPEED MATH	S: Square and square roots - Square for	numbe	ers fro	om 31	to 50. F	inding squ	ares of number	S
between 81 to	100. Cubes and cubes roots.							
NUMBER SYS	TEMS: Numbers and types of Numbers -	- Prope	erties	of N	umbers -	Face value	e and place	
value - Divisib	ility rules - Concept on unit digit and rem	nainde	er the	eorem				
UNIT 2 SIN	PLIFICATIONS & PROBLEMS ON NUM	/BERS	S		-17-17	11.81	1	6
SIMPLIFICATI	ONS: BODMAS rule - Application of alge	braic f	ormu	lae -S	Simplifica	tion of dec	cimal fraction &	
mixed fraction	- Continued fraction and its simplification	on - Re	curr	ina de	cimals.			
PROBLEMS O	N NUMBERS: Set of numbers - Assume	the un	knov	vn nu	mbers ar	nd form ea	uations	
UNIT 3 RA	TIO & PROPORTION, ALLIGATIONS &	ΜΙΧΤΙ	JRE					6
RATIO AND PI	ROPORTION: Ratio between two or more	e perso	ons -	Misce	llaneous	s problems	i.	
ALLIGATIONS	ANS MIXTURES: Definition - Allegation	rule -	Mear	n valu	e (or cos	st price) of	the mixture - Si	ix
golden rules to	solve problems on mixture - Removal a	among	the	quant	ities mo	re than two	o.	
UNIT 4 AV	ERAGES & PROBLEM ON AGES							6
AVERAGES: A	verage from total -Total from the average	e - Mis	cella	neous	s probler	ns.	and an all the second	1
PROBLEMS O	N AGES: Ages - Persons in Past - Prese	ent - Fi	uture	. Misc	ellaneou	is problem	1.	
UNIT 5 AN	ALOGY & MIRROR & WATER IMAGES	ano a 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 - 1910 -						6
ANALOGY: Stu	udy and topic relationship - Worker and t	ool rel	ation	ship -	Tool an	d action re	elationship - Wo	ork
and working p	lace - Worker and product - Product a	nd rav	v ma	terial	s - Instr	ument and	d measuremen	t -
Quantity and u	unit - Animals and young ones - Male a	and fe	male	).				
MIRROR IMAG	ES AND WATER IMAGES: Letter inverte	ed - Ol	bject	invert	ed.			
REFERENCE(	S):	1.7						
1. Abhiiit G	uha, Quantitative Aptitude for Competitive	Exam	ninati	ons. F	ourth Ec	lition. Tata	McGraw-Hill	
Publishir	a Company I to 2012	/ L/tdil	maaa	0110, 1	ourur Ec	inion, ruce	inicalan rim	
2 Arun Sha	arma. How to prepare for Data Interpretati	ion for	the (		First Edit	ion Tata M	AcGraw-Hill	
Publishir	ng Company Ltd, 2012.		une c	57(1,1	not Luit	ion, rata r		
3. R.V.Prav	een," Quantitative Aptitude and Reasonir	ng" Thi	rd Ec	lition,	PHI Lea	rning, 201	6.	
4. Dr.R S A Ltd, 2017	ggarwal, Quantitative Aptitude, Revised a 7.	and En	large	ed Edi	tion, S.C	hand Publ	ishing Company	y
5. Arun Sha	arma "How to Prepare for Quantitative Apt	itude"	Eiaht	Editio	n, McGr	aw Hill Ed	ucation. 2018.	
6. "Reasoni	ing and Aptitude" for GATE and ESE Preli	ims, M	ade	Easy	Publicati	on, 2020.		
					2			



Departme	ent BIOMEDICAL ENGINE	ERING				R 2019	Semester III	PC
Course		Hour	s / V	/eek	Credit	Total	Maximun	1
Code	Course Name	L	т	Р	С	Hours	Marks	
19BM30	PATHOLOGY AND MICROBIOLOGY LABORATORY	0	0	2	1	30	100	
<ul> <li>Practic</li> <li>Practic</li> <li>Practic</li> <li>Studer</li> <li>Have</li> <li>Acquir</li> <li>1. Urine</li> <li>Acquir</li> <li>1. Urine</li> <li>2. Study</li> <li>3. Histop</li> <li>4. Manual</li> <li>5. Cryo p</li> <li>6. Basic</li> <li>7. Special</li> <li>8. Capsu</li> <li>9. Antige</li> <li>10. Slides</li> <li>11 Haem</li> </ul>	ce on chemical examinations, Cryoprocessing, utcomes: At the end of this course, learners wi nt can perform practical experiments on tissue knowledge about basic concepts of infection ar re the fundamental knowledge of structure of Ba Name of Exper- physical and chemical examination of parts of compound microscope bathological slides of benign and malignant turn al paraffin tissue processing and section cutting processing of tissue and cryosectioning (demor staining – Hematoxylin and eosin staining al stains – cresyl fast Blue (CFV)- Trichrome – ule , Simple, AFB and Gram stain en-Antibody reaction Immuno electrophoresis s of malarial parasites, micro filaria and leishma patology slides of apemia and leukomia	Histop ill be al proces nd imm acteria erimen nours. g (demo nstratio ojl red niadon	atho ble to sing unity , viru ts onst n) O -	logic c: cryc of the s an ration PAS	al exami oprocess ne huma d its cau	nations ing, staini n body, se.	ng Processes	
12. Study	of bone marrow charts	F0					s. 10	
S No		DMEN.	r				QUANTIT	~
1 1	UV-Vis Spectrophotometer						01	a
2 (	Colorimeter	-					02	
3 1	Electronic Weighing balance	1	-				01	-
4. (	Optical Microscope						01	
5. 0	Centrifuge	-				-	01	
	Chrosectioning						01	
6. 0							01	
6. ( 7. H	Hot Air Oven						01 01 01 01	
6. ( 7. H 8. H	Hot Air Oven		1				01 01 01 01 01	
6. ( 7. H 8. H 9. A	Hot Air Oven Incubator Autoclave	-	1				01 01 01 01 01 01	
6. (0 7. H 8. H 9. A 10. F	Hot Air Oven Incubator Autoclave Fridge						01 01 01 01 01 01 01	
6.         0           7.         H           8.         I           9.         A           10.         F           11.         F	Hot Air Oven Incubator Autoclave Fridge PH Meter	4					01 01 01 01 01 01 01 01	
6. ( 7. H 8. H 9. A 10. F 11. F 12. H	Hot Air Oven Incubator Autoclave Fridge PH Meter Homogeniser						01 01 01 01 01 01 01 01 01	
6.       0         7.       H         8.       I         9.       A         10.       F         11.       F         12.       H         13.       M	Hot Air Oven Incubator Autoclave Fridge PH Meter Homogeniser Magnetic Stirrer						01 01 01 01 01 01 01 01 01 01	
6.       0         7.       H         8.       I         9.       A         10.       F         11.       F         12.       H         13.       M         14.       S	Hot Air Oven Incubator Autoclave Fridge PH Meter Homogeniser Magnetic Stirrer Sonicator						01 01 01 01 01 01 01 01 01 01 01	
6.       0         7.       H         8.       I         9.       A         10.       F         11.       F         12.       H         13.       M         14.       S         15.       N	Hot Air Oven Incubator Autoclave Fridge PH Meter Homogeniser Magnetic Stirrer Sonicator						01 01 01 01 01 01 01 01 01 01 01 02	
6.       0         7.       H         8.       I         9.       A         10.       F         11.       F         12.       H         13.       M         14.       S         15.       V         16.       L	Hot Air Oven Incubator Autoclave Fridge PH Meter Homogeniser Magnetic Stirrer Sonicator Vortex Mixer						01 01 01 01 01 01 01 01 01 01 01 02 01	
6.       0         7.       H         8.       I         9.       A         10.       F         11.       F         12.       H         13.       M         14.       S         15.       V         16.       L         17.       V	Hot Air Oven Incubator Autoclave Fridge PH Meter Homogeniser Magnetic Stirrer Sonicator Vortex Mixer Laminar Air Flow Wax Dispenser						01 01 01 01 01 01 01 01 01 01 02 01 01	

Chairman - BoS

Chairman - BoS Deal of Ethic - ESEO

Departr	nent	BIOMEDICAL ENGINEER	RING				R 2019	Semester III	PC
Cour	se	Course Name	H V	ours Veel	; / K	Credit	Total	Maximur	n
Cod	e	oourse name	Ĺ	Т	Р	С	Hours	Marks	
19BM	304 HUMA	N PHYSIOLOGY LABORATORY	0	0	2	1	30	100	N.
Course • Estin • Lean • Estin • Lean	Objective (s): mation and quar int methods for mation of hemai int the analysis	The purpose of learning this course ntification of blood cells identification of blood groups tological parameters of visual and hearing test	is to			<u>.</u>	,		
• Iden • Iden • Enu • Ana	Outcomes: At t tification and er meration of hen ysis of special s	he end of this course, learners will h numeration of blood cells natological parameters sensory organs test	be al	ole to	<b>)</b> :				
		Name of Experi	men	ts	1	1.00			
1. Co	llection of Bloo	d Samples							
2. Ide	entification of BI	ood groups (Forward and Reverse)							
3. Ble	eding and Clot	ting time							
4. Es	timation of Hem	noglobin							
5. To	tal RBC Count								
6. To	tal WBC Count								
7. Dif	ferential count of	of Blood cells							
8. Es	timation of ESF								
9. PC	CV, MCH, MCV,	MCHC							
10. He	aring test - Tur	iing fork							
11. Vis	ual Activity - Sr	nellen's Chart and Jaeger's Chart					S		
IST OF E	QUIPMENTS I	FOR A BATCH OF 30 STUDENTS		14	1			1	
S.No	1 Section 1	NAME OF THE EQUIP	IEN.	Г				QUANTIT	Y
11	Microscope		2		2	IL IN	Provide a	2	_
2.	Centrifuge No	rmal			3.5			1	-
3.	Wintrobe's tub	De	-			A. Land		2	
4.	PCV tube		-					2	_
5.	Neubaur's Ch	amber		Ц.,				2	
6.	Heparinized S	Syringe					la sur la	1	
77	Haemoglobing	ometer	5	1	1			1	
8.	Blood groupin	g kit	_		61			1	
9.	Capillary tube	s				1.1.1	1.1.1	1.	
10.	Ophthalmosco	ppe .	-					1	
111.	Tuning fork (2	56Hz to 512Hz)			-			5	
12.	Microslides (P	ackets)	-				1.1	2	
13.	Lancet (boxes	)						5	

	BIOMEDICAL ENGIN	IEERING	G	1	1	R 2019	Semester	Ш
Course	Course Name	Ηοι	ırs / W	/eek	Credit	Total	Maxim	um
Code	oouise Name	L	Т	Р	C	Hours	Marl	(S
19HS301	COMMUNICATION SKILLS	0	0	4	2	60	100	
Course Objec	tive (s): The purpose of learning this co	urse is t	0					
<ul> <li>Involve t</li> </ul>	he students in effective listening activitie	S.						
Improve	the oral communication skills in proper i	manner.						
Focus th	e effective reading of general and techn	ical text.				-		
Ennance	and comprehend the written text.							
	mes: At the end of this course learners	will be :	able to		-			12-
Indersta	and the technical talks	will be e						
Commun	nicate to his peer group properly							
Compret	and the general and technical text							
<ul> <li>Write the</li> </ul>	reports and job application in clear mar	nner.						
<ul> <li>Integrate</li> </ul>	LSRW skills.							
Unit I LI	STENING	color is						12
istening as a k	key skill- its importance - Listen to a prod	cess info	ormatio	on- gi	ve inform	nation, as	part of a si	mple
explanation - B	eing an active listener: giving verbal and	non-ve	rbal fe	edba	ck - takir	ng lecture	e notes -	
reparing to list	ten to a lecture							
Unit II SF	PEAKING						1.1.1	12
Nive meneral t	nformation , ack for naroanal information	a over	ana ah	1114 · ·	and the second s			
alve personal i	mormation - ask for personal information	r-expre	ess ap	nity -	enquire a	about abi	lity - ask fo	r
larification - In	proving pronunciation - pronunciation b	asics - c	conver	satior	enquire and starters	about abi s: small ta	lity - ask fo ilk - stressir	r ng
alve personal l larification - Im	proving pronunciation - pronunciation b peaking clearly - summarizing academic	asics - c	conver is and	satior lectu	enquire a starters res	about abi :: small ta	lity - ask fo ilk - stressir	r ng
aive personal i larification - Im yllables and sp Unit III RE	proving pronunciation - pronunciation b peaking clearly - summarizing academic EADING	asics - c	conver	satior lectu	enquire a n starters res	about abi :: small ta	lity - ask fo Ilk - stressir	r ng <b>12</b>
Unit III RE	proving pronunciation - pronunciation b peaking clearly - summarizing academic EADING ffective reading- Read and recognize di	fferent to	conver is and ext typ	linty - o satior lectu	enquire and starters res	about abi s: small ta content (	lity - ask fo ilk - stressir using photo	ng 12 Is
Unit III Read	proving pronunciation - pronunciation b peaking clearly - summarizing academic <b>ADING</b> ffective reading- Read and recognize di d for details-Use of graphic organizers	asics - co reading fferent to to revie	ess ab conver js and ext typ ew and	linty - satior lectu bes-Pr	enquire a starters res redicting compreh	about abi : small ta content i nension -	lity - ask fo ilk - stressir using photo Understan	ng 12 s ading
Unit III RE Trategies for e Ind title - Read Reference	Anomation - ask for personal information proving pronunciation - pronunciation b beaking clearly - summarizing academic <b>EADING</b> ffective reading- Read and recognize di d for details-Use of graphic organizers ince and use of connectors in a passage	fferent to reading	ess ab conver js and ext typ ew and readin	bes-Pr d aid	enquire a starters res redicting compreh nniques	about abi :: small ta content t nension -	lity - ask fo ilk - stressir using photo Understar	ng 12 s ding
Clarification - Im Syllables and sp Unit III RE Strategies for e and title - Read pronoun referent Unit IV WF Plan before write	approving pronunciation - pronunciation b peaking clearly - summarizing academic EADING ffective reading- Read and recognize di d for details-Use of graphic organizers ince and use of connectors in a passage RITING	fferent to speed	ext typew and readin	satior lectu pes-Pi d aid ig tech	enquire a starters res redicting compreh nniques	about abi s: small ta content ( nension -	lity - ask fo lik - stressir using photo Understan	r 19 12 Is Iding 12
Larification - Im         clarification - Im         cyllables and sp         Unit III       RE         Strategies for e         and title - Read         pronoun referent         Unit IV       WF         Plan before write         Write a description	ADING AD	fferent to reading fferent to speed	ext type w and readin	satior lectu bes-Pi d aid ig tech sente	enquire a starters res redicting compreh nniques ences, co bles- Wri	about abi s: small ta content ( nension -	lity - ask fo ilk - stressir using photo Understan sentence -	12 12 13 14 12 12 12
Dive personal fill         clarification - Im         cyllables and sp         Unit III       RE         Strategies for e         oronoun referent         Unit IV       WF         Plan before writt         Vrite a descript         Email writing -	Approving pronunciation - pronunciation b peaking clearly - summarizing academic EADING ffective reading- Read and recognize di d for details-Use of graphic organizers ince and use of connectors in a passage RITING ting- Develop a paragraph: topic sentence tive paragraph - Write a paragraph with Types of essays- descriptive-narrative-	fferent to reading fferent to speed ce, supp reasons	ext type ext type ext and readin	satior lectu bes-Pr d aid ig teck sente examp	enquire a starters res redicting compret nniques ences, co bles- Wri pentative	about abi s: small ta content t nension - oncluding te an opin -analytica	lity - ask fo alk - stressir using photo Understan sentence - nion paragr	ng 12 s ading 12 aph
Interpretation     Interpretation       Initial     Regulation	Anomation - ask for personal information aproving pronunciation - pronunciation b beaking clearly - summarizing academic <b>EADING</b> ffective reading- Read and recognize di d for details-Use of graphic organizers ace and use of connectors in a passage <b>RITING</b> ting- Develop a paragraph: topic senten- tive paragraph - Write a paragraph with Types of essays- descriptive-narrative- <b>TEGRATION OF LSRW</b>	fferent to reading fferent to to revie - speed ce, supp reasons issue-ba	ext type ext type ext and readin porting and e ased-a	satior lectu bes-Pi d aid ig tech sente examp argum	enquire a starters res redicting compreh nniques ences, co oles- Wri nentative	about abi s: small ta content i nension - oncluding te an opin -analytica	lity - ask fo ilk - stressir using photo Understan sentence - nion paragr al.	12 s ding 12 aph
alve personal i         larification - Im         yllables and sp         Unit III       RE         Strategies for e         nd title - Read         ronoun referent         Unit IV       WF         Plan before writt         Vrite a descript         Email writing -         Unit V       IN         ask based Inst	Approving pronunciation - pronunciation b peaking clearly - summarizing academic EADING ffective reading- Read and recognize di d for details-Use of graphic organizers ince and use of connectors in a passage RITING ting- Develop a paragraph: topic sentence tive paragraph - Write a paragraph with Types of essays- descriptive-narrative- FEGRATION OF LSRW truction :Listing Task- Sorting and order	fferent to reading fferent to speed ce, supp reasons issue-ba	ext type ext type ew and readin porting and e ased-a	satior lectu bes-Pid aid ig tech sente examp argum	enquire a starters res redicting compret nniques ences, co bles- Wri nentative	about abi s: small ta content to nension - pncluding te an opin -analytica ing-shari	lity - ask fo ilk - stressir using photo Understan sentence - nion paragr al.	12 12 13 14 12 12 12 1
alve personal i         larification - Im         values and sp         Unit III       Re         Witategies and sp         orrategies for e         ind title - Read         ronoun referent         Unit IV       WF         'lan before write         Vrite a descript         Email writing -         Unit V       INT         ask based Inst         xperience-Cor	Anomation - ask for personal information approving pronunciation - pronunciation b beaking clearly - summarizing academic <b>EADING</b> Iffective reading- Read and recognize di d for details-Use of graphic organizers ince and use of connectors in a passage <b>RITING</b> ting- Develop a paragraph: topic senten- tive paragraph - Write a paragraph with Types of essays- descriptive-narrative- <b>TEGRATION OF LSRW</b> truction :Listing Task- Sorting and orderin thent based instruction : Texts, Articles,	fferent to reading fferent to speed ce, supp reasons issue-ba ng-com Adds , V	ext type ext type ew and readin porting and e ased-a paring /ideos	satior lectu pes-Pid aid ag tecl sente examp argum -Prob	enquire a starters res redicting compreh nniques ences, co bles-Wri nentative lem solv	about abi s: small ta content ( nension - oncluding te an opin -analytica ing-shari	lity - ask fo alk - stressin using photo Understan sentence - nion paragr al. ng Persona	12 s ding 12 aph 12
Larification - Im         clarification - Im         cyllables and sp         Unit III       RE         Strategies for e         ind title - Read         oronoun referent         Unit IV       WF         Plan before writh         Vrite a descript         Email writing -         Unit V       IN         'ask based Inst         'xperience-Cor	ADING AD	fferent to reading fferent to to revie - speed ce, supp reasons issue-ba ng-com Adds , V	ext type ext type ext and readin porting ased-a paring /ideos	satior lectu bes-Pi d aid ig tech sente examp argum -Prob	enquire a starters res redicting compreh nniques ences, co bles- Wri nentative	about abi s: small ta content t nension - oncluding te an opin -analytica ing-shari	lity - ask fo alk - stressir using photo Understan sentence - nion paragr al. ng Persona	12 12 13 14 12 12 12 1
alve personal i         clarification - Im         cyllables and sp         Unit III       RE         Chrategies for e         oronoun referent         Unit IV       WF         Plan before write         Vrite a descript         Email writing -         Unit V       INT         ask based Inst         experience-Cor         EXT BOOK(S         1       Gramer F	Anomation - ask for personal information approving pronunciation - pronunciation b beaking clearly - summarizing academic <b>EADING</b> Iffective reading- Read and recognize di d for details-Use of graphic organizers ince and use of connectors in a passage <b>RITING</b> ting- Develop a paragraph: topic sentener tive paragraph - Write a paragraph with Types of essays- descriptive-narrative- <b>FEGRATION OF LSRW</b> truction :Listing Task- Sorting and order intent based instruction : Texts, Articles, <b>):</b> Margot and Colin S. Ward Reading and	fferent to reading fferent to to revie - speed ce, supp reasons issue-ba ng-com Adds , V	ext type ext type ew and readin porting and e ased-a paring /ideos	satior lectu pes-Pid aid ag tecl sente examp argum -Prob	enquire a n starters res redicting compreh nniques ences, co bles- Wri nentative lem solv	about abi s: small ta content i nension - oncluding te an opii -analytica ing-shari	lity - ask fo alk - stressir using photo Understan sentence - nion paragr al. ng Persona	12 s iding 12 aph 12 l
alve personal f         larification - Im         vyllables and sp         Unit III       RE         Strategies for e         ind title - Read         oronoun referent         Unit IV       WF         Plan before writh         Vrite a descript         Email writing -         Unit V       INT         ask based Insi         experience-Cor         EXT BOOK(S         1. Gramer F.         2011	ADING ADING ffective reading- Read and recognize di d for details-Use of graphic organizers ace and use of connectors in a passage <b>RITING</b> ting- Develop a paragraph: topic sentence tive paragraph - Write a paragraph with Types of essays- descriptive-narrative- <b>TEGRATION OF LSRW</b> truction :Listing Task- Sorting and ordering then based instruction : Texts, Articles, ): Margot and Colin S. Ward Reading and	fferent to reading fferent to to revie - speed ce, supp reasons issue-ba ng-com Adds , V	ext type ext type ew and readin porting and e ased-a /ideos (Leve	satior lectu oes-Pid aid ag tecl sente examp argum -Prob	enquire a n starters res redicting compreh nniques ences, co oles- Wri nentative lem solv	about abi s: small ta content to nension - oncluding te an opio -analytica ing-shari	lity - ask fo alk - stressin using photo Understan sentence - nion paragr al. ng Persona	r ng 12 s ding 12 aph 12 l
alve personal i         larification - Im         yllables and sp         Unit III       RE         Strategies for e         nd title - Read         ronoun referer         Unit IV       WF         Van before write         Vrite a descript         Email writing -         Unit V       INT         ask based Inst         experience-Cor         EXT BOOK(S         1. Gramer F.         2011         2. Brooks.Ma	Anomation - ask for personal information proving pronunciation - pronunciation b beaking clearly - summarizing academic <b>EADING</b> Iffective reading- Read and recognize di d for details-Use of graphic organizers ince and use of connectors in a passage <b>RITING</b> ting- Develop a paragraph: topic sentend tive paragraph - Write a paragraph with Types of essays- descriptive-narrative- <b>FEGRATION OF LSRW</b> truction :Listing Task- Sorting and orderin thent based instruction : Texts, Articles, ): Margot and Colin S. Ward Reading and rgret. Skills for Success, Listening and S	fferent to reading fferent to to revie - speed ce, supp reasons issue-ba ng-com Adds , V Writing	ext type ext type ext type ew and readin porting ased-a paring /ideos (Leve g. Lev	satior lectu oes-Pid aid ig tech sente examp argum -Prob ) I 3) O el 4 C	enquire a starters res redicting compreh nniques ences, co bles- Wri hentative lem solv	about abi s: small ta content in nension - oncluding te an opin -analytica ing-shari iversity F	lity - ask fo alk - stressir using photo Understan sentence - nion paragr al. ng Persona Press: Oxfo Press, Oxfo	rd, rd; rd, rd;
alve personal i         larification - Im         yllables and sp         Unit III       RE         Strategies for e         nd title - Read         ronoun referent         Unit IV       WF         Van before writh         Vrite a descript         Email writing -         Unit V       INT         ask based Inst         xperience-Cor         EXT BOOK(S         1. Gramer F.         2011         2. Brooks,Ma         2011	Anomation - ask for personal information approving pronunciation - pronunciation b beaking clearly - summarizing academic <b>EADING</b> Iffective reading- Read and recognize di d for details-Use of graphic organizers ace and use of connectors in a passage <b>RITING</b> ting- Develop a paragraph: topic sentend tive paragraph - Write a paragraph with Types of essays- descriptive-narrative- <b>TEGRATION OF LSRW</b> truction :Listing Task- Sorting and order intent based instruction : Texts, Articles, ): Margot and Colin S. Ward Reading and rgret. Skills for Success. Listening and S	fferent to reading fferent to to revie - speed ce, supp reasons issue-ba issue-ba Adds , V Writing	ext type ext type ew and readin porting and e ased-a paring /ideos (Leve g. Lev	satior lectu oes-Prod aid aid sente examp argum -Prob ) I 3) O el 4 C	enquire a n starters res redicting compreh nniques ences, co oles- Wri nentative lem solv xford Un	about abi s: small ta content ta nension - oncluding te an opin -analytica ing-shari iversity F	lity - ask fo alk - stressin using photo Understan sentence - nion paragr al. press: Oxfo Press, Oxfo	r 12 s ding 12 aph 12 l rd, rd,
alve personal i         larification - Im         yllables and sp         Unit III       RE         trategies for e         nd title - Read         ronoun referent         Unit IV       WF         lan before writh         Vrite a descript         Email writing -         Unit V       INT         ask based Instruct         xperience-Cor         EXT BOOK(S         1. Gramer F.         2011         2. Brooks,Ma         2011         3. Richards,C	ADING ADING ffective reading- Read and recognize di d for details-Use of graphic organizers ace and use of connectors in a passage <b>RITING</b> ting- Develop a paragraph: topic sentend tive paragraph - Write a paragraph with Types of essays- descriptive-narrative- <b>TEGRATION OF LSRW</b> truction :Listing Task- Sorting and orderint thent based instruction : Texts, Articles, ): Margot and Colin S. Ward Reading and rgret. Skills for Success. Listening and S 2. Jack. & David Bholke. Speak Now Lew	fferent to reading fferent to to revie - speed ce, supp reasons issue-ba ng-com Adds , V Writing Speaking vel 3. Ox	ext type ext type ext type ew and readin porting ased-a paring /ideos (Leve g. Lev	satior lectu pes-Pi d aid g tech sente examp -Prob ) I 3) O el 4 C	enquire a starters res redicting compreh nniques ences, co oles- Wri nentative lem solv xford Un oxford Ur sity Pres	about abi s: small ta content to nension - oncluding te an opin -analytica ing-shari iversity F niversity F	lity - ask fo alk - stressir using photo Understan sentence - nion paragr al. Press: Oxfo Press, Oxfo 1: 2010	rd, rd:
Iarification - Im         Iarification - Im         yllables and sp         Unit III       RE         Strategies for e         nd title - Read         ronoun referent         Unit IV       WF         Vana before writh         Vrite a descript         Email writing -         Unit V       INT         ask based Inst         xperience-Cor         EXT BOOK(S         1. Gramer F.         2011         2. Brooks,Ma         2011         3. Richards,C	Anomation - ask for personal mormation proving pronunciation - pronunciation b beaking clearly - summarizing academic <b>EADING</b> ffective reading- Read and recognize di d for details-Use of graphic organizers nce and use of connectors in a passage <b>RITING</b> ting- Develop a paragraph: topic sentend tive paragraph - Write a paragraph with Types of essays- descriptive-narrative- <b>TEGRATION OF LSRW</b> truction :Listing Task- Sorting and orderin thent based instruction : Texts, Articles, ): Margot and Colin S. Ward Reading and rgret. Skills for Success. Listening and S 2. Jack. & David Bholke. Speak Now Leve (a):	fferent te reading fferent te to revie - speed ce, supp reasons issue-ba issue-ba ng-com Adds , V Writing Speaking vel 3. Ox	ext type ext type ew and readin porting and e ased-a paring /ideos (Leve g. Lev	satior lectu bes-Pid aid ag tecl sente sente argum -Prob ) I 3) O el 4 C	enquire a n starters res redicting compreh nniques ences, co bles- Wri nentative lem solv xford Un xford Un sity Pres	about abi s: small ta content ta nension - oncluding te an opia -analytica ing-shari iversity F niversity F	lity - ask fo alk - stressin using photo Understan sentence - nion paragr al. Press: Oxfo Press, Oxfo 1: 2010	r ng 12 s ding 12 aph 12 l rd, rd, rd;
alve personal i         clarification - Im         cyllables and sp         Unit III       RE         chrategies for e         ind title - Read         oronoun referer         Unit IV       WF         Plan before writh         Vrite a descript         Email writing -         Unit V       INT         ask based Inst         xperience-Cor         EXT BOOK(S)         1. Gramer F.         2011         2. Brooks,Ma         2011         3. Richards,C         EFERENCE(S)         1. Davis, Jase         2006	ADING ADING ffective reading- Read and recognize di d for details-Use of graphic organizers ace and use of connectors in a passage <b>RITING</b> ting- Develop a paragraph: topic sentend tive paragraph - Write a paragraph with Types of essays- descriptive-narrative- <b>FEGRATION OF LSRW</b> truction :Listing Task- Sorting and orderin thent based instruction : Texts, Articles, ): Margot and Colin S. Ward Reading and rgret. Skills for Success. Listening and S 2. Jack. & David Bholke. Speak Now Leve S): on and Rhonda LIss.Effective Academic	fferent to reading fferent to revie - speed ce, supp reasons issue-ba ng-com Adds , V Writing Speaking vel 3. Ox	ext type ext type ext type ew and readin porting ased-a paring /ideos (Leve g. Lev (Leve	Inty - f satior lectu oes-Pid aid og tech sente examp argum -Prob ) I 3) O el 4 C Jniver	enquire a n starters res redicting compreh nniques ences, co bles- Wri hentative lem solv xford Un sity Pres	about abi s: small ta content in nension - oncluding te an opin -analytica ing-shari iversity F niversity F niversity F	lity - ask fo alk - stressin using photo Understan sentence - nion paragr al. Press: Oxfo Press: Oxfo Press: Oxfo	rd, rd, rd,
alve personal i         clarification - Im         cyllables and sp         Unit III       RE         Strategies for e         ind title - Read         ronoun referent         Unit IV       WF         Plan before writh         Vrite a descript         Email writing -         Unit V       INT         ask based Inst         xperience-Cor         EXT BOOK(S         1. Gramer F.         2011         2. Brooks,Ma         2011         3. Richards,C         EFERENCE(S         1. Davis, Jase         2006         2. E. Suresh	Anomation - ask for personal mormation approving pronunciation - pronunciation b beaking clearly - summarizing academic <b>EADING</b> Iffective reading- Read and recognize di d for details-Use of graphic organizers ace and use of connectors in a passage <b>RITING</b> ting- Develop a paragraph: topic sentence tive paragraph - Write a paragraph with Types of essays- descriptive-narrative- <b>TEGRATION OF LSRW</b> truction :Listing Task- Sorting and orderin thent based instruction : Texts, Articles, <b>):</b> Margot and Colin S. Ward Reading and rgret. Skills for Success. Listening and S C. Jack. & David Bholke. Speak Now Leve <b>5):</b> on and Rhonda LIss.Effective Academic Kumar and et al. Enriching Speaking and	fferent to reading fferent to to revie - speed ce, supp reasons issue-ba ng-com Adds , V Writing Speaking vel 3. Ox	ext type ext type ext type ew and readin porting ased-a joaring /ideos (Leve g. Lev (Leve g. Lev	satior lectu pes-Pi d aid g tech sente examp -Prob ) I 3) O el 4 O Jniver el 3) O 6. Sec	enquire a n starters res redicting compreh nniques ences, co oles- Wri nentative lem solv xford Un oxford Ur sity Pres xford Ur	about abi s: small ta content in nension - oncluding te an opin -analytica ing-shari iversity F niversity F s, Oxforc niversity F	lity - ask fo ilk - stressir using photo Understan sentence - nion paragr al. Press: Oxfo Press: Oxfo 1: 2010 Press: Oxfo nt Black sw	rd, rd, rd, an

Chairman - BoS Dept.of BME - ESEC

Department	BIOMEDICAL ENGINE	ERING	6			R 2019	Semester IV	BS
Course	0N	Hou	ırs / V	Veek	Credit	Total	Maximun	n
Code	Course Name	L	Т	Ρ	С	Hours	Marks	
19BS401	PROBABILITY AND STATISTICS	3	1	0	4	60	100	
Course Object • Understa • Understa • Understa • Summariz • Develop e appropria	tive(s): The purpose of learning this cour nd the basic concepts of probability and t nd the basic concepts of random variable nd the basic concepts of hypothetical tes ze and apply the methodologies for the d enough confidence to identify and model te solutions, using the skills learned in th	se is to the dist s ting of ata and mathe eir inte	samp alysis matic	ons w les fr using al pat e and	ith chara om a po statistic terns in I suppor	acteristics pulation cal notion real work	s. d and offer onment.	
<ul> <li>Course Outcon</li> <li>Demonstri</li> <li>Apply the</li> <li>Apply bas science/e</li> <li>Design ar</li> <li>Correlate</li> </ul>	mes: At the end of this course, learners we rate and apply the basic probability axion concepts of probability distributions in an sic statistical inference techniques, includ engineering problems. In experiment for an appropriate situation and predict the valid outcome of a real ti	will be ns and n appro- ing con using / me pro-	able to conce opriate nfiden ANOV oblem	o: epts in e plac ice int /A tec	n their co e of scie tervals, l hnique.	ore areas ence and nypothesi	Engineering s testing to	
Unit I PR	OBABILITY AND RANDOM VARIABLE	S		1				12
Probability - Axi variable - Proba	omsof probability - Conditional probabilit bility mass function - Probability density	ty - To functio	tal pro on - P	obabi roper	lity - Bye ties - Mo	e's theore oment ge	em-Random nerating	
Unit II PR	OBABILITY DISTRIBUTIONS							12
Moment genera distributions: Bi	ting functions of probability distributions nomial - Poisson - Uniform - Exponentia	- Conc al -Nor	ept ar rmal -	nd ap Weit	plication oull distr	s of stand ibutions.	lard probability	y 10
	STING OF HYPOTHESIS	atiotion	al hun	othor	in Lor	a compl	a tasts based	12
Normal distributions for	ition for single mean and difference of mean, variance and proportion - Continu	of mea	ans - able (	Test test f	s base or indep	d on t, C endent) -	Chisquare and Goodness of	d F fit.
Unit IV DES	SIGN OF EXPERIMENTS						hu synthellige	12
One way and Ty square design	wo way classifications - Completely rand	omize	d des	ign – I	Random	ized bloc	kdesign - Latii	n
Unit V CO	RRELATION AND REGRESSION	Suba			1.5.73	5.210	ell's Sal	12
Correlation - Mu	Iltiple correlation - Regression - Multiple	regre	ssion	-Line	ear fit - O	Quadratic	; fit	
REFERENCE(S 1. Devore. J Delhi, 8th 2. Ross, S.M Elsevier, 2 3. Spiegel. M Probability 4. Walpole. I	): .L., "Probability and Statistics for Engined Edition, 2014. 1., "Introduction to Probability and Statisti 2004. A.R., Schiller. J. and Srinivasan, R.A., "S y and Statistics", Tata McGraw Hill Editio R.E., Myers. R.H., Myers. S.L. and Ye. K	ering a ics for chaum n, 200 ., "Prol	end the Engin 1's Ou 4. babilit	e Scie leers tline c y and	ences∥, ( and Scie of Theor	Cengage entists", 3 y and Pro cs for Eng	Learning, New rd Edition, blems of gineers and	/

CK.9 Chairman - BoS Dept.of BME - ESEC

Hoom

Chairman - BoS Dept. of Maths - ESEC 33

Department	BIOMEDICAL ENGINEE	RING	6			R 2019	Semester IV	ΡĊ
Course		Ηοι	ırs / V	Veek	Credit	Total	Maximu	m
Code	Course Name	L	Т	Р	С	Hours	Marks	
19BM401	BIO SENSORS AND MEASUREMENTS	3	0	1	4	60	100	
Course Obje Discuss Determ Describ Discuss Discuss Demon	ctive (s): The purpose of learning this course is the basic concepts of Transducer, Electroo ine the recording of biological components. be the knowledge in electrochemical and opt is the various biological components using bi strate the various types of Transducer.	e is to les ai ical b osen	o nd its iosen sors.	classi isors.	fication.			
Course Outc At the end of t Classify various Define t systems Identify	omes: this course, learners will be able to: and describe resistive, inductive and capac parameters like displacement, temperature units and standards, their conversions, char s. the various transducers used for various ap	citive , hum acter plicat	trans nidity istics tions.	ducer etc and e	s which ana	are used lysis of m	for measuring neasurement	)
Unit I M	EASUREMENT SYSTEM AND BASIC TRA	NSE	DUCE	R	1 4			12
General meas Transducer -	surement system - Transducer and its class Inductive Transducer.	ificat	ion – I	Resist	ive Tran	sducer -	Capacitive	
Unit II T	RANSDUCER			-		1.200	11 J V	12
Temperature Transducer -	Transducer - Piezoelectric Transducer - Pie Introduction to Smart sensors and MEM	zo R S	esisti	ve Tra	ansduce	r - Photo	electric	
Unit III B	IO POTENTIAL ELECTRODES		-,8%	4		TTP HEAT	1	12
Half Cell poter Electrodes, Cl	ntial - Types of Electrodes - Micro Electrode nemical Electrodes and Catheter type Elect	s, De rodes	epth a s - Ele	nd Ne	edle Ele e Paste	ectrodes, - Electroo	Surface de Material	
Unit IV B	IO SENSORS				10201			12
Biological eler Biosensor – C	nents - Immobilization of biological compon Chemical fibro sensors.	ents	- Che	emical	Biosens	sor - Elec	tro Chemical	
Unit V A	PPLICATIONS OF BIO SENSOR			4 je	-			12
Blood Glucos Fermentation	e Sensor - Bananatrode - Non Invasive Blo process control - Environmental monitorin	od ga ig - N	as mo ledica	nitorii al app	ng - URE lications	EASE Bio 8.	osensor -	14
TEXT BOOK( 1. Shakthi 2. E.A. Do 3. John P. 4. John G REFERENCE 1. S. Rang 2. D.V.S. M 3. D.Patran 4. Geddes Dublicat	<b>S):</b> Chatterjee, "Biomedical Instrumentation", Ta ebelin, "Measurement Systems - Application Bentley, "Principles of Measurement Syster Webster, "Medical Instrumentation: Application ( <b>S):</b> anathan, "Transducer Engineering", Allied F Aurthy, "Transducers and Instrumentation", nabis, "Sensors and Transducers", Prentice and Baker, "Principles of Applied Biomedications, 2008	nta M ns an ms", 4 on ar Publis Prent Hall al Inst	cGrav d Des 4th Ed ad des shers tice H of Ind trume	v Hill, sign", lition,l sign", Pvt. L all of I ia, 20 ntatio	New Yo Tata Mc Pearson John Wi td., 2003 India, 20 04 n", 3 <sup>rd</sup> Ec	rk, 2013 Graw Hill Educatic ley Public 3. 11. dition, Jol	, New York, 2 on, 2005 cations, 2001. hn Wiley	012

CNS Chairman - BoS Dept.of BME - ESEC

Charanan - Bo Current BMC - L1

	BIO	WEDICAL ENGINEE	RING	-		2.1	K 2019	Semester IV	E
Course	Course	Name	Hour	s/V	Veek	Credit	Total	Maximu	m
19BM402	ANALOG AND DIGI	TAL INTEGRATED	L 3	0	P 0	3	45	100	1
	CIRCI	UITS		-					
Study the	uve(s). The purpose of	f linear integrated air							
<ul> <li>Study the</li> </ul>	e circuit configuration c	of linear integrated of	vircuit						
	e practical applications the concent of analog	n multiplier and Phase		b ked l	000	with ann	lications		
<ul> <li>Study the</li> </ul>	application of ADC a	nd DAC in real times	vsten	neui	_00p	with app	lications		
<ul> <li>Understa</li> </ul>	and the Real time appli	cations and introduce	espec	cial fu	unctio	n ICs ar	nd its con	struction	
ourse Outco	mes: At the end of this	s course, learners wil	l be a	ble to	o:	1.00			
<ul> <li>Ability to</li> </ul>	comprehend and ap	preciate the signification	ance	and	role	of the c	perationa	al amplifier in	th
present of	contemporary world	, , , , , , , , , , , , , , , , , , , ,						1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	
<ul> <li>Ability to</li> </ul>	design new analog line	ear circuit using oper	ationa	alam	plifier				
<ul> <li>Ability to</li> </ul>	analyzer and develop	communication syste	ems u	sing	linear	ICs			
<ul> <li>Ability to</li> </ul>	deploy the data conve	erters in real time scer	nario						
Ability to	select appropriate ICs	and circuits for analog	og sys	stem	aesig	n	1		0
	KCUT CONFIGURAT				-	_		1	3
urrent source	s, Analysis of differen	ice amplifiers with a	ctive i molifie	oads	s, sup	ications	frequence	cy compensat	ion
lew rate and n	hethods of improving s	lew rate. Interpretation	on of	FL08	2 dat	asheet.	, nequen	cy compensa	
Unit II AF	PLICATION OF OPE	RATIONAL AMPLIF	IERS				1		9
inear and No	nlinear Circuits using	operational amplifier	s and	t the	ir an	alveis I	nverting	and Noninver	ting
mplifiers Diff	erentiator. Integrator	Voltage to Current	conve	erter	Inst	rumenta	tion amr	olifier. Sine w	ave
scillators, Lov	v pass and band pass	s filters, Comparator,	Mult	ivibra	ator a	nd Sch	mitt trigge	er, Triangle w	ave
enerator, Prec	ision rectifier, Log and	Antilog amplifiers, N	on-lin	ear f	unctio	on gene	rator.		
Unit III AM	ALOG MULTIPLIER	AND PLL					+		9
nalysis of four oltage control	quadrants and variab ed oscillator, Closed k	le Trans conductanc	e mul AM, P	tiplie M ar	rs, Ai nd FS	nalog m K modu	ultiplier M lators and	IPY634 featu d demodulato	res, rs
Unit IV AN	ALOG TO DIGITAL A	AND DIGITAL TO AN	ALO	G CO	ONVE	RTORS	3		9
and the second se		and hold circuit and	C's T	ype	s of D	A conv	erter, Cu	rrent driven D	AC
nalog switche	s, High speed sample	and noid circuit and	05,			cossivo	approxim	nation, Voltag	e to
nalog switche witches for D	s, High speed sample AC, A/D converter - F	lash, Single slope, D	oual s	lope.	, Suc	Cessive	approxim		
nalog switche witches for D ime and Volta	s, High speed sample AC, A/D converter - F ge to Frequency conve	lash, Single slope, D erters.	oual s	lope.	, Suc	CESSIVE	approxim	and the second	- 11
nalog switche witches for D, ime and Volta Unit V SF	s, High speed sample AC, A/D converter - F ge to Frequency conve PECIAL FUNCTION IC	lash, Single slope, E erters. S AND REAL TIME	oual s	lope.	, Suc	S	approxim		9
nalog switche witches for D me and Volta <b>Unit V SF</b> mers, Voltag	s, High speed sample AC, A/D converter - F ge to Frequency conve PECIAL FUNCTION IC e regulators, SMPS,	Iash, Single slope, Derters. S AND REAL TIME Tuned amplifiers, P	oual s APPL	lope ICA amp	, Suc TION olifiers	s and l	solation	Amplifiers, Vi	<b>9</b> dec
nalog switche witches for D ime and Volta <b>Unit V</b> SF imers, Voltag mplifiers, Digi	s, High speed sample AC, A/D converter - F ge to Frequency conver PECIAL FUNCTION IC e regulators, SMPS, tal stethoscope and	lash, Single slope, Derters. S AND REAL TIME Tuned amplifiers, P digital blood pressu	APPL ower	ICA amponito	, Suc TION olifiers or, Di	<b>s</b> and ligital blo	solation A	Amplifiers, Vi ose monitor	9 dec and
nalog switche witches for D ime and Volta Unit V SF imers, Voltag mplifiers, Digi hermometer.	s, High speed sample AC, A/D converter - F ge to Frequency conver PECIAL FUNCTION IC e regulators, SMPS, tal stethoscope and	Ilash, Single slope, Derters. <b>S AND REAL TIME</b> Tuned amplifiers, P digital blood pressu	APPL ower	ICA amponito	, Suc TION olifiers or, Di	<b>S</b> and ligital blo	solation /	Amplifiers, Vi ose monitor	9 dec anc
nalog switche witches for D ime and Volta Unit V SF imers, Voltag mplifiers, Digi hermometer. EXT BOOK(S 1 Sergio Fr	s, High speed sample AC, A/D converter - F ge to Frequency conver- PECIAL FUNCTION IC e regulators, SMPS, tal stethoscope and ): anco, "Design with Op	and hold circuit and lash, Single slope, D erters. S AND REAL TIME Tuned amplifiers, P digital blood pressu	APPL ower ure m	ICA amponito	, Suc TION olifiers or, Di	s and ligital blo	solation A bod gluce	Amplifiers, Vi ose monitor Mc Graw Hill	9 dec and
nalog switche witches for D ime and Volta Unit V SF imers, Voltag mplifiers, Digi hermometer. EXT BOOK(S 1. Sergio Fr Educatio	s, High speed sample AC, A/D converter - F ge to Frequency conver PECIAL FUNCTION IC e regulators, SMPS, tal stethoscope and ): anco, "Design with Op n, 2014.	and hold circuit and lash, Single slope, D erters. S AND REAL TIME Tuned amplifiers, P digital blood pressu perational Amplifiers a	APPL ower and A	ICA amponito	, Suc TION olifiers or, Di g Integ	s and ligital blo	solation / bod gluce	Amplifiers, Vi ose monitor Mc Graw Hill	9 dec and
nalog switche witches for D ime and Volta Unit V SF imers, Voltag mplifiers, Digi hermometer. EXT BOOK(S 1. Sergio Fr Education 2. Roy Chor	s, High speed sample AC, A/D converter - F ge to Frequency conver PECIAL FUNCTION IC e regulators, SMPS, tal stethoscope and ): anco, "Design with Op n, 2014. udhury and Shail Jain I	and hold circuit and lash, Single slope, D erters. S AND REAL TIME Tuned amplifiers, P digital blood pressu perational Amplifiers a Linear Integrated Circ	APPL ower ower ire m and A	ICA amponitonito	, Suc TION olifiers or, Di g Integ / Eas	s and lingital blo	solation A bod gluce Circuits'', N w Delhi, 2	Amplifiers, Vi ose monitor Mc Graw Hill 2014	9 dec and
nalog switche witches for D ime and Volta Unit V SF imers, Voltag mplifiers, Digi hermometer. EXT BOOK(S 1. Sergio Fr Education 2. Roy Chor EFERENCE(S	s, High speed sample AC, A/D converter - F ge to Frequency conver PECIAL FUNCTION IC e regulators, SMPS, tal stethoscope and ): anco, "Design with Op n, 2014. udhury and Shail Jain I	and hold circuit and lash, Single slope, D erters. S AND REAL TIME Tuned amplifiers, P digital blood pressu perational Amplifiers a Linear Integrated Circ	APPL cower and A cuits, '	ICA amponito nalog Wiley	, Suc TION olifiers or, Di g Integ / Eas	S and ligital blo grated C tern, Ne	solation / bod gluce Circuits", M w Delhi, 2	Amplifiers, Vi ose monitor Mc Graw Hill 2014	9 dec and
nalog switche witches for D ime and Volta Unit V SF imers, Voltag mplifiers, Digi hermometer. EXT BOOK(S 1. Sergio Fr Education 2. Roy Chor EFERENCE(S	s, High speed sample AC, A/D converter - F ge to Frequency conver PECIAL FUNCTION IC e regulators, SMPS, tal stethoscope and ): anco, "Design with Op n, 2014. udhury and Shail Jain I 5):	And Hold Circuit and lash, Single slope, D erters. S AND REAL TIME Tuned amplifiers, P digital blood pressu berational Amplifiers a Linear Integrated Circ	APPL ower ire m and A cuits, '	ICA amponito nalog Wiley	, Suc TION olifiers or, Di g Integ / Eas	S and lingital blo	solation A bod gluce Circuits", N w Delhi, 2	Amplifiers, Vi ose monitor Mc Graw Hill 2014	9 dec and
halog switche witches for D ime and Volta Unit V SF imers, Voltag mplifiers, Digi hermometer. EXT BOOK(S 1. Sergio Fr Education 2. Roy Choo EFERENCE(S 1. Gray and	s, High speed sample AC, A/D converter - F ge to Frequency conver PECIAL FUNCTION IC e regulators, SMPS, tal stethoscope and ): anco, "Design with Op n, 2014. udhury and Shail Jain I 5): Meyer, "Analysis and	and fiold circuit and lash, Single slope, D erters. S AND REAL TIME Tuned amplifiers, P digital blood pressu perational Amplifiers a Linear Integrated Circu Design of Analog Int	APPL Power Ire m and A cuits, '	ICA amponito nalog Wiley	, Suc TION olifiers or, Di g Integ / Eas	S and lingital blo grated C tern, Ne	solation / bod gluce Dircuits", M w Delhi, 2	Amplifiers, Vi ose monitor Mc Graw Hill 2014 onal, 2009.	9 dec and
nalog switche witches for D me and Volta Unit V SF mers, Voltag mplifiers, Digi hermometer. EXT BOOK(S 1. Sergio Fr Education 2. Roy Choi EFERENCE(S 1. Gray and 2. Michael J	s, High speed sample AC, A/D converter - F ge to Frequency conver- PECIAL FUNCTION IC e regulators, SMPS, tal stethoscope and ): anco, "Design with Op n, 2014. udhury and Shail Jain I 5): Meyer, "Analysis and lacob J., "Applications	and hold circuit and lash, Single slope, D erters. S AND REAL TIME Tuned amplifiers, P digital blood pressu berational Amplifiers a Linear Integrated Circu Design of Analog Inte and Design with Ana	APPL Power Ire m and A cuits, v egrate	ICA amponito nalog Wiley ed Ci	, Suc TION olifiers or, Di g Integ / Eas	S and ligital blo grated C tern, Ne ", Wiley Circuits"	solation / bod gluce Circuits", M w Delhi, 2 Internation , Prentice	Amplifiers, Vi ose monitor Mc Graw Hill 2014 onal, 2009. Hall of	9 dec and
halog switche witches for D ime and Volta Unit V SF mers, Voltag mplifiers, Diginermometer. EXT BOOK(S 1. Sergio Fr Education 2. Roy Chor EFERENCE(S 1. Gray and 2. Michael J Inida, 199	s, High speed sample AC, A/D converter - F ge to Frequency conver- PECIAL FUNCTION IC e regulators, SMPS, tal stethoscope and ): anco, "Design with Op n, 2014. udhury and Shail Jain I 5): Meyer, "Analysis and lacob J., "Applications 6	and hold circuit and lash, Single slope, D erters. S AND REAL TIME Tuned amplifiers, P digital blood pressu berational Amplifiers a Linear Integrated Circ Design of Analog Int and Design with Ana	APPL ower ire m and A cuits, ' egrate log In	ICA amponito nalog Wiley ed Ci tegra	, Suc TION olifiers or, Di g Integ / Eas	s and lingital blo grated C tern, Ne ", Wiley Circuits"	solation A bod gluce Circuits", N w Delhi, 2 Internation , Prentice	Amplifiers, Vi ose monitor Mc Graw Hill 2014 onal, 2009. Hall of	9 dec and
nalog switche witches for D me and Volta Unit V SF mers, Voltag mplifiers, Digi nermometer. EXT BOOK(S 1. Sergio Fr Education 2. Roy Chor EFERENCE(S 1. Gray and 2. Michael J Inida, 199 3. Ramakar	s, High speed sample AC, A/D converter - F ge to Frequency conver PECIAL FUNCTION IC e regulators, SMPS, tal stethoscope and ): anco, "Design with Op n, 2014. udhury and Shail Jain I b): Meyer, "Analysis and lacob J., "Applications 6 ht A. Gayakwad, "OP A	And Hold Circuit and lash, Single slope, D erters. <b>S AND REAL TIME</b> Tuned amplifiers, P digital blood pressu perational Amplifiers a Linear Integrated Circuit Design of Analog Inte and Design with Analog MP and Linear IC's",	APPL Power Ire m and A cuits, ' egrate log In Pren	ICA amponite nalog Wiley ed Ci tegra	, Suc TION olifiers or, Di g Integ / Eas rcuits ated ( Hall, 2	S and lingital blo grated C tern, Ne ", Wiley Circuits"	solation / bod gluce Circuits", M w Delhi, 2 Internatio , Prentice	Amplifiers, Vi ose monitor Mc Graw Hill 2014 onal, 2009. Hall of	9 dec and
nalog switche witches for D me and Volta Unit V SF mers, Voltag mplifiers, Digi nermometer. EXT BOOK(S 1. Sergio Fr Education 2. Roy Choo EFERENCE(S 1. Gray and 2. Michael J Inida,199 3. Ramakar 4. Botkar K.	s, High speed sample AC, A/D converter - F ge to Frequency conver- PECIAL FUNCTION IC e regulators, SMPS, tal stethoscope and ): anco, "Design with Op n, 2014. udhury and Shail Jain I 5): Meyer, "Analysis and lacob J., "Applications 6 at A. Gayakwad, "OP A R., "Integrated Circuits	And Hold Circuit and lash, Single slope, D erters. <b>S AND REAL TIME</b> Tuned amplifiers, P digital blood pressu berational Amplifiers a Linear Integrated Circuit Design of Analog Inte and Design with Analog MP and Linear IC's", s", Khanna Publishers	APPL ower ire m and A cuits, ' egrate log In Pren s, 199	ICA amponito nalog Wiley ed Ci tegra tice I	, Suc TION olifiers or, Di g Integ / Eas rcuits ated ( Hall, 2	S and ligital blo grated C tern, Ne ", Wiley Circuits"	solation / bod gluce Circuits", M w Delhi, 2 Internation , Prentice	Amplifiers, Vi ose monitor Mc Graw Hill 2014 onal, 2009. Hall of	9 dec and
<ul> <li>Inalog switches</li> <li>Switches for Dail</li> <li>Ime and Volta</li> <li>Unit V SF</li> <li>Imers, Voltage</li> <li>Imers, Voltage</li> <li>Imers, Voltage</li> <li>Imers, Voltage</li> <li>Imers, Voltage</li> <li>Imers, Digition</li> <li>FXT BOOK(S</li> <li>1. Sergio Free</li> <li>Education</li> <li>2. Roy Choose</li> <li>EFERENCE(S</li> <li>1. Gray and</li> <li>2. Michael Janida, 199</li> <li>3. Ramakar</li> <li>4. Botkar K.</li> <li>5. Taub and</li> </ul>	s, High speed sample AC, A/D converter - F ge to Frequency conver- PECIAL FUNCTION IC e regulators, SMPS, tal stethoscope and ): anco, "Design with Op n, 2014. udhury and Shail Jain I b): Meyer, "Analysis and lacob J., "Applications 6 at A. Gayakwad, "OP A R., "Integrated Circuits Schilling, "Digital Integ	and hold circuit and lash, Single slope, D erters. <b>S AND REAL TIME</b> Tuned amplifiers, P digital blood pressu berational Amplifiers a Linear Integrated Circuit Design of Analog Intr and Design with Analog MP and Linear IC's", s", Khanna Publishers grated Electronics", N	APPL ower ire m and A cuits, ' egrate log In Pren s, 199 Mc Gra	ICA amponito nalog Wiley ed Ci tegra tice I 6 aw H	, Suc TION olifiers or, Di g Integ rcuits ated ( Hall, 2 lill, 19	s and lingital blo grated C tern, Ne ", Wiley Circuits" 2012	solation A bod gluce Circuits", N w Delhi, 2 Internation , Prentice	Amplifiers, Vi ose monitor Mc Graw Hill 2014 onal, 2009. Hall of	9 dec and
halog switche witches for D me and Volta Unit V SF mers, Voltag nplifiers, Digi nermometer. EXT BOOK(S 1. Sergio Fr Education 2. Roy Chort EFERENCE(S 1. Gray and 2. Michael J Inida, 199 3. Ramakar 4. Botkar K. 5. Taub and 6. Coughlin 7 Millman	s, High speed sample AC, A/D converter - F ge to Frequency conver PECIAL FUNCTION IC e regulators, SMPS, tal stethoscope and ): anco, "Design with Op n, 2014. udhury and Shail Jain I b): Meyer, "Analysis and lacob J., "Applications 6 at A. Gayakwad, "OP A R., "Integrated Circuits Schilling, "Digital Integrated and Driscoll, "Operation and Halkias C. "Integrated	And hold circuit and lash, Single slope, Derters. S AND REAL TIME Tuned amplifiers, P digital blood pressu perational Amplifiers a Linear Integrated Circuit Design of Analog Intra and Design with Analog MP and Linear IC's", s", Khanna Publishers grated Electronics", Nonal amplifiers and Linear Linear Integrated Circuits State Circuits (Content of Content of Con	APPL Power Ire m and A cuits, V egrate log In Pren s, 199 Ac Gra near I	ICA amponito nalog Wiley ed Ci tegra tice I 6 aw H nteg	, Suc TION olifiers or, Di g Integ / Eas rcuits ated ( Hall, 2 lill, 19 rated	S and lingital blo grated C tern, Ne ", Wiley Circuits" 2012 77 Circuits	solation / bod gluce Circuits", M w Delhi, 2 Internatio , Prentice	Amplifiers, Vi ose monitor Mc Graw Hill 2014 onal, 2009. Hall of e Hall, 1989	9 dec anc

	BIOMEDICAL ENGINE	ERING				R 2019	Semester IV	E
Course Code	Course Name	Hour	s/W T	P	Credit	Total Hours	Maximu Marks	m
19BM403	MICROPROCESSORS AND MICROCONTROLLERS	3	0	0	3	45	100	
<ul> <li>Understa</li> <li>Understa</li> <li>Studies t</li> <li>Study the</li> <li>Explore t</li> <li>Develop</li> </ul>	tive (s): The purpose of learning this cound architecture and assembly language the architecture of 8085, 8086, 8051 and e addressing modes and instruction set of he need and use of Peripherals and Interskill to explore system design technique	urse is to program ARM. of 8085, 8 orfacing.	ming 3086	of N 8051	licroproc	essor and M.	d Microcontro	ller
Ability to     Dunit I 8-I	relate any architecture and assembly lar comprehend the architectural and pipeli design and deploy the Interfacing periph discriminate different microprocessor an design, develop and trouble shoot micro BIT and 16 - BIT MICROPROCESSOR	will be all nguage for nerals in r nd microc pocontrolle	or a p cepts real ti ontro r bas	for N me s ller a ed s	Aicroprocessor. Aicroprocessor and its sp ystem.	cessors.	ction registers	s.
terfacing. 80	86 Architecture, Instruction set and	d progra	mmi	ng,	Minimur	n and	Maximum m	od
rogrammable terface, Prog ommunication	Peripheral Interface (8255), Keyboard grammable Timer Controller (8254), Interface (8251).	display Program	contr imab	oller le ir	(8279), nterrupt	ADC080 controlle	98 and DAC0 r (8259), S	)80 eria
051 - Architect	ure, Special Function Registers (SFRs).	, Instructi	on se	et, Ad	dressin	g modes,	Assembly	1
	amming, I/O Ports, Timers / counters, In	terrupts a	and s	erial	commu	nication.	and appendix	-
nguage progra		and the second second						
Jnit IV MIC	CROCONTROLLER BASED SYSTEM	DESIGN		N. 82				
Jnit IV MIC	CROCONTROLLER BASED SYSTEM D natrix display, (16x2) LCD, high power de Control using PWM, BTC and EEPBO	DESIGN evices, o M interfa	ptical	mot	or shaft	encoder,	Stepper Mote	or,
Unit IV     MIC       terfacing to: m     C       C Motor speed     Unit V	CROCONTROLLER BASED SYSTEM I natrix display, (16x2) LCD, high power do d Control using PWM, RTC and EEPRO BIT ARM PROCESSOR	DESIGN evices, o M interfa	ptical ce us	mot ing l	or shaft 2C proto	encoder, ocol.	Stepper Moto	or,
Unit IV     MIC       Iterfacing to: m     C       C Motor speed     Unit V       ISC Vs CISC A       rocessor mode	CROCONTROLLER BASED SYSTEM I natrix display, (16x2) LCD, high power de d Control using PWM, RTC and EEPRO BIT ARM PROCESSOR Architecture, ARM Processor Architectures and families, pipelining , ARM instruct	DESIGN evices, o M interfa re, ARM	ptical ce us Core nd its	mot ing l data	or shaft 2C proto flow mo	encoder, ocol. del, Barro	Stepper Moto	or, g
Inguage progra Unit IV MIC Iterfacing to: m C Motor speed Unit V 32- ISC Vs CISC / rocessor mode EXT BOOK(S) 1. Ramesh S Penram In 2. Douglas V Revised 2	CROCONTROLLER BASED SYSTEM I natrix display, (16x2) LCD, high power de d Control using PWM, RTC and EEPRO BIT ARM PROCESSOR Architecture, ARM Processor Architectures and families, pipelining, ARM instruct s and families, pipelining, ARM instruct S. Gaonkar, "Microprocessor Architecture international Publishing reprint, 6th Edition /. Hall, "Microprocessor and Interfacing, 2nd Edition 2006, 11th reprint 2015.	DESIGN evices, o M interfa re, ARM tion Set a re, Progra Program	ptical ce us Core ind its ammi	mot ing I data s Pro	or shaft 2C proto flow mo ogrammin nd Appli Hardwa	encoder, ocol. del, Barrong. cations w	Stepper Mote el Shifter, AR ith 8085". McGraw Hill,	or, S

Department	BIOMEDICAL ENGINEE	RING				R 2019	Semester IV	PC
Course	Course Name	Hou	rs / W	Veek	Credit	Total	Maximum	1
Code	Course Name	L	T	Ρ	С	Hours	Marks	
19BM404	INTERNET OF THINGS IN MEDICINE	3	0	0	3	45	100	
<ul> <li>Course Object</li> <li>Understate</li> <li>Learn alt</li> <li>Build sint</li> <li>Understate</li> <li>Develop</li> </ul>	tive (s): The purpose of learning this course and Smart Objects and IoT Architectures bout various IOT-related protocols nple IoT Systems using Arduino and Raspb and data analytics and cloud in the context IoT infrastructure for popular applications	e is to erry Pi of IoT	i.					
<ul> <li>Explain</li> <li>Analyze</li> <li>Design a</li> <li>Apply da</li> <li>Analyze</li> <li>Unit I FUI</li> </ul>	omes: At the end of this course, learners will the concept of IoT. various protocols for IoT. a PoC of an IoT system using Rasperry Pi / ata analytics and use cloud offerings related applications of IoT in real time scenario. NDAMENTALS OF IoT	Arduin to loT						9
Evolution of In (IoTWF) and A Edge and Clou Connecting Sr Unit II IoT	Iternet of Things - Enabling Technologies Alternative IoT models – Simplified IoT Ard ad in IoT – Functional blocks of an IoT eco mart Objects <b>PROTOCOLS</b>	– IoT chitect syster	Arch ure a n – S	itecti and C enso	ures: on core loT rs, Actu	eM2M, Id Function ators, Sn	oT World Foru al Stack — Fo nart Objects a	um og, nd <b>9</b>
IoT Access Te 802.15.4e, 19 Constrained No Networks – Ap Protocols: Co	chnologies: Physical and MAC layers, top 01.2a, 802.11ah and LoRaWAN – Netwo etworks - Optimizing IP for IoT: From 6LoV plication Transport Methods: Supervisory AP and MQTT	ology ork La VPAN Contro	and S iyer: to 6L ol and	Secu IP ve o, Ro d Dat	rity of IE ersions, outing ov a Acqui	EE 802. Constrai /er Low F sition – A	15.4, 802.15.4 ned Nodes a Power and Los pplication Lay	lg, nd sy /er
Design Method blocks -Arduind Programming	lology - Embedded computing logic - Micro o - Board details, IDE programming - Raspl	contro perry F	oller, S Pi - In	Syste terfa	em on Cl ces and	hips - IoT Raspberi	system buildi ry Pi with Pyth	ng on
Unit IV DA	TA ANALYTICS AND SUPPORTING SERV	/ICES						9
Structured Vs Databases - H Analytics - Xiv Management w	Unstructured Data and Data in Motion Vs E adoop Ecosystem - Apache Kafka, Apache rely Cloud for IoT, Python Web Applicatio rith NETCONF-YANG	Data in e Spai on Fra	Rest rk - E mew	t - Ro dge \$ ork -	le of Ma Streamin Django	achine Le ng Analyt - AWS fé	arning - No So ics and Netwo or IoT - Syste	QL ork m
Unit V API	PLICATIONS OF IOT IN MEDICINE			Part in		1		9
NSUM Technic IoT Model for N Cancer, A Fuz enabled Perso Environments, diseases using	que for Diabetes Patients, Healthcare Moni Neuro sensors, AdaBoost with feature selec zzy-Based expert System to diagnose Alz nalized Healthcare Systems, Healthcare Approach to predict Diabetic Retinopath artificial neural networks.	toring ction u zheime Applie ny thre	syste sing I er's E catior ough	em th loT fo Disea n De data	rough C or somat se, Sec velopme a analyt	yber-phy ic mutatic ured arcl ent in Mo ics, Diag	sical system, a ons evaluation hitecture for lo obile and Clo nosis of che	An in oT ud est
TEXT BOOK(S 1. David H Fundame Press, 20 2. Venkata Personal and Med	5): Ianes, Gonzalo Salgueiro, Patrick Gro entals: Networking Technologies, Protoco 017. Krishna, SasikumarGurumoorthy, Moh ized Healthcare Systems", Springer Briefs i ical Bioinformatics, 2019.	ssetete Is anc amma n Appl	e, R I Use d S. lied S	ob E e Cas Ob cienc	Barton ses for aidat, ' æs, and	and Jero Internet o 'Internet Technolo	ome Henry, of Things, Cis of Things a ogy, Forensic	loT sco and

CX9

#### **REFERENCE(S):**

- 1. ArshdeepBahga, Vijay Madisetti, "Internet of Things A hands-on approach", Universities Press, 2015,
- 2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things Key applications and Protocols", Wiley, 2012,
- Jan Ho" Iler, VlasiosTsiatsis, Catherine Mulligan, Stamatis ,Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014,
- 4. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011,
- 5. Michael Margolis, Arduino Cookbook, "Recipes to Begin, Expand, and Enhance Your Projects", O'Reilly Media, 2nd Edition.

	BIOMEDICAL ENGINE	ERING				R 2019	Semester IV E
Course	Course Name	Hour	s/W	eek	Credit	Total	Maximum
Code	oourse nume	L	Т	Р	С	Hours	Marks
19HS402	UNIVERSAL HUMAN VALUES 2 : UNDERSTANDING HARMONY	2	1	0	3	45	100
Course Objec	tive (s): The purpose of learning this cou	irse is t	0 ontor	ilu h	atucan '		and SKILLS to
<ul> <li>Help the ensure s</li> <li>Facilitate well as t the rest moveme</li> <li>Highlight trustful a</li> <li>Salient Featur</li> <li>It preser (i.e. a wo</li> <li>The who aspects verifying living.</li> <li>The prim student r</li> <li>While int is also m</li> <li>Course Methol</li> <li>To exploit human b</li> <li>The court</li> <li>It is free</li> <li>It is a proposed or the lab a</li> <li>This proof begin wit evolution</li> </ul>	students appreciate the essential coustained happiness and prosperity which the development of a Holistic perspection owards happiness and prosperity based of existence. Such a holistic perspective int towards value-based living in a natural t plausible implications of such a Holistic and mutually fulfilling human behavior and res of the Course: The salient features the this a universal approach to value educa orldview of the reality "as it is") through the of the reality are presented in the form of a of the reality are presented and the stude them on the basis of their natural access the focus throughout the course is toward rather than just a transfer of information. Troducing the holistic worldview and its im- nade to enable the students discern the d dology: The methodology of this course orational and thus universally adaptable eing vis-à-vis the rest of existence. The is in the form of 28 lectures (discussion from any dogma or value prescriptions. Docess of self-investigation and self-exploid or reality is stated as a proposal and the number of self-investigation and self-exploid or reality is a source of reflection. The self-exploration takes the form of th, and then to continue within the st during the self-exploration takes the form of the self-exploration takes the form of the self-exploration takes the form of the self-exploration takes the form of the self-exploration takes the form	mpleme are the stive and on a cover form on a cover a form on a cover a form on a cover a form on a cover a mutual his count dialogue ents are eptance affection ifference affection ifference a student a dialo udent i y evalue	entari e com orrect s the tandin illy er rse is deve ess of ue with og a c ms, a e on olves d 14 p and m os ar perier gue h n ev ate th	ily be e asp studi t und bas ng in <u>nrichi</u> to elopir f self- hereb oura- nin or qualit their a sy pract not of e fac ntial '	etween ' birations of ents tow erstandir is of Un terms of ng intera ng the rig exploration ative tran cal appra own righ ystemation ice session giving s ilitated to validation een the t activity, I re-condition	VALUES' of all hum ards life a ng of the H iversal Hu ethical hu ction with aft unders ion. of propose aff-explore ad validate asformatic isal of the t. c and rati ons. ermons. Vo verify it n – the w eacher ar leading to tionings a	and 'SKILLS' to an beings. and profession a duman reality and uman values and uman conduct, <u>Nature</u> standing of reality als about various the proposals by e experientially in on in the life of the prevailing notion onal study of the Whatever is found in their own right hole existence is not the students to continuous self
ioaule 1 – Int	roduction to value Education	المعام والملا	-	a 41-	Dress		0+3
Continuous Ha nd Physical F spirations	ppiness and Prosperity – the Basic Hum acility - Happiness and Prosperity – Cu	xpiorati ian Asp irrent S	on a iratio cenai	ns - rio -	Right U Method	nderstand to Fulfill 1	ling, Relationship he Basic Human
utorials [Prace latural Accepta	tice Session] - Sharing about Oneself	- Exp	olorin	g Hu	uman Co	onsciousn	ess - Exploring
lodule 2 – Ha	armony in the Human Being						6+3
ectures - Un etween the Ne larmony in the lealth	derstanding Human being as the Co-ex eeds of the Self and the Body – The B e Self - Harmony of the Self with the I	xistence ody as Body -	e of t an Ir Pro	he S nstru ograr	elf and t ment of nme to e	he Body the Self - ensure se	<ul> <li>Distinguishing Understanding If-regulation and</li> </ul>

Chairman - BoS

Module 3 - Harmony in the Family and Society 6+3
Lectures - Harmony in the Family - the Basic Unit of Human Interaction - Values in Human-to-Human Relationship - 'Trust' - the Foundational Value in Relationship - 'Respect' - as the Right Evaluation Understanding Harmony in the Society - Vision for the Universal Human Order
<b>Tutorials</b> [Practice Session] - Exploring the Feeling of Trust - Exploring the Feeling of Respect Exploring Systems to fulfill Human Goal
Module 4 - Harmony in the Nature/Existence 4+2
Lectures - Understanding Harmony in the Nature - Interconnectedness, self-regulation and Mutual Fulfillments among the Four Orders of Nature - Realizing Existence as Co-existence at All Levels - The Holistic Perception of Harmony in Existence
Tutorials [Practice Session] - Exploring the Four Orders of Nature - Exploring Co-existence in Existence
Module 5 - Implications of the Holistic Understanding 6+3
Lectures - Natural Acceptance of Human Values - Definitiveness of (Ethical) Human Conduct - A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order - Competence in Professional Ethics - Holistic Technologies, Production Systems and Management Models-Typical Case Studies - Strategies for Transition towards Value-based Life and Profession
Tutorials [Practice Session] - Exploring Ethical Human Conduct - Exploring Humanistic Models in
Education - Exploring Steps of Transition towards Universal Human Order
Course Outcomes: At the end of this course, learners will be able to:
<ul> <li>Students are expected to become more aware of themselves, and their surroundings (family, society, society)</li> </ul>
nature) Students would be sense more assisted in life, and in bendling much lower with sustainable solutions.
<ul> <li>Students would become more responsible in life, and in nandling problems with sustainable solutions.</li> <li>Students become constitute to their commitment towards what they have understand (human values).</li> </ul>
<ul> <li>Students become sensitive to their commitment towards what they have understood (numan values, human relationship and human society).</li> </ul>
<ul> <li>Students would be able to apply what they have learnt to their own self in different day-to-day settings</li> </ul>
in real life, at least a beginning would be made in this direction.
<ul> <li>Students would have better critical ability.</li> </ul>
TEXT BOOK(S):
1. A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria
2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
<ol> <li>Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978- 93-87034-53-2</li> </ol>
REFERENCE(S):
1. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004
3. The Story of Stuff (Book)
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swarai or Indian Home Rule - by Mohandas K. Gandhi

CK.g

Course Code         Course Name         Hours / Week         Credit         Total Hours         Maximum           19TP504         QUANTITATIVE APTITUDE AND LOGICAL REASONING – II         2         0         0         0         30         100           Course Objective (s):         -         -         0         0         0         30         100           Course Objective (s):         -         -         -         0         0         0         30         100           Course Outcomes: At the end of this course, learners will be able to:         -	V E	EE
Code         Conservation         L         T         P         C         Hours         Maximum           19TPS04         QUANTITATIVE APTITUDE AND LOGICAL REASONING – II         2         0         0         0         30         100           Course Objective (s):         •         Learn the basic of partnership and chain rule in simplified way,         Solve problems using fast track method by learning profit and loss with percentage.         •         Teach the angle of elevation and depression.         •         Know the relationship, direction concepts in easy way.         •         Know about coding and decoding through logical way.           Course Outcomes: At the end of this course, learners will be able to:         •         Solve problems by using shortcut in partnership and chain rule.         •         Know the tips and tricks of profit and loss with percentage through fast track methods.           •         Understand the concepts of angles.         •         Evaluate critically the real life situations by resorting and analyzing analytical reasoning of key is: and factors.           •         Enhance the logical way of thinking by solving problems codes and rankings concepts.         Unit II         PARTNERSHIP & CHAIN RULE           PARTNERSHIP & CHAIN RULE         PARTNERSHIP & CHAIN RULE         •         •         •         •         •         •         •         •         •         •         •         •	Mar	rk
19TPS04         QUANTITATIVE APTITUDE AND LOGICAL REASONING - II         2         0         0         30         100           Course Objective (s):         •         Learn the basic of partnership and chain rule in simplified way,         Solve problems using fast track method by learning profit and loss with percentage.         •         Feach the angle of elevation and depression.         •         Know the relationship, direction concepts in easy way.         •         Know the relationship, direction concepts in easy way.         •         Know about coding and decoding through logical way.         •         Course Outcomes: At the end of this course, learners will be able to:         •         Solve problems by using shortcut in partnership and chain rule.         •         Know the tips and tricks of profit and loss with percentage through fast track methods.         •         Understand the concepts of angles.         •         Evaluate critically the real life situations by resorting and analyzing analytical reasoning of key is: and factors.           •         Enhance the logical way of thinking by solving problems codes and rankings concepts.         •         Init II         PARTNERSHIP: Ratio of division of gains: Simple Partnership - Compound Partnership - Working and sleeping partners.           CHAIN RULE:         Definition - Direct proportion and Indirect proportion.         •         •         •         •         •         •         •         •         •         •         •         •         • </th <th>viai</th> <th>IR</th>	viai	IR
Course Objective (s):         • Learn the basic of partnership and chain rule in simplified way,         • Solve problems using fast track method by learning profit and loss with percentage.         • Teach the angle of elevation and depression.         • Know the relationship, direction concepts in easy way.         • Know the trigs and teacoding through logical way.         Course Outcomes: At the end of this course, learners will be able to:         • Solve problems by using shortcut in partnership and chain rule.         • Know the tips and tricks of profit and loss with percentage through fast track methods.         • Understand the concepts of angles.         • Evaluate critically the real life situations by resorting and analyzing analytical reasoning of key is: and factors.         • Enhance the logical way of thinking by solving problems codes and rankings concepts.         Unit II       PARTNERSHIP: Ratio of division of gains: Simple Partnership - Compound Partnership - Working and sleeping partners.         CHAIN RULE: Definition - Direct proportion and Indirect proportion.       Unit III         PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked pri Concept of fure v/s false value - Application in data interpretation problems.         PERCENTAGE: Percentage - Percentage using shortcuts.       Unit III         Unit III       HEIGHT AND DISTANCE         HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.       Unit V	4	
<ul> <li>Learn the basic of partnership and chain rule in simplified way,</li> <li>Solve problems using fast track method by learning profit and loss with percentage.</li> <li>Teach the angle of elevation and depression.</li> <li>Know the relationship, direction concepts in easy way.</li> <li>Know about coding and decoding through logical way.</li> <li>Course Outcomes: At the end of this course, learners will be able to:</li> <li>Solve problems by using shortcut in partnership and chain rule.</li> <li>Know the tips and tricks of profit and loss with percentage through fast track methods.</li> <li>Understand the concepts of angles.</li> <li>Evaluate critically the real life situations by resorting and analyzing analytical reasoning of key is: and factors.</li> <li>Enhance the logical way of thinking by solving problems codes and rankings concepts.</li> <li>Unit I PARTNERSHIP &amp; CHAIN RULE</li> <li>PARTNERSHIP: Ratio of division of gains: Simple Partnership - Compound Partnership - Working and sleeping partners.</li> <li>Chalt II PROFIT &amp; LOSS AND PERCENTAGE</li> <li>PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked pri Concept of true v/s false value - Application in data interpretation problems.</li> <li>PERCENTAGE: Percentage - Percentage using shortcuts.</li> <li>Unit II HEIGHT AND DISTANCE</li> <li>EIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.</li> <li>Unit V BLOOD RELATIONSHIP &amp; DIRECTION SENSE TEST</li> <li>BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree.</li> <li>DOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING &amp; TIME SEQUENCE TEST.</li> <li>DOGING AND DECODING: Introduction - Description of coding method.</li> <li>VUMBER RANKINGS &amp; TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.</li> <li>REFERENCE(S):         <ul> <li>Abhijit Guha, Quantitative Ap</li></ul></li></ul>		
<ul> <li>Solve problems using fast track method by learning profit and loss with percentage.</li> <li>Teach the angle of elevation and depression.</li> <li>Know the relationship, direction concepts in easy way.</li> <li>Know about coding and decoding through logical way.</li> <li>Solve problems by using shortcut in partnership and chain rule.</li> <li>Know the tips and tricks of profit and loss with percentage through fast track methods.</li> <li>Understand the concepts of angles.</li> <li>Evaluate critically the real life situations by resorting and analyzing analytical reasoning of key is: and factors.</li> <li>Enhance the logical way of thinking by solving problems codes and rankings concepts.</li> <li>Unit!</li> <li>PARTNERSHIP &amp; CHAIN RULE</li> <li>PARTNERSHIP &amp; CHAIN RULE</li> <li>PARTNERSHIP: Ratio of division of gains: Simple Partnership - Compound Partnership - Working and sleeping partners.</li> <li>CHAIN RULE: Definition - Direct proportion and Indirect proportion.</li> <li>Unit !!</li> <li>PROFIT &amp; LOSS AND PERCENTAGE</li> <li>PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked pri Concept of true v/s false value - Application in data interpretation problems.</li> <li>PERCENTAGE: Percentage - Percentage using shortcuts.</li> <li>Unit !!</li> <li>HEIGHT AND DISTANCE</li> <li>HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.</li> <li>Unit !!</li> <li>LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING &amp; TIME SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING &amp; TIME SEQUENCE TEST</li> <li>LOGICAL SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a class group - Sequence of increasing/decreasing size, value, intensity, etc.</li> <li>CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts o soding addecoding - Problems involving coding &amp; decoding method.<td></td><td></td></li></ul>		
<ul> <li>Teach the angle of elevation and depression.</li> <li>Know the relationship, direction concepts in easy way.</li> <li>Know about coding and decoding through logical way.</li> </ul> Course: Outcomes: At the end of this course, learners will be able to: <ul> <li>Solve problems by using shortcut in partnership and chain rule.</li> <li>Know the tips and tricks of profit and loss with percentage through fast track methods.</li> <li>Understand the concepts of angles.</li> <li>Evaluate critically the real life situations by resorting and analyzing analytical reasoning of key is: and factors.</li> <li>Enhance the logical way of thinking by solving problems codes and rankings concepts.</li> <li>Unit11 PARTNERSHIP &amp; CHAIN RULE</li> </ul> PARTNERSHIP: Ratio of division of gains: Simple Partnership - Compound Partnership - Working and sleeping partners. CHAIN RULE: Definition - Direct proportion and Indirect proportion. Unit11 PROFIT & LOSS AND PERCENTAGE PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked priconcept of true v/s false value - Application in data interpretation problems. PERCENTAGE: Percentage - Percentage using shortcuts. Unit 11 HEIGHT AND DISTANCE HEIGHT AND DISTANCE HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression. Unit 1V BLOOD RELATIONSHIP & DIRECTION SENSE TEST BICOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree. DDIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corr Unit V ICGICAL SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a clasgroup- Sequence of increasing/decreasing size, value, intensity, etc. CODING AND DECODING: Introduction - Description of coding method. NUMBER RANKINGS & TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test. REFERENCE		
<ul> <li>Know the relationship, direction concepts in easy way.</li> <li>Know about coding and decoding through logical way.</li> <li>Course Outcomes: At the end of this course, learners will be able to:         <ul> <li>Solve problems by using shortcut in partnership and chain rule.</li> <li>Know the tips and tricks of profit and loss with percentage through fast track methods.</li> <li>Understand the concepts of angles.</li> <li>Evaluate critically the real life situations by resorting and analyzing analytical reasoning of key is: and factors.</li> <li>Enhance the logical way of thinking by solving problems codes and rankings concepts.</li> </ul> </li> <li>Unit! PARTNERSHIP &amp; CHAIN RULE</li> <li>PARTNERSHIP: Ratio of division of gains: Simple Partnership - Compound Partnership - Working and sleeping partners.</li> <li>CHAIN RULE: Definition - Direct proportion and Indirect proportion.</li> <li>Unit II</li> <li>PROFIT &amp; LOSS AND PERCENTAGE</li> <li>PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked pri Concept of true v/s false value - Application in data interpretation problems.</li> <li>PERCENTAGE: Percentage - Percentage using shortcuts.</li> <li>Unit III</li> <li>HEIGHT AND DISTANCE</li> <li>HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.</li> <li>Unit V</li> <li>BLOOD RELATIONSHIP &amp; DIRECTION SENSE TEST</li> <li>BLOOD RELATIONSHIP &amp; ADIRSCHONS AULE, intensity, etc.</li> <li>DODING RAND DECODING: Introduction - Description of coding method, Coding patterns - Concepts or coding &amp; decoding - Problems involving coding &amp; decoding method, Coding patterns - Concepts or coding &amp; decoding - Problems involving coding &amp; decoding method, Coding patterns - Concepts or coding &amp; decoding - Problems involving coding &amp; decoding method, Coding patterns - Concepts or coding &amp; decoding - Problems involving codin</li></ul>		
<ul> <li>Know about coding and decoding through logical way.</li> <li>Course Outcomes: At the end of this course, learners will be able to:</li> <li>Solve problems by using shortcut in partnership and chain rule.</li> <li>Know the tips and tricks of profit and loss with percentage through fast track methods.</li> <li>Understand the concepts of angles.</li> <li>Evaluate critically the real life situations by resorting and analyzing analytical reasoning of key is: and factors.</li> <li>Enhance the logical way of thinking by solving problems codes and rankings concepts.</li> <li>Unit1 PARTNERSHIP &amp; CHAIN RULE</li> <li>PARTNERSHIP: Ratio of division of gains: Simple Partnership - Compound Partnership - Working and sleeping partners.</li> <li>CHAIN RULE: Definition - Direct proportion and Indirect proportion.</li> <li>Unit II PROFIT &amp; LOSS AND PERCENTAGE</li> <li>PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked pri Concept of true v/s false value - Application in data interpretation problems.</li> <li>PERCENTAGE: Percentage - Percentage using shortcuts.</li> <li>Unit III HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.</li> <li>Unit III BLOOD RELATIONSHIP &amp; DIRECTION SENSE TEST</li> <li>BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree.</li> <li>DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corr</li> <li>Unit VI LOSICAL SEQUENCE CF ST</li> <li>CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts o coding &amp; decoding - Problems involving coding &amp; decoding method.</li> <li>NUMBER RANKINGS &amp; TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.</li> <li>REFERENCE(S):</li> <li>Abhinjit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012.</li> <li>Arun</li></ul>		
Course Outcomes: At the end of this course, learners will be able to:   Solve problems by using shortcut in partnership and chain rule.  Know the tips and tricks of profit and loss with percentage through fast track methods.  Understand the concepts of angles.  Evaluate critically the real life situations by resorting and analyzing analytical reasoning of key is: and factors.  Init I PARTNERSHIP & CHAIN RULE PARTNERSHIP & CHAIN RULE PARTNERSHIP. Ratio of division of gains: Simple Partnership - Compound Partnership - Working and sleeping partners.  CHAIN RULE: Definition - Direct proportion and Indirect proportion. Unit II PROFIT & LOSS AND PERCENTAGE PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked pri Concept of true v/s false value - Application in data interpretation problems. PERCENTAGE: Percentage - Percentage using shortcuts. Unit III HEIGHT AND DISTANCE HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression. Unit IV BLOOD RELATIONSHIP & DIRECTION SENSE TEST BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree. DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corr Unit V LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING & TIME SEQUENCE TEST BLOGDING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts of coding & decoding method. NUMBER RANKINGS & TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test. REFERENCE(S):  A bhingit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012.  A run Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-H Publishing Company Ltd, 2012.  A run Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-H Publishing Company Ltd, 2012.  A run Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-H Publishing Compa	_	-
<ul> <li>Solve problems by using shortcut in partnership and chain rule.</li> <li>Know the tips and tricks of profit and loss with percentage through fast track methods.</li> <li>Understand the concepts of angles.</li> <li>Evaluate critically the real life situations by resorting and analyzing analytical reasoning of key is: and factors.</li> <li>Enhance the logical way of thinking by solving problems codes and rankings concepts.</li> <li>Unit   PARTNERSHIP &amp; CHAIN RULE</li> <li>PARTNERSHIP: Ratio of division of gains: Simple Partnership - Compound Partnership - Working and sleeping partners.</li> <li>CHAIN RULE: Definition - Direct proportion and Indirect proportion.</li> <li>Unit II PROFIT &amp; LOSS AND PERCENTAGE</li> <li>PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked pri Concept of true v/s false value - Application in data interpretation problems.</li> <li>PERCENTAGE: Percentage - Percentage using shortcuts.</li> <li>Unit II HEIGHT AND DISTANCES</li> <li>HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.</li> <li>Unit IV BLOOD RELATIONSHIP &amp; DIRECTION SENSE TEST</li> <li>BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree.</li> <li>DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corre</li> <li>Unit V IDEGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING &amp; TIME SEQUENCE TEST: Number test - Sequence of objects in a class group - Sequence of increasing/decreasing size, value, intensity, etc.</li> <li>CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts o coding &amp; decoding - Problems involving coding &amp; decoding method.</li> <li>NUMBER RANKINGS &amp; TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.</li> <li>REFERENCE(S):         <ul> <li>Abhijit Guha, Quantitative Aptitude for Competitive Examinations,</li></ul></li></ul>		
<ul> <li>Know the tips and tricks of profit and loss with percentage through fast track methods.</li> <li>Understand the concepts of angles.</li> <li>Evaluate critically the real life situations by resorting and analyzing analytical reasoning of key is: and factors.</li> <li>Enhance the logical way of thinking by solving problems codes and rankings concepts.</li> <li>Unit1 PARTNERSHIP &amp; CHAIN RULE</li> <li>PARTNERSHIP: Ratio of division of gains: Simple Partnership - Compound Partnership - Working and sleeping partners.</li> <li>CHAIN RULE: Definition - Direct proportion and Indirect proportion.</li> <li>Unit1 PROFIT &amp; LOSS AND PERCENTAGE</li> <li>PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked priconcept of true v/s false value - Application in data interpretation problems.</li> <li>PERCENTAGE: Percentage - Percentage using shortcuts.</li> <li>Unit11 HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.</li> <li>Unit 11 BLOOD RELATIONSHIP &amp; DIRECTION SENSE TEST</li> <li>BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree.</li> <li>DIRECTION SENSE TEST: Distance between the starting and ending points - Sequence of objects in a class group. Sequence of increasing/decreasing size, value, intensity, etc.</li> <li>CODING: AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts or oding &amp; decoding - Problems involving coding &amp; decoding method.</li> <li>NUMBER RANKINGS &amp; TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.</li> <li>REFERENCE(S):         <ul> <li>Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-Hill Publishing Company Ltd, 2012</li> <li>Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.</li> </ul> </li> <li>PROPICAL Compo</li></ul>		
<ul> <li>Understand the concepts of angles.</li> <li>Evaluate critically the real life situations by resorting and analyzing analytical reasoning of key is: and factors.</li> <li>Enhance the logical way of thinking by solving problems codes and rankings concepts.</li> <li>Unit I PARTNERSHIP &amp; CHAIN RULE</li> <li>PARTNERSHIP : Ratio of division of gains: Simple Partnership - Compound Partnership - Working and sleeping partners.</li> <li>CHAIN RULE: Definition - Direct proportion and Indirect proportion.</li> <li>Unit II PROFIT &amp; LOSS AND PERCENTAGE</li> <li>PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked pri Concept of true v/s false value - Application in data interpretation problems.</li> <li>PERCENTAGE: Percentage - Percentage using shortcuts.</li> <li>Unit III HEIGHT AND DISTANCE</li> <li>HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.</li> <li>Unit IV BLOOD RELATIONSHIP &amp; DIRECTION SENSE TEST</li> <li>BLOOD RELATIONSHIP: Analysis the gender relationship and ending points - Sense the direction corr</li> <li>Unit V</li> <li>LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING &amp; TIME SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a class group - Sequence of increasing/decreasing size, value, intensity, etc.</li> <li>CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts o coding &amp; decoding - Problems involving coding &amp; decoding method.</li> <li>NUMBER RANKINGS &amp; TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.</li> <li>REFERENCE(S):         <ul> <li>Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012</li> <li>Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-H Publishing Company Ltd, 2012.</li> <li>R.W-Praveen," Quant</li></ul></li></ul>		
<ul> <li>Evaluate critically the real life situations by resorting and analyzing analytical reasoning of key is: and factors.</li> <li>Enhance the logical way of thinking by solving problems codes and rankings concepts.</li> <li>Unit I PARTNERSHIP &amp; CHAIN RULE</li> <li>PARTNERSHIP: Ratio of division of gains: Simple Partnership - Compound Partnership - Working and sleeping partners.</li> <li>CHAIN RULE: Definition - Direct proportion and Indirect proportion.</li> <li>Unit II PROFIT &amp; LOSS AND PERCENTAGE</li> <li>PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked pri Concept of true v/s false value - Application in data interpretation problems.</li> <li>PERCENTAGE: Percentage - Percentage using shortcuts.</li> <li>Unit III HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.</li> <li>Unit IV BLOOD RELATIONSHIP &amp; DIRECTION SENSE TEST</li> <li>BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree.</li> <li>DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corr</li> <li>Unit V IDGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING &amp; TIME SEQUENCE TEST</li> <li>LOGICAL SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a class group - Sequence of increasing/decreasing size, value, intensity, etc.</li> <li>CODING AND DECODING Introduction - Description of coding method, Coding patterns - Concepts o coding &amp; decoding - Problems involving coding &amp; decoding method, Coding patterns - Concepts or coding &amp; decoding - Problems involving coding &amp; decoding method.</li> <li>NUMBER RANKINGS &amp; TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.</li> <li>REFERENCE(S):         <ul> <li>Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012</li> <li>Arun Sharma, How to prepare</li></ul></li></ul>		
<ul> <li>Enhance the logical way of thinking by solving problems codes and rankings concepts.</li> <li>Unit I</li> <li>PARTNERSHIP &amp; CHAIN RULE</li> <li>PARTNERSHIP: Ratio of division of gains: Simple Partnership - Compound Partnership - Working and sleeping partners.</li> <li>CHAIN RULE: Definition - Direct proportion and Indirect proportion.</li> <li>Unit II</li> <li>PROFIT &amp; LOSS AND PERCENTAGE</li> <li>PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked proceed of true v/s false value - Application in data interpretation problems.</li> <li>PERCENTAGE: Percentage - Percentage using shortcuts.</li> <li>Unit III</li> <li>HEIGHT AND DISTANCE</li> <li>HEIGHT AND DISTANCE</li> <li>HEIGHT AND DISTANCE</li> <li>BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree.</li> <li>DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction correction SENSE TEST:</li> <li>DOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING &amp; TIME SEQUENCE TEST</li> <li>LOGICAL SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a class group - Sequence of increasing/decreasing size, value, intensity, etc.</li> <li>CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts or coding decoding - Problems involving coding &amp; decoding method.</li> <li>NUMBER RANKINGS &amp; TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.</li> <li>REFERENCE(S):         <ol> <li>Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012</li> <li>Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.</li> <li>RW-Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.</li> </ol></li></ul>	ues	S
Enhance the logical way of thinking by solving problems codes and rankings concepts.     Unit I PARTNERSHIP & CHAIN RULE PARTNERSHIP: Ratio of division of gains: Simple Partnership - Compound Partnership - Working and sleeping partners.     CHAIN RULE: Definition - Direct proportion and Indirect proportion.     Unit II PROFIT & LOSS AND PERCENTAGE PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked pr Concept of true v/s false value - Application in data interpretation problems.     PERCENTAGE: Percentage - Percentage using shortcuts.     Unit II HEIGHT AND DISTANCE HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.     Unit IV BLOOD RELATIONSHIP & DIRECTION SENSE TEST BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree. DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corr Unit V LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING & TIME SEQUENCE TEST LOGICAL SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a clas group - Sequence of increasing/decreasing size, value, intensity, etc. CODING: AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts o coding & decoding - Problems involving coding & decoding method. NUMBER RANKINGS & TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test. REFERENCE(S): 1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012 2. Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-H Publishing Company Ltd, 2012. 3. R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.		
Unit1         PARTNERSHIP & CHAIN RULE           PARTNERSHIP: Ratio of division of gains: Simple Partnership - Compound Partnership - Working and sleeping partners.           CHAIN RULE: Definition - Direct proportion and Indirect proportion.           Unit11         PROFIT & LOSS AND PERCENTAGE           PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked priconcept of true v/s false value - Application in data interpretation problems.           PERCENTAGE: Percentage - Percentage using shortcuts.           Unit III         HEIGHT AND DISTANCE           HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.           Unit IV         BLOOD RELATIONSHIP & DIRECTION SENSE TEST           BLOOD RELATIONSHIP & nalysis the gender relationship - Relationship diagram - Family tree.           DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corr           Unit V         LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING & TIME SEQUENCE TEST           LOGICAL SEQUENCE TEST         CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts o coding & decoding - Problems involving coding & decoding method.           NUMBER RANKINGS & TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.           REFERENCE(S):           1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012           2. Arun Sharma,		_
<ul> <li>PARTNERSHIP: Ratio of division of gains: Simple Partnership - Compound Partnership - Working and sleeping partners.</li> <li>CHAIN RULE: Definition - Direct proportion and Indirect proportion.</li> <li>Unit III PROFIT &amp; LOSS AND PERCENTAGE</li> <li>PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked price concept of true v/s false value - Application in data interpretation problems.</li> <li>PERCENTAGE: Percentage - Percentage using shortcuts.</li> <li>Unit III   HEIGHT AND DISTANCE</li> <li>HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.</li> <li>Unit IV   BLOOD RELATIONSHIP &amp; DIRECTION SENSE TEST</li> <li>BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree.</li> <li>DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corrigioup - Sequence of increasing/decreasing size, value, intensity, etc.</li> <li>CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts of coding &amp; decoding - Problems involving coding &amp; decoding method.</li> <li>NUMBER RANKINGS &amp; TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.</li> <li>REFERENCE(S): <ol> <li>Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012</li> <li>Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-H Publishing Company Ltd, 2012.</li> <li>R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.</li> </ol> </li> </ul>		6
Sleeping partners.         CHAIN RULE: Definition - Direct proportion and Indirect proportion.         Unit II       PROFIT & LOSS AND PERCENTAGE         PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked priconcept of true v/s false value - Application in data interpretation problems.         PERCENTAGE: Percentage - Percentage using shortcuts.         Unit III       HEIGHT AND DISTANCE         HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.         Unit IV       BLOOD RELATIONSHIP & DIRECTION SENSE TEST         BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree.         DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corr         Unit V       LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING & TIME SEQUENCE TEST         LOGICAL SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a class group - Sequence of increasing/decreasing size, value, intensity, etc.         CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts o coding & decoding - Problems involving coding & decoding method.         NUMBER RANKINGS & TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.         REFERENCE(S):         1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012         2. Arun Sharma, How to prepare for Data Interpretation for the CAT		
CHAIN RULE: Definition - Direct proportion and Indirect proportion.         Unit II       PROFIT & LOSS AND PERCENTAGE         PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked priconcept of true v/s false value - Application in data interpretation problems.         PERCENTAGE: Percentage - Percentage using shortcuts.         Unit III       HEIGHT AND DISTANCE         HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.         Unit IV       BLOOD RELATIONSHIP & DIRECTION SENSE TEST         BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree.         DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corr         Unit V       LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING & TIME SEQUENCE TEST         LOGICAL SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a class group - Sequence of increasing/decreasing size, value, intensity, etc.         CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts o coding & decoding - Problems involving coding & decoding method.         NUMBER RANKINGS & TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.         REFERENCE(S):         1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012         2. Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company		
Unit II         PROFIT & LOSS AND PERCENTAGE           PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked price           Concept of true v/s false value - Application in data interpretation problems.           PERCENTAGE: Percentage - Percentage using shortcuts.           Unit III         HEIGHT AND DISTANCE           HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.           Unit IV         BLOOD RELATIONSHIP & DIRECTION SENSE TEST           BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree.           DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corr           Unit V         LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING & TIME SEQUENCE TEST           OGICAL SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a class group - Sequence of increasing/decreasing size, value, intensity, etc.           CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts o coding & decoding - Problems involving coding & decoding method.           NUMBER RANKINGS & TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.           REFERENCE(S):           1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-Hill Publishing Company Ltd, 2012           2. Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012. <tr< td=""><td>_</td><td></td></tr<>	_	
PROFIT AND LOSS: Basic definition and types of profit and loss - Concept of discount and marked pri         Concept of true v/s false value - Application in data interpretation problems.         PERCENTAGE: Percentage - Percentage using shortcuts.         Unit III       HEIGHT AND DISTANCE         HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.         Unit IV       BLOOD RELATIONSHIP & DIRECTION SENSE TEST         BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree.         DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corr         Unit V       LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING & TIME SEQUENCE TEST         LOGICAL SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a class group Sequence of increasing/decreasing size, value, intensity, etc.         CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts o coding & decoding - Problems involving coding & decoding method.         NUMBER RANKINGS & TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.         REFERENCE(S):         1.       Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-Hill Publishing Company Ltd, 2012         2.       Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.         3.       R.V.Praveen," Quantitative Aptitude and Reasoning "Third		6
Concept of true v/s false value - Application in data interpretation problems. PERCENTAGE: Percentage - Percentage using shortcuts. Unit III   HEIGHT AND DISTANCE HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression. Unit IV   BLOOD RELATIONSHIP & DIRECTION SENSE TEST BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree. DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corr Unit V   LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING & TIME SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a clas group - Sequence of increasing/decreasing size, value, intensity, etc. CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts o coding & decoding - Problems involving coding & decoding method. NUMBER RANKINGS & TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test. REFERENCE(S): 1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012 2. Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-H il Publishing Company Ltd, 2012. 3. R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.	ce -	T.
PERCENTAGE: Percentage - Percentage using shortcuts.         Unit III       HEIGHT AND DISTANCE         HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.         Unit IV       BLOOD RELATIONSHIP & DIRECTION SENSE TEST         BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree.         DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corr         Unit V       LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING & TIME SEQUENCE TEST         LOGICAL SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a class group - Sequence of increasing/decreasing size, value, intensity, etc.         CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts of coding & decoding - Problems involving coding & decoding method.         NUMBER RANKINGS & TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.         REFERENCE(S):         1.       Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012         2.       Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.         3.       R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.		
Unit III       HEIGHT AND DISTANCE         HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.         Unit IV       BLOOD RELATIONSHIP & DIRECTION SENSE TEST         BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree.         DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corr         Unit V       LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING & TIME SEQUENCE TEST         LOGICAL SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a class group - Sequence of increasing/decreasing size, value, intensity, etc.         CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts o coding & decoding - Problems involving coding & decoding method.         NUMBER RANKINGS & TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.         REFERENCE(S):         1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012         2. Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.         3. R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.		-
HEIGHT AND DISTANCES: Line of sight - Angle of elevation - Angle of depression.         Unit IV       BLOOD RELATIONSHIP & DIRECTION SENSE TEST         BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree.         DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corr         Unit V       LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING & TIME SEQUENCE TEST         LOGICAL SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a class group - Sequence of increasing/decreasing size, value, intensity, etc.         CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts o coding & decoding - Problems involving coding & decoding method.         NUMBER RANKINGS & TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.         REFERENCE(S):         1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012         2. Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.         3. R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.		6
Unit IV         BLOOD RELATIONSHIP & DIRECTION SENSE TEST           BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree.           DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corr           Unit V         LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING & TIME SEQUENCE TEST           LOGICAL SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a class group - Sequence of increasing/decreasing size, value, intensity, etc.           CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts of coding & decoding - Problems involving coding & decoding method.           NUMBER RANKINGS & TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.           REFERENCE(S):           1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012           2. Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.           3. R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.	-	
<ul> <li>BLOOD RELATIONSHIP: Analysis the gender relationship - Relationship diagram - Family tree.</li> <li>DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corr</li> <li>Unit V</li> <li>LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING &amp; TIME SEQUENCE TEST</li> <li>LOGICAL SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a class group - Sequence of increasing/decreasing size, value, intensity, etc.</li> <li>CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts of coding &amp; decoding - Problems involving coding &amp; decoding method.</li> <li>NUMBER RANKINGS &amp; TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.</li> <li>REFERENCE(S):</li> <li>1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012</li> <li>2. Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.</li> <li>3. R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.</li> </ul>		6
DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction corr         Unit V       LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING & TIME SEQUENCE TEST         LOGICAL SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a class group - Sequence of increasing/decreasing size, value, intensity, etc.         CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts of coding & decoding - Problems involving coding & decoding method.         NUMBER RANKINGS & TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.         REFERENCE(S):         1.       Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012         2.       Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.         3.       R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.		
Unit V         LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING & TIME SEQUENCE TEST           LOGICAL SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a class group - Sequence of increasing/decreasing size, value, intensity, etc.           CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts of coding & decoding - Problems involving coding & decoding method.           NUMBER RANKINGS & TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.           REFERENCE(S):           1.         Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012           2.         Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.           3.         R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.	ectly	у.
<ul> <li>LOGICAL SEQUENCE OF WORDS: Sequence of occurrence of events - Sequence of objects in a class group - Sequence of increasing/decreasing size, value, intensity, etc.</li> <li>CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts of coding &amp; decoding - Problems involving coding &amp; decoding method.</li> <li>NUMBER RANKINGS &amp; TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.</li> <li><b>REFERENCE(S):</b> <ol> <li>Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012</li> <li>Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.</li> <li>R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.</li> </ol> </li> </ul>		6
<ul> <li>group - Sequence of increasing/decreasing size, value, intensity, etc.</li> <li>CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts of coding &amp; decoding - Problems involving coding &amp; decoding method.</li> <li>NUMBER RANKINGS &amp; TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.</li> <li><b>REFERENCE(S):</b> <ol> <li>Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012</li> <li>Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.</li> <li>R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.</li> </ol> </li> </ul>	S OI	r
<ul> <li>CODING AND DECODING: Introduction - Description of coding method, Coding patterns - Concepts of coding &amp; decoding - Problems involving coding &amp; decoding method.</li> <li><u>NUMBER RANKINGS &amp; TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.</u></li> <li><b>REFERENCE(S):</b> <ol> <li>Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012</li> <li>Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.</li> <li>R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.</li> </ol> </li> </ul>		
<ul> <li>coding &amp; decoding - Problems involving coding &amp; decoding method.</li> <li>NUMBER RANKINGS &amp; TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.</li> <li><b>REFERENCE(S):</b> <ol> <li>Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012</li> <li>Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.</li> <li>R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.</li> </ol> </li> </ul>		
<ol> <li>NOMBER RANKINGS &amp; TIME SEQUENCE TEST: Number test - Ranking test - Time sequence test.</li> <li>REFERENCE(S):         <ol> <li>Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012</li> <li>Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.</li> <li>R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.</li> </ol> </li> </ol>		
<ol> <li>REFERENCE(S):</li> <li>Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012</li> <li>Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.</li> <li>R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.</li> </ol>		
<ol> <li>Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-H Publishing Company Ltd, 2012</li> <li>Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.</li> <li>R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.</li> </ol>		
<ol> <li>Abilit Guna, Guantitative Aptitude for Competitive Examinations, Fourth Edition, Fata McGraw-Hill Publishing Company Ltd, 2012</li> <li>Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.</li> <li>R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.</li> </ol>		
<ol> <li>Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.</li> <li>R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.</li> </ol>	"	
<ol> <li>Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.</li> <li>R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.</li> </ol>		
<ol> <li>Publishing Company Ltd, 2012.</li> <li>R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.</li> </ol>		
3. R.V.Praveen," Quantitative Aptitude and Reasoning "Third Edition, PHI Learning, 2016.		
<ol> <li>Dr.K S Aggarwal, Quantitative Aptitude, Revised and Enlarged Edition, S.Chand Publishing Com Ltd, 2017.</li> </ol>	ban	y
5. Arun Sharma "How to Prepare for Quantitative Aptitude "Eight Edition. McGraw Hill Education.20"	8	
6 "Reasoning and Aptitude" for GATE and ESE Prelims. Made Easy Publication. 2020		

Chairman - BoS Dept.of BME - ESEC

	BIOWEDICAL ENGINEERI	NG				R 2019	Semester IV
Course Code	Course Name	н \ 	ours Veel	k K	Credit	Total Hours	Maximum Marks
19BM405	ANALOG AND DIGITAL IC LABORATORY	0	0	4	2	60	100
<ul> <li>Study</li> <li>Learn</li> <li>Study</li> <li>Perfor</li> <li>Perfor</li> <li>Desig</li> <li>Desig</li> <li>Desig</li> </ul>	the Frequency response of CE, CB and CC Amplifiers the frequency response of CS Amplifiers the Transfer characteristics of differential amplif rm experiment to obtain the bandwidth of single s rm SPICE simulation of Electronic Circuits n and implement the Combinational and sequent comes: At the end of this course, learners will b n and Test rectifiers, filters and regulated power n and Test B IT/ IEET amplifiers	to olifie ier stage tial lo e ab supp	e and ogic le to olies	d mu circu	ltistage a its	amplifiers	
<ul> <li>Analy:</li> <li>Measure</li> <li>Simulation</li> <li>Design</li> </ul>	ze the limitation in bandwidth of single stage and ure CMRR in differential amplifier ate and analyze amplifier circuits using PSpice. n and Test the digital logic circuits.	mu	lti sta	age a	amplifier		
	NAME OF EXPERI	MEN	ITS				1
<ol> <li>Analysis</li> <li>Analysis</li> <li>Analysis</li> <li>Analysis</li> <li>Digita</li> <li>Design a</li> </ol>	s of BJT with Fixed bias and Voltage divider bias s of FET with fixed bias, self-bias and voltage div	usir ider	ng S bias	oice usir	ng simula	ition softw	are like Spice
gray 2. Design a 3. Design a 4. Construct	and implementation of code converters using log and implementation of Multiplexer and De-multip and implementation of encoder and decoder usir ction and verification of 4 bit ripple counter and N	ic ga lexe ng lo 1od-	ates( r usi gic g 10 F	i) B( ng lo ates lipple	CD to exc ogic gates a counter	cess-3 coo s rs	de (ii) Binary to
gray 2. Design a 3. Design a 4. Construct 5. Design a	and implementation of code converters using log and implementation of Multiplexer and De-multip and implementation of encoder and decoder usir ction and verification of 4 bit ripple counter and N and implementation of 3-bit synchronous up/dow	ic ga lexe ig lo lod- n co	r usi gic g 10 F unte	i) B( ng lo ates tipple	CD to exc ogic gates te counter	cess-3 coo s rs	de (ii) Binary to
gray 2. Design a 3. Design a 4. Construct 5. Design a <b>S.No</b>	and implementation of code converters using log and implementation of Multiplexer and De-multip and implementation of encoder and decoder usir ction and verification of 4 bit ripple counter and N and implementation of 3-bit synchronous up/dow NAME OF THE EQUIPMI	ic ga lexe ng lo nod- n co <b>ENT</b>	r usi gic g 10 F unte	i) B( ng lo ates ipple r	CD to exc ogic gates e counter	cess-3 coo s rs	de (ii) Binary to QUANTITY 15
gray 2. Design a 3. Design a 4. Construct 5. Design a <b>S.No</b> 1. Dual 2. CRC	and implementation of code converters using log and implementation of Multiplexer and De-multip and implementation of encoder and decoder usir ction and verification of 4 bit ripple counter and N and implementation of 3-bit synchronous up/dow NAME OF THE EQUIPMI Regulated Power Supplies (0 - 30V)	ic ga lexe ng lo 1od- n co <b>ENT</b>	r usi gic g 10 F unte	i) B( ng lo ates lipple	CD to exc ogic gates e counter	xess-3 coo s rs	de (ii) Binary to QUANTITY 15 15
gray 2. Design a 3. Design a 4. Construct 5. Design a 5. No 1. Dual 2. CRC 3. Stan	and implementation of code converters using log and implementation of Multiplexer and De-multip and implementation of encoder and decoder usir ction and verification of 4 bit ripple counter and N and implementation of 3-bit synchronous up/dow NAME OF THE EQUIPMI Regulated Power Supplies (0 - 30V) 0 / DSO (30 MHz) dalone desktop PCs with SPICE software	ic ga lexe ng lo 1od- n co <b>ENT</b>	r usi gic g 10 F unte	i) B( ng lo ates lipple r	CD to exc ogic gates e counter	cess-3 coo s rs	de (ii) Binary to QUANTITY 15 15 15 15
gray 2. Design a 3. Design a 4. Construct 5. Design a <b>S.No</b> 1. Dual 2. CRC 3. Stan 4. Tran	and implementation of code converters using log and implementation of Multiplexer and De-multip and implementation of encoder and decoder usir ction and verification of 4 bit ripple counter and N and implementation of 3-bit synchronous up/dow NAME OF THE EQUIPMI Regulated Power Supplies (0 - 30V) 0 / DSO (30 MHz) dalone desktop PCs with SPICE software sistor/FET (BJT-NPN-PNP and NMOS/PMOS)	ic ga lexe ng lo n co <b>ENT</b>	r usi gic g 10 F unte	i) B( ng lo ates lipple r	CD to exc ogic gates e counter	cess-3 coo	de (ii) Binary to          QUANTITY         15         15         15         15         15         15         15         15         15         15         15         15         15         15         15         15         15         15
gray 2. Design a 3. Design a 4. Construct 5. Design a <b>S.No</b> 1. Dual 2. CRC 3. Stan 4. Tran 5. Com Diod	and implementation of code converters using log and implementation of Multiplexer and De-multip and implementation of encoder and decoder usir ction and verification of 4 bit ripple counter and N and implementation of 3-bit synchronous up/dow <b>NAME OF THE EQUIPMI</b> Regulated Power Supplies (0 - 30V) 0 / DSO (30 MHz) dalone desktop PCs with SPICE software sistor/FET (BJT-NPN-PNP and NMOS/PMOS) ponents and Accessories: Resistors, Capacitors es, Bread Boards, Transformers	ic ga lexe ng lo n co ENT	r usi gic g 10 F unte	i) BC ng lo ates ipple r	CD to exc ogic gates e counter liodes, Ze	cess-3 coo	de (ii) Binary to           QUANTITY           15           15           15           15           15           15           15           15           15           15           15           15           15           15           15           As Required
gray gray 2. Design a 3. Design a 5. Design a 5. No 1. Dual 2. CRC 3. Stan 4. Tran 5. Com Diod 6. SPIC	and implementation of code converters using log and implementation of Multiplexer and De-multip and implementation of encoder and decoder usir ction and verification of 4 bit ripple counter and N and implementation of 3-bit synchronous up/dow <b>NAME OF THE EQUIPMI</b> Regulated Power Supplies (0 - 30V) 0 / DSO (30 MHz) dalone desktop PCs with SPICE software sistor/FET (BJT-NPN-PNP and NMOS/PMOS) ponents and Accessories: Resistors, Capacitors es, Bread Boards, Transformers CE Circuit Simulation Software: (any public doma	ic ga lexe ng lo Aod- n co <b>ENT</b> , Ind	ates( r usi gic g 10 F unte	i) BC ng lo ates lipplo r rs, c	CD to exc ogic gates e counter liodes, Ze rcial softw	cess-3 coo s rs ener ware)	de (ii) Binary to           QUANTITY           15
gray gray 2. Design a 3. Design a 5. Design a 5. Design a 5. No 1. Dual 2. CRC 3. Stan 4. Tran 5. Com Diod 6. SPIC 7. Brea	and implementation of code converters using log and implementation of Multiplexer and De-multip and implementation of encoder and decoder usir ction and verification of 4 bit ripple counter and N and implementation of 3-bit synchronous up/dow <b>NAME OF THE EQUIPMI</b> Regulated Power Supplies (0 - 30V) 0 / DSO (30 MHz) dalone desktop PCs with SPICE software sistor/FET (BJT-NPN-PNP and NMOS/PMOS) ponents and Accessories: Resistors, Capacitors es, Bread Boards, Transformers CE Circuit Simulation Software: (any public doma d board	ic ga lexe ng lo 1od- <b>Ind</b> , Ind	ates( r usi gic g 10 F unte	i) BC ng lo ates lipple r rs, c	CD to exe ogic gates e counter liodes, Ze rcial softw	cess-3 coo s rs ener ware)	de (ii) Binary to          QUANTITY         15
gray gray 2. Design a 3. Design a 5. Design a 5. No 1. Dual 2. CRC 3. Stan 4. Tran 5. Com Diod 6. SPIC 7. Brea 8. IC T	and implementation of code converters using log and implementation of Multiplexer and De-multip and implementation of encoder and decoder usir ction and verification of 4 bit ripple counter and N and implementation of 3-bit synchronous up/dow <b>NAME OF THE EQUIPMI</b> Regulated Power Supplies (0 - 30V) 0 / DSO (30 MHz) dalone desktop PCs with SPICE software sistor/FET (BJT-NPN-PNP and NMOS/PMOS) ponents and Accessories: Resistors, Capacitors es, Bread Boards, Transformers CE Circuit Simulation Software: (any public doma d board Trainer Kit	ic ga lexe ng lo Aod- n co <b>ENT</b>	ates( r usi gic g 10 F unte	i) BC ng la ates ipple r rs, d	iodes, Ze	cess-3 coo s rs ener ware)	de (ii) Binary to          QUANTITY         15         15         15         15         15         15         15         15         15         15         15         15         15         15         15         15         10
gray 2. Design a 3. Design a 4. Construct 5. Design a <b>S.No</b> 1. Dual 2. CRC 3. Stan 4. Tran 5. Com Diod 6. SPIC 7. Brea 8. IC T 9. Sev	and implementation of code converters using log and implementation of Multiplexer and De-multip and implementation of encoder and decoder usir ction and verification of 4 bit ripple counter and N and implementation of 3-bit synchronous up/dow <b>NAME OF THE EQUIPMI</b> Regulated Power Supplies (0 - 30V) 0 / DSO (30 MHz) dalone desktop PCs with SPICE software sistor/FET (BJT-NPN-PNP and NMOS/PMOS) ponents and Accessories: Resistors, Capacitors es, Bread Boards, Transformers CE Circuit Simulation Software: (any public doma d board Trainer Kit en segment display	ic ga lexe ng lo 1od- n co <b>ENT</b>	ates( r usi gic g 10 F unte	i) B0 ng lo ates lipple r rs, d	CD to exe ogic gates e counter liodes, Ze rcial softw	ener ware)	de (ii) Binary to QUANTITY 15 15 15 As Required 1 15 10 25
gray 2. Design a 3. Design a 4. Construct 5. Design a <b>S.No</b> 1. Dual 2. CRC 3. Stan 4. Tran 5. Com Diod 6. SPIC 7. Brea 8. IC T 9. Sev 10. Multi	and implementation of code converters using log and implementation of Multiplexer and De-multip and implementation of encoder and decoder usir ction and verification of 4 bit ripple counter and N and implementation of 3-bit synchronous up/dow <b>NAME OF THE EQUIPMI</b> Regulated Power Supplies (0 - 30V) 0 / DSO (30 MHz) dalone desktop PCs with SPICE software sistor/FET (BJT-NPN-PNP and NMOS/PMOS) ponents and Accessories: Resistors, Capacitors es, Bread Boards, Transformers CE Circuit Simulation Software: (any public doma d board Trainer Kit en segment display timeter	ic ga lexe ng lo Aod- n co <b>ENT</b>	ates( r usi gic g 10 F unte	i) BC ng la ates ipple r rs, d	CD to exe ogic gates e counter liodes, Ze rcial softw	cess-3 coo s rs ener ware)	de (ii) Binary to QUANTITY 15 15 15 As Required 1 15 15 25 5

Chairman - BoS' Dept.of BME - ESEC

Departr	nent	BIOMEDICAL ENGINEER	ING				R 2019	Semester IV ES	
Cour	se	Course Name	Ho V	ours lee	s / k	Credit	Total	Maximum	
Cod	e		L	Т	P	С	Hours	ivia rks	
19BM4	406	MICROPROCESSOR AND MICROCONTROLLER LABORATORY	0	0	2	1	30	100	
<ul> <li>Ur</li> <li>Ga Mi</li> <li>Int</li> <li>At</li> <li>sy</li> <li>Course</li> <li>Peeus</li> <li>Int</li> <li>co</li> <li>Peeus</li> <li>Int</li> <li>co</li> <li>Peeus</li> <li>Int</li> <li>co</li> <li>At</li>     &lt;</ul>	and erstan ain ha crocont erface 1 ble to us stem de <b>Outcon</b> orform the orform the arform v ing 808 erface 1 erform v ing 808 erface 1 erform the erface 1 erform be enerate <b>EXPE</b> writhmet Sorting, lex. to A diction interfacin the facin terfacin terface tepper	Are(s). The purpose of learning this course is and and analyze instruction sets of 8086 micro nds-on experience in doing experimen- troller. the microprocessor / microcontroller with var se an Integrated Development Environment ( avelopment. <b>nes:</b> At the end of this course, learners will b the basic operations of 8086 microprocessor various operations like sorting, finding the ma 6 microprocessor 8085/8086 microprocessor to implement vari asic operations using 89c51 Microcontroller. an interrupt, LED operations using push but <b>RIMENTS</b> tic operations using 8086, searching and string manipulation using 808 ASCII/BCD code conversion using 8086 microproces / Subtraction / Multiplication / Division using ng of switch and LED with 89c51/8086 micro ng of ADC with 89c51/8086 microcontroller, mg of DAC with 89c51/8086 microcontroller, Motor/DC Motor interfacing with 89c51/8086	oproc ious ( iDE) e abl using ximu ous c on ai 6, ropro ssor, 89c5 contr micr	ess on perij e to As m & oper nd li ces 1 m olle	or an mici phera a mo semi semi a min ratior nput sor, nicroc	nd 89c51 roprocess als for va dern soft bly langu imum nu ns likeAD capture of controller	microcon sors (80 rious appl ware tool age Progr mbers & s C,DAC,82 operations	troller. 86) and 89c51 ications for embedded amming. string operations 279, Traffic Light s using 89c51	
10. L	IART/L	CD interfacing with 89c51/8086 microcontro	ller.		-			QUANTITY	
1	8086 D	evelopment Kits			in the			30	
2	Interfac	sing Units				Y		Each 10	
3.	Microco	ontroller Kits		-				30	
-	0								
4.	Compu	ter (MASM installed)						30	

CX.9

Department	BIOMEDICAL ENGIN	EERING	G			R 2019	Semester V	PC
Course		Ho	urs / V	Veek	Credit	Total	Maximur	n
Code	Course Name	L	Т	Р	С	Hours	Marks	-
19BM501	BIO CONTROL SYSTEM	3	0	1	4	60	100	
The purpose of Study the Study the Study the Study the Course Outcor At the end of thi Develop r Determine Perform s Determine Explain th Unit I CO reminology an	learning this course is to mathematical techniques for analysis given system in time domain and frequestability analysis of the given system. concept of physiological control system e concept of physiological control system s course, learners will be able to: mathematical model for a given system e and analyze the time domain specific stability analysis of the given system us e and Analyze the frequency domain specific stability analyze the frequency domain specific stability analyze the frequency domain specific to concept and model of physiological of NTROL SYSTEM MODELING d basic structure of control system,	of given uency de m. cations c ing varie pecificat control s example	of diffe ous te ions c system	m. analy rent s chniq of the ons	ystems ues. different	systems	transfer funct	1: ion
odeling of ele ystems, block gnal flow grap ystem. Unit II   TIM	ectrical systems, translational and rot diagram and signal flow graph repres oh, conversion of block diagram to s IERESPONSE ANALYSIS	ational sentatior signal fl	mech i of sy ow gi	anical /stem raph.	system s, reduc Need fo	ns, and e tion of bl or model	lectromechan ock diagram a ing physiolog	ical ical 1:
tep and impu pecifications of onstants and it Unit III STA	lse responses of first order and sec f first and second order systems from s computations. Introduction to PI,PD a ABILITY ANALYSIS	cond or its outp and PID	der s out res contro	ystem sponse ollers.	s, detei es, defir	mination hition of s	of time dom teady state er	ain ror 12
efinition of stat	bility, Routh-Hurwitz criteria of stability , definition of dominant poles and relat	, root lo ive stab	cus te ility.	chniq	ue, cons	struction o	f root locus ar	nd
requency resp efinition of gai sing Bode plot,	onse, Nyquist stability criterion, Nyq n margin and phase margin, Bode pl use of Nichol's chart to compute frequ	uist plot ot, dete iency ar	t and rmina id ban	deter tion o dwidt	mination f gain n h.	n of clos nargin an	ed loop stabi d phase mar	ity, gin
Unit V PHY	SIOLOGICAL CONTROL SYSTEM				ALC: NO			12
xample of phys eneralized syst ystems-Examp EXT BOOK(S)	siological control system, difference be tem properties, models with combination les, introduction to simulation. Illustration	tween e on of sys on with	ngine stem e real tir	ering a eleme ne ap	and phy nts, line plicatior	siological ar models is.	control syster s of physiologi	ns, cal
1. J.Nagrath 2008.	and M.Gopal, "Control System Engine	ering", N	New A	ge Int	ernatior	al Publis	hers, 6th Editio	on,
2 Michael C	K Khoo "Physiological control system	s" IEEE	Pres	s. Pre	ntice Ha	all of India	. 2005.	

Chairman - BoS Dept.of BME - ESEC

### REFERENCE(S):

- 1. FaridGolnaraghi, Benjamin C. Kuo, "Automatic Control Systems", Wiley, 9 th Edition, 2014.
- 2. M. Gopal, "Control System, Principles and Design", McGraw-Hill, 2012
- 3. Constantine H.Houpis, Stuart N. Sheldon, "Linear Control System Analysis and Design with MATLAB", CRC Press, 6th Edition, 2013.
- 4. Richard C.Dorf& Robert H. Bishop, "Modern Control Systems", Prentice Hall, 12 th Edition, 2010
- 5. Joseph J.DiStefano, Allen R.Stubberud, Schaum's, "Outline of Feedback and Control Systems", McGraw-Hill Education, 2nd Edition, 2013.

Chairman - BoS

Dept.of BME - ESEC

198 - Marvilado 198 - Bhe teacair

Department	BIOMEDICAL ENGIN	EERING				R 2019	Semester V	PC
Course	Course Name	Hou	rs / V	Veek	Credit	Total	Maximu	m
Code	Course Name	L	Т	Р	С	Hours	Marks	
19BM502	BIOMECHANICS	3	0	1	4	60	100	
<ul> <li>Course Object</li> <li>Discuss</li> <li>Study al</li> <li>To gain</li> <li>To Study</li> <li>Illustrate</li> <li>Course Outco</li> <li>Understa</li> <li>Understa</li> <li>Distingu</li> <li>Analyze</li> </ul>	tive (s): The purpose of learning this co the mechanics of physiological systems bout the mechanics involved with various knowledge in deriving the mathematical y the deformability, strength, and visco e the mathematical models used in the ar omes: At the end of this course, learners and the use of mechanics in medicine. and the mechanics of physiological syste ish the reason for abnormal patterns. the biomechanical systems using mathe	errse is to s physiolo models r elasticity o nalysis of will be a ems.	ogica elate of har bion ble to	l syst d to b rd and necha b:	ems. blood ves d flexible anical sy	ssels tissues stems		
Design a     Unit I IN	TRODUCTION	pedic app	Diicat	ions.	1.25	-		12
Scope of mech fluid mechanic Unit II ME	anics in medicine, mechanics of bone st s, flow properties of blood. Anthropomet ECHANICS OFPHYSIOLOGICALSYST	tructure, ry. EM	deter	mina	tion of in	-vivo elas	stic modulus.	Bio 12
Heart valves, dynamics of flu circuits.	power developed by the heart, prosthuid flow in cardiovascular system and e	etic valveffect of	es. ( vibra	Const tion -	titutive e shear s	equations stresses i	for soft tissun extra-corpo	ies, real
Unit III OF	THOPAEDIC MECHANICS			-		1		12
Mechanical pro kinetics and kir	perties of cartilage, diffusion properties	of articula	ar cai	tilage	e, mecha	anical pro	perties of bon	ə,
Unit IV MA	ATHEMATICAL MODELS				2		-	12
Introduction to	Finite Element Analysis, Mathematical n	nodels - j	oulse	wave	e velociti	ies in arte	ries,	
Unit V OF	THOPAEDICAPPLICATIONS	mics of fi	uia ti	lea c	atheters			12
Dynamics and analysis), occu	analysis of human locomotion - Gait ana pant response to vehicular vibration. Me	alysis (de chanics o	termi of kne	natio ee joi	n of insta nt during	antaneou standing	s joint reaction and walking.	1
TEXT BOOK(S 1. Y.C.Fung 2. C. Ross Universit	i): g, <sup>—</sup> Bio-Mechanics, "Mechanical Propert Ether and Craig A.Simmons, "Introducto y Press, New Delhi, 2009.	ties ofTis ory Biome	sues chan	", Sp lics fr	ringer-V om cells	erilog, 19 to organ	98. isms", Cambri	dge
REFERENCE( 1. Susan J 2. Dhanjool 3. Joseph E 4. John End 2005.	<b>S):</b> Hall, "Basics of Biomechanics", McGraw N.Ghista, "Orthopaedic Mechanics", Aca ).Bronzino, "Biomedical Engineering Fur Jerle, Susanblanchard, Joseph Bronzinc	v Hill Pub ademic Pr ndamenta o, "Introdu	lishin ess, als", 1 uctior	g.co. 1990 Faylo i to B	New Yo r& Franc iomedica	ork, 5 th E cis, 2006. al Engine	dition, 2007. ering", Elsevie	ər,

Department	BIOMEDICAL ENGINEE	RING	191	e. 1		R 2019	Semester V	PC
Course	Course Name	Hou	rs / V	Veek	Credit	Total HoursMaxim Marin Marin601001 various bio signals, students can handle0 that the student can develop new assist0 that the student can out and synchronou0 that the student can out and synchronou0 that the student can on ctioning, Pulse Oxi types of hemodial0 that the student can on all parameter. Spiro nctioning, Pulse Oxi types of hemodial0 the student can pumps, Central con Applications in ECO0 nic Technique and f Lithotripsy.1 tition, Wiley India	Maximu	m
Code		L	T	Ρ	С	Hours	IVIATKS	
19BM503	EQUIPMENT	3	0	1	4	60	100	
Course Objec Know the equipme Develop learn to d Study the devices. Introduce Course Outco Describe Interpret understa Discuss Outline t Unit I CA Pacemakers – Defibrillators, H Unit II AS Heart lung m	tive (s): The purpose of learning this course e various bio potential recordings so as to e e various functional blocks present is cardia ints with care and safety. an understanding of the physiotherapy and operate. e concept of various assist devices so as to e the recent trends in field of diagnostic and mes: At the end of this course, learners will the working and recording setup of all bass the various assist devices used in the hosy ind the recording of diagnostic and therape the various extracorporeal and special diag he importance of patient safety against elect <b>IRDIAC CARE UNITS</b> Need for pacemaker, different types a eed, AC defibrillators and demerits, DC azards and safety issues, patient monitorint <b>SIST DEVICES</b> achines - Need for the unit, functionin	se is to enable ac carr d diath o enable d thera ill be a sic carr pitals eutic ec gnostic ctrical and th Defibr ng sys	stud e unit ermy ermy ele the peut ble to diac e diac e diac e illato tem. bub	lents f ts so f / equi e stuc ic equi equip nent's ices u ird compa r, asy ble, f	to record that the ipment s dents to uipments ment related ised in h arison, I ynchrono disc typ	d various students to that the develop r s. to stimula ospitals batteries bus and be and	bio signals, can handle th e student can new assist ation for pacemak synchronous	ese 12 cers. DC 12 type
Indication and Monitoring Sys Unit III ST Electrical stimu stimulator. Ner and relief.	Principle of Hemodialysis, Membrane, tems, Wearable Artificial Kidney, Implanting <b>IMULATORS</b> Jators: Strength-duration curve, types of ve-muscle stimulator: peripheral nerve stim	, Dialy g Type of stim mulato	yasat nulato r, Ult	ors, a rason	ifferent in elect ic stimu	types o rodiagnos lators, sti	f hemodialys stic / therape mulators for j	ers, 12 autic pain
	TIENT MONITORING AND BIOTELEMET						<b>N</b>	12
controls. Radio EEG Transmiss	Telemetry (single, multi), Portable and L sion.	side r _andlir	noniti le Te	ors, li eleme	ntusion try unit,	pumps, C Applicati	ons in ECG	and
Unit V RE	CENT DEVICES	1				1		12
Principles and a application, prin	application of thermography, Detection circ aciples of Fiber optic cables, Endoscopy, La	uits, P aparos	rincip scopy	oles o /, prin	f cryoge ciples o	nic Techr f Lithotrip	nique and sy.	
TEXT BOOK(S 1. John G. V PvtLtd,No 2. Joseph J education	): Webster, <sup>—</sup> Medical Instrumentation Applica ew Delhi, 2015 . Carr and John M. Brown, <sup>—</sup> Introduction to n. 2012.	ation a o Bion	nd D nedic	)esigr al Eq	n∥, 4th eo uipment	dition, Wil	ey India ogy∥, Pearsor	1
REFERENCE(S 1. Leslie Cr New Dell 2. Khandpu 2014. 3. L.A Gedo 4. Antony Y Ltd, Illino	5): omwell, Biomedical Instrumentation and ni, 2015. r R.S, Handbook of Biomedical Instrumen les and L.E.Baker, Principles of Applied I .K.Chan "Biomedical Device Technology, F is, USA, 2008.	measu ntation Biome Princip	uremo   , 3rc dical lles a	ent  , 2 deditio Instru ind de	2nd editi on, Tata umentat esign" C	ion, Prent McGraw ion∥, 3rd harles Th	ice hall of Inc -Hill, New De Edition, 2008. omas Publish	lia, Ihi, ner
Cha	irman - BoS							

Department	BIOMEDICAL ENGINE	ERING				R 2019	Semester V	PC
Course	Course Name	Hou	rs / W	/eek	Credit	Total	Maximu	m
Code	Course Name	L	Т	Ρ	С	Hours	Marks	
19BM504	BIOMEDICAL INSTRUMENTATION	3	0	0	3	45	100	
<ul> <li>Illustrate</li> <li>understa</li> <li>design b</li> <li>Learn th</li> <li>Summain</li> </ul>	e origin of bio potentials and its propagatio and the different types of electrodes and it bio amplifier for various physiological recor- te different measurement techniques for n rize different biochemical measurements	nse is to ons ts place rdings ion-phy	emen siolo	t for v gical	arious re paramete	cordings ers.		
<ul> <li>Different</li> <li>Illustrate</li> <li>Design I</li> <li>Explain</li> <li>Demons</li> </ul>	tiate different bio potentials and its propage of different electrode placement for various bio amplifier for various physiological reco various technique for non-electrical physio strate different biochemical measurement	ations physio ordings ologica technic	logic I mea Jues.	al rec surer	ordings nent0073	3		•
	EDICAL INSTRUMENTATION				na Darfe		requirements	5
nedical Instru	mentation system, PC based medical Instru- mentation system, PC based medical Instru- n system, Regulation of Medical devices.	umenta strumer	tion nts, C	syste	m, Pend al constra	aints in d	esign of med	lical
Unit II BI	OPOTENTIAL MEASUREMENTS		_			15.18		9
Bio signals cha system, Princi mode. EMG -	aracteristics - frequency and amplitude ra ples of vector cardiography.EEG – 10-2 unipolar and bipolar mode. Recording o	anges. 20 elect of ERG,	ECG trode EOC	- Ein syst G and	thoven's em, unip I EGG	triangle, olar, bipo	standard 12 plar and aver	lead age
Unit III   Bl	OELECTRIC SIGNALS AND BIOELECT	RIC AI	MPLI	FIER	S			9
artifacts, Need         Right leg driver         Unit IV       ME         Femperature,         Auscultatory m         Systolic, diastor         hermal dilution	I for bio-amplifier, Instrumentation amp n ECG amplifier, Special features of bioel EASUREMENT OF NON - ELECTRICAL respiration rate and pulse rate mean nethod, oscillometric method, direct me plic, mean detector circuit. Blood flow a n and dye dilution method, Electromagnetic	ectric a PARA surement thods: nd card ic and t	isola mplif MET ents. elect diac ultras	tion a iers. ERS Bloo tronic outpu ound	d Press manom t measu blood flo	s, differen sure: indi eter, Pre rement: l w measu	itial bio-ampl rect method ssure amplif indicator dilu rement.	ifier, 9 s - iers, tion,
Unit V PA	TIENT MONITORING SYSTEMS			1				9
Cardiac monito Pulse rate met _aboratory Inst	or, Selection of system parameters, Bed er, Measurement of respiration rate, Hol rumentation, Organization and equipmer	tside m ter mon ts use	nonito nitor d in l	ors, C and C CCU	central m Cardiac s & ITU	onitors, I stress tes	Heart rate me t, Catheteriza	eter, ation
EXT BOOK(S 1. Joseph J Educatio 2. John G.V 4 th Editi	5): J. Carr and John M. Brown, "Introduction t on, 4th Edition, 2014. Nebster, "Medical Instrumentation Applica ion, 2009.	to Biom ation a	edica	al equ esign	ipment te ", John V	echnology Viley and	y", Pearson Sons, New Y	′ork,
EFERENCE( 1. Khandpu 2014 2. L.A Geda	<b>S):</b> Ir R.S, "Handbook of Biomedical Instrume des and L.E.Baker, "Principles of Applied	entation Biome	", Ta dical	ta Mc Instru	Graw Hil Imentatic	I, New De on", John	elhi, 3 rd Editi Wiley and So	on, ns,
3 rd Editi 3. Leslie Cr Pearson	on, Reprint 2008 omwell, Fred J. Weibell, Erich A. Pfeiffer, Education India, 2 nd Edition, 2015.	, Biome	dical	Instr	umentatio	on and M	easurements	,
4. Myer Kut	z, "Standard Handbook of Biomedical En	gineeri	ng &	Desig	jn", McG	raw-Hill P	ublisher, 200	3
Chai	irman - BoS' of BME - ESEC						a "K	

Department	BIOMEDICAL ENGIN	EERING	i			R 2019	Semester V	PC
Course	Course Name	Hou	rs / W	leek	Credit	R 2019       Semester V         Total Hours       Maximu Marks         45       100         signals, including ECG       ion         ignals       making to aid diagnos         making to aid diagnos       ion         ignals       making to aid diagnos         making to aid diagnos       ion         ignals       making to aid diagnos         making to aid diagnos       ion         ignals       making to aid diagnos         making to aid diagnos       ion         ignals       making to aid diagnos         making to aid diagnos       ion         ignals       making to aid diagnos         making to aid diagnos       ion         ignals       making to aid diagnos         making to aid diagnos       ion         ignals       ion         making to aid diagnos       ion         idaptive representation -Black       ion         epresentation, Application in Noi       ion	m	
Code		L	Т	P	С	Hours	IMARKS	1
19BM505	BIOSIGNAL PROCESSING	3	0	0	3	45	100	
Underst EEG, E4 To learr Underst Analyze To under Course Outco Preproc Use diffe Apply w Use diffe Extract t Unit I IN IN Inosignal Cha EMG), Electro ING), Event ignal analysis Unit II TI ime series a	and characteristics of some of the most of DG and EMG. Inear and non-linear filtering techniques and choice of filters to remove noise and various biomedical signals through advaterstand various techniques for automated ones: At the end of this course, learners ess the Bio signals arent filters on biomedical signals and judavelet detection techniques for bio signal arent filters on biomedical signals and judavelet detection techniques for bio signals arent filters on biomedical signals and judavelet detection techniques for bio signal arent filters on biomedical signals and judavelet detection techniques for bio signal arent filters on biomedical signals and judavelet detection techniques for bio signal arent filters on biomedical signals and judavelet detection techniques for bio signal arent filters on biomedical signals and judavelet detection techniques for bio signal arent filters on biomedical signals and judavelet detection techniques for bio signals arent filters on biomedical signals and judavelet detection techniques for bio signal arent filters on biomedical signals and judavelet detection techniques for bio signal arent filters on biomedical signals and judavelet detection techniques for bio signals arent filters on biomedical signals and judavelet detection techniques for bio signals and judavelet detections techniques for bio signals and judavelet detections (EOG), Electroretinogram (ECD) techniques in Biomedical signal analysis <b>ME SERIES ANALYSIS AND SPECTRA</b> nalysis – linear prediction models, pro-	s to extra anced te commor anced te classific will be dge filter process dge filter tanalys ALS CG), Ele (ERG), I gram (PC s, Comp AL ESTI ocess of	act de s from cchniq cation able te perfo sing. perfo sis ectroe Electr CG), S outer-a <b>MATI</b> order	ed bio esired bion ues. and o: orman orman ncepl ogas Speed aided <b>ON</b>	omedical informat nedical s decision ce nece. nalogram trogram ch signal diagnos	signals, i tion ignals making to making to (EGG), E , Objectiv is.	ncluding ECC o aid diagnos Electromyog electroneurog res of Biome o resentation,	G, is gram ram dical 9 non-
ationary prod arying analys ukey method, Unit III AE iltering – LM /avelet detect verlapping w	<ul> <li>xess, fixed segmentation, adaptive segniss of Heart-rate variability, model based periodogram, and model based estimation</li> <li>APTIVE FILTERING AND WAVELET IT</li> <li>S adaptive filter, adaptive noise canction in ECG – structural features, match avelets.</li> </ul>	gmentati ed ECG ion. App DETEC1 celing in red filter	on, a i simu licatio <b>ION</b> ECO ing, a	pplica ulator on in H à, imp dapti	ation in . Spectu leart rate proved a ve wave	EEG, PC al estima e variabilit adaptive t let detect	G signals, T ation -Black ty, PCG signa filtering in E tion, detectio	ime man als. 9 CG, n of
Unit IV BI	<b>OSIGNAL CLASSIFICATION AND REC</b>	OGNIT	ION				. V	9
lignal classific eature selectic ersus Ectopic	ation and recognition – Statistical sign on and ordering, Back propagation neura ECG beats.	nal class al netwo	sificat rk bas	ion, I sed c	inear dis lassificat	criminan ion. Appli	t function, di ication in Nor	rect mal
Unit V TI	ME FREQUENCY AND MULTIVARIATE	ANAL	YSIS	2.0		-		9
ime frequency vavelet analys xtraction- Wa EXT BOOK(S 1. Arnon Co 1999. 2. Rangara	y representation, spectrogram, Wigner sis – Data reduction techniques, ECG velet packets, Multivariate component ): ohen, "Bio-Medical Signal Processing Vo M. Rangavyan, "Biomedical Signal Ana	distribu data co analysis ol I and V	ition, ompre s-PC/ /ol II" case :	Time ssior A, IC/ , CRC study	-scale ro n, ECG ( A. C Press I approac	epresenta character nc., Boca ch", Wilev.	ation, scalogr ization, Fea Rato, Florida , 2nd Edition,	ram, ture a,
2016.								
<ol> <li>EFERENCE(3</li> <li>Willis J. 1</li> <li>KayvanN Francis,</li> <li>K.P.Som Edition, 2</li> <li>D.C.Red Publishin</li> </ol>	orpkins, "Biomedical Digital Signal Pro ajarian and Robert Splerstor, "Biomedic New York, 2nd Edition, 2012. an, K.Ramachandran, "Insight into wave 2010. dy, "Biomedical Signal Processing - Prin- g Co. Ltd, 2005.	cessing al signa elet from ciples a	", Pre Is and theor nd Te	ntice d Ima y to p chnic	Hall of Ir ge proce practice", jues", Ta	ndia, New essing", C PHI, Nev ata McGra	Delhi, 2003. RC - Taylor a v Delhi, 3 rd aw-Hill	and
CK 8					1.052		IE-Paper	
Chair Dept.of	man - BoS BME - ESEC						an an an t	

Course				1	0. 14	-		
OUUE	Course Name	Hou	rs/W	Veek	Credit	Total Hours	Maximum Marks	n
19TPS05	QUANTITATIVE APTITUDE AND LOGICAL REASONING - III	2	0	0	0	30	100	
Course Obje	ctive (s):	1,7,757				2		5
The purpose	of learning this course is to							
<ul> <li>Design</li> </ul>	to help people make sense of numerica	al data.						
<ul> <li>Calcula</li> </ul>	ate the calendars and series in simplified	l way.						
<ul> <li>Underst</li> </ul>	stand the concept of the interest amount	in SI and	CI.					
<ul> <li>Know t</li> </ul>	he procedure to deal with a situation an	d sufficien	t to d	etern	nine the	answer.		
Teach	seating arrangements in rows or in sma	ll groups.	11	-		1.12		
Course Outo	omes: At the end of this course, learne	rs will be a	able t	o:			in the second second	
Demon	strate various principles involved in sol	ing mathe	emati	cal pr	oblems	and there	eby reducing th	ie
time ta	ken to solve Aptitude Questions.	n out and	oorio	. h	uning oh	ortout ma	thede	
Solve t	he question based on calendar, odd ma	n out and	serie	SDYI	using sn	oncut me	ethous.	
	their critical thinking by solving the cyll	is instead	orua		action	ous.		
Analyz	a the conditions and do interpretation	yısın anu	cours	se ui	action.			
	ATA INTERPRETATION & CLOCKS			-	-			6
DATA INTER	PRETATION: Tabulation - Bar graphs	- Pie char	ts-l	ine a	ranhs			U
LOCKS: De	finition - Important points - Angular diffe	rence het	ween	n two	hands s	t differer	t timinas -	
ncorrect clo	ninition - important points - Angular dint		ween	1 1000	nanus c	it unicities	it tirings	
	ALENDARS ODDMAN OUT & SERIE	c				-		6
	Codd days - Lean year - Ordinany year	s r_Counti	ng of	odd	dave - D	av of the	wook	0
	IT & SERIES: Odd man out _ Power so	rioc Num	hor c	orios	Soquor	ay of the	al numbors	
	INDIE & COMPOLIND INTEREST	ies - Null	iber 5	enes	-Sequei	ice of fea		6
	REST. Principal - Bate of interest - Nu	mber of w	aare -	llein	a formu	lao and	shortcuts metho	ode
	INTEREST: Compounded Annually - C	omnound	od H		arly - C		ded Quarterly -	Jus
Compoundor	appually Dates are different for diffe	vont voor			any - C	ompound	deu Quarterry -	
	TATEMENT & COURSE OF ACTION		5. CM					C
	TATEMENT & COURSE OF ACTION,	STLLUGI	Decir	nion t	akon Ir	nnrovom	ont Follow up	or
	AND COURSE OF ACTION. Courses (	action -	Decis	SION	aken - n	nprovem	ent, rollow-up	01
	In regard to the given statement.	ohin hotu	oon ti	ho tu	e thinge	arnat (	Classification of	•
STLLOGISIVI/	LOGICAL VENN DIAGRAMS: Relation	ship betw	een u	ne tw	o things	or not - t	Jassification of	1.
no positions -			uctive	e mie	rence.			-
	EATING ARRANGEMENTS & DATAS	UFFICIEI	NCY Deci					6
SEATING AR	RANGEMENTS: Persons seating in the	e circular -	Reci	tangu	lar - Sq	uare.		
DATA SUFFIC	JENCY: Reasoning ability using a se	of directi	ons.		1			
EFEDENCE	(6):			- A	- 100-10-	3 1 7		
	(3). Suba Quantitativa Antituda far Campati	ine Even	inatia	no E	ourth Ea	lition To	to McCrow Hill	
Publish	ing Company Ltd, 2012		matio	п5, г		nuon, ra		
2. Arun Sh Publish	arma, How to prepare for Data Interpre ing Company Ltd, 2012.	tation for	the C	AT, F	irst Edit	ion, Tata	McGraw-Hill	
3. R.V.Pra	veen,"Quantitative Aptitude and Reaso	ning"Third	Editi	on, P	HI Lear	ning, 201	6.	
4. Dr.R S /	Aggarwal, Quantitative Aptitude, Revise	d and Enl	argeo	d Edit	ion, S.C	hand Pu	blishing Compa	any
Ltd. 201	1.							



Departr	nent	BIOMEDICAL ENGINEE	RING	1			R 2019	Semester V PC
Cours	se	Course Name	H	ours Neel	(   (	Credit	Total	Maximum
Cod	e		L	Т	Ρ	С	Hours	Warks
19BM	506	DIAGNOSTIC AND THERAPEUTIC EQUIPMENT LABORATORY	0	0	2	1	30	100
Course De Pro Stu	Objectiv monstra ovide pra udy the fu	re (s): The purpose of learning this course te recording and analysis of different Bio p actice on recording and analysis of different unction of different therapeutic equipment fferent therapeutic modalities	o is to poten nt Bio s.	tials pote	ntia	ls		
Course (	Dutcom	es: At the end of this course, learners will	be at	ole to				
<ul> <li>As:</li> <li>Illu</li> <li>Exa</li> <li>An</li> <li>1.</li> <li>2.</li> <li>3.</li> <li>4.</li> <li>5.</li> <li>6.</li> <li>7.</li> <li>8.</li> <li>9.</li> <li>10.</li> <li>11.</li> <li>12.</li> </ul>	strate va amine the alyze the <b>Experim</b> Measure Galvanic Study of Measure Study of Analyze Recordir Study the Analysis	e electrical safety measurements e different bio signals using suitable tools. ements ement of visually evoked potential c skin resistance (GSR) measurement shortwave and ultrasonic diathermy ement of various physiological signals usir hemodialysis model al safety measurements ement of Respiratory parameters using sp medical stimulator the working of ESU - cutting and coagula ng of Audiogram e working of Defibrillator and pacemakers of ECG, EEG and EMG signals	ng bio irome	telen etry. node	netr	y		
13. 14. 15.	Study of Study of Study of	ventilators Ultrasound Scanners heart lung machine model						
	QUIPIVIC		MEN	т				OUANTITY
1	Visuall	v evoked potential setup				- 6-	-	1
2	GSR	etun	- 71					1
3	Multi-o	utput power supply (+15y -15y +30V va	iable	+51/	24	0	100 A.	1
4	Short v	vave Diathermy & Ultrasound diathermy			,	.,	1 Star	1
5.	Multipa	arameter biotelemetry system		1	-		2.01 57	1
6.	Electric	cal Safety Analyser			-			1
7.	Spirom	etry with associated analysis system						1
8.	Medica	al stimulator						1
9.	Surgica	al diathermy with analyzer				1.17		1
10.	Audion	neter						1
11.	Pacem	aker						1
12.	Defibril	lator						1
13.	Haemo	odialysis model		1				1
14.	Ventila	tor						1
15.	Ultraso	und Scanner						1

CXP Chairman - BoS Dept.of BME - ESEC

	ment	BIOMEDICAL ENGINEE	RING				R 2019	Semester V	PC
Cour	se	Course Name	H	ours Nee	s / k	Credit	Total	Movimum M	
Cod	e	Course Name	L	Т	Р	С	Hours		irks
19BM	507	BIOMEDICAL INSTRUMENTATION LABORATORY	0	0	2	1	30	100	w
Course Sti Pri Es Course De	Objective udy and ovide hat stimation earnt the Outcom esign pre	re (s): The purpose of learning this cours design Bio amplifiers nds on training on Measurement of phys of haematological parameters analysis of visual and hearing test es: At the end of this course, learners wi amplifiers and amplifiers for various bio	iologi Il be a signal	o cal p able reco	arar to: ordin	gs			
• M	easure vector dans	arious non-electrical parameters using so d analyze pulse rate and respiration rate	itable	e ser	isors	s/transd	ucers		
Name of 1.	Experim Design	ents of low noise pre-amplifier.		4					
2. 3.	Design Design	of ECG amplifier and Measurement of he of EMG amplifier.	eart ra	ite.					
4.	Measure	ement of heart sounds using PCG.							
5.	Measure	ement of pulse-rate using Photo transduc	er.						
6. 7	Measure	ement of respiration rate.	und t	rone	duce	r			
8.	Measure	ement of blood now velocity using ultrast	unu t	ans	uuce	a.			
9.	0. 1	ement of blood pressure using sphyamoi	nano	mete	r.				
	Study of	ement of blood pressure using sphygmoi characteristics of optical Isolation ampli	nano iers.	mete	r.				
10.	Study of Measure	ement of blood pressure using sphygmon characteristics of optical Isolation ampli ement of vital parameters using Patient M	nano iers. lonito	mete oring	r. Sysi	tem			
10. 11.	Measure Study of	ement of blood pressure using sphygmol characteristics of optical Isolation ampli ement of vital parameters using Patient M Biotelemetry	nano iers. Ionito	mete oring	r. Sysi	tem			
10. 11. <b>IST OF I</b>	Study of Measure Study of EQUIPM	ement of blood pressure using sphygmol characteristics of optical Isolation ampli ement of vital parameters using Patient M Biotelemetry ENTS FOR A BATCH OF 30 STUDENT	nanoi iers. Ionito S	mete oring	r. Syst	tem			
10. 11. <b>.IST OF I</b> <b>S.No</b>	Study of Measure Study of EQUIPM	ement of blood pressure using sphygmol characteristics of optical Isolation ampli ement of vital parameters using Patient M Biotelemetry ENTS FOR A BATCH OF 30 STUDENT NAME OF THE EQUIF	nano iers. Ionito S MEN	mete oring T	r. Sysi	tem		QUANTIT	Ϋ́
10. 11. <b>.IST OF I</b> <b>S.No</b> 1.	Study of Measure Study of EQUIPM pH met	ement of blood pressure using sphygmol characteristics of optical Isolation ampli ement of vital parameters using Patient M Biotelemetry ENTS FOR A BATCH OF 30 STUDENT NAME OF THE EQUIF er and conductivity meter	nano iers. Ionito S MEN	mete oring T	syst	tem		QUANTIT 1	Y
10. 11. <b>.IST OF I</b> <b>S.No</b> 1. 2.	Study of Measure Study of EQUIPM pH met Photo t	ement of blood pressure using sphygmol characteristics of optical Isolation ampli ement of vital parameters using Patient M Biotelemetry ENTS FOR A BATCH OF 30 STUDENT NAME OF THE EQUIF er and conductivity meter ransducer for pulse measurement	nano iers. Ionito S MEN	mete oring T	sys	tem		QUANTIT 1 1	Y
10. 11. <b>-IST OF I</b> <b>S.No</b> 1. 2. 3.	Study of Study of EQUIPM PH met Photo t Sphygr	ement of blood pressure using sphygmol characteristics of optical Isolation ampli ement of vital parameters using Patient M Biotelemetry ENTS FOR A BATCH OF 30 STUDENT NAME OF THE EQUIF er and conductivity meter ransducer for pulse measurement nomanometer and Stethoscope	nano iers. Ionito S MEN	mete oring T	syst	tem		QUANTIT 1 1 1	Y
10. 11. <b>IST OF I</b> <b>S.No</b> 1. 2. 3. 4.	Study of Measure Study of EQUIPM PH met Photo t Sphygr Multipa	ement of blood pressure using sphygmol characteristics of optical Isolation ampli ement of vital parameters using Patient M Biotelemetry ENTS FOR A BATCH OF 30 STUDENT NAME OF THE EQUIF er and conductivity meter ransducer for pulse measurement nomanometer and Stethoscope rameter (ECG, EMG, EEG) Simulator	nanon ïers. Ionito S MEN	mete oring T	sysi	tem		QUANTIT 1 1 1 1 1 1	Y
10. 11. <b>IST OF I</b> <b>S.No</b> 1. 2. 3. 4. 5.	Study of Measure Study of QUIPM PH met Photo t Sphygr Multipa Spirom	ement of blood pressure using sphygmol characteristics of optical Isolation ampli ement of vital parameters using Patient M Biotelemetry ENTS FOR A BATCH OF 30 STUDENT NAME OF THE EQUIP er and conductivity meter ransducer for pulse measurement nomanometer and Stethoscope rameter (ECG, EMG, EEG) Simulator etry with associated analysis system	nanon iers. Ionito S MEN	mete oring T	sysi	tem		QUANTIT 1 1 1 1 1 1 1 1	Y
10. 11. IST OF I S.No 1. 2. 3. 4. 5. 6.	Study of Measure Study of EQUIPM PH met Photo t Sphygr Multipa Spirom Blood f	ement of blood pressure using sphygmol characteristics of optical Isolation ampli ement of vital parameters using Patient M Biotelemetry ENTS FOR A BATCH OF 30 STUDENT NAME OF THE EQUIF er and conductivity meter ransducer for pulse measurement nomanometer and Stethoscope rameter (ECG, EMG, EEG) Simulator etry with associated analysis system ow measurement system	nanol iers. Ionito S MEN	nete oring T	syst			QUANTIT 1 1 1 1 1 1 1 1 1	Y
10. 11. <b>IST OF I</b> <b>S.No</b> 1. 2. 3. 4. 5. 6. 7.	Study of Measure Study of EQUIPM PH met Photo t Sphygr Multipa Spirom Blood f Functio	ement of blood pressure using sphygmol characteristics of optical Isolation ampli ement of vital parameters using Patient M Biotelemetry ENTS FOR A BATCH OF 30 STUDENT NAME OF THE EQUIP er and conductivity meter ransducer for pulse measurement nomanometer and Stethoscope rameter (ECG, EMG, EEG) Simulator etry with associated analysis system low measurement system n generator	nanon iers. 1onito S MEN	T	Syst			QUANTIT 1 1 1 1 1 1 1 1 8	Y
10. 11. IST OF I S.No 1. 2. 3. 4. 5. 6. 7. 8.	Study of Measure Study of EQUIPM PH met Photo t Sphygr Multipa Spirom Blood f Functio DSO	ement of blood pressure using sphygmol characteristics of optical Isolation ampli ement of vital parameters using Patient M Biotelemetry ENTS FOR A BATCH OF 30 STUDENT NAME OF THE EQUIF er and conductivity meter ransducer for pulse measurement nomanometer and Stethoscope rameter (ECG, EMG, EEG) Simulator etry with associated analysis system ow measurement system n generator	nanon iers. Ionito S MEN	mete pring T	Syst			QUANTIT 1 1 1 1 1 1 1 1 8 8 8	Y
10. 11. IST OF I S.No 1. 2. 3. 4. 5. 6. 7. 8. 9.	Study of Measure Study of EQUIPMI PH met Photo t Sphygr Multipa Spirom Blood f Functio DSO Regula	ement of blood pressure using sphygmol characteristics of optical Isolation ampli ement of vital parameters using Patient M Biotelemetry ENTS FOR A BATCH OF 30 STUDENT NAME OF THE EQUIF er and conductivity meter ransducer for pulse measurement nomanometer and Stethoscope rameter (ECG, EMG, EEG) Simulator etry with associated analysis system ow measurement system n generator	nanol iers. Ionito	T	Syst			QUANTIT 1 1 1 1 1 1 1 8 8 8 8 8 8	Y
10. 11. IST OF I S.No 1. 2. 3. 4. 5. 6. 7. 8. 9. 10.	Study of Measure Study of EQUIPM PH met Photo t Sphygr Multipa Spirom Blood f Functio DSO Regula Bread t	ement of blood pressure using sphygmol characteristics of optical Isolation ampli ement of vital parameters using Patient M Biotelemetry ENTS FOR A BATCH OF 30 STUDENT NAME OF THE EQUIF er and conductivity meter ransducer for pulse measurement nomanometer and Stethoscope rameter (ECG, EMG, EEG) Simulator etry with associated analysis system low measurement system n generator	nanon iers. Ionito	T	Syst			QUANTIT 1 1 1 1 1 1 1 1 8 8 8 8 8 8 8 8 8 8	Y
10. 11. <b>IST OF I</b> <b>S.No</b> 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11.	Study of Measure Study of EQUIPMI PH met Photo t Sphygr Multipa Spirom Blood f Functio DSO Regula Bread t IC LM 3	ement of blood pressure using sphygmol characteristics of optical Isolation ampli ement of vital parameters using Patient M Biotelemetry ENTS FOR A BATCH OF 30 STUDENT NAME OF THE EQUIF er and conductivity meter ransducer for pulse measurement nomanometer and Stethoscope rameter (ECG, EMG, EEG) Simulator etry with associated analysis system ow measurement system n generator ted Power supplies poards 24, AD 620, IC555	nanol iers. Ionito	T	Syst			QUANTIT 1 1 1 1 1 1 1 8 8 8 8 8 8 8 8 8 8 8 8	Y
10. 11. IST OF I S.No 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.	Study of Measure Study of EQUIPM PH met Photo t Sphygr Multipa Spirom Blood f Functio DSO Regula Bread t IC LM 3 Opto Is	ement of blood pressure using sphygmol characteristics of optical Isolation ampli ement of vital parameters using Patient M Biotelemetry ENTS FOR A BATCH OF 30 STUDENT NAME OF THE EQUIF er and conductivity meter ransducer for pulse measurement nomanometer and Stethoscope rameter (ECG, EMG, EEG) Simulator etry with associated analysis system low measurement system n generator ted Power supplies boards 224, AD 620, IC555 olator IC: MCT2E	manon Tiers. Monito	T	syst			QUANTIT 1 1 1 1 1 1 1 1 1 8 8 8 8 8 8 8 8 8 8	Y

CKS Chairman - BoS Dept.of BME - ESEC

Department	BIOMEDICAL ENG	OMEDICAL ENGINEERING R 2019 Semes						EEC
Course	Course Name	Hours / Week Credit				Total	Maximur	n
Code	oouise nume	L	T	Р	С	Hours	s Marks	
19BM508	HOSPITAL TRAINING	0	0	2	1	30	100	
Observed M     Provide acce	(s): The purpose of learning this conduct of the purpose of learning this conduct of the purpose	ourse is to wards ar	o nd the	roles	of Allie	d Health F	Professionals,	

- Demonstrate patient care in a hospital setting,
- . Guide on the various procedures for validation of the product and analyze the cost effectiveness,
- Familiar with various medical imaging techniques and Gain some practical experience in servicing the equipments.

Course Outcomes: At the end of this course, learners will be able to:

- Advocate a patient centred approach in health care
- Communicate with other health professionals in a respectful and responsible manner
- Recognize the importance of inter professionals collaboration in healthcare
- Propose a patient centred inter professionals health improvement plan based upon the patientsperceived needs

#### SYLLABUS

- Students need to complete training in any leading Multi speciality hospital for a period of 5 days 15 days. They need to prepare an extensive report and submit to their respective course incharges during the session,
- Out of the following departments, it is mandatory to complete training in any 5. The students can give a presentation of the remaining departments during laboratory hours.
  - 1. Cardiology
  - 2. ENT
  - 3. Ophthalmology
  - 4. Orthopedic and Physiotherapy
  - 5. ICU/CCU
  - 6. Operation Theatre
  - 7. Biomedical Engineering
  - 8. Histo Pathology
  - 9. Biochemistry
  - 10. Medical Records / Biotelemetry
  - 11. Neurology
  - 12. Nephrology
  - 13. Radiology
  - 14. Nuclear Medicine
  - 15. Pulmonology
  - 16. Urology
  - 17. Obstetrics and Gynecology
  - 18. Emergency Medicine
  - 19. Histo Pathology
  - 20. Paediatric / Neonatal
  - 21. Dental
  - 22. Oncology
  - 23. PAC's

an - BoS Dept.of BME - ESEC

Department	BIOMEDICAL EN	GINEERIN	IG			R 2019	Semester V	EE	
Course		Hou	ırs / V	Veek	Credit	Total	Maximu	m	
Code	Course Name	L	т	Р	с	Hours	Marks	ks	
19HS501	CAREER SKILLS	0	0	2	0	30	100		
Acquire so     Make effec     Motivate le     Develop th     Enhance th     Course Outcom     Develop ac     Make effec     Participate     Develop th     Make them     Unit I SOF Introduction to S professional with	ft skills, tive presentations in general and te arners to participate effectively in G eir confidence and help them attend the Employability and Career Skills of es: At the end of this course, learned dequate Soft Skills required for the v tive presentations, confidently in Group Discussions, eir confidence and help them attend the Employability Graduates. <b>F SKILLS</b> oft Skills – Hard skills & soft skill values – Time Management – Gen	echnical, Broup Disc d interview of students ers will be a workplace, d interview	ussio /s suc able t	n, ccessf	ully, ully, nd caree	er Skills –	- Grooming a	6 s a	
professional with	values – Time Management – Gen	eral aware	ness	of Cu	rrent Aff	airs.		c	
Self-Introduction	- Organizing the material - Introdu	ucina ones	self tr	the a	audience	e – Introd	ucina the toni	0 C —	
Answering quest	ions – Individual presentation pra	ctice - P	resen	nting t	he visua	als effecti	ively – 5 min	ute	
presentations	server at the reality	1.1.1		07					
Unit III GRO	UP DISCUSSION			(		L. L.		6	
ntroduction to G	roup Discussion - Participating in	group dise	cussio	ons –	Underst	tanding g	roup dynamic	s –	
3rainstorming the	topic – Questioning and clarifying	– GD stra	tegies	s – Ac	ctivities to	o improve	GD skills.		
Unit IV INTE	RVIEW SKILLS			N.		a share		6	
nterview etiquett	e – Dress code – Body language –	Attending	job iı	ntervie	ews – Te	elephone	/ Skype interv	iew	
- One to one inte	rview & Panel interview – FAQs rela	ated to job	inter	views	ino mitela	1.11	ALX STATE		
Unit V CARI	ER PLANNING					âgu gu	· · · · · · · · · · · · · · · · · · ·	6	
Recognizing diffe	rences between groups and team	ns – Mana	aging	time	– Mana	ging stre	ss - Network	ing	
professionally -	Respecting social protocols – Uno	derstandin	g car	reer n	nanagen	nent – De	eveloping a lo	ong	
erm career plan	- Making career changes.		. Å				Stanson and		
EARNING RES	JURCES:			1				-	
1 Butterfield I	eff Soft Skills for Everyone Cengac				hi 2015				
2 Interact Engl	ish Lab Manual for Undergraduate	Studente (	Orion	t Balo	k Swan:	Hyderab	ad 2016	-	
3 E Suroch Ki	isin Lab Manual for Ondergraduate	scional Si	locos		ont Black	k swan: H	lyderabad 20	15	
4 Raman Me	analetal Communication for From	Profession	al Co	mmu	nication	Oxford	Iniversity Pre	10,	
Oxford, 2014		Toression		, initia	modulon.	Oxiora .	enverony ric	.00.	
	3/1 - C - C - C - C - C - C - C - C - C -	ennai 20	10	. /		5 11 11	Zarone deserv		
5 S Haribaran	etal Soft Skills MIP Publishers Ch	WILLIAM CU							
5. S. Hariharan Neb Sources:	etal. Soft Skills. MJP Publishers: Ch								
5. S. Hariharan Neb Sources: http://www.sli	etal. Soft Skills. MJP Publishers: Ch deshare.net/rohitjsh/presentation-o	n-group-	4		W. I	) en			
5. S. Hariharan <b>Veb Sources:</b> <u>http://www.sli</u> <u>discussionhtt</u>	etal. Soft Skills. MJP Publishers: Ch deshare.net/rohitjsh/presentation-or p://www.washington.edu/doit/Team	n-group- V/present	tips.h	itml					
5. S. Hariharan <b>Veb Sources:</b> <u>http://www.sli</u> <u>discussionhttp</u> <u>http://www.ox</u>	etal. Soft Skills. MJP Publishers: Ch deshare.net/rohitjsh/presentation-or o://www.washington.edu/doit/Team forddictionaries.com/words/writing-	n-group- N/present	tips.h	<u>ıtml</u>	Ч.				
5. S. Hariharan Veb Sources: <u>http://www.sli</u> <u>discussionhttp</u> <u>http://www.ox</u> <u>applicationsh</u>	etal. Soft Skills. MJP Publishers: Ch deshare.net/rohitjsh/presentation-ou p://www.washington.edu/doit/Team forddictionaries.com/words/writing- tp://www.kent.ac.uk/careers/cv/cov	n-group- V/present job- eringletter	tips.h s.htm	ı <u>tml</u> 1					

10 Chairman - BoS Dept.of BME - ESEC

m Chairman - BoS Dept. of English - ESEC
Department	BIOMEDICAL ENGINE	ERING		-		R 2019	Semester V	I P
Course	Course Name	Hou	rs / V	Veek	Credit	Total	Maximu	m
Code		L	Т	Ρ	С	Hours	Marks	
19BM601	MEDICAL IMAGE PROCESSING	3	0	0	3	45	100	
Understa     Describe     Know the     Learn the     Discuss Course Outco     Discuss     Explain t     Describe     Explain t     Demonst Unit I IN Drigin of DIP, e	and the generation of X-ray and its uses in the principle of Computed Tomography. the techniques used for visualizing various and the radiation therapy techniques and radia ones: At the end of this course, learners we the principle and working of various radio the tomography concept and image reconsist the basic principle and working of Magnet the concept of nuclear imaging techniques that the effects of radiation, radiation safe <b>TRODUCTION AND FUNDAMENTALS</b>	n imagin sections quipme ation sa will be a graphy struction struc	ng s of th afety. ble to equip n tech onance diation the p	he bo Imag o: omen hniqu ce im on de rincip , con	ts, les, aging te tectors, ble of Ra	chnique, adio thera	py techniques	, gita
nage represe erception, ligh	ntation, Image characteristics & qualit it and the EM spectrum, a simple image ationships between pixels	y, Imag formatio	ge vi on m	odel,	g condi image s	tions, Ele sampling	ements of vi and quantiza	sua tion,
onic basic rea	ationships between pixels.							
Unit II IM, mage Enhanc processing, en ilters, sharpeni T and freque	AGE ENHANCEMENT IN SPATIAL DOM ement in Spatial Domain: Background, hancement using arithmetic and logic op- ing spatial filters. Image Enhancement in ency domain, smoothing frequency dor	IAIN & I some k erations the Free main fil	REC basic s, bas quen ters,	gray sic of cy Do shar	ICY DO level to spatial omain: E pening	MAIN ransforma filtering, s Backgrour frequenc	ations, Histog smoothing sp nd, Introductio y domain fil	ram atial n to ers,
Unit IIIM.mage Enhanceprocessing, enhanceprocessing, enhanceilters, sharpenieT and frequenomomorphic fiUnit IIIIM.Fundamentals,ength coding,	AGE ENHANCEMENT IN SPATIAL DOM ement in Spatial Domain: Background, hancement using arithmetic and logic op- ing spatial filters. Image Enhancement in ency domain, smoothing frequency dor iltering, additional properties of the 2-D FT AGE COMPRESSION image compression models, elements of loss less predictive coding, lossy predic	<b>IAIN &amp; I</b> some k erations the Free main fil Γ, conve of inform tive coe	REG basic s, bas quent ters, blutio matio ding,	QUEN gray sic of cy Do shar n and on the imag	ICY DO level to spatial pmain: E pening d correla eory, en je comp	MAIN ransforma filtering, s Backgroun frequenc ation theor fror free Coression s	ations, Histog smoothing sp nd, Introductio y domain fil rems. Compression, standards, JP	ram atial n to ers, <b>9</b> run EG,
Unit II     IM.       mage Enhance     broccessing, enhance       broccessing, enhance     broccessing, enhance       Tand freque     broccessing, enha	AGE ENHANCEMENT IN SPATIAL DOM ement in Spatial Domain: Background, hancement using arithmetic and logic op- ing spatial filters. Image Enhancement in ency domain, smoothing frequency dor iltering, additional properties of the 2-D FT AGE COMPRESSION image compression models, elements of loss less predictive coding, lossy prediction sion standards.	TAIN & F some k erations the Free main fil T, conve of inform tive coe	FREC pasic s, bas quent ters, plutio matio ding,	QUEN gray sic of cy Do shar n and imag	ICY DO level to spatial pmain: E pening d correla eory, en je comp	MAIN ransforma filtering, s Backgrour frequenc tion theorem for free Coression s	ations, Histog smoothing sp nd, Introductio y domain fil rems. Compression, standards, JP	g ram atial n to ers, ers, <b>9</b> run EG,
Unit II     IM.       mage Enhance     Display State       processing, enhance     Display State       processing, enhance     Display State       Tand freque	AGE ENHANCEMENT IN SPATIAL DOM ement in Spatial Domain: Background, hancement using arithmetic and logic op- ing spatial filters. Image Enhancement in ency domain, smoothing frequency dor iltering, additional properties of the 2-D FT AGE COMPRESSION image compression models, elements of loss less predictive coding, lossy predic sion standards. AGE SEGMENTATION scontinuities, point detection, line detect d boundary detection, thresholding, region	TAIN & F some k erations the Free main fil T, conve of inform tive coo	FREC pasic s, bas quent ters, plutio matio ding, ge de	QUEN gray sic of cy Do shar n and image etect	ICY DO level to spatial pmain: E pening d correla eory, err je comp ion, gra	MAIN ransforma filtering, s Backgrour frequenc ation theorem for free Coression s dient ope	ations, Histog smoothing sp nd, Introductio y domain fil rems. Compression, standards, JP erators, Iaplac	ram atial n to ers, <b>9</b> run EG, <b>9</b> ian,
Unit II     IM.       Image Enhance     processing, enhance       processing, enhance     processing, enhance       filters, sharpenie     Former and freque       FT and freque     freque       homomorphic filters     IM.       Fundamentals,     ength coding,       video compress     IM.       Unit IV     IM.       Detection of diadge linking an     IM.	AGE ENHANCEMENT IN SPATIAL DOM ement in Spatial Domain: Background, hancement using arithmetic and logic op- ing spatial filters. Image Enhancement in ency domain, smoothing frequency dor iltering, additional properties of the 2-D FT AGE COMPRESSION image compression models, elements of loss less predictive coding, lossy prediction sion standards. AGE SEGMENTATION scontinuities, point detection, line detected d boundary detection, thresholding, region AGE REPRESENTATION. DESCRIPTION	IAIN & I some k erations the Free main fil Γ, conve of inform tive coo tion, ed n based	REC pasic s, bas quent ters, plutio matio ding, ge de l segu REC	gray gray sic of cy Do shar n and imag etect ment	ICY DO level to spatial omain: E pening d correla eory, err je comp ion, gra ation.	MAIN ransforma filtering, s Backgroun frequenc tion theor for free Coression s dient ope	ations, Histog smoothing sp nd, Introductio y domain fil rems. Compression, standards, JP	g     g     g     run     EG,
Unit IIIM.Image Enhanceprocessing, enhanceprocessing, enhancefilters, sharpenieT and frequenomomorphic filtersUnit IIIIM.Fundamentals,ength coding,video compressUnit IVIM.Detection of diaedge linking andUnit VIM.Representationpased on decisi	AGE ENHANCEMENT IN SPATIAL DOM ement in Spatial Domain: Background, hancement using arithmetic and logic op- ing spatial filters. Image Enhancement in ency domain, smoothing frequency dor iltering, additional properties of the 2-D FT AGE COMPRESSION image compression models, elements of loss less predictive coding, lossy predic sion standards. AGE SEGMENTATION scontinuities, point detection, line detect d boundary detection, thresholding, region AGE REPRESENTATION, DESCRIPTION , Boundary descriptors, Regional descripton ion theoretic & structural methods.	IAIN & I some k erations the Free main fil T, conve of inform tive coo tion, ed n based N AND iptors,	REC pasic s, bas quent ters, plutio matio ding, ge de l segu REC Princ	QUEN gray sic of cy Do shar n and imag etect ment cipal	ICY DO level to spatial pmain: E pening d correla eory, err je comp ion, gra ation. ITION compon	MAIN ransforma filtering, s Backgrour frequenc ation theor for free C oression s dient ope ent analy	ations, Histog smoothing sp nd, Introductio y domain fil rems. Compression, standards, JP erators, Iaplac	ram atia n to ers run EG, j 9 ian, j 9 tion
Unit II     IM.       mage Enhance     processing, enhance       processing, enhance     processing, enhance       Tand freque     momomorphic fill       Tand freque     momomorphic fill       Unit III     IM.       Fundamentals,     ength coding,       video compress     IM.       Unit IV     IM.       Detection of dial     edge linking and       Unit V     IM.       Representation     pased on decisis       "EXT BOOK(S	AGE ENHANCEMENT IN SPATIAL DOM ement in Spatial Domain: Background, hancement using arithmetic and logic op- ing spatial filters. Image Enhancement in ency domain, smoothing frequency dor iltering, additional properties of the 2-D FT AGE COMPRESSION image compression models, elements of loss less predictive coding, lossy predic sion standards. AGE SEGMENTATION scontinuities, point detection, line detect d boundary detection, thresholding, region AGE REPRESENTATION, DESCRIPTION , Boundary descriptors, Regional descr ion theoretic & structural methods.	TAIN & F some k erations the Free main fil T, conve of inform tive coo tion, ed n based N AND iptors,	REC pasic s, bas quent ters, plutio matio ding, ge de segu REC Princ	gray gray sic of cy Do shar n and on the image etect ment OGN	ICY DO level to spatial omain: E pening d correla eory, ern je comp ion, gra ation. ITION compon	MAIN ransforma filtering, s Backgrour frequence tion theorem fror free Coression s dient ope ent analy	ations, Histog smoothing sp nd, Introductio y domain fil rems. Compression, standards, JP erators, Iaplac	ram atia n to ers Left ian, 9 ian,
Unit IIIM.mage Enhanceprocessing, enhanceprocessing, enhanceprocessing, enhanceT and frequenomomorphic fillUnit IIIIM.Fundamentals,ength coding,video compressUnit IVIM.Detection of dialenge linking andUnit VIM.Representationpased on decise*EXT BOOK(S1.Wolfgang I2.KavyanNa	AGE ENHANCEMENT IN SPATIAL DOM ement in Spatial Domain: Background, hancement using arithmetic and logic op- ing spatial filters. Image Enhancement in ency domain, smoothing frequency dor iltering, additional properties of the 2-D FT AGE COMPRESSION image compression models, elements of loss less predictive coding, lossy predic sion standards. AGE SEGMENTATION scontinuities, point detection, line detect d boundary detection, thresholding, region AGE REPRESENTATION, DESCRIPTION , Boundary descriptors, Regional descriptors, Regional descriptors, ion theoretic & structural methods. ): Birkfellner, "Applied Medical Image Procession jarian and Robert Splerstor," Biomedical	IAIN & I some k erations the Free main fill T, conver- of inform tive coor tion, ed n based N AND iptors, essing - signals	FREC pasic s, bas quent ters, plutio matio ding, ge da l segu REC Princ - A B	QUEN gray sic of cy Do shar n and on the imag etect ment OGN cipal	ICY DO level to spatial pmain: E pening d correla eory, err je comp ion, gra ation. ITION compon	MAIN ransforma filtering, s Backgrour frequenc ation theor for free C ression s dient ope ent analy CRC Pre essing", C	ations, Histog smoothing sp nd, Introductio y domain fil rems. Compression, standards, JP erators, Iaplac ysis, Recogni ess, 2011, RC – Taylor	ram atia n to ers I g ian, g ian, and
Unit II     IM.       mage Enhance     processing, enhance       processing, enhance     processing, enhance       T and freque     freque       nomomorphic fill     IM.       Unit III     IM.       Fundamentals,     ength coding,       video compress     IM.       Unit IV     IM.       Detection of dial     edge linking and       Unit V     IM.       Representation     pased on decise       FEXT BOOK(S     1.       Volfgang I     2.       KavyanNa     Francis, Ne	AGE ENHANCEMENT IN SPATIAL DOM ement in Spatial Domain: Background, hancement using arithmetic and logic op- ing spatial filters. Image Enhancement in ency domain, smoothing frequency dor iltering, additional properties of the 2-D FT AGE COMPRESSION image compression models, elements of loss less predictive coding, lossy prediction sion standards. AGE SEGMENTATION scontinuities, point detection, line detected d boundary detection, thresholding, region AGE REPRESENTATION, DESCRIPTION , Boundary descriptors, Regional description theoretic & structural methods. ): Birkfellner, "Applied Medical Image Procession and Robert Splerstor," Biomedical ew York,2006.	IAIN & I some k erations the Free main fil T, conve of inform tive coo tion, ed n based N AND iptors, essing - signals	REC pasic s, bas quent ters, plutio matio ding, ge de segu REC Princ - A B	QUEN gray sic of cy Do shar n and imag etect ment cipal asic	ICY DO level to spatial omain: E pening d correla eory, ern je comp ion, gra ation. ITION compon	MAIN ransforma filtering, s Backgrour frequenc ation theor for free C oression s dient ope ent analy CRC Pre essing", C	ations, Histog smoothing sp nd, Introductio y domain filt rems. Compression, standards, JP erators, Iaplac ysis, Recogni ess, 2011, RC – Taylor	ram atia n to ers, run EG, ian, ian, ian, and
Unit II     IM.       mage Enhance     Display State       processing, enhance     Display State       processing, enhance     Display State       T and freque     Im.       Fundamentals,     ength coding,       video compress     Unit IV       Unit IV     IM.       Detection of dia     and       Unit V     IM.       Representation     Disaed on decise       TEXT BOOK(S     1.       Volfgang I     2.       KavyanNaj     Francis, Nag       REFERENCE(S)	AGE ENHANCEMENT IN SPATIAL DOM ement in Spatial Domain: Background, hancement using arithmetic and logic op- ing spatial filters. Image Enhancement in ency domain, smoothing frequency dor iltering, additional properties of the 2-D FT AGE COMPRESSION image compression models, elements of loss less predictive coding, lossy predic sion standards. AGE SEGMENTATION scontinuities, point detection, line detect d boundary detection, thresholding, region AGE REPRESENTATION, DESCRIPTION , Boundary descriptors, Regional descriptors, Regional descriptors, ion theoretic & structural methods. ): Birkfellner, "Applied Medical Image Proce jarian and Robert Splerstor," Biomedical ew York,2006. 5):	IAIN & I some k erations the Free main fil T, conver- of inform tive coor tion, ed n based N AND iptors, essing - signals	FREC pasic s, bas quent ters, plutio matio ding, ge da I segu REC Princ - A B s and	QUEN gray sic of cy Do shar n and on the imag etect ment OGN cipal	ICY DO level to spatial pmain: E pening d correla eory, ern je comp ion, gra ation. ITION compon	MAIN ransforma filtering, s Backgroun frequenc ation theor for free C oression s dient ope ent analy CRC Pre essing", C	ations, Histog smoothing sp nd, Introductio y domain filt rems. Compression, standards, JP erators, Iaplac ysis, Recogni ess, 2011, :RC – Taylor	ramatia n to ers I g ian, I g tion
Unit II     IM.       mage Enhance     processing, enhance       processing, enhance     processing, enhance       T and freque     momomorphic fill       T and freque     momomorphic fill       Unit III     IM.       Fundamentals,     ength coding,       video compress     unit IV       Unit IV     IM.       Detection of dial     edge linking and       Unit V     IM.       Representation     pased on decise       TEXT BOOK(S     1.       Volfgang I     2.       KavyanNa     Francis,Na       REFERENCE(S     1.       P. Suetens	AGE ENHANCEMENT IN SPATIAL DOM ement in Spatial Domain: Background, hancement using arithmetic and logic op- ing spatial filters. Image Enhancement in ency domain, smoothing frequency dor iltering, additional properties of the 2-D FT AGE COMPRESSION image compression models, elements of loss less predictive coding, lossy predic sion standards. AGE SEGMENTATION scontinuities, point detection, line detect d boundary detection, thresholding, region AGE REPRESENTATION, DESCRIPTION , Boundary descriptors, Regional descr ion theoretic & structural methods. ): Birkfellner, "Applied Medical Image Proce jarian and Robert Splerstor," Biomedical ew York, 2006. 5):	TAIN & Free some the Free main fill T, convolution, fill T, convolution, eddin based to the source of the source o	FREC pasic s, bas quent ters, plutio matio ding, ge du segu REC Princ - A B s and	QUEN gray sic of cy Do shar n and on the image etect ment cipal asic I Ima	ICY DO level to spatial omain: E pening d correla eory, ern je comp ion, gra ation. ITION compon	MAIN ransforma filtering, s Backgrour frequenc ation theor for free Coression s dient ope ent analy CRC Pre essing",C	ations, Histog smoothing sp nd, Introductio y domain filt rems. Compression, standards, JP erators, Iaplac ysis, Recogni ess, 2011, RC – Taylor	ramatia n to ers ( run EG, ian, ian, s tion
Unit II       IM.         Image Enhance       processing, enlighters, sharpening         Filters, sharpening       Tand frequence         Tand frequence       Tand frequence         Tunit III       IM.         Fundamentals,       ength coding,         video compress       Unit IV       IM.         Detection of diage linking and       Unit V       IM.         Representation pased on decise       TEXT BOOK(S)       1.         Volfgang I       2.       KavyanNa         Francis, Ne       EFERENCE(S)       1.         P. Suetens       2.       R. C. Gonz         Technolog       Technolog       Technolog	AGE ENHANCEMENT IN SPATIAL DOM ement in Spatial Domain: Background, hancement using arithmetic and logic op- ing spatial filters. Image Enhancement in ency domain, smoothing frequency dor iltering, additional properties of the 2-D FT AGE COMPRESSION image compression models, elements of loss less predictive coding, lossy predic sion standards. AGE SEGMENTATION scontinuities, point detection, line detect d boundary detection, thresholding, region AGE REPRESENTATION, DESCRIPTION , Boundary descriptors, Regional descr ion theoretic & structural methods. ): Birkfellner, "Applied Medical Image Proce jarian and Robert Splerstor," Biomedical ew York,2006. 5): s, Fundamentals of image processing, Car zalez, R. E. Woods, S. L. Eddins , Digital y, 1 edition, 2004	IAIN & I some k erations the Free main fil T, conve of inform tive coo tion, ed n based N AND iptors, essing - signals mbridge Image	REC pasic s, bas quent ters, plutio matio ding, ge de segu REC Princ - A B s and s and Proc	QUEN gray sic of cy Do shar n and on the image etect ment oGN ipal asic I Ima	ICY DO level to spatial omain: E pening d correla eory, ern je comp ion, gra ation. ITION compon course", ge proc	MAIN ransforma filtering, s Backgroun frequenc ation theor for free C oression s dient ope ent analy CRC Pre essing",C , 2002	ations, Histog smoothing sp nd, Introductio y domain filt rems. Compression, standards, JP erators, Iaplac ysis, Recogni ess, 2011, RC – Taylor B(R) ,Course	ramatia n to ers I g ian, I g tion
Unit II       IM.         Image Enhance       processing, enhance         processing, enhance       processing, enhance         FT and freque       filters, sharpenie         FT and freque       formomorphic filters, sharpenie         FT and freque       formomorphic filters, sharpenie         funit III       IM.         Fundamentals,       ength coding,         video compress       Unit IV       IM.         Detection of dia       and         Unit V       IM.         Detection of dia       and         Unit V       IM.         Representation       pased on decise         TEXT BOOK(S       1. Wolfgang II         2. KavyanNaj       Francis, Nag         Francis, Nag       Francis, Nag         2. R. C. Gonz       Technolog         3. Jerry L.Prin       2006.	AGE ENHANCEMENT IN SPATIAL DOM ement in Spatial Domain: Background, hancement using arithmetic and logic op- ing spatial filters. Image Enhancement in ency domain, smoothing frequency dor iltering, additional properties of the 2-D FT AGE COMPRESSION image compression models, elements of loss less predictive coding, lossy predic sion standards. AGE SEGMENTATION scontinuities, point detection, line detect d boundary detection, thresholding, region AGE REPRESENTATION, DESCRIPTION , Boundary descriptors, Regional descriptors, Regional descriptors, ion theoretic & structural methods. ): Birkfellner, "Applied Medical Image Proce jarian and Robert Splerstor," Biomedical ew York,2006. 5): s, Fundamentals of image processing, Cal zalez, R. E. Woods, S. L. Eddins , Digital y, 1 edition, 2004 nce and Jnathan M.Links," Medical Imagi	AIN &	FREC pasic s, bas quent ters, blutio matio ding, ge dd I segu REC Princ - A B s and Princ - A B	QUEN gray sic of cy Do shar n and imag etect ment: OGN cipal asic I Ima versit cessir	ICY DO level to spatial pmain: E pening d correla eory, ern je comp ion, gra ation. ITION compon course", ge proc	MAIN ransforma filtering, s Backgroun frequenc ation theor for free Coression s dient ope ent analy CRC Pre essing", C , 2002 MATLAE	ations, Histog smoothing sp nd, Introductio y domain filt rems. Compression, standards, JP erators, Iaplac ysis, Recogni ess, 2011, RC – Taylor B(R) ,Course on Education	ram atia n tc ers I g ian, I g tion

Chairman - BoS Dept.of BME - ESEC

Department	BIOMEDICAL ENGI	NEERIN	IG			R 2019	Semester VI	PC
Course	- 14-14	Hou	rs / V	Veek	Credit	Total	Maximur	n
Code	Course Name	L	Т	Р	С	Hours	Marks	
19BM602	HEALTH CARE ANALYTICS	3	0	0	3	45	100	
Course Objectiv	ve (s): The purpose of learning this co	ourse is	to			N. 11		
<ul> <li>Understar</li> </ul>	nd the health data formats, health car	e policy	and	standa	ards,			
<ul> <li>Learn the</li> </ul>	significance and need of data analys	is and o	lata v	isualiz	zation,			
<ul> <li>Understar</li> </ul>	nd the health data management frame	eworks,						
<ul> <li>Learn the</li> </ul>	use of machine learning and deep learning	arning a	algorit	hms i	n healthc	are,		
<ul> <li>Apply heat</li> </ul>	Ithcare analytics for critical care appli	cations			1.5			
Course Outcom	es: At the end of this course, learner	s will be	able	to:				
<ul> <li>Use mach</li> </ul>	ine learning and deep learning algorit	thms fo	r heal	th dat	a analysi	s,		
<ul> <li>Apply the</li> </ul>	data management techniques for hea	althcare	data	,		*		
<ul> <li>Evaluate</li> </ul>	the need of healthcare data analysis	s in e-l	nealth	care,	telemedi	cine and	other critical of	care
application	ns,							
<ul> <li>Design he</li> </ul>	alth data analytics for real time applic	ations,				а 		
Design en	nergency care system using health da	ata ana	ysis.		e 11 - 12 - 13	Call		
Unit I INTR	ODUCTION TO HEALTHCARE ANA	ALYSIS						9
Overview – Hist	ory of Healthcare Analysis Paramet	ers on	medi	cal ca	re syster	ns – Hea	Ith Care Polic	у —
	ado Sate Data Lormate Maa	10 1 10 O	and the second second second	na ha	undation	C' Iroo	I IVO FOOODIN	
Standardized C	ode Sets - Data Politiats - Mac	nine L	earni	ig i c	unuation	s. nee	Like reasoning	g,
Probabilistic reas	soning and Bayes Theorem, Weighter	d sum a	approa	ach.	unuation	s. nee		g,
Probabilistic reas	soning and Bayes Theorem, Weighter	d sum a	approa	ach.		s. nee		g, 9.
Probabilistic reas	soning and Bayes Theorem, Weighter LTH CARE MANAGEMENT nsors – Migration of Healthcare Rela	tional d	earnii approa ataba	ach. ise to	NoSQL (	Cloud Dat	abase – Decis	g , 9 ion
Probabilistic reas Unit II HEA IOT – Smart Ser Support System	soning and Bayes Theorem, Weighter LTH CARE MANAGEMENT nsors – Migration of Healthcare Relation – Matrix block Cipher System – Semi-	tional d antic Fr	ataba amev	ach. ise to vork A	NoSQL ( nalysis –	Cloud Dat	abase – Decis m bin Shifting a	g, 9 ion and
Probabilistic reas Unit II HEA IOT – Smart Ser Support System Rc6 Encryption -	soning and Bayes Theorem, Weighter LTH CARE MANAGEMENT nsors – Migration of Healthcare Rela – Matrix block Cipher System – Semi - Clinical Prediction Models – Visual	tional d antic Fr	approa ataba amev s for	ach. ise to vork A Health	NoSQL ( nalysis – ncare.	Cloud Dat	abase – Decis m bin Shifting a	g , 9 ion and
Standardized     C       Probabilistic reast     Unit II       HEA       IOT – Smart Ser       Support System       Rc6 Encryption -       Unit III       HEA	soning and Bayes Theorem, Weighter LTH CARE MANAGEMENT Insors – Migration of Healthcare Relation – Matrix block Cipher System – Sema – Clinical Prediction Models – Visual / LTHCARE AND DEEP LEARNING	tional d antic Fr	earnin approa ataba amev s for	ach. ise to vork A Health	NoSQL ( nalysis – ncare.	Cloud Dat Histogram	abase – Decis m bin Shifting a	g , <u>9</u> ion and 9
Standardized     C       Probabilistic reas       Unit II     HEA       IOT – Smart Ser       Support System       Rc6 Encryption -       Unit III     HEA       Introduction on I	soning and Bayes Theorem, Weighter LTH CARE MANAGEMENT Insors – Migration of Healthcare Relation – Matrix block Cipher System – Semi- Clinical Prediction Models – Visual / LTHCARE AND DEEP LEARNING Deep Learning – DFF network CNN -	tional d antic Fr Analytic - RNN	ataba ataba amev s for for Se	ach. Ise to vork A Health equen	NoSQL ( nalysis – ncare.	Cloud Dat Histogram	abase – Decis m bin Shifting a	g 9 ion and 9 nal
Standardized     C       Probabilistic reas       Unit II     HEA       IOT – Smart Ser       Support System       Rc6 Encryption -       Unit III     HEA       Introduction on I       Analysis – Natur	soning and Bayes Theorem, Weighter LTH CARE MANAGEMENT nsors – Migration of Healthcare Relat – Matrix block Cipher System – Semi - Clinical Prediction Models – Visual / LTHCARE AND DEEP LEARNING Deep Learning – DFF network CNN - ral Language Processing and Data M	tional d antic Fr Analytic - RNN	earnin approa ataba amev s for s for for Se or Clin	ach. Ise to vork A Health equen iical D	NoSQL ( nalysis – ncare. ces – Bie pata – Mo	Cloud Dat Histogram	abase – Decis m bin Shifting a Image and Sig	g , <u>9</u> ion and <u>9</u> nal tics
Standardized     C       Probabilistic reas       Unit II     HEA       IOT – Smart Ser       Support System       Rc6 Encryption -       Unit III     HEA       Introduction on I       Analysis – Natur       - Clinical Decisio	soning and Bayes Theorem, Weighter LTH CARE MANAGEMENT Insors – Migration of Healthcare Relat – Matrix block Cipher System – Semi - Clinical Prediction Models – Visual / LTHCARE AND DEEP LEARNING Deep Learning – DFF network CNN - ral Language Processing and Data M on Support System.	tional d antic Fr Analytic - RNN lining fo	earnin approa ataba amew s for for Se for Clin	ach. se to vork A Health equen nical D	NoSQL ( nalysis – ncare. ces – Bie pata – Mo	Cloud Dat Histogram	abase – Decis m bin Shifting a Image and Sig ing and Analy	g , 9 ion and 9 nal tics
Standardized       C         Probabilistic reas       Unit II       HEA         IOT – Smart Ser       Support System         Rc6 Encryption -       Unit III       HEA         Unit III       HEA         Introduction on I       Analysis – Natur         – Clinical Decision       Unit IV       MAC	soning and Bayes Theorem, Weighter LTH CARE MANAGEMENT Insors – Migration of Healthcare Relat – Matrix block Cipher System – Semi - Clinical Prediction Models – Visual / LTHCARE AND DEEP LEARNING Deep Learning – DFF network CNN - al Language Processing and Data M on Support System. HINE LEARNING IN HEALTH CARE Indical Imaging and Diagnosia	tional d antic Fr Analytic - RNN ining fc	earnin approa ataba amev s for for Se or Clin	ach. Ise to vork A Health equen iical D	NoSQL ( nalysis – ncare. ces – Bio pata – Mo	Cloud Dat Histogram	abase – Decis m bin Shifting a Image and Sig ing and Analy	g , <u>9</u> ion and 9 nal tics 9
Standardized       C         Probabilistic reas         Unit II       HEA         IOT – Smart Ser         Support System         Rc6 Encryption -         Unit III       HEA         Introduction on I         Analysis – Natur         – Clinical Decisio         Unit IV       MAC         Introduction – M         Smart Health Pa	soning and Bayes Theorem, Weighter LTH CARE MANAGEMENT nsors – Migration of Healthcare Relat – Matrix block Cipher System – Semi- Clinical Prediction Models – Visual / LTHCARE AND DEEP LEARNING Deep Learning – DFF network CNN - ral Language Processing and Data M on Support System. HINE LEARNING IN HEALTH CARE ledical Imaging and Diagnosis – Me cords – Clinical Trial and Research	tional d antic Fr Analytic - RNN lining fo	ataba ataba amev s for for Se or Clin	ach. Ise to vork A Health equen tical D	NoSQL ( nalysis – ncare. ces – Bio pata – Mo	Cloud Dat Histogram omedical lobile Imag	abase – Decis m bin Shifting a Image and Sig ing and Analyt	g , <u>9</u> iion and 9 nal tics 9 9 ə –
Standardized       C         Probabilistic reas         Unit II       HEA         IOT – Smart Ser         Support System         Rc6 Encryption -         Unit III       HEA         Introduction on I         Analysis – Natur         – Clinical Decision         Unit IV       MAC         Introduction – M         Smart Health Re         Unit V       APTI	soning and Bayes Theorem, Weighter LTH CARE MANAGEMENT Insors – Migration of Healthcare Relat – Matrix block Cipher System – Semi – Clinical Prediction Models – Visual / LTHCARE AND DEEP LEARNING Deep Learning – DFF network CNN – ral Language Processing and Data M on Support System. HINE LEARNING IN HEALTH CARE ledical Imaging and Diagnosis – Me cords – Clinical Trial and Research – EICIAL INTELLIGENCE AND MACH	tional d antic Fr Analytic - RNN lining fc edical D Persor	ataba ataba ataba amev s for for Se or Clin	ach. se to vork A Health equen iical D - Trea d Med	NoSQL ( nalysis – ncare. ces – Bio pata – Mo tment ar licine.	Cloud Dat Histogram omedical lobile Imag	abase – Decis m bin Shifting a Image and Sig ing and Analyt	g , <u>9</u> ion and 9 nal tics 9 9 -
Standardized       C         Probabilistic reas         Unit II       HEA         IOT – Smart Ser         Support System         Rc6 Encryption -         Unit III       HEA         Introduction on I         Analysis – Natur         – Clinical Decision         Unit IV       MAC         Introduction – M         Smart Health Re         Unit V       ARTI         Predicting       Morta	soning and Bayes Theorem, Weighter LTH CARE MANAGEMENT Insors – Migration of Healthcare Relat – Matrix block Cipher System – Semi- Clinical Prediction Models – Visual / LTHCARE AND DEEP LEARNING Deep Learning – DFF network CNN - al Language Processing and Data M on Support System. HINE LEARNING IN HEALTH CARE ledical Imaging and Diagnosis – Me cords – Clinical Trial and Research – FICIAL INTELLIGENCE AND MACH lity for cardiology Practice – Smatt	tional d antic Fr Analytic - RNN ining fo dical D Persor INE LE	ataba ataba ataba amev s for for Se or Clin	ach. Ise to vork A Health equen iical D - Trea d Med	NoSQL ( nalysis – ncare. ces – Bio pata – Mo tment ar licine. APPLICA	Cloud Dat Histogram omedical lobile Imag	abase – Decis m bin Shifting a Image and Sig ing and Analy ion of Disease	g , <u>9</u> iion and 9 nal tics 9 e – 9 e –
Standardized       C         Probabilistic reas         Unit II       HEA         IOT – Smart Ser         Support System         Rc6 Encryption -         Unit III       HEA         Introduction on I         Analysis – Natur         – Clinical Decisic         Unit IV       MAC         Introduction – M         Smart Health Re         Unit V       ARTI         Predicting Morta         Conditions (HAC)	soning and Bayes Theorem, Weighter LTH CARE MANAGEMENT Insors – Migration of Healthcare Relation – Matrix block Cipher System – Semi- Clinical Prediction Models – Visual / LTHCARE AND DEEP LEARNING Deep Learning – DFF network CNN - Tal Language Processing and Data M on Support System. HINE LEARNING IN HEALTH CARE ledical Imaging and Diagnosis – Me cords – Clinical Trial and Research – FICIAL INTELLIGENCE AND MACH lity for cardiology Practice – Smart ) program – Healthcare and Emergin	tional d antic Fr Analytic - RNN ining fo edical D Persor IINE LE Ambu	approa ataba ataba amev s for for Se or Clin pata – nalize <b>ARN</b> lance	ach. Ise to vork A Health equen nical D - Trea d Med ING A Syste	NoSQL ( nalysis – ncare. ces – Bio pata – Mo tment ar licine. APPLICA em using	Cloud Dat Histogram omedical lobile Imag nd Predict TIONS	abase – Decis m bin Shifting a Image and Sig ing and Analy ion of Disease	g , <u>9</u> ion and 9 nal tics 9 9 - 9 9 red
Standardized     C       Probabilistic reas       Unit II     HEA       IOT – Smart Ser       Support System       Rc6 Encryption -       Unit III     HEA       Introduction on I       Analysis – Natur       – Clinical Decision       Unit IV     MAC       Introduction – M       Smart Health Re       Unit V     ARTI       Predicting Morta       Conditions (HAC	Soning and Bayes Theorem, Weighter LTH CARE MANAGEMENT Insors – Migration of Healthcare Relat – Matrix block Cipher System – Semi- Clinical Prediction Models – Visual / LTHCARE AND DEEP LEARNING Deep Learning – DFF network CNN - al Language Processing and Data M on Support System. HINE LEARNING IN HEALTH CARE ledical Imaging and Diagnosis – Me cords – Clinical Trial and Research – FICIAL INTELLIGENCE AND MACH lity for cardiology Practice – Smart ) program – Healthcare and Emerging	tional d antic Fr Analytic - RNN ining fc edical D Persor IINE LE Ambu g Techi	ataba ataba ataba amev s for for Se or Clin pata – nalize <b>ARN</b> lance nologi	ach. Ise to vork A Health equen lical D - Trea d Med ING A Syste	NoSQL ( nalysis – ncare. ces – Bio pata – Mo tment ar licine. APPLICA em using ECG Data	Cloud Dat Histogram omedical lobile Imag nd Predict TIONS I IOT – Ha Analysis	abase – Decis m bin Shifting a Image and Sig ing and Analyt ion of Disease	g , 9 ion and 9 nal tics 9 9 e – 9 red
Standardized       C         Probabilistic reas       Unit II       HEA         IOT – Smart Ser       Support System         Rc6 Encryption -       Unit III       HEA         Introduction on I       Analysis – Natur       -         Clinical Decisic       Unit IV       MAC         Introduction – M       Smart Health Re       Unit V         Unit V       ARTI         Predicting Morta       Conditions (HAC         TEXT BOOK(S):       A	Soning and Bayes Theorem, Weighter LTH CARE MANAGEMENT Insors – Migration of Healthcare Relat – Matrix block Cipher System – Semi- Clinical Prediction Models – Visual / LTHCARE AND DEEP LEARNING Deep Learning – DFF network CNN - ral Language Processing and Data M on Support System. HINE LEARNING IN HEALTH CARE ledical Imaging and Diagnosis – Me cords – Clinical Trial and Research – FICIAL INTELLIGENCE AND MACH lity for cardiology Practice – Smart ) program – Healthcare and Emerging	tional d antic Fr Analytic - RNN ining fo dical D Persor IINE LE Ambu g Techi	ataba ataba ataba amev s for for Se or Clin pata - nalized <b>ARN</b> lance nologi	ach. Ise to vork A Health equen tical D - Trea d Med ING A Syste	NoSQL ( nalysis – ncare. ces – Bid pata – Mo timent ar licine. APPLICA em using ECG Data	Cloud Dat Histogram omedical lobile Imag ad Predict TIONS I IOT – Ha Analysis	abase – Decis m bin Shifting a Image and Sig ing and Analy ion of Disease	g , 9 iion and 9 nal tics 9 e – 9 red
Standardized       C         Probabilistic reas       Unit II       HEA         IOT – Smart Ser       Support System         Rc6 Encryption -       Unit III       HEA         Introduction on I       Analysis – Natur       Clinical Decision         Onit IV       MAC         Introduction – M       Smart Health Re         Unit V       ARTI         Predicting Morta       Conditions (HAC         TEXT BOOK(S):       1. Chandan K.	Soning and Bayes Theorem, Weighter LTH CARE MANAGEMENT Insors – Migration of Healthcare Relar – Matrix block Cipher System – Semi- Clinical Prediction Models – Visual / LTHCARE AND DEEP LEARNING Deep Learning – DFF network CNN - al Language Processing and Data M on Support System. HINE LEARNING IN HEALTH CARE ledical Imaging and Diagnosis – Me cords – Clinical Trial and Research – FICIAL INTELLIGENCE AND MACH lity for cardiology Practice – Smart ) program – Healthcare and Emerging Reddy, Charu C. Aggarwal, "Health C	tional d antic Fr Analytic - RNN ining fo edical D Persor IINE LE Ambu g Tech	earnin approa ataba ataba amev s for for Se for Clin pata – nalize <b>ARN</b> lance nologi ta Ana	ach. Ise to vork A Health equen ical D - Trea d Med ING A Syste ies – E	NoSQL ( nalysis – ncare. ces – Bio pata – Mo itment ar licine. APPLICA em using ECG Data	Cloud Dat Histogram omedical obile Imag d Predict TIONS I IOT – Ha Analysis	abase – Decis m bin Shifting a Image and Sig ing and Analyt ion of Disease Hospital Acquin	g , 9 ion and 9 nal tics 9 9 9 red
Standardized       C         Probabilistic reas         Unit II       HEA         IOT – Smart Ser         Support System         Rc6 Encryption -         Unit III       HEA         Introduction on I         Analysis – Natur         – Clinical Decision         Unit IV       MAC         Introduction – M         Smart Health Re         Unit V       ARTI         Predicting Morta         Conditions (HAC         TEXT BOOK(S):         1. Chandan K.         2. Nilanjan De         Managemer	Soning and Bayes Theorem, Weighter         LTH CARE MANAGEMENT         Insors – Migration of Healthcare Relat         – Matrix block Cipher System – Sema         – Clinical Prediction Models – Visual /         LTHCARE AND DEEP LEARNING         Deep Learning – DFF network CNN -         al Language Processing and Data M         on Support System.         HINE LEARNING IN HEALTH CARE         ledical Imaging and Diagnosis – Me         cords – Clinical Trial and Research –         FICIAL INTELLIGENCE AND MACH         lity for cardiology Practice – Smart         ) program – Healthcare and Emerging         Reddy, Charu C. Aggarwal, "Health Care         ey, Amira Ashour, Simon James For         at, First Edition, Academic Press, 201	tional d antic Fr Analytic - RNN ining fc edical D Persor IINE LE Ambu g Techi Care da ong, Ch 8.	earnin approa ataba amev s for for Se for Clin eata - nalize <b>ARN</b> lance nologi ta Ana intan	ach. Ise to vork A Health equen ical D - Trea d Med ING A Syste ies – E alysis' Bhat	NoSQL ( nalysis – ncare. ces – Bio pata – Mo tment ar licine. APPLICA em using ECG Data ', First ec I, "Health	Cloud Dat Histogram omedical lobile Imag d Predict TIONS I IOT – Ha Analysis lition, CRO	abase – Decis m bin Shifting a Image and Sig ing and Analy ion of Disease Hospital Acquin C, 2015. ata Analysis a	g , 9 ion and 9 nal tics 9 9 - 9 red
Standardized       C         Probabilistic reas         Unit II       HEA         IOT – Smart Ser         Support System         Rc6 Encryption -         Unit III       HEA         Introduction on I         Analysis – Natur         – Clinical Decisic         Unit IV       MAC         Introduction – M         Smart Health Re         Unit V       ARTI         Predicting Morta         Conditions (HAC         TEXT BOOK(S):         1. Chandan K.         2. Nilanjan De         Managemer         3. Vikas Kuma	soning and Bayes Theorem, Weighter LTH CARE MANAGEMENT Insors – Migration of Healthcare Relat – Matrix block Cipher System – Semi- Clinical Prediction Models – Visual / LTHCARE AND DEEP LEARNING Deep Learning – DFF network CNN - ral Language Processing and Data M on Support System. HINE LEARNING IN HEALTH CARE ledical Imaging and Diagnosis – Me cords – Clinical Trial and Research – FICIAL INTELLIGENCE AND MACH lity for cardiology Practice – Smart ) program – Healthcare and Emerging Reddy, Charu C. Aggarwal, "Health C ry, Amira Ashour, Simon James For nt, First Edition, Academic Press, 201 r, "Health Care Analysis Made Simple	tional d antic Fr Analytic - RNN ining fo edical D Persor IINE LE Ambu g Tech Care da ong, Ch 8. e <sup>2</sup> , Pacl	earnin approa ataba ataba amew s for for Se or Clin pata – nalized ance nologi ta Ana iintan ct Pub	ach. ach. ise to vork A Health equen ical D - Trea d Med ING A Syste ies – E alysis' Bhat	NoSQL ( nalysis – ncare. ces – Bid pata – Mo timent ar licine. APPLICA em using CG Data ', First ec I, "Health g, 2018	Cloud Dat Histogram omedical lobile Imag nd Predict TIONS I IOT – Ha Analysis	abase – Decis m bin Shifting a Image and Sig ing and Analy ion of Disease Hospital Acquin  C, 2015. ata Analysis a	g , 9 iion and 9 nal tics 9 9 - 9 red 9 red
Standardized       C         Probabilistic reas       Unit II       HEA         IOT – Smart Ser       Support System         Rc6 Encryption -       Unit III       HEA         Introduction on I       Analysis – Natur         - Clinical Decision       MAC         Unit IV       MAC         Introduction – M       Smart Health Re         Unit V       ARTI         Predicting Morta       Conditions (HAC         TEXT BOOK(S):       1. Chandan K.         2. Nilanjan De       Managemer         3. Vikas Kuma       REFERENCE(S)	Soning and Bayes Theorem, Weighter LTH CARE MANAGEMENT Insors – Migration of Healthcare Relar – Matrix block Cipher System – Sema – Clinical Prediction Models – Visual / LTHCARE AND DEEP LEARNING Deep Learning – DFF network CNN - al Language Processing and Data M on Support System. HINE LEARNING IN HEALTH CARE ledical Imaging and Diagnosis – Me cords – Clinical Trial and Research – FICIAL INTELLIGENCE AND MACH lity for cardiology Practice – Smart ) program – Healthcare and Emerging Reddy, Charu C. Aggarwal, "Health C ey, Amira Ashour, Simon James Fo nt, First Edition, Academic Press, 201 r, "Health Care Analysis Made Simple :	tional d antic Fr Analytic - RNN ining fc edical D Persor INE LE Ambu g Tech Care da ong, Ch 8. e", Pacl	earnin approa ataba ataba amev s for for Se for Clin pata – nalize <b>ARN</b> lance nologi ta Ana iintan	ach. Ise to vork A Health equen ical D - Trea d Med ING A Syste ies – E alysis' Bhat	NoSQL ( nalysis – ncare. ces – Bio pata – Mo tment ar licine. APPLICA em using ECG Data ', First ec I, "Health g, 2018	Cloud Dat Histogram omedical lobile Imag nd Predict TIONS I IOT – Ha Analysis lition, CRO	abase – Decis m bin Shifting a Image and Sig ing and Analyt ion of Disease Hospital Acquin C, 2015. ata Analysis a	g , 9 iion and 9 nal tics 9 9 9 red 9 red
Standardized       C         Probabilistic reas       Unit II       HEA         IOT – Smart Ser       Support System         Rc6 Encryption -       Unit III       HEA         Introduction on I       Analysis – Natur         – Clinical Decisio       Unit IV       MAC         Introduction – M       Smart Health Re         Unit V       ARTI         Predicting Morta       Conditions (HAC         TEXT BOOK(S):       1. Chandan K.         2. Nilanjan De       Managemer         3. Vikas Kuma       REFERENCE(S)         1. Kulkarni , Si       2020	<ul> <li>Soning and Bayes Theorem, Weighter</li> <li>LTH CARE MANAGEMENT</li> <li>Insors – Migration of Healthcare Relat</li> <li>Matrix block Cipher System – Sema</li> <li>Clinical Prediction Models – Visual /</li> <li>LTHCARE AND DEEP LEARNING</li> <li>Deep Learning – DFF network CNN -</li> <li>al Language Processing and Data M</li> <li>on Support System.</li> <li>HINE LEARNING IN HEALTH CARE</li> <li>Iedical Imaging and Diagnosis – Me</li> <li>cords – Clinical Trial and Research –</li> <li>FICIAL INTELLIGENCE AND MACH</li> <li>Ity for cardiology Practice – Smart</li> <li>) program – Healthcare and Emerging</li> <li>Reddy, Charu C. Aggarwal, "Health Care Analysis Made Simple</li> <li>arry, Singh ,Abraham, Zhang, Zomay</li> </ul>	tional d antic Fr Analytic - RNN ining fo dical D Persor INE LE Ambu g Techn Care da ong, Ch 8. e <sup>*</sup> , Pacl	earnin approa ataba ataba amev s for for Se or Clin eata - nalized <b>ARN</b> lance nologi ta Ana iintan ct Pub	ach. ach. se to vork A Health equen ical D - Trea d Med ING A Syste ies – E alysis' Bhat	NoSQL ( nalysis – ncare. ces – Bid pata – Mo tment ar licine. APPLICA em using ECG Data 7, First ec I, "Health g, 2018	Cloud Dat Histogram omedical lobile Imag d Predict TIONS I IOT – Ha Analysis lition, CRO n Care D	abase – Decis m bin Shifting a Image and Sig ing and Analy ion of Disease Hospital Acquin C, 2015. ata Analysis a thCare", Spring	g , 9 ion and 9 nal tics 9 9 - 9 9 - 9 - 9 - 9 - 9 - 9 - - 9 - - 9 - - - 9 - - - - 9 -



	BIOMEDICAL ENGINE	ERING				R 2019	Semester VI	P
Course	Course News	Hou	rs / V	Veek	Credit	Total	Maximun	1
Code	Course Name	L	Т	Р	С	Hours	Marks	
19BM603	PATTERN RECOGNITION AND NEURAL NETWORKS	3	0	0	3	45	100	
Course Objec	tive(s): The purpose of learning this cour	rse is to						
<ul> <li>Study th</li> </ul>	e fundamentals of pattern recognition and	d its app	licati	on,				
<ul> <li>learn alg</li> </ul>	porithms suitable for pattern classification,	(Ball)					1	
<ul> <li>Underst</li> </ul>	and the applications of pattern recognition	٦,			our -	-		
<ul> <li>Underst</li> </ul>	and the classification in image processing	and co	mput	er vis	sion,			
<ul> <li>Discuss</li> </ul>	the radiation therapy techniques and radi	iation sa	fety.				10.00	
Course Outco	omes: At the end of this course, learners	will be a	ble to	<b>)</b> :				
<ul> <li>Classify</li> </ul>	patterns using statistical pattern classifier	r.						
<ul> <li>Perform</li> </ul>	unsupervised classification using clusteri	ng techr	nique	S,				
<ul> <li>Explain</li> </ul>	the fundamentals of neural networks,			a l				
• Design I	Back Propagation and Hopfield network,	191						
- Perform	classification using competitive neural ne	tworks.			Sec. 1			_
Unit I SL	JPERVISED LEARNING	da i s	1.1.1	1	1	1.1	2	9
Overview of P	attern recognition, Types of Pattern rec	ognition	, Pai	ame	tric and	Nonpara	metric approa	ch
Sayesian class	sifier, Discriminant function, non-paramet	tric dens	sity e	stima	ation, his	stograms,	kernels, wind	ow
stimators, K- I	nearest heighbor classifier, estimation of e	error rate	es.				The second second	
Unit II UN	SUPERVISED LEARNING AND CLUST	ERING	ANA	LYS	IS			9
Insupervised	earning – Hierarchical clustering – Single	e – linka	ge A	gorit	hm, Cor	nplete – li	nkage Algorith	m,
verage – Lini	kage Algorithm and Ward's method. Par	titional c	luste	ering	− ⊢orgy	's Algorit	nm and k-mea	
	a strutter			-		J		ins
igonunm. Cas	e studies.		s lês	6	1.4 -9 -1			ins
Unit III IN	e studies. TRODUCTION TO NEURAL NETWORK							s g
Unit III IN	e studies. <b>TRODUCTION TO NEURAL NETWORK</b> urophysiology and biological neural netw	ork –Ar	tificia	l neu	iral netw	vork – Arc	chitecture, bias	ses
Unit III IN Elementary ne	e studies. <b>TRODUCTION TO NEURAL NETWORK</b> urophysiology and biological neural netw , Hebb net, Perceptron, Adaline and Mada	vork –Arl aline.	tificia	l neu	iral netw	vork – Arc	chitecture, bias	ses
Unit III IN Iementary ne nd thresholds Unit IV BA	e studies. <b>TRODUCTION TO NEURAL NETWORK</b> urophysiology and biological neural netw , Hebb net, Perceptron, Adaline and Mada <b>ACK PROPAGATION NETWORK AND A</b>	ork –Artaline.	tificia ATIV	l neu E <b>ME</b>	mal netw	vork – Arc	chitecture, bias	ses g
Unit III IN Ilementary ne Ind thresholds Unit IV BA Back propagati	e studies. <b>TRODUCTION TO NEURAL NETWORK</b> urophysiology and biological neural netw , Hebb net, Perceptron, Adaline and Mada <b>CK PROPAGATION NETWORK AND A</b> on network, generalized delta rule, Bidire	vork –Art aline. <b>SSOCIA</b> ctional A	tificia ATIV	l neu E <b>ME</b> ciativo	mal network MORY e memo	vork – Arc ry, Hopfie	chitecture, bias Id Network.	ses 9
Unit III IN Iementary ne nd thresholds Unit IV BA Eack propagati Unit V NE	e studies. <b>TRODUCTION TO NEURAL NETWORK</b> urophysiology and biological neural netw , Hebb net, Perceptron, Adaline and Mada <b>ACK PROPAGATION NETWORK AND A</b> on network, generalized delta rule, Bidire <b>URAL NETWORKS BASED ON COMPE</b>	rork –Ari aline. SSOCIA ctional A ETITION	tificia ATIV	l neu E <b>ME</b> ciativo	mal networks in the second sec	vork – Arc ry, Hopfie	hitecture, bias	ins ges g
Unit III     IN       Unit III     IN       Elementary ne     Ind       Ind thresholds     Init IV       Back propagati     Init V       Unit V     NE       Cohonen Self c	e studies. <b>TRODUCTION TO NEURAL NETWORK</b> urophysiology and biological neural netw , Hebb net, Perceptron, Adaline and Mada <b>ACK PROPAGATION NETWORK AND A</b> on network, generalized delta rule, Bidire <b>URAL NETWORKS BASED ON COMPE</b> organizing map, Learning Vector Quantisa	vork –Arl aline. SSOCIA ctional A ETITION tion, Cou	tificia ATIV Assoc	I neu E <b>ME</b> ciativo Prop	MORY memo	vork – Arc ry, Hopfie network,	hitecture, bias ld Network. Case studies.	ins ses g
Unit III IN Elementary ne ind thresholds Unit IV BA Back propagati Unit V NE Cohonen Self of EXT BOOK(S	e studies. <b>TRODUCTION TO NEURAL NETWORK</b> urophysiology and biological neural netw , Hebb net, Perceptron, Adaline and Mada <b>ACK PROPAGATION NETWORK AND A</b> on network, generalized delta rule, Bidire <b>URAL NETWORKS BASED ON COMPE</b> organizing map, Learning Vector Quantisa <b>S):</b>	rork –Art aline. SSOCIA ctional A ETITION tion, Cou	tificia ATIV Assoc	I neu E <b>ME</b> ciativo Prop	MORY memo	vork – Arc ry, Hopfie network,	hitecture, bias ld Network. Case studies.	ins ses g
Unit IIIINIementary neINIementary neInd thresholdsUnit IVBABack propagatiIntUnit VNEIohonen Self coEXT BOOK (S1. Duda R.O	e studies. <b>TRODUCTION TO NEURAL NETWORK</b> urophysiology and biological neural netwo , Hebb net, Perceptron, Adaline and Mada <b>ACK PROPAGATION NETWORK AND A</b> on network, generalized delta rule, Bidire <b>URAL NETWORKS BASED ON COMPE</b> organizing map, Learning Vector Quantisa <b>S):</b> , Hart P.G, "Pattern Classification and sce	rork –Art aline. SSOCIA ctional A ETITION tion, Cou	tificia ATIV Associunter ysis"	I neu E <b>ME</b> ciativo Prop	MORY MORY e memo pagation ey Editic	vork – Arc ry, Hopfie network, on, 2000.	hitecture, bias Id Network. Case studies.	ins ses g
Unit III IN Elementary ne and thresholds Unit IV BA Back propagati Unit V NE Cohonen Self of EXT BOOK(S 1. Duda R.O 2. Earl Gose of India Py	e studies. <b>TRODUCTION TO NEURAL NETWORK</b> urophysiology and biological neural netwo , Hebb net, Perceptron, Adaline and Mada <b>ACK PROPAGATION NETWORK AND A</b> on network, generalized delta rule, Bidire <b>URAL NETWORKS BASED ON COMPE</b> organizing map, Learning Vector Quantisation <b>Sp:</b> , Hart P.G, "Pattern Classification and sceed , Richard Johnsonbaugh Steve Jost, "Pattern Ltd., New Delhi, 1999.	vork –Art aline. SSOCIA ctional A ETITION tion, Cou ene anal ttern Rec	tificia ATIV Assoc unter ysis" cogn	I neu E <b>ME</b> ciative Prop , Will	mal networks MORY e memo- bagation ey Editic and Ima	vork – Arc ry, Hopfie network, on, 2000. ge Analys	hitecture, bias ld Network. Case studies.	
Unit III       IN         Unit III       IN         Iementary ne       IN         Iementary ne       IN         Iementary ne       IN         Iementary ne       IN         Imit IV       BA         Back propagati       In         Unit V       NE         Cohonen Self of       EXT BOOK(S         1.       Duda R.O         2.       Earl Gose of India PN         3.       Freeman techniques	e studies. <b>TRODUCTION TO NEURAL NETWORK</b> urophysiology and biological neural network, Hebb net, Perceptron, Adaline and Mada <b>ACK PROPAGATION NETWORK AND A</b> on network, generalized delta rule, Bidire <b>URAL NETWORKS BASED ON COMPE</b> organizing map, Learning Vector Quantisa <b>SJ:</b> , Hart P.G, "Pattern Classification and sceles, , Richard Johnsonbaugh Steve Jost, "Pattern Least for the state of the	vork –Art aline. SSOCIA ctional A ETITION tion, Cou ene anal ttern Rec works,	tificia ATIV Associunter ysis" cogn	I neu E <b>ME</b> siative Prop , Will ition	mal network more memore pagation ey Editic and Ima	vork – Arc ry, Hopfie network, on, 2000. ge Analys cations a	chitecture, bias ld Network. Case studies. sis", Prentice H	ses g g
Unit III IN Elementary ne and thresholds Unit IV BA Back propagati Unit V NE Cohonen Self of EXT BOOK(S 1. Duda R.O 2. Earl Gose of India Pv 3. Freeman techniques	e studies. <b>TRODUCTION TO NEURAL NETWORK</b> urophysiology and biological neural network, Hebb net, Perceptron, Adaline and Mada <b>ACK PROPAGATION NETWORK AND A</b> on network, generalized delta rule, Bidire <b>URAL NETWORKS BASED ON COMPE</b> organizing map, Learning Vector Quantisa <b>SURAL NETWORKS BASED ON COMPE</b> organizing map, Learning Vector Quantisa (a): Hart P.G, "Pattern Classification and sceed , Richard Johnsonbaugh Steve Jost, "Pattern Ltd., New Delhi, 1999. J. A., and Skapura B.M, "Neural netros", Addison-Wesley,2003 <b>S):</b>	vork –Arl aline. SSOCIA ctional A ETITION tion, Cou ene anal ttern Rea	tificia ATIV Assoc unter ysis" cogn algor	I neu E <b>ME</b> siative Prop , Will ition	mal network MORY e memo- bagation ey Editic and Ima s, applic	vork – Arc ry, Hopfie network, on, 2000. ge Analys cations a	hitecture, bias ld Network. Case studies. sis", Prentice H	ses 9 9
Unit III       IN         Image: Image and Image a	e studies. <b>TRODUCTION TO NEURAL NETWORK</b> urophysiology and biological neural network, Hebb net, Perceptron, Adaline and Mada <b>ACK PROPAGATION NETWORK AND A</b> on network, generalized delta rule, Bidire <b>URAL NETWORKS BASED ON COMPE</b> organizing map, Learning Vector Quantisa <b>SURAL NETWORKS BASED ON COMPE</b> <b>SURAL NEW Delhi</b> , 1999. J. A., and Skapura B.M, "Neural network <b>S</b> ", Addison-Wesley,2003 <b>S</b> ]: emuth and Beale, "Neural Network Des	rork –Art aline. SSOCIA ctional A ETITION tion, Cou ene anal ttern Rec works, a ign", Vil	tificia ATIV Associunter ysis" cogn algor	I neu E <b>ME</b> siative Prop , Will ition ithms	mal network more memore pagation ey Editic and Ima s, applic shing He	vork – Arc ry, Hopfie network, on, 2000. ge Analys cations a ouse Pvt	chitecture, bias Id Network. Case studies. sis", Prentice H nd programm Ltd., New De	ing Ini
Unit III       IN         Imit III       IN         Iementary ne       In         Idementary ne       In         Iementary ne       IN         Iementary ne       IN         Imit IV       BA         Back propagati       In         Unit V       NE         Schonen Self co       EXT BOOK(S         1.       Duda R.O         2.       Earl Gose of India P         3.       Freeman techniques         EFERENCE(S       1.         1.       Hagan, Do         2002.       Robert Sc         Sons (Asia)       Sons (Asia)	e studies. <b>TRODUCTION TO NEURAL NETWORK</b> urophysiology and biological neural network, Hebb net, Perceptron, Adaline and Mada <b>ACK PROPAGATION NETWORK AND A</b> on network, generalized delta rule, Bidire <b>URAL NETWORKS BASED ON COMPE</b> organizing map, Learning Vector Quantisa <b>SURAL NETWORKS BASED ON COMPE</b> organizing map, Learning Vector Quantisa <b>CIRAL NETWORKS BASED ON COMPE</b> organizing map, Learning Vector Quantisa <b>SURAL NETWORKS BASED ON COMPE</b> <b>SURAL </b>	vork –Art aline. SSOCIA ctional A ETITION tion, Cou ene anal ttern Red works, ign", Vil Structura	tificia ATIV Assoc unter ysis" cogn algor kas f	I neu E <b>ME</b> siative Prop , Will ition ithms <sup>D</sup> ublis d ne	main network more memory memor	vork – Arc ry, Hopfie network, on, 2000. ge Analys cations a ouse Pvt proaches"	chitecture, bias ld Network. Case studies. sis", Prentice H nd programm Ltd., New De	ans ses ses fal ing

Department	BIOMEDICAL ENGINEE	ERING			a	R 2019	Semester VI	EEC
Course		Hou	rs / V	Veek	Credit	Total	Maximur	n
Code	Course Name	L	Т	Р	С	Hours	Marks	ex(17) /
19TPS06	QUANTITATIVE APTITUDE AND LOGICAL REASONING – IV	2	0	0	0	30	100	
Course Objec	tive (s): The purpose of learning this cours	se is to	)					
<ul> <li>Ascertai</li> </ul>	ns the occurrence of an event on the basis	s of alr	eady	prese	ent infor	mation,		
Use are	a models to represent the distributive prope	erty in	math	emat	ical reas	soning,		
<ul> <li>Calculat</li> </ul>	e the work capacity by chocolate based me	ethod,						
<ul> <li>Work wi</li> </ul>	th time, speed and distance by relative spe	eed co	ncep	ts,			1.1	1
<ul> <li>Determi</li> </ul>	ne how various phenomena are related.							
Course Outco	mes: At the end of this course, learners w	vill be a	able t	0:				
<ul> <li>Know th</li> </ul>	e outcome of an event developed the conc	cept of	prob	ability	/,			
<ul> <li>Calculat</li> </ul>	e the area and surface volume in real time	applic	cation	'				
Understa	and the concepts of Times and Work and	Pipes	s and	Ciste	ern and	Correlati	ng the Concep	ots
of both,					<b>-</b>		. (a	
<ul> <li>Know th</li> </ul>	e concepts of Time, Speed and Distance a	and co	ncep	IS OF I	Boats a	nd Stream	ns,	
Analyze	the cause and effect of problems by using	Critica	al thin	king,				
	COBABILITY & PERMUTATIONS & COM	BINA	TION	5		and from		6
PROBABILITY	": Rolling an unbiased dice - Tossing a	tair c	oin —	Drav	ving a o	card from	a pack of w	ell
snumed cards	- Picking up balls of certain color from a b	ag co	ntaini	ng ba	ins or a	nerent co		19
PERMUTATIO	NS: Numbers with digits – Words with	n lette	ers –	Arra	ingemei	nts of pe	erson in a ro	w –
Arrangements	of books on a shelf.							
	NS: Formation of committee – Selection of	t ques	tions	from	questio	n papers.		
	Ref & VOLUME		Jundr	ilator		at track to	chniquos	0
	boids - Cube - Cylinder - Cope - Frust	Jie – C		nalen	ai – ra: Sobere	- Homi	echniques. enhere – Pyra	mid
- theirformula		unioi	a cu	ne –	opnere	= Herris	sphere – r yra	mu
Unit III TI	S. ME & WORK PIPE & CISTERNS		TO DE	-	1000		The second second	6
	<b>DRK</b> : Introduction – Basic concepts – Lea	ving a	nd io	inina	- Alter	native da	vs – In betwee	en
daysthe works	starting and ending.	unig a	ina jo		,	ianie aa	,	
PIPES AND CI	STERNS: Introduction - Basic concepts -	Cana	citv o	f the	total lite	ers –Wate	er flow in the ta	ink.
	WE & DISTANCE, TRAINS, BOATS AND	STRE	AMS	1 410	total inte	no mate		6
TIME AND DI	STANCE: Definition – Average speed –	Dista	nce d	cover	ed is s	ame – D	istance cover	ed is
different – Sto	ppage time per hour for a train – Time ta	aken v	with t	wo di	fferent	modes o	of transport	Time
anddistance b	etween two moving bodies.							
PROBLEMS (	ON TRAINS: Basic concepts - Basic for	ormula	ae -	Diffe	rent typ	bes of ot	ojects –Two ti	rains
crossingeach	other in both directions — Shortcuts.							
BOATS AND S	TREAMS: Introduction - Speed of man (	boat a	nd st	ream	s) – Mo	ving sam	e and opposite	9
directions - Im	portant formulae.					C		
Unit V ST RE	ATEMENT - CONCLUSION , ARGUMEN ASON	ITS, C	AUSI	E & E	FFECT	, ASSER	TION AND	6
STATEMENT A	AND CONCLUSION: Statement to be true	e – Tw	o con	clusio	ons toge	ether - Lo	ogically follows	i.
STATEMENT	AND ARGUMENTS: Arguments strong v	with re	spect	t to th	ie state	ment.		
AUSE AND E	FFECT: Cause and effect relationship bet ND REASON: Assertion (A) and Reason(	ween R) – E	the tw Both ()	vo sta A) an	tement d (R) ar	s. e individu	ually true and (	R) -

(A) is true but (R) is false – (A) is false but (R) is true.

Chairman - BoS Dept.of BME - ESEC

REF	ERENCE(S):
17	Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-Hill Publishing Company Ltd, 2012
2.	Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.
3.	R.V.Praveen,"Quantitative Aptitude and Reasoning"Third Edition, PHI Learning, 2016.
4.	Dr.R S Aggarwal, Quantitative Aptitude, Revised and Enlarged Edition, S.Chand Publishing Company Ltd, 2017.
5.	Arun Sharma "How to Prepare for Quantitative Aptitude" Eight Edition, McGraw Hill Education, 2018.
6.	"Reasoning and Aptitude" for GATE and ESE Prelims, Made Easy Publication, 2020

CK9

Departm	ent	BIOMEDICAL ENGIN	IEERIN	G			R 2019	Semester VI	P
Cours	e		Hou	rs / V	Veek	Credit	Total	Maximun	n
Code		Course Name	L	т	Р	С	Hours	Marks	
19BM60	04 I	BIO SIGNAL AND IMAGE PROCESSING LABORATORY	0	0	2	1	30	100	÷
Course O Und Und Dev Enh Seg Course O Dev Ana Dev Extra Perf Jame of E 1. 2. 3. 4. 5.	bjective (s lerstand the lerstand the elop algorith ance the m ment the re utcomes: A elop algorith lyze the spe elop algorith act the regio orm the cor xperiments Analysis of electrodem LABVIEW Analysis of calculate F EEGbands Feature ext Preprocess	The purpose of learning this con analysis of bio signals, extraction of features in bio signa- ms for power spectral density and edical images by applying various gion of interest using various images the end of this course, learners ms for preprocessing of Bio signals of preprocessing of Bio signals for enhancement of medical images m for enhancement of medical images on of interest from medical images. ECG signals – Removal of artifact ovement, wandering etc. and stud MATLAB. EEG Signal – Extraction of rhyth ower spectral density in each r	urse is t als, d classif filters, ge proce will be a als, s, nages, s, s, cts like p dy of ab ms (delt hythms	o essing ble t ble t norm a, the using	r line alities eta, a g LAF	orithms. orithms. interfere s in ECG lpha, bet 3VIEW /	ls, nce, base pattern - ta and gat MATLAE	eline, using mma waves), 3 Analysis of	
6. 7. 8. 9. 10. IST OF EC	Image Enh Human Join Human Join Study of DI	ing of medical images. of medical images. ancement using Python nt angle measurements using star of angle measurements using elec COM standards. S FOR A BATCH OF 30 STUDEN	ndard G ctronic C IT <b>S</b>	onior Sonio	meter				
6. 7. 8. 9. 10. ST OF EC S.No	Image Enh Human Join Human Join Study of DI QUIPMENTS	ing of medical images. of medical images. ancement using Python at angle measurements using star at angle measurements using elec COM standards. S FOR A BATCH OF 30 STUDEN NAME OF THE EQ	ndard G ctronic C ITS UIPMEI	onior Gonio	meter			QUANTIT	1
6. 7. 8. 9. 10. IST OF EC S.No 1.	Image Enh Human Join Human Join Study of DI QUIPMENTS PCs with re RAM2GB (	ing of medical images. of medical images. ancement using Python at angle measurements using star at angle measurements using elec COM standards. <b>5 FOR A BATCH OF 30 STUDEN</b> <b>NAME OF THE EQ</b> lated accessories (Intel CORE 2 Minimum), Hard Disk — 1TB)	ndard G ctronic C ITS UIPMEI Duo(Mir	onior Sonio NT Iimur	meter meter meter	ntel 15, 1	7(latest),	QUANTIT' 1	1



	BIOMEDICAL EN	GINEERIN	G			R 2019	Semester VI	PC
Course		Hou	rs / W	Veek	Credit	Total	Maximun	1
Code	Course Name	L	т	Р	с	Hours	Marks	
19BM605	MINI PROJECT	I         I <thi< th=""> <thi< th=""> <thi< th=""> <thi< th=""></thi<></thi<></thi<></thi<>	30	100				
working mode	of a Biomedical / Electronics /	Mechatroni	cs/l	nstru	mentatio	n system,		

Course Outcomes: At the end of this course, learners will be able to:

- Formulate a real world problem, identify the requirement and develop the design solutions
- Express the technical ideas, strategies and methodologies
- Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project
- Test and validate through conformance of the developed prototype and analysis the cost effectiveness
- Prepare report and present the oral demonstrations

## Guidelines

- 1. Students should select a problem which addresses some basic home, office or other real life applications,
- 2. The circuit for the selected problem should have at least 20 to 25 components,
- 3. Students should understand testing of various components,
- 4. Students should develop a necessary circuit,
- 5. Students should see that final circuit submitted by them is in working condition,
- 6. 5 25 pages report to be submitted by students,
- 7. Group of maximum four students can be permitted to work on a single mini project,
- 8. The mini project must have hardware part. The software part is optional,
- 9. Department may arrange demonstration with poster presentation of all mini projects developed by the students at the end of semester,
- 10. It is desirable that the electronic circuit/systems developed by the students have some novel features,
- 11. Each student of the project batch shall involve in carrying out the project work jointly in constant consultation with internal guide, co-guide, and external guide and prepare the project report as per the norms avoiding plagiarism,
- 12. Marks for the mini-project shall be awarded based on the evaluation of Mini-Project Report, Presentation skill and Question and Answer session

Department	BIOMEDICAL ENGINE	EKING		1		R 2019	Semester V	
Course	Course Name	Hou	rs / V	Veek	Credit	Total	Maximu	ım
Code		L	Ţ	Р	С	Hours	Warks	5
19BM701	RADIOLOGICAL EQUIPMENTS	3	0	1	4	60	100	
Course Objec	tive(s): The purpose of learning this cour	rse is to		2				÷.,
<ul> <li>Understa</li> </ul>	and the generation of X-ray and its uses i	n imagii	ng,					
<ul> <li>Describe</li> </ul>	e the principle of Computed Tomography,							
<ul> <li>Know the</li> </ul>	e techniques used for visualizing various	sections	s of th	ne bo	dy,			
Learn the	e principles of different radio diagnostic e	quipme	nt in	Imagi	ing,			
Discuss	the radiation therapy techniques and radi	iation sa	afety.		_			
Course Outco	mes: At the end of this course, learners w	will be a	ble to	):				
Discuss	the principle and working of various radio	graphy	equip	omen	ts,			
<ul> <li>Explain t</li> </ul>	he tomography concept and image recon	nstructio	n tec	hniqu	ies,			
<ul> <li>Describe</li> </ul>	e the basic principle and working of Magne	etic reso	onano	ce im	aging te	chnique,		
<ul> <li>Explain t</li> </ul>	he concept of nuclear imaging techniques	s and ra	diatio	on de	tectors,			
<ul> <li>Demonst</li> </ul>	trate the effects of radiation, radiation safe	ety and	the p	princip	ble of Ra	adio thera	py technique	s.
Unit I ME	EDICAL X – RAY EQUIPMENT					1 - X -		12
Nature of X-ray	ys, X-Ray absorption - Tissue contrast.	X- Ray	Equi	ipmeı	nt (Block	k Diagran	n) – X-Ray T	ube,
Collimator, Bud	cky Grid, Power Supply. Digital Radiogra	phy – D	Discre	ete Di	gital De	tectors, S	Storage Phos	phor
and Film Scanr	ning. Fluoroscopy – X-ray Image Intensif	ier tube	s – C	Digital	Fluoros	scopy. An	giography -	Cine
Angiography, D	igital Subtraction Angiography. Mammog	raphy.						
		1						
Unit II CC	MPUTED TOMOGRAPHY	,,·-,						12
Unit II CO Principles of to	OMPUTED TOMOGRAPHY omography, CT Generations – X- Ray	source	es, c	ollima	ation, X	- Ray De	etectors, Vie	12 wing
Unit II CC Principles of to systems, Spira	OMPUTED TOMOGRAPHY omography, CT Generations – X- Ray I CT Scanning, Ultra Fast CT Scanners.	source Image	es, c Rece	ollima onstri	ation, X uction T	- Ray De	etectors, Vie s back projec	12 wing ction
Unit II CC Principles of to systems, Spiral and iterative me	OMPUTED TOMOGRAPHY omography, CT Generations – X- Ray I CT Scanning, Ultra Fast CT Scanners. ethod.	source Image	es, c Rec	ollima onstri	ation, X uction T	- Ray De	etectors, Vie s back proje	12 wing ction
Unit IICCPrinciples of tosystems, Spiraland iterative meUnit IIIMA	OMPUTED TOMOGRAPHY omography, CT Generations – X- Ray I CT Scanning, Ultra Fast CT Scanners. ethod.	source Image	es, c Rec	ollima onstri	ation, X uction T	- Ray De echnique	etectors, Vie s back proje	12 wing ction
Unit II CC Principles of to systems, Spiral and iterative mo Unit III MA Fundamentals	OMPUTED TOMOGRAPHY omography, CT Generations – X- Ray I CT Scanning, Ultra Fast CT Scanners. ethod. AGNETICRESONANCE IMAGING of Magnetic Resonance – Interaction of N	source Image	es, co Reco vith st	ollima onstru tatic r	ation, X uction T magnetic	- Ray Do echnique	etectors, Vie s back projec d Radiofreque	12 wing ction 12 ency
Unit IICCPrinciples of tosystems, Spiraland iterative meUnit IIIMAFundamentalsvave, rotation	MPUTED TOMOGRAPHY omography, CT Generations – X- Ray I CT Scanning, Ultra Fast CT Scanners. ethod. AGNETICRESONANCE IMAGING of Magnetic Resonance – Interaction of N and precession. Induction of magnetic re	source Image Nuclei w esonan	es, co Reco rith st	ollima onstru tatic r gnals	ation, X uction T magnetic – bulk	- Ray De echnique c field and Magnetiz	etectors, Vie s back project d Radiofreque ation, Relaxa	12 wing ction 12 ency ation
Unit IICCPrinciples of to systems, Spiral and iterative meUnit IIIMAUnit IIIMAFundamentals of wave, rotation processes T1 a	OMPUTED TOMOGRAPHY omography, CT Generations – X- Ray I CT Scanning, Ultra Fast CT Scanners. ethod. AGNETICRESONANCE IMAGING of Magnetic Resonance – Interaction of N and precession. Induction of magnetic re and precession. Induction of magnetic re	source Image Nuclei w esonane	es, co Reco vith st ce sig	ollima onstru tatic r gnals em N	ation, X uction T magnetic – bulk lagnet (l	- Ray De echnique c field and Magnetiz Permane	etectors, Vie s back project d Radiofreque ation, Relaxant, Electroma	12 wing ction 12 ency ation gnet
Unit IICCPrinciples of tosystems, Spiraland iterative modifiedUnit IIIMAFundamentals ofwave, rotationprocesses T1 aand Super con	MPUTED TOMOGRAPHY omography, CT Generations – X- Ray I CT Scanning, Ultra Fast CT Scanners. ethod. GRETICRESONANCE IMAGING of Magnetic Resonance – Interaction of N and precession. Induction of magnetic re and T2. Block Diagram approach of MRI S ductors), Gradient Magnetic Fields, Rac	v source Image Nuclei w esonand System dio Fred	es, co Reco vith st ce sig Syst	ollima onstru tatic r gnals em N cy Cc	ation, X uction T magnetic – bulk lagnet (l	- Ray De echnique c field and Magnetiz Permanel ding and	etectors, Vie s back project d Radiofreque ation, Relaxa nt, Electroma receiving), S	12 wing ction 12 ency ation gnet Shim
Unit IICCPrinciples of tosystems, Spiraland iterative meUnit IIIMAundamentalsvave, rotationprocesses T1 aand Super conCoils and Elect	MPUTED TOMOGRAPHY omography, CT Generations – X- Ray I CT Scanning, Ultra Fast CT Scanners. ethod. AGNETICRESONANCE IMAGING of Magnetic Resonance – Interaction of N and precession. Induction of magnetic re and T2. Block Diagram approach of MRI S ductors), Gradient Magnetic Fields, Rac ronic Components. fMRI.	v source Image Nuclei w esonand System dio Frec	vith st ce sig Syst	ollima onstru tatic r gnals em N cy Cc	ation, X uction T magnetic – bulk lagnet (l iils (sen	- Ray De echnique c field and Magnetiz Permanel ding and	etectors, Vie s back project d Radiofreque ation, Relaxa nt, Electroma receiving), S	12 wing ction 12 ency ation gnet Shim
Unit IICCPrinciples of tosystems, Spiraland iterative meUnit IIIMAundamentalsvave, rotationprocesses T1 aand Super concoils and ElectUnit IVNU	MPUTED TOMOGRAPHY omography, CT Generations – X- Ray I CT Scanning, Ultra Fast CT Scanners. ethod. GRETICRESONANCE IMAGING of Magnetic Resonance – Interaction of N and precession. Induction of magnetic re and T2. Block Diagram approach of MRI S ductors), Gradient Magnetic Fields, Rad ronic Components. fMRI.	v source Image Nuclei w esonand System dio Frec	es, co Reco vith st ce sig Syst guenc	ollima onstru tatic r gnals em M cy Cc	ation, X uction T magnetic – bulk lagnet (l bils (sen	- Ray De echnique c field and Magnetiz Permanen ding and	etectors, Vie s back project d Radiofreque ation, Relaxant, Electroma receiving), S	12 wing ction 12 ency ation gnet Shim
Unit IICCPrinciples of toSystems, Spiraland iterative meUnit IIIMAFundamentals ofvave, rotationprocesses T1 aand Super conCoils and ElectionUnit IVNURadio Isotopes	OMPUTED TOMOGRAPHY         omography, CT Generations – X- Ray         I CT Scanning, Ultra Fast CT Scanners.         ethod.         AGNETICRESONANCE IMAGING         of Magnetic Resonance – Interaction of N         and precession. Induction of magnetic re         ind T2. Block Diagram approach of MRI S         ductors), Gradient Magnetic Fields, Rad         ronic Components. fMRI.         CLEAR IMAGING SYSTEM         a – alpha, beta, and gamma radiations.	source Image Nuclei w esonand System dio Frec Radiop	es, co Reco vith st ce sig Syst juenc	ollima onstru- tatic r gnals em M cy Cc	ation, X uction T magnetic – bulk lagnet (l bils (sen	- Ray De echnique c field and Magnetiz Permanei ding and Radiation	etectors, Vie s back project d Radiofreque ation, Relaxa nt, Electroma receiving), S detectors –	12 wing ction 12 ency ation gnet Shim 12 gas
Unit IICCPrinciples of tesystems, Spiraland iterative meUnit IIIMAFundamentals ofvave, rotationprocesses T1 aand Super conCoils and ElectedUnit IVNURadio Isotopesilled, ionization	OMPUTED TOMOGRAPHY         omography, CT Generations – X- Ray         I CT Scanning, Ultra Fast CT Scanners.         ethod.         AGNETICRESONANCE IMAGING         of Magnetic Resonance – Interaction of N         and precession. Induction of magnetic re         and precession. Induction of magnetic re         and precession. Induction of MRI S         ductors), Gradient Magnetic Fields, Rac         ronic Components. fMRI.         CLEAR IMAGING SYSTEM         a – alpha, beta, and gamma radiations.         a chambers, proportional counter, GM co	source Image Nuclei w esonand System dio Frec Radiop unter al	es, co Reco vith st ce sig Syst juenc oharm nd sc	ollima onstru- tatic r gnals em M cy Cc naceu	ation, X uction T magnetic – bulk lagnet (l bils (sen uticals. I ttion Def	- Ray De echnique c field and Magnetiz Permanen ding and Radiation tectors. G	etectors, Vie s back project d Radiofreque ation, Relaxa nt, Electroma receiving), S detectors – Gamma came	12 wing ction 12 ency ation gnet Shim 12 gas era –
Unit IICCPrinciples of toSystems, Spiraland iterative meUnit IIIMAFundamentals ofvave, rotationprocesses T1 aand Super conCoils and ElectedUnit IVNURadio IsotopesPrinciple of op	MPUTED TOMOGRAPHY omography, CT Generations – X- Ray I CT Scanning, Ultra Fast CT Scanners. ethod. GRETICRESONANCE IMAGING of Magnetic Resonance – Interaction of N and precession. Induction of magnetic re- and T2. Block Diagram approach of MRI S ductors), Gradient Magnetic Fields, Rac ronic Components. fMRI. CLEAR IMAGING SYSTEM – alpha, beta, and gamma radiations. a chambers, proportional counter, GM co- eration, collimator, photo multiplier tube	v source Image Nuclei w esonand System dio Frec Radiop unter an e, X-Y	es, co Reco vith st ce sig Syst juenc oharm nd sc posit	ollima onstru- tatic r gnals em N cy Cc naceu	ation, X uction T magnetic – bulk lagnet (l bils (sen uticals. I uticals. I uticals. I g circui	- Ray De echnique c field and Magnetiz Permane ding and Radiation tectors. G t, Pulse	etectors, Vie s back project d Radiofreque ation, Relaxa nt, Electroma receiving), S detectors – Gamma came Height Analy	12 wing ction 12 ency ation gnet Shim 12 gas era – yzer.
Unit IICCPrinciples of toSystems, Spiraland iterative meUnit IIIMAUnit IIIMAUnit IIIMAUnit IIIMAOrocesses T1 aand Super conCoils and ElectionUnit IVNURadio Isotopesilled, ionizationPrinciple of opPrinciples of SF	OMPUTED TOMOGRAPHY         omography, CT Generations – X- Ray         I CT Scanning, Ultra Fast CT Scanners.         ethod.         AGNETICRESONANCE IMAGING         of Magnetic Resonance – Interaction of N         and precession. Induction of magnetic re         and precession. Induction of magnetic re         and precession. Induction of MRI S         ductors), Gradient Magnetic Fields, Rac         ronic Components. fMRI.         CLEAR IMAGING SYSTEM         - alpha, beta, and gamma radiations.         chambers, proportional counter, GM co         eration, collimator, photo multiplier tube         PECT and PET.	v source Image Nuclei w esonand System dio Frec Radiop unter an e, X-Y	es, co Reco vith st ce sig Syst juenc oharm nd sc posit	ollima onstru- tatic r gnals em M cy Cc naceu	ation, X uction T magnetic – bulk lagnet (l bils (sen uticals. I uticals. I g circui	- Ray De echnique c field and Magnetiz Permanen ding and Radiation tectors. G t, Pulse	etectors, Vie s back project d Radiofreque ation, Relaxa nt, Electroma receiving), S detectors – Gamma came Height Analy	12 wing ction 12 ency ation gnet Shim 12 gas era – yzer.
Unit IICCPrinciples of tosystems, Spiraland iterative meUnit IIIMAFundamentalsvave, rotationprocesses T1 aand Super conCoils and ElectricUnit IVNURadio Isotopesilled, ionizationPrinciples of SPUnit VRA	OMPUTED TOMOGRAPHY         omography, CT Generations – X- Ray         I CT Scanning, Ultra Fast CT Scanners.         ethod.         AGNETICRESONANCE IMAGING         of Magnetic Resonance – Interaction of N         and precession. Induction of magnetic re         and precession. Induction of magnetic re         and precession. Induction of MRI S         ductors), Gradient Magnetic Fields, Rac         ronic Components. fMRI.         CLEAR IMAGING SYSTEM         a – alpha, beta, and gamma radiations.         a chambers, proportional counter, GM co         peration, collimator, photo multiplier tube         PECT and PET.         DIATION THERAPY AND RADIATION \$	source Image Nuclei w esonand System dio Fred Radiop unter an e, X-Y	es, co Reco vith st ce sig Syst juenc oharm nd sc posit	ollima onstru- tatic r gnals em M cy Cc naceu tionin	ation, X uction T magnetic – bulk lagnet (l bils (sen iticals. I iticals. I tion Det g circui	- Ray De echnique c field and Magnetiz Permanen ding and Radiation tectors. G t, Pulse	etectors, Vie s back project d Radiofreque ation, Relaxa nt, Electroma receiving), S detectors – Gamma came Height Analy	12 wing ction 12 ency ation gnet Shim 12 gas era - yzer.
Unit IICCPrinciples of toSystems, Spiraland iterative meUnit IIIMAUnit IIIMAUnit IIIMAUnit IIIMAUnit IIIMAUnit IIIMAUnit IIIMAUnit IIIMAUnit IVNUCoils and ElectedUnit IVNURadio IsotopesVinciple of opPrinciples of SFUnit VRARadiation thera	OMPUTED TOMOGRAPHY         omography, CT Generations – X- Ray         I CT Scanning, Ultra Fast CT Scanners.         ethod.         AGNETICRESONANCE IMAGING         of Magnetic Resonance – Interaction of N         and precession. Induction of magnetic re         and precession. Induction of magnetic re         and precession. Induction of MRI S         ductors), Gradient Magnetic Fields, Rad         ronic Components. fMRI.         CLEAR IMAGING SYSTEM         a – alpha, beta, and gamma radiations.         a chambers, proportional counter, GM co         eration, collimator, photo multiplier tube         PECT and PET.         DIATION THERAPY AND RADIATION S         app – linear accelerator, Telegamma Magnetic relevance	source Image Nuclei w esonand System dio Fred Radiop unter an e, X-Y	es, co Reco vith st ce sig Syst juenc oharm nd sc posit	ollima onstru- tatic r gnals em N cy Co naceu tionin	ation, X uction T magnetic – bulk lagnet (l bils (sen uticals. I uticals. I tion De g circui	- Ray De echnique c field and Magnetiz Permane ding and Radiation tectors. G t, Pulse	etectors, Vie s back project d Radiofreque ation, Relaxa nt, Electroma receiving), S detectors – Gamma came Height Analy ques in radia	12 wing ction 12 ency ation gnet Shim 12 gas era – yzer. 12 ation
Unit IICCPrinciples of tesystems, Spiraland iterative meUnit IIIMAFundamentalsorocesses T1 aorocesses T1 aor	DMPUTED TOMOGRAPHY         omography, CT Generations – X- Ray         I CT Scanning, Ultra Fast CT Scanners.         ethod.         AGNETICRESONANCE IMAGING         of Magnetic Resonance – Interaction of N         and precession. Induction of magnetic re         and precession. Induction of magnetic re         and precession. Induction of MRI S         ductors), Gradient Magnetic Fields, Rac         ronic Components. fMRI.         CLEAR IMAGING SYSTEM         a – alpha, beta, and gamma radiations.         a chambers, proportional counter, GM co         eration, collimator, photo multiplier tube         PECT and PET.         DIATION THERAPY AND RADIATION S         py – linear accelerator, Telegamma Mar         RT – IMRT – IGRT and Cyber knife – I	v source Image Nuclei w esonand System dio Frec Radiop unter an e, X-Y SAFETY chine. S Radiatic	es, c Reco vith st ce sig Syst juenc oharm nd sc posit	ollima onstru- tatic r gnals em M cy Cc naceu tionin	ation, X uction T magnetic – bulk lagnet (l bils (sen iticals. I tion De g circui	- Ray De echnique c field and Magnetiz Permanen ding and Radiation tectors. G t, Pulse nt Techni ruments -	etectors, Vie s back project d Radiofreque ation, Relaxa nt, Electroma receiving), S detectors – Gamma came Height Analy ques in radia – Dosimeter,	12 wing ction 12 ency ation gnet Shim 12 gas era – yzer. 12 ation film
Unit IICCPrinciples of tesystems, Spiraland iterative meUnit IIIMAFundamentals ofvave, rotationprocesses T1 aand Super conCoils and ElectricUnit IVNURadio IsotopesPrinciples of SPUnit VRARadiation theraherapy – 3DCIaddges, Therm	OMPUTED TOMOGRAPHY         omography, CT Generations – X- Ray         I CT Scanning, Ultra Fast CT Scanners.         ethod.         AGNETICRESONANCE IMAGING         of Magnetic Resonance – Interaction of N         and precession. Induction of magnetic re         and precession. Induction of magnetic re         and precession. Induction of MRI S         ductors), Gradient Magnetic Fields, Rac         ronic Components. fMRI.         CLEAR IMAGING SYSTEM         a – alpha, beta, and gamma radiations.         chambers, proportional counter, GM co         pectr and PET.         DIATION THERAPY AND RADIATION S         py – linear accelerator, Telegamma Magnetic Fields         RT – IMRT – IGRT and Cyber knife – Fields         to Luminescent Dosimeters – Electronic	source Image Nuclei w esonand System dio Fred Radiop unter al e, X-Y SAFETY chine. S Radiatic c Dosin	es, c Reco vith st ce sig Syst juenc oharm nd sc posif	ollima onstru- tatic r gnals em M cy Cc naceu tionin -SRT easur - R	ation, X uction T magnetic – bulk lagnet (l bils (sen uticals. I tion Det g circui	- Ray De echnique c field and Magnetiz Permaner ding and Radiation tectors. G t, Pulse nt Techni ruments - protectic	etectors, Vie s back project d Radiofreque cation, Relaxa nt, Electroma receiving), S detectors – Gamma came Height Analy ques in radia – Dosimeter, on in medicir	12 wing ction 12 ency ation gnet Shim 12 gas era - yzer. 12 ation film ne -
Unit IICCPrinciples of tosystems, Spiraland iterative meUnit IIIMAFundamentals ofvave, rotationorocesses T1 aorocesses T1 a <td< td=""><td>OMPUTED TOMOGRAPHY         omography, CT Generations – X- Ray         I CT Scanning, Ultra Fast CT Scanners.         ethod.         AGNETICRESONANCE IMAGING         of Magnetic Resonance – Interaction of N         and precession. Induction of magnetic re         and precession. Induction of magnetic re         and precession. Induction of MRI S         ductors), Gradient Magnetic Fields, Rad         ronic Components. fMRI.         CLEAR IMAGING SYSTEM         a – alpha, beta, and gamma radiations.         a chambers, proportional counter, GM co         pectra and PET.         DIATION THERAPY AND RADIATION S         py – linear accelerator, Telegamma Mar         RT – IMRT – IGRT and Cyber knife – F         to Luminescent Dosimeters – Electronic         ction Principles.</td><td>source Image Nuclei w esonand System dio Fred Radiop unter an e, X-Y SAFETY chine. S Radiatic c Dosin</td><td>es, co Reco vith st ce sig Syst juenc oharm nd sc posit</td><td>ollima onstru- tatic r gnals em N cy Co naceu tionin -SR1 easur - Ra</td><td>ation, X uction T magnetic – bulk lagnet (l bils (sen uticals. I tion Dei g circui</td><td>- Ray De echnique c field and Magnetiz Permane ding and Radiation tectors. G t, Pulse nt Techni ruments - protectic</td><td>etectors, Vie s back project d Radiofreque ation, Relaxa nt, Electroma receiving), S detectors – Gamma came Height Analy ques in radia – Dosimeter, on in medicir</td><td>12 wing ction 12 ency ation gnet Shim 12 gas era – yzer. 12 ation film ne –</td></td<>	OMPUTED TOMOGRAPHY         omography, CT Generations – X- Ray         I CT Scanning, Ultra Fast CT Scanners.         ethod.         AGNETICRESONANCE IMAGING         of Magnetic Resonance – Interaction of N         and precession. Induction of magnetic re         and precession. Induction of magnetic re         and precession. Induction of MRI S         ductors), Gradient Magnetic Fields, Rad         ronic Components. fMRI.         CLEAR IMAGING SYSTEM         a – alpha, beta, and gamma radiations.         a chambers, proportional counter, GM co         pectra and PET.         DIATION THERAPY AND RADIATION S         py – linear accelerator, Telegamma Mar         RT – IMRT – IGRT and Cyber knife – F         to Luminescent Dosimeters – Electronic         ction Principles.	source Image Nuclei w esonand System dio Fred Radiop unter an e, X-Y SAFETY chine. S Radiatic c Dosin	es, co Reco vith st ce sig Syst juenc oharm nd sc posit	ollima onstru- tatic r gnals em N cy Co naceu tionin -SR1 easur - Ra	ation, X uction T magnetic – bulk lagnet (l bils (sen uticals. I tion Dei g circui	- Ray De echnique c field and Magnetiz Permane ding and Radiation tectors. G t, Pulse nt Techni ruments - protectic	etectors, Vie s back project d Radiofreque ation, Relaxa nt, Electroma receiving), S detectors – Gamma came Height Analy ques in radia – Dosimeter, on in medicir	12 wing ction 12 ency ation gnet Shim 12 gas era – yzer. 12 ation film ne –
Unit IICCPrinciples of tesystems, Spiraland iterative meUnit IIIMAFundamentals ofwave, rotationprocesses T1 aand Super conCoils and ElecteUnit IVNURadio Isotopesilled, ionizationPrinciple of opPrinciples of SFUnit VRARadiation theraherapy – 3DCIbadges, ThermRadiation ProteEXT BOOK(S)	DMPUTED TOMOGRAPHY         omography, CT Generations – X- Ray         I CT Scanning, Ultra Fast CT Scanners.         ethod.         AGNETICRESONANCE IMAGING         of Magnetic Resonance – Interaction of N         and precession. Induction of magnetic re         and precession. Induction of magnetic re         and precession. Induction of Magnetic Fields, Rad         of Magnetic Resonance – Interaction of N         and precession. Induction of magnetic re         and precession. Induction of magnetic re         and precession. Induction of MRI S         ductors), Gradient Magnetic Fields, Rad         ronic Components. fMRI.         CLEAR IMAGING SYSTEM         a – alpha, beta, and gamma radiations.         a chambers, proportional counter, GM co         prectand PET.         DIATION THERAPY AND RADIATION S         py – linear accelerator, Telegamma Mar         RT – IMRT – IGRT and Cyber knife – F         to Luminescent Dosimeters – Electronic         ction Principles.         ):	v source Image Nuclei w esonand System dio Frec Radiop unter an e, X-Y SAFETY chine. S Radiatic c Dosin	es, c Rec vith st ce sig Syst juenc oharm nd sc posit	ollima onstru- gnals em M cy Cc naceu tionin -SR1 easur - Ra	ation, X uction T magnetic – bulk lagnet (l bils (sen iticals. I tion De g circui	- Ray De echnique c field and Magnetiz Permanen ding and Radiation tectors. G t, Pulse nt Techni ruments - protectic	etectors, Vie s back project d Radiofreque ation, Relaxa nt, Electroma receiving), S detectors – Gamma came Height Analy ques in radia – Dosimeter, on in medicir	12 wing ction 12 ency ation gnet Shim 12 gas era - yzer. 12 ation film ne -
Unit II       CC         Principles of test       Spiral         and iterative me       Image: Construction of the systems, Spiral         and iterative me       Image: Construction of the system of the syst	DMPUTED TOMOGRAPHY         omography, CT Generations – X- Ray         I CT Scanning, Ultra Fast CT Scanners.         ethod.         AGNETICRESONANCE IMAGING         of Magnetic Resonance – Interaction of N         and precession. Induction of magnetic re         and precession. Induction of magnetic re         and precession. Induction of Magnetic Fields, Rad         of Magnetic Resonance – Interaction of N         and precession. Induction of magnetic re         and precession. Induction of magnetic re         and precession. Induction of Magnetic Fields, Rad         ornic Components. fMRI.         CLEAR IMAGING SYSTEM         a – alpha, beta, and gamma radiations.         a chambers, proportional counter, GM co         pectr and PET.         DIATION THERAPY AND RADIATION S         app – linear accelerator, Telegamma Magnetic Fields.         app – linear accelerator, Telegamma Magnetic relation         app – linear accelerator, Telegamma Magnetic Fields.         b):         Bushberg – I Anthony Seibert Edwin	source Image Nuclei w esonand System dio Fred Radiop unter ar e, X-Y SAFETY chine. S Radiatic c Dosin	es, c Reco vith st ce sig Syst juenc oharm nd sc posit	ollima onstru- tatic r gnals em M cy Cc naceu tionin -SRT easur - Ra	ation, X uction T magnetic – bulk lagnet (l bils (sen iticals. I iticals. I tion De g circui	- Ray De echnique c field and Magnetiz Permaner ding and Radiation tectors. G t, Pulse nt Techni ruments - protectic	etectors, Vie s back project d Radiofreque cation, Relaxa nt, Electroma receiving), S detectors – Gamma came Height Analy ques in radia – Dosimeter, on in medicir	12 wing ction 12 ency ation gnet Shim 12 gas era - yzer. 12 ation film ne -
Unit II       CC         Principles of test       Spiral         and iterative me       Imit III       MA         Fundamentals of       Spiral       Spiral         Unit III       MA       MA         Fundamentals of       Spiral       Spiral         Outit III       MA       MA         Fundamentals of       Spiral       Spiral         Orocesses T1 a       Spiral       Spiral         Operation Spiral       Spiral       Spiral         Operadiction Prote	DMPUTED TOMOGRAPHY         omography, CT Generations – X- Ray         I CT Scanning, Ultra Fast CT Scanners.         ethod.         AGNETICRESONANCE IMAGING         of Magnetic Resonance – Interaction of N         and precession. Induction of magnetic re         and precession. Induction of magnetic re         and precession. Induction of magnetic re         and precession. Induction of MRI S         ductors), Gradient Magnetic Fields, Rad         ronic Components. fMRI.         CLEAR IMAGING SYSTEM         a – alpha, beta, and gamma radiations.         a chambers, proportional counter, GM co         pectra and PET.         DIATION THERAPY AND RADIATION S         py – linear accelerator, Telegamma Mar         RT – IMRT – IGRT and Cyber knife – I         to Luminescent Dosimeters – Electronic         ction Principles.         ):         T.Bushberg, J.Anthony Seibert, Edwin         f Medical Imaging" Linpincett Williams ar	source Image Nuclei w esonand System dio Fred Radiop unter an e, X-Y SAFETY chine. S Radiatic c Dosin	es, co Reco vith st ce sig Syst juenc oharm nd sc posit	ollima onstru- tatic r gnals em N cy Cc naceu tionin -SR1 easur - Ra	ation, X uction T magnetic – bulk lagnet (l bils (sen uticals. I tion De g circui G circui	- Ray De echnique c field and Magnetiz Permanei ding and Radiation tectors. G t, Pulse nt Techni ruments - protectic I.Boone, 12	etectors, Vie s back project d Radiofreque cation, Relaxa nt, Electroma receiving), S detectors – Gamma came Height Analy ques in radia – Dosimeter, on in medicir	12 wing ction 12 ency ation gnet Shim 12 gas era – yzer. 12 ation film ne – tial
Unit II       CC         Principles of test       Spiral         and iterative me       Imit III       MA         Fundamentals of wave, rotation       MA         Fundamentals of wave, rotation       Imit III       MA         Fundamentals of wave, rotation       Imit IV       NU         Coils and Electric       Unit IV       NU         Radio Isotopes       Imit IV       NU         Radio Isotopes of SP       Unit V       RA         Radiation thera       herapy – 3DCI       Imit V         Wadges, Therm       Radiation Prote       Imit SOCK(S)         1. Jerrold T       Physicson       Physicson         2       R Hendeed       Imit SOCK(S)	DMPUTED TOMOGRAPHY         omography, CT Generations – X- Ray         I CT Scanning, Ultra Fast CT Scanners.         ethod.         AGNETICRESONANCE IMAGING         of Magnetic Resonance – Interaction of N         and precession. Induction of magnetic resonance – Interaction of MRI S         ductors), Gradient Magnetic Fields, Rad         ronic Components. fMRI.         CLEAR IMAGING SYSTEM         a – alpha, beta, and gamma radiations.         a chambers, proportional counter, GM co         PECT and PET.         DIATION THERAPY AND RADIATION S         py – linear accelerator, Telegamma Mar         RT – IMRT – IGRT and Cyber knife – I         no Luminescent Dosimeters – Electronic         ction Principles.         ):         T.Bushberg, J.Anthony Seibert, Edwin         f Medical Imaging", Lippincott Williams ar	v source Image Nuclei w esonand System dio Frec Radiop unter ar e, X-Y SAFETY chine. S Radiatic c Dosin M.Leid nd Wilkin	es, c Reco vith st ce sig Syst juenc oharm nd sc posit C SRS on me neter	ollima onstru- tatic r gnals em M cy Cc naceu tintilla tionin -SRT easur - Ra t,Jr, - rd Ed	ation, X uction T magnetic – bulk lagnet (l bils (sen iticals. I tion De g circui G circui	- Ray De echnique c field and Magnetiz Permanei ding and Radiation tectors. G t, Pulse nt Techni ruments - protectio	etectors, Vie s back project d Radiofreque ation, Relaxa nt, Electroma receiving), S detectors – Gamma came Height Analy ques in radia – Dosimeter, on in medicir	12 wing ction 12 ency ation gnet Shim 12 gas era - yzer. 12 ation film ne -
Unit II       CC         Principles of test       Spiral         and iterative me       Imit III       MA         Unit III       MA         Fundamentals of       Vave, rotation         Principles of T1 a       Imit IV       MU         and Super con       Principles of SP       Imit IV       NU         Radio Isotopes       Imit IV       NU       Radio Isotopes         Principles of SP       Unit V       RA         Radiation thera       Principles of SP       Imit V       RA         Radiation thera       Protes       Steve We	<ul> <li>DMPUTED TOMOGRAPHY</li> <li>omography, CT Generations – X- Ray</li> <li>I CT Scanning, Ultra Fast CT Scanners.</li> <li>ethod.</li> <li>AGNETICRESONANCE IMAGING</li> <li>of Magnetic Resonance – Interaction of N</li> <li>and precession. Induction of magnetic resonance procession.</li> <li>Inductors), Gradient Magnetic Fields, Rac</li> <li>ronic Components. fMRI.</li> <li>CLEAR IMAGING SYSTEM</li> <li>and percession, collimator, photo multiplier tube</li> <li>PECT and PET.</li> <li>DIATION THERAPY AND RADIATION S</li> <li>py – linear accelerator, Telegamma Magnetic Telestoric conditions.</li> <li>ronic Components. Dosimeters – Electronic ction Principles.</li> <li>):</li> <li>T.Bushberg, J.Anthony Seibert, Edwin f Medical Imaging", Applications of Medical Imaging</li> </ul>	source Image Nuclei w esonand System dio Fred Radiop unter ar e, X-Y SAFETY chine. S Radiatic c Dosin M.Leid nd Wilkin Physic	es, c Reco vith st ce sig Syst juenc oharm nd sc posif SRS on me neter	ollima onstru- tatic r gnals em M cy Cc naceu intilla tionin -SRT - Ra ti,Jr, - rd Ed illiam	ation, X uction T magnetic – bulk lagnet (l bils (sen iticals. I titicals. I titicals. I f, Recei ing instr adiation John M ition, 20 ,Wiley-	- Ray De echnique c field and Magnetiz Permaner ding and Radiation tectors. G t, Pulse nt Techni ruments - protectic I.Boone, 12. Liss, 4 th 988	etectors, Vie s back project d Radiofreque cation, Relaxa nt, Electroma receiving), S detectors – Camma came Height Analy ques in radia – Dosimeter, on in medicir 'The Essent Edition, 2002	12 wing ction 12 ency ation gnet Shim 12 gas era - yzer. 12 ation film ne - tial

REI	FERENCE(S):
1.	P.Ragunathan, "Magnetic Resonance Imaging and Spectroscopy in Medicine concepts and
	Techniques", Orient Longman, 2007.
2.	Gopal B. Saha, "Physics and Radiobiology of Nuclear Medicine", Springer, 3 rd Edition 2006.
3.	Myer Kutz, "Standard handbook of Biomedical Engineering and design", McGraw Hill, 2003.
4.	B.H.Brown, PV Lawford, RH Smallwood, DR Hose, DC Barber, "Medical physics and Biomedical
	Engineering", - CRC Press, 1999.

. 1

CK.8

Department	BIOMEDICAL ENG	INEERIN	IG			R 2019	Semester VII PO
Course	Course Name	Ηοι	ırs / V	Veek	Credit	Total	Maximum
Code		L	Т	Ρ	С	Hours	Warks
19BM702	HUMAN ASSIST DEVICES	3	0	0	3	45	100
Course Objecti Understal Study the Learn the Study the Study the Study the Study the Understal Understal Ability to s Categoriz Unit I HEA Condition to be Continuous Ty Mechanism, Blo assessing its Fu Unit II CAR Synchronous C Ventricular Bypa	ve (s): The purpose of learning this of nd the various building blocks of Hea working principle of various cardiac role and working of artificial kidney, type of assistive devices for rehabili different types of respiratory assist of nes: At the end of this course, learned the various building blocks of Heart land the principle and working of various nd the role and working of artificial ki specify the type of assistive devices the different types of respiratory as <b>RT LUNG MACHINE AND ARTIFIC</b> a satisfied by the H/L System. D pes, Monitoring Process, Shuntin and Handling System, Functioning an inctions. <b>DIAC ASSIST DEVICES</b> counter pulsation, Assisted throug ass Pump, Open Chest and closed	course is art lung M assist de tation, devices a rs will be ung Mac us cardia dney, for rehab ssist devi ifferent f ng, The nd differe h Respi Chest ty	to Machine evices and he e able hine a c ass ilitation ces a <b>ART</b> types Indie ent type ration pe, Ir	earing to: and its ist de on, ind he of C cation pes of Rigi	d its work aids. s working vices, earing aid bxygenate for Ca f Artificia nt Ventri ortic Ball	principle, principle, s. ors, Pump ardiac Tra I Heart, Me icular Byp oon Pump	ole, 9 os, Pulsatile and ansplant, Driving ock test setup for 9 oass Pump, Left ping Veno Arterial
Pumping, Prost characteristics a	hetic Cardio Valves, Principle and and testing	probler	n, Bi	omate	erials for	implantal	ble purposes, its
Unit III ART	IFICIAL KIDNEY						
Indication and							9
Unit IV PRO	Principle of Haemodialysis, Mem	prane, D	lialys	ate, [	Jifferent	types of	9 heamodialysers,
onen i Ko	Principle of Haemodialysis, Memi ems, Wearable Artificial Kidney, Impl	orane, D anting Ty S	)ialys: /pe.	ate, [	Jifferent	types of	heamodialysers,
Arm Replaceme limb orthotic dev orthotic devices,	Principle of Haemodialysis, Members, Wearable Artificial Kidney, Imples, Wearable Artificial Kidney, Implest STHETIC AND ORTHOTIC DEVICE nt - Different Types of Models Extenvices, Functional Electrical Stimulation Haptic Devices.	orane, E anting Ty E <b>S</b> nally Pow on, Senso	)ialys /pe. werec ory As	ate, [   Limb ssist [	) Prosthe Devices,	types of sis, Lower Materials f	9 heamodialysers, 9 r Limb and Upper for Prosthetic and
Arm Replaceme limb orthotic dev orthotic devices, Unit V RES	Principle of Haemodialysis, Members, Wearable Artificial Kidney, Imples, Wearable Artificial Kidney, Implest STHETIC AND ORTHOTIC DEVICE nt - Different Types of Models Exter rices, Functional Electrical Stimulatio Haptic Devices. PIRATORY AND HEARING AIDS	orane, E anting Ty S nally Poo on, Senso	)ialys: /pe. werec ory As	ate, [ I Limb ssist [	) Prosthe Devices,	types of esis, Lower Materials f	9 heamodialysers, 9 r Limb and Upper for Prosthetic and 9
Arm Replaceme limb orthotic devices, <b>Unit V RES</b> Ventilator and its IPPB unit with m Functional Chara	Principle of Haemodialysis, Members, Wearable Artificial Kidney, Imples, Wearable Artificial Kidney, Imples, Wearable Artificial Kidney, Imples, STHETIC AND ORTHOTIC DEVICE Int - Different Types of Models Externices, Functional Electrical Stimulation Haptic Devices. PIRATORY AND HEARING AIDS Is types-Intermittent positive pressure conitoring for all respiratory parameter acteristics	orane, E anting Ty S nally Poo n, Senso e, Breath ers. Type	ialys ype. werec ory As ing A s of I	ate, [ I Limb ssist [ ppara Deafn	Different Devices, Itus Oper ess, Hea	types of esis, Lower Materials f rating Seq ring Aids,	9 heamodialysers, 9 r Limb and Upper for Prosthetic and 9 uence, Electronic Construction and
Arm Replaceme limb orthotic devices, <b>Unit V RES</b> Ventilator and its IPPB unit with m Functional Chara	Principle of Haemodialysis, Members, Wearable Artificial Kidney, Implest Vearable Artificial Kidney, Implest Partice And ORTHOTIC DEVICE nt - Different Types of Models Extervices, Functional Electrical Stimulatic Haptic Devices. PIRATORY AND HEARING AIDS s types-Intermittent positive pressure nonitoring for all respiratory parameter acteristics	orane, E anting Ty ES nally Poo n, Senso e, Breath ers. Type	ialys ype. werec ory As ing A is of I	ate, [ I Limb ssist [ ppara Deafn	Different Prosthe Devices, itus Oper ess, Hea	types of esis, Lower Materials f rating Seq ring Aids,	9 heamodialysers, 9 r Limb and Upper for Prosthetic and 9 uence, Electronic Construction and
Arm Replaceme limb orthotic devices, Unit V RES Ventilator and its IPPB unit with m Functional Chara TEXT BOOK(S) 1. Gray E Wr Dekker Inc	Principle of Haemodialysis, Members, Wearable Artificial Kidney, Implest Participal Kidney, Implest Participal And Orthotic Device nt - Different Types of Models Externices, Functional Electrical Stimulatic Haptic Devices. <b>PIRATORY AND HEARING AIDS</b> Is types-Intermittent positive pressure nonitoring for all respiratory parameter acteristics : iek, Gray L Browlin – Encyclopedia New York 2004	anting Ty anting Ty ES nally Poo on, Senso e, Breath ers. Type a of Bior	ialys ype. werec ory As ing A is of I nater	I Limb ssist I ppara Deafn	o Prosthe Devices, Itus Oper ess, Hea	types of sis, Lower Materials f rating Seq ring Aids, edical Eng	9 heamodialysers, 9 r Limb and Upper for Prosthetic and 9 uence, Electronic Construction and
Arm Replaceme limb orthotic devices, Unit V RES Ventilator and its IPPB unit with m Functional Chara TEXT BOOK(S) 1. Gray E Wr Dekker Inc 2. John. G. W	Principle of Haemodialysis, Members, Wearable Artificial Kidney, Implems, Wearable Artificial Kidney, Implems, Wearable Artificial Kidney, Implement - Different Types of Models Extervices, Functional Electrical Stimulation Haptic Devices. <b>PIRATORY AND HEARING AIDS</b> Is types-Intermittent positive pressure ionitoring for all respiratory parameter acteristics : iek, Gray L Browlin – Encyclopedia New York 2004 ebster – Bioinstrumentation - John W	anting Ty anting Ty S nally Poo on, Senso e, Breath ers. Type a of Bior	)ialys /pe. werec ory As ing A ing A s of [ nateri ons (/	I Limb ssist I ppara Deafn ials a Asia)	o Prosthe Devices, Itus Oper ess, Hea nd Biom	types of esis, Lower Materials f rating Seq ring Aids, edical Eng 2004	9 heamodialysers, 9 r Limb and Upper for Prosthetic and 9 uence, Electronic Construction and gineering –Marcel
Arm Replaceme limb orthotic devices, Unit V RES Ventilator and its IPPB unit with m Functional Chara TEXT BOOK(S) 1. Gray E Wr Dekker Inc 2. John. G. Wa	Principle of Haemodialysis, Members, Wearable Artificial Kidney, Implements, Wearable Artificial Kidney, Implement - Different Types of Models Extervices, Functional Electrical Stimulation Haptic Devices. <b>PIRATORY AND HEARING AIDS</b> Is types-Intermittent positive pressure nonitoring for all respiratory parameter acteristics : iek, Gray L Browlin – Encyclopedia New York 2004 ebster – Bioinstrumentation - John W	orane, E anting Ty ES nally Poo on, Senso e, Breath ers. Type a of Bior Viley & S	ing A s of I naterions (	I Limb ssist I ppara Deafn ials a Asia)	o Prosthe Devices, Itus Oper ess, Hea nd Biom	types of esis, Lower Materials f rating Seq ring Aids, edical Eng 2004	9 heamodialysers, 9 r Limb and Upper for Prosthetic and 9 uence, Electronic Construction and gineering –Marcel
Arm Replaceme limb orthotic devices, Unit V RES Ventilator and its IPPB unit with m Functional Chara TEXT BOOK(S) 1. Gray E Wr Dekker Inc 2. John. G. W REFERENCE(S) 1. Andreas.F.	Principle of Haemodialysis, Members, Wearable Artificial Kidney, Implest Wearable Artificial Kidney, Implest Wearable Artificial Kidney, Implest Princes, Functional Electrical Stimulation Haptic Devices. <b>PIRATORY AND HEARING AIDS</b> Is types-Intermittent positive pressure to nonitoring for all respiratory parameter acteristics : mek, Gray L Browlin – Encyclopedia New York 2004 ebster – Bioinstrumentation - John W ): /on racum, Hand book of bio materia	anting Ty anting Ty ES nally Poo on, Senso o, Breath ers. Type a of Bior viley & S al evaluti	ons (A	I Limb ssist I ppara Deafn ials a Asia)	o Prosthe Devices, itus Oper ess, Hea nd Biom Pvt Ltd - an publis	types of sis, Lower Materials f rating Seq ring Aids, edical Eng 2004	9 heamodialysers, 9 r Limb and Upper for Prosthetic and 9 uence, Electronic Construction and gineering –Marcel

Chairman - BoS Dept.of BME - ESEC

Department	BIOMEDICAL ENGIN	EERING				R 2019	Semester VII	PC
Course	Contract Reference in the P	Hou	rs / V	leek	Credit	Total	Maximum	1
Code	Course Name	L	Т	L	Т	Hours	Marks	
19BM703	HOSPITAL MANAGEMENT	3	0	0	3	45	100	
Course Objec	tive (s): The purpose of learning this co	urse is to	)					1
<ul> <li>Provide</li> </ul>	knowledge an overview of hospital admin	nistration	٦,					
<ul> <li>Understa</li> </ul>	and the principles, practices and areas o	f applica	tion i	n Ho	spital ma	anageme	ent,	
<ul> <li>Learn th</li> </ul>	e quality aspect specified by the internat	ional sta	ndard	ds,				
<ul> <li>Enlighte</li> </ul>	n with the Quality and safety issues in ho	ospital,						
<ul> <li>Understa</li> </ul>	and the principles, practices and areas o	f applica	tion i	n Ho	spital Ma	anageme	nt,	
Course Outco	omes: At the end of this course, learners	will be a	ble to	<b>)</b> :	Turnin,		Strengthere and	
<ul> <li>Explain</li> </ul>	the principles, practices and areas of app	olication	in Ho	spita	I Manag	ement		
Understa	and the biomedical waste disposal conce	ept						
- Explain	the importance of supportive services							
<ul> <li>Comprel</li> </ul>	hend the quality aspect specified by the i	internatio	onal s	stand	ards.			
<ul> <li>Knowled</li> </ul>	lge on Hospital safety.							
Unit I O	VERVIEW OF HOSPITAL ADMINISTRA	TION			- 1.			9
Distinction bet	ween Hospital and Industry, Challenge	s in Ho	spita	Adr	ninistrat	ion – Ho	ospital Planning	g –
Equipment Pla	anning – Functional Planning – Current	Issues	in H	ospit	al Mana	gement	- Telemedicine	e –
Biomedical Wa	aste Management.							
Unit II HL	JMAN RESOURCE MANAGEMENT ON	HOSPI	TAL					9
Principles of H	IRM - Functions of HRM - Profile of H	HRD Ma	nage	r – 1	<b>Fools</b> of	HRD -	Human Resou	rce
Inventory - N	lanpower Planning. Different Departme	ents of	Hos	oital,	Recruit	ment, S	election, Train	ing
Guidelines – M	lethods of Training – Evaluation of Traini	ng – Lea	aders	hip g	rooming	and Tra	ining, Promotio	n –
Transfer.								
Unit III MA	ARKETING RESEARCH & CONSUMER	BEHAV	/IOUF	२		65.00		9
Marketing Info	rmation Systems - Assessing information	on need	s, de	velop	oing & d	issemina	ting information	n –
Market Resear	ch process - Other market research cor	nsideratio	ons –	Con	sumer M	/larkets 8	Consumer Bu	yer
Behaviour – N	lodel of consumer behaviour - Types	of buyin	g deo	cisior	n behav	iour – Tl	ne buyer decis	ion
process – Mod	lel of business buyer behaviour - Major	types of	f buyi	ing s	ituations	- Globa	al marketing in	the
medical sector	<ul> <li>WTO and its implications</li> </ul>	Stat.	án.	R		Si keen		
Unit IV HC	OSPITAL INFORMATION SYSTEMS AN	ID SUPP	PORT	IVE	SERVIC	ES		9
Management	Decisions and Related Information	Require	ment	-	Clinical	Informa	ation Systems	-
Administrative	Information Systems – Support Se	rvice T	echni	cal	Informa	tion Sys	stems – Medi	cal
Transcription, I	Medical Records Department – Central	Steriliza	ition a	and s	Supply I	Departme	ent – Pharmacy	y –
Food Services	– Laundry Services.	1.11	Suc.			- 192 - L	× 12	
Unit V QL	JALITY AND SAFETY ASPECTS IN HO	SPITAL			-			9
Quality system	<ul> <li>Elements, implementation of quality system</li> </ul>	ystem, D	ocun	nenta	ition, Qu	ality aud	iting, Internatio	nal
Standards ISO	9000 – 9004 – Features of ISO 9001 -	- ISO 14	4000	– Er	vironme	ent Mana	igement Syster	ns.
NABA, JCI, N	ABL. Security – Loss Prevention – Fir	re Safet	y - /	Alarm	n Syster	n - Sate	ety Rules. Hea	alth
nsurance & Ma	anaging Health Care – Medical Audit – H	azard a	nd Sa	fety	in a hos	pital Setu	ip.	
TEXT BOOK(S	5):							_
1. R.C.Goyal	l, "Hospital Administration and Human Re	esource	Mana	igem	ent", Fo	urth Editi	on PHI, 2006.	
2. G.D.Kunde	ers, "Hospitals – Facilities Planning and I	Manage	ment	- TN	IH, New	Delhi – I	Fifth Reprint 20	07
REFERENCE(	S):							
1. Arnold D.	Kalcizony & Stephen M. Shortell, "Heal	th Care	Mana	agem	ent", 6"	Edition	Cengage Learr	ning
2 Blane Day	vid Brunner "Health and Social Organi	zation <sup>.</sup> T	owar	ds a	Health	Policy fo	r the 21st Cent	turv
Eric Calrer	ndon Press, 2002		onui	40 U	, iouiur	. ency io		
	R	.195				1		
(Xx	Pas						Stalling a C	
Chai	Aman - BOO						Control of the state	
Dept.c	DI DIALE - FOR							

	BIOMEDICAL ENGINE	ERING			5 × 15	R 2019	Semester V	II P
Course	Course Name	Hou	rs / V	Veek	Credit	Total	Maximu	m
Code	Course Name	L	Т	L	Т	Hours	Marks	
19BM704	REHABILITATION ENGINEERING	3	0	0	3	45	100	
Course Objec	tive (s): The purpose of learning this cour	rse is to	)				i per pro	
<ul> <li>Understa andappli</li> <li>Understa</li> <li>Understa</li> <li>Understa</li> <li>Learn the visually a</li> <li>Study the</li> <li>Course Outco</li> <li>Gain ade</li> <li>Have an thediffere</li> <li>Design a andhenc</li> <li>Gain in-co</li> <li>Unit I</li> <li>INT</li> </ul>	and the rehabilitation concepts and Rehabilitations, and different types of Therapeutic Exercise and the tests to assess the hearing loss, e development of electronic devices to con- and auditory impaired, e various orthotic devices and prosthetic d <b>mes:</b> At the end of this course, learners we equate knowledge about the needs of reha- in depth idea about Engineering Concept ent types of Therapeutic Exercise Technic and apply different types Hearing aids, visu e the benefit of the society. lepth knowledge about different types of n <b>TRODUCTION TO REHABILITATION</b> pairments, disabilities and handicaps, Pr ate Technology, Residual function, Reha	bilitation e Tech mpensa levices vill be a abilitation s in Se que to b ual aids nodels imary a bilitation	tean nique ate fo ble to ons a nsory penef s and of Ha	m me e, or the verco o: and its v & M it the their and a secon	Ioss an me ortho otor reh society applica nd arm dary dis litation t	or future of d various opedic pro- developme abilitation tion in bio replaceme sabilities, ream – m	development assist device oblems. ent. Apply medical field ent. Activities of co	s for
unctions. Ren	abilitation care - need for proper de			choh	ilitation	coro C	ommunity ho	nod
Chabilitation ar Unit II EN Sensory augme and Auditory vis risual auditory	nd its aspects. <b>GINEERING CONCEPTS IN SENSORY</b> entation and substitution – Visual system sion substitution. Auditory system – Audit substitution, tactual auditory substitution	REHAE n: Visu tory au n. Tac	BILIT al au gmen	ATIO gmer ntation	NENGI ntation, n, Heari n, Tact	care, C NEERING Tactual v ng aids, c ual augm	ommunity ba 3 ision substitu cochlear impla ientation, Tac	<b>9</b> tion, nts,
Constitution and Auditory visual auditory Constitution, Co	nd its aspects. <b>GINEERING CONCEPTS IN SENSORY</b> entation and substitution – Visual system sion substitution. Auditory system – Audit substitution, tactual auditory substitution mputerized wheel chairs.	REHAN n: Visua tory au n. Taci	BILIT al aug gmen ual s	ATIO gmer itation system	N ENGI ntation, T n, Heari m, Tact	care, C NEERING Tactual v ng aids, c ual augm	ommunity ba 3 ision substitu cochlear impla ientation, Tac	g g g g s tion, nts, s tual
ehabilitation ar         Unit II       EN         Sensory augment         and Auditory visional auditory visional auditory         substitution, Co         Unit III       OR         Engineering       co	nd its aspects. <b>GINEERING CONCEPTS IN SENSORY</b> entation and substitution – Visual system sion substitution. Auditory system – Audit substitution, tactual auditory substitution mputerized wheel chairs. <b>THOPEDIC PROSTHETICS AND ORTH</b> incepts in motor rehabilitation. Artificial	REHAE n: Visua tory au n. Tack OTICS limbs	BILIT al aug gmen ual s IN R – bo	ATIO gmer ntation system EHA	Ilitation N ENGI Intation, T n, Heari m, Tact BILITAT	Care, C NEERING Tactual v ng aids, c ual augm TION	ommunity ba <b>3</b> ision substitut cochlear implation, Tac intation, Tac ally powered	ised 9 tion, nts, tual 9 and
ehabilitation ar         Unit II       EN         Sensory augment         and Auditory visional auditory         isual auditory         ubstitution, Co         Unit III       OR         engineering co         ontrolled ortho         vistame Restor	nd its aspects. <b>GINEERING CONCEPTS IN SENSORY</b> entation and substitution – Visual system sion substitution. Auditory system – Audit substitution, tactual auditory substitution mputerized wheel chairs. <b>THOPEDIC PROSTHETICS AND ORTH</b> incepts in motor rehabilitation, Artificial tics and prosthetics, Myoelectric hand an ration of hand function, restoration of stan	REHAL n: Visua tory aug n. Tack OTICS limbs id arm diag ar	BILIT al aug gmen ual s IN R – bo prost	ATIO gmer itation system EHA ody p hetic	N ENGI ntation, n, Heari m, Tact BILITAT	Care, C NEERING Tactual v ng aids, c ual augm TION , externational Electory	ommunity ba <b>3</b> ision substitut cochlear implate intation, Tac ally powered ctrical Stimula Systems (HA	sed g tion, nts, tual g and tion
ehabilitation ar         Unit II       EN         Sensory augment         and Auditory visional auditory         risual auditory         substitution, Co         Unit III       OR         Engineering co         controlled ortho         ystems-Restor         Unit IV       VIE	nd its aspects. <b>GINEERING CONCEPTS IN SENSORY</b> entation and substitution – Visual system sion substitution. Auditory system – Audit substitution, tactual auditory substitution mputerized wheel chairs. <b>THOPEDIC PROSTHETICS AND ORTH</b> incepts in motor rehabilitation, Artificial tics and prosthetics, Myoelectric hand an ration of hand function, restoration of stan <b>TUAL REALITY IN REHABILITATION</b>	REHAL n: Visua tory aug n. Tack OTICS limbs id arm ding ar	BILIT al aug gmen ual s IN R – bo prost	ATIO gmer itation system EHAI ody p hetic alking	ilitation N ENGI Intation, T n, Heari m, Tact BILITAT Dowered s. Funct , Hybrid	care, C NEERING Tactual v ng aids, c ual augm TION , externa ional Elec Assistive	ommunity ba <b>3</b> ision substitut cochlear implate nentation, Tac ally powered ctrical Stimulate Systems (HA	ised 9 ition, nts, tual 9 and tion S)
ehabilitation ar         Unit II       EN         Sensory augment         and Auditory vision         risual auditory         substitution, Co         Unit III       OR         ingineering co         ontrolled ortho         ystems-Restor         Unit IV       VIR         troduction to y	and its aspects. <b>GINEERING CONCEPTS IN SENSORY</b> entation and substitution – Visual system sion substitution. Auditory system – Audit substitution, tactual auditory substitution mputerized wheel chairs. <b>THOPEDIC PROSTHETICS AND ORTH</b> incepts in motor rehabilitation, Artificial tics and prosthetics, Myoelectric hand an ration of hand function, restoration of stan <b>RTUAL REALITY IN REHABILITATION</b> virtual reality. Virtual reality based rehabili	REHAL n: Visua tory aug n. Tack OTICS limbs Id arm ding ar tation.	BILIT al aug gmen ual s IN R – bo prost nd wa	ATIO gmer tation system EHA ody p hetic alking	ilitation <b>N ENGI</b> Itation, 7 h, Heari m, Tact <b>BILITAT</b> bowered s. Funct , Hybrid	care, C <b>NEERING</b> Tactual v ng aids, c ual augm <b>TON</b> , externational Electronic Assistive	ommunity ba <b>G</b> ision substitut cochlear implate nentation, Tac ally powered ctrical Stimulate Systems (HA ms with Phan	ised 9 tion, nts, tual 9 and tion S) 9 tom
ehabilitation ar         Unit II       EN         Sensory augment         isual auditory vision         isual auditory         ubstitution, Co         Unit III       OR         ingineering       co         ontrolled ortho       ystems-Restor         Unit IV       VIR         itroduction to vision       itroduction to vision	nd its aspects. <b>GINEERING CONCEPTS IN SENSORY</b> entation and substitution – Visual system sion substitution. Auditory system – Audit substitution, tactual auditory substitution imputerized wheel chairs. <b>THOPEDIC PROSTHETICS AND ORTH</b> incepts in motor rehabilitation, Artificial tics and prosthetics, Myoelectric hand an ration of hand function, restoration of stan <b>RTUAL REALITY IN REHABILITATION</b> virtual reality, Virtual reality based rehabilit as and Virtual Reality Applications in Mobi	REHAL n: Visua tory aug n. Tack OTICS limbs d arm ding ar tation, lity Rel	BILIT al aug gmen ual s IN R – bo prost nd wa Hand	ATIO gmer ntation system EHA ody p hetic alking	ilitation N ENGI Intation, n, Heari m, Tact BILITAT powered s. Funct , Hybrid	Care, C NEERING Tactual v ng aids, c ual augm TION , externa ional Elec Assistive	ommunity ba <b>G</b> ision substitut cochlear implate intation, Tac ally powered ctrical Stimulat Systems (HA ms with Phan	ised <b>g</b> tion, nts, tual <b>g</b> and tion S) <b>g</b> tom
ehabilitation ar         Unit II       EN         Sensory augment       End Auditory vision         ind Auditory vision       Sensory augment         isual auditory vision       End Auditory vision         isual auditory       Sensory augment         isual auditory       Sensory augment         isual auditory       Sensory         isual auditory       Sensory         ubstitution, Co       On         Unit III       OR         ingineering co       Ontrolled ortho         ystems-Restor       Unit IV         Unit IV       VIR         ntroduction to visit       Aptics, Robotic         Unit V       RE	Ind its aspects. GINEERING CONCEPTS IN SENSORY I entation and substitution – Visual system sion substitution. Auditory system – Audit substitution, tactual auditory substitution mputerized wheel chairs. THOPEDIC PROSTHETICS AND ORTH incepts in motor rehabilitation, Artificial tics and prosthetics, Myoelectric hand an ration of hand function, restoration of stan <b>RTUAL REALITY IN REHABILITATION</b> virtual reality, Virtual reality based rehabilit cs and Virtual Reality Applications in Mobi- HABILITATION MEDICINE AND ADVOC	REHAL n: Visu: tory aug n. Tack OTICS limbs d arm ding ar tation, lity Rel CACY	BILIT al aug gmen ual s IN R – bo prost nd wa Hand	ATIO gmer tation system EHA ody p hetical king I mot tation	ilitation <b>N ENGI</b> Itation, n, Heari m, Tact <b>BILITAT</b> owered s. Funct , Hybrid or recov	care, C NEERING Tactual v ng aids, c ual augm TION , externational Elect Assistive very syste	ommunity ba <b>3</b> ision substitut cochlear implate intentation, Tac ally powered ctrical Stimulat Systems (HA ms with Phan	isec ition, itual stual ition ition ition itom
ehabilitation ar         Unit II       EN         Sensory augment       End Auditory visional auditory         isual auditory       isual auditory         isual auditory       isual auditory         isual auditory       isual auditory         isual auditory       isual auditory         isual auditory       ontrolled ortho         ontrolled ortho       ystems-Restor         Unit IV       VIR         introduction to viaptics, Robotic       Unit V         Unit V       RE         Physiological as       vailable in cho	Ind its aspects. GINEERING CONCEPTS IN SENSORY I entation and substitution – Visual system sion substitution. Auditory system – Audit substitution, tactual auditory substitution imputerized wheel chairs. THOPEDIC PROSTHETICS AND ORTH incepts in motor rehabilitation, Artificial tics and prosthetics, Myoelectric hand an ration of hand function, restoration of stan <b>TUAL REALITY IN REHABILITATION</b> wirtual reality, Virtual reality based rehabilities and Virtual Reality Applications in Mobit HABILITATION MEDICINE AND ADVOC spects of Function recovery, Psychologic opsing the device and provision available in	REHAL n: Visua tory aug n. Tack OTICS limbs d arm ding ar tation, lity Rel CACY cal asp n. educ	BILIT. al aug gmen ual s IN R – bo prost ad wa Hand habilit	ATIO gmer ntation system EHA ody p hetic alking I mot tation of Re	ilitation <b>N ENG</b> itation, n, Heari m, Tact <b>BILITAT</b> powered s. Funct , Hybrid or recov	care, C <b>NEERING</b> Tactual v ng aids, c ual augm <b>TON</b> , externational Electron Assistive very systectron tion theration theration	ommunity ba	sed sed tion, nts, tual so so so so so so so so so so so so so
ehabilitation ar         Unit II       EN         Sensory augme       and Auditory vision         and Auditory vision       vision         risual auditory       substitution, Co         Unit III       OR         engineering co       controlled ortho         ystems-Restor       Unit IV       VIR         unit IV       VIR         hysiological as       vailable in cho         EXT BOOK(S)       Control	and its aspects. <b>GINEERING CONCEPTS IN SENSORY</b> entation and substitution – Visual system sion substitution. Auditory system – Audit substitution, tactual auditory substitution mputerized wheel chairs. <b>THOPEDIC PROSTHETICS AND ORTH</b> incepts in motor rehabilitation, Artificial tics and prosthetics, Myoelectric hand an ration of hand function, restoration of stan <b>RTUAL REALITY IN REHABILITATION</b> virtual reality, Virtual reality based rehabilities and Virtual Reality Applications in Mobities <b>HABILITATION MEDICINE AND ADVOC</b> spects of Function recovery, Psychologic osing the device and provision available in the second sec	REHAL n: Visuatory aug n. Tack orrics limbs d arm ding ar tation, lity Rel cal asp n educ	BILIT al aug gmen ual s IN R – bo prost ad wa Hand habilit ects a	ATIO gmer tation system EHA ody p hetical king I mot tation of Re , job a	ilitation <b>N ENGI</b> itation, Tation, Heari m, Heari m, Tact <b>BILITAT</b> owered s. Funct , Hybrid or recover ehabilitation	care, C <b>NEERING</b> Tactual v ng aids, c ual augm <b>TON</b> , externational Electory Assistive very systectory tion theration theration ay-to-day	ommunity ba <b>G</b> ision substitut cochlear implate intation, Tac ally powered ctrical Stimulate Systems (HA ms with Phan py, Legal as life.	sed c tion, nts, tual g and tion S) g tom g pect
ehabilitation ar         Unit II       EN         Sensory augment       Sensory augment         and Auditory visional auditory       Sensory augment         substitution, Co       Unit III       OR         Sensory augment       Sensory augment       Sensory augment         substitution, Co       Unit III       OR         Unit III       OR       OR         engineering       Co       Sensory augment         ontrolled orthom       Sensory augment       OR         systems-Restor       Unit IV       VIR         Introduction to vision       Sensory Restor       Note:	and its aspects. <b>GINEERING CONCEPTS IN SENSORY</b> entation and substitution – Visual system sion substitution. Auditory system – Audit substitution, tactual auditory substitution imputerized wheel chairs. <b>THOPEDIC PROSTHETICS AND ORTH</b> incepts in motor rehabilitation, Artificial tics and prosthetics, Myoelectric hand an ration of hand function, restoration of stan <b>RTUAL REALITY IN REHABILITATION</b> virtual reality, Virtual reality based rehabilit as and Virtual Reality Applications in Mobil <b>HABILITATION MEDICINE AND ADVOC</b> spects of Function recovery, Psychologic osing the device and provision available in <b>State State State</b>	REHAL n: Visua tory aug n. Tack OTICS limbs d arm ding ar tation, lity Rel CACY cal asp n educ ers Me	BILIT. al aug gmen ual s IN R – bo prost ad wa Hand habilit ects o ation, dical	ATIO gmer ntation system EHA ody p hetic alking I mot tation of Re , job a	ilitation <b>N ENGI</b> itation, n, Heari m, Tact <b>BILITAT</b> oowered s. Funct , Hybrid or recov chabilita and in d	care, C <b>NEERING</b> Tactual v ng aids, c ual augm <b>TON</b> , externational Electron Assistive very systectron tion theration theration ay-to-day vt. Ltd, Ne	ommunity ba	sed sed tion, nts, tual and tion S) 9 tom 9 pect
ehabilitation ar         Unit II       EN         Sensory augme       and Auditory visitival auditory visitival auditory visitival auditory         substitution, Co       Unit III       OR         Unit III       OR       OR         Engineering co       controlled ortho         systems-Restor       Unit IV       VIR         Introduction to visit V       RE         Physiological as       vailable in cho         EXT BOOK(S       1. Sunder, "T         Edition, Re       2. Rory A Coordination	and its aspects. <b>GINEERING CONCEPTS IN SENSORY</b> entation and substitution – Visual system sion substitution. Auditory system – Audit substitution, tactual auditory substitution mputerized wheel chairs. <b>THOPEDIC PROSTHETICS AND ORTH</b> incepts in motor rehabilitation, Artificial tics and prosthetics, Myoelectric hand an ration of hand function, restoration of stan <b>RTUAL REALITY IN REHABILITATION</b> virtual reality, Virtual reality based rehabilities and Virtual Reality Applications in Mobit <b>HABILITATION MEDICINE AND ADVOC</b> spects of Function recovery, Psychologic osing the device and provision available in <b>D</b> : extbooks of Rehabilitation", Jaypee Brother print 2007. oper (Editor), HisaichiOhnabe (Editor). Do	REHAL n: Visuatory aug n. Tack OTICS limbs d arm ding ar tation, lity Rel CACY cal asp n educ ers Me ouglas	BILIT al aug gmen ual s IN R – bo prost ad wa Hand habilit ects ation, dical	ATIO gmer system EHA ody p hetical king I mot tation of Re , job a	ilitation <b>N ENGI</b> itation, Taction,	care, C <b>NEERING</b> Tactual v ng aids, c ual augm <b>TON</b> , externational Electron Assistive very syste tion theration ay-to-day vt. Ltd, Netron	ommunity ba	sed 9 1 1 1 1 1 1 9 1 1 9 1 1 1 1 1 1 1 1 1 1 1 1 1
ehabilitation ar         Unit II       EN         Sensory augment       Sensory augment         and Auditory visional auditory       Sensory augment         substitution, Co       Unit III       OR         Sensory augment       Sensory augment         substitution, Co       Unit III       OR         Ingineering       Co       Sensory augment         controlled ortho       Sensors Restor         Unit IV       VIR         Introduction to viality       RE         Physiological as       Vailable in cho         EXT BOOK(S       1. Sunder, "T         Edition, Re       2. Rory A Coor         Rehabilitati       Sensory A Coor	And its aspects. GINEERING CONCEPTS IN SENSORY I entation and substitution – Visual system sion substitution. Auditory system – Audit substitution, tactual auditory substitution imputerized wheel chairs. THOPEDIC PROSTHETICS AND ORTHON incepts in motor rehabilitation, Artificial tics and prosthetics, Myoelectric hand an ration of hand function, restoration of stan <b>RTUAL REALITY IN REHABILITATION</b> virtual reality, Virtual reality based rehabilities and Virtual Reality Applications in Mobil HABILITATION MEDICINE AND ADVOC spects of Function recovery, Psychologic osing the device and provision available in print 2007. per (Editor), HisaichiOhnabe (Editor), Do on Engineering (Series in Medical Physical Content of the series of Physical Series in Medical Physical print 2007.	REHAL n: Visua tory aug n. Tack OTICS limbs d arm ding ar tation, lity Rel CACY cal asp n educ ers Me ouglas / s and E	BILIT. al aug gmen ual s IN R - bo prost ad wa Hand habilit ects ation, dical	ATIO gmer ntation system EHA ody p hetic alking I mot tation of Re , job a Publi	ilitation <b>N ENGI</b> itation, n, Heari m, Tact <b>BILITAT</b> oowered s. Funct , Hybrid or recov chabilita and in d shers P (Editor) Engine	care, C <b>NEERING</b> Tactual v ng aids, c ual augm <b>TON</b> , externa ional Elec Assistive very syste tion thera ay-to-day vt. Ltd, Ne , "An Intro ering" CR	ommunity ba	sed sed stion, nts, tual and tion S) <b>9</b> pect <b>9</b> pect
ehabilitation ar         Unit II       EN         Sensory augmed       Sensory augmed         and Auditory visional auditory       Sensory augmed         and Auditory visional auditory       Sensory augmed         substitution, Co       Unit III         Unit III       OR         Engineering co       Sensory augmed         controlled ortho       Sensory augmed         ontrolled ortho       Sensory augmed         unit IV       VIR         Introduction to visit       Sensory augmed         unit V       RE         Physiological as       Sensory augmed         vailable in cho       Sensory augmed         EXT BOOK(S       1. Sunder, "The         Edition, Re       2. Rory A Coo         Rehabilitati       Sensory augmed	and its aspects. <b>GINEERING CONCEPTS IN SENSORY I</b> entation and substitution – Visual system sion substitution. Auditory system – Audit substitution, tactual auditory substitution imputerized wheel chairs. <b>THOPEDIC PROSTHETICS AND ORTH</b> incepts in motor rehabilitation, Artificial tics and prosthetics, Myoelectric hand an ration of hand function, restoration of stan <b>TUAL REALITY IN REHABILITATION</b> virtual reality, Virtual reality based rehabilities and Virtual Reality Applications in Mobit <b>HABILITATION MEDICINE AND ADVOC</b> aspects of Function recovery, Psychologic osing the device and provision available in <b>D:</b> extbooks of Rehabilitation", Jaypee Brother print 2007. oper (Editor), HisaichiOhnabe (Editor), Do on Engineering (Series in Medical Physics <b>B):</b>	REHAL n: Visuatory aug n. Tack oTICS limbs d arm ding ar ding ar tation, lity Rel CACY cal asp n educ ers Me ouglas <i>I</i> s and E	BILIT al aug gmen ual s IN R – bo prost ad wa Hand habilit ects ation, dical	ATIO gmer tation system EHA ody p hetical liking I mot tation of Re , job a Publical	ilitation <b>N ENGI</b> itation, Taction,	care, C <b>NEERING</b> Tactual v ng aids, c ual augm <b>TON</b> , externational Elector Assistive very syste tion theration ay-to-day vt. Ltd, Netor ering" CR	ommunity ba	sed <b>g</b> and tion, S) <b>g</b> tom <b>9</b> bect
ehabilitation ar         Unit II       EN         Sensory augment       Sensory augment         and Auditory visional auditory       Sensory augment         and Auditory visional auditory       Sensory augment         substitution, Co       Unit III       OR         Init III       OR       Sensory augment         and Auditory visional auditory       Sensory augment         substitution, Co       Unit III       OR         Engineering co       Co         controlled ortho       Sensory         optics, Robotic       VIR         Introduction to visit       RE         Physiological as       Sensory         vailable in cho       EXT BOOK(S         1. Sunder, "The       Edition, Re         2. Rory A Coord       Rehabilitati         REFERENCE(S       1. Warren E.	Ind its aspects. GINEERING CONCEPTS IN SENSORY I entation and substitution – Visual system sion substitution. Auditory system – Audit substitution, tactual auditory substitution imputerized wheel chairs. THOPEDIC PROSTHETICS AND ORTHON Incepts in motor rehabilitation, Artificial tics and prosthetics, Myoelectric hand an ration of hand function, restoration of stan <b>RTUAL REALITY IN REHABILITATION</b> virtual reality, Virtual reality based rehabilities and Virtual Reality Applications in Mobil HABILITATION MEDICINE AND ADVOOD spects of Function recovery, Psychologic osing the device and provision available in print 2007. Deer (Editor), HisaichiOhnabe (Editor), Do on Engineering (Series in Medical Physics Finn, Peter G. Lopressor, "Handbook of N	REHAL n: Visua tory aug n. Tack OTICS limbs d arm ding ar tation, lity Rel CACY cal asp n educ cal asp n educ ers Me buglas / s and E leuropr	BILIT al aug gmen ual s IN R - bo prost ad wa Hand habilit ects ation, dical A. Ho Biome osthe	ATIO gmer system EHAI ody p hetical liking I mot tation of Re job a Publi bson edical	ilitation <b>N ENG</b> itation, 'n, Heari m, Tact <b>BILITAT</b> powered s. Funct , Hybrid or recov ehabilita and in d shers P (Editor) Engine lethods'	care, C <b>NEERING</b> Tactual v ng aids, c ual augm <b>TON</b> , externa ional Elec Assistive rery syste tion thera ay-to-day vt. Ltd, Ne , "An Intro ering" CR , CRC, 20	ommunity ba	sed sed sion, nts, tual and tion S) 9 9 tom 9 0 ect
Tehabilitation ar         Unit II       EN         Sensory augmed       Sensory augmed         and Auditory visual auditory       visual auditory         visual auditory       visual auditory         visual auditory       substitution, Co         Unit III       OR         Engineering co       co         controlled ortho       systems-Restor         Unit IV       VIR         ntroduction to viaptics, Robotic       No         Unit V       RE         Physiological as       as         vailable in cho       EXT BOOK(S)         1.       Sunder, "The         Edition, Re       2.         2.       Rory A Coord         Rehabilitati       CFERENCE(S)         1.       Warren E.         2.       Joseph D E	Ind its aspects. GINEERING CONCEPTS IN SENSORY I entation and substitution – Visual system sion substitution. Auditory system – Audit substitution, tactual auditory substitution imputerized wheel chairs. THOPEDIC PROSTHETICS AND ORTHON Incepts in motor rehabilitation, Artificial tics and prosthetics, Myoelectric hand an ration of hand function, restoration of stan <b>TUAL REALITY IN REHABILITATION</b> virtual reality, Virtual reality based rehabilities and Virtual Reality Applications in Mobil HABILITATION MEDICINE AND ADVOC spects of Function recovery, Psychologic osing the device and provision available in print 2007. Deer (Editor), HisaichiOhnabe (Editor), Do on Engineering (Series in Medical Physics 5): Finn, Peter G. Lopressor, "Handbook of N Bronzino, "The Biomedical Engineering Hardbook of N	REHAL REHAL N: Visus tory aug n. Tack OTICS limbs d arm ding ar ding ar tation, lity Rel CACY cal asp n educ ers Me buglas / s and E leuropr andboo	BILIT al aug gmen ual s IN R – bo prost ad wa Hand habilit ects ation, dical A. Ho Biome osthe k <sup>*</sup> . 2r	ATIO gmer itation system EHA ody p hetic alking I mot tatior of Re , job a Public bson edical	ilitation <b>N ENGI</b> itation, <sup>T</sup> n, Heari m, Tact <b>BILITAT</b> oowered s. Funct , Hybrid or recov ehabilita and in d shers P (Editor) Engine lethods <sup>2</sup> ition, CF	Care, C NEERING Tactual v ng aids, c ual augm TON , externational Electory Assistive rery syste tion theration ay-to-day vt. Ltd, Nettory , "An Intro- ering" CR , CRC, 20 RC Press	ommunity ba	sed sed sion, nts, tual so so so so so so so so so so



Departme	nt BIOMEDICAL ENGIN	NEERIN	G			R 2019	Semester VI	PC
Course		Ηοι	rs / V	Veek	Credit	Total	Maximun	n
Code	Course Name	L	Т	Р	с	Hours	Marks	
19 <b>BM</b> 70	DATA ACQUISITION AND PROCESSING LABORATORY	0	0	2	1	30	100	
Course Ob	jective (s): The purpose of learning this co	urse is t	) 	2				
<ul> <li>Study</li> </ul>	the various aspects of acquisition and ana	lysis of l	bio sig	gnals	and me	dical imag	ges,	
• Unde	rstand the importance of electrical safety of	medica	equi	pmer	nts,			
Study	practically the concepts of physiological m	odeling,	aaion	on it	change	-		-
<ul> <li>Enga</li> <li>Domo</li> </ul>	ge in lifelong learning to stay current with the	and res	onsik	i as n	n divers	s, 9 work er	vironments	
course Ou	tcomes: At the end of this course, learners	will be a	ble to	):	ii uiveis	e work of	ivironmento.	
- Ability	to acquire and analyze any physiological s	signal an	d mo	del th	ne physic	ological s	ystems,	
- Apply	the techniques of medical image analysis	and prov	iding	secu	rity to m	edical da	ta	
• Be at	ble to identity a data acquisition system.							
Designew c	n and develop DATA acquisition and proce ones or a combination of both.	ssing so	lution	s by	adapting	g existing	tools, designir	ng
•= Be fa	miliar with at least one Medical software pa	ckage u	sed to	view	/ data or	a PC.	1.	
ame of Ex	periments							
1. Acqui	sition and analysis of bio signals using worl	kstation,						
2. Study	of auditory and visual evoked responses,							
3. Deve	opment of software for basic telemedicine,							
4. Deve	opment of neural network for signal classifi	cation,						
5. Acqui	sition and analysis of medical images,							
6. Deve	opment of software for medical image com	pression	,					
7. Devel	opment of algorithm for medical data secur	ity,		×				
8. Study	of IDL as a tool for medical image analysis	,						
9. Study	of DICOM standards,							
10. Study	of lung and cardiovascular models,							
11. Electr	ical safety testing of medical equipment.							
ST OF EQU	JIPMENTS FOR A BATCH OF 30 STUDE	NTS	in an					
S.No	NAME OF THE EQ	UIPMEN	T				QUANTIT	'Y
1. F	Cs with related accessories (Intel CORE 2 AM2GB (Minimum), Hard Disk — 1TB)	Duo(Mir	nimun	n) or	Intel 15,	I7(latest)	' 1	
2. N	ATLAB (Latest Version) 17A or 18, Image	process	ing to	ol bo	x		1	

CK.9



Department	BIOWEDICAL ENGIN	EERIN	G			R 2019	Semester VI	P
Course	Course Name	Hour	s / W	/eek	Credit	Total Hours	Maximum Marks	1
land		L	T	P	С			
19BMX01	TOTAL QUALITY MANAGEMENT	3	0	0	3	45	100	
<ul> <li>Learn th</li> <li>Learn th</li> <li>Learn th</li> <li>Aware o</li> <li>Course Outco</li> <li>Students</li> <li>Student</li> </ul>	e basic concepts of quality and quality fr e concept of total quality management f e internal politics, quality culture, educat f international / national Quality awards. <b>mes:</b> At the end of this course, learners s should be able to Quality environment should be able to know the TQM	rom org rom we tion and s will be of the c approa	aniza stern d trair able organ ch foi	ationa and ning c to: izatio	I point of Japanes of the orga n. n.	f view. e approact anization. ing/service	h. e organization	
in length Student cycle, Crosby's Student	should be able to know various Quality a 10 points and Deming's 14 Points should be able to know international/nat	terms li tional Q	ke To uality	olerar v awa	nce and \ rds	/ariability,	PDCA	
Unit I INTE		D.C.				D:		5
service quality Barriers to TQI Customer reter	<ul> <li>Basic concepts of TQM - TQM Frame</li> <li>Guild Concepts of TQM - TQM Frame</li> <li>Customer focus - Customer oriental</li> <li>M PRINCIPLES</li> </ul>	- Defin ework - tion, Cu	Con	tribut er sa	ions of E itisfactior	Dimension Deming, Ju n, Custome	is of product a iran and Crosk er complaints a	and and
Motivation, En Continuous pro selection, Supp Unit III TQM The seven tra	npowerment, Team and Teamwork, I bcess improvement - PDCA cycle, 5S, blier Rating. I <b>TOOLS AND TECHNIQUES I</b> ditional tools of quality - New manage	Recogn Kaizer	ition 1 - St tools	and upplie s - S	Reward er partne	, Perform rship - Pa	ance appraisa rtnering, Supp ts, Methodolo	il - lier 9 gy,
applications to marking proces	manufacturing, service sector including s - FMEA - Stages, Types.	IT - Be	ench	mark	ing - Rea	ason to be	nch mark, Ber	ich
Quality Circles	- Cost of Quality - Quality Eulerion Den	lovmen	t (OF	<u>- (م</u>	Faguchi	nuality loss	function - TP	9 M -
Concepts, impr	ovement needs - Performance measure	es.	i (Ga	0) -	aguerne	quality 103t		VI
Unit V QUA	LITY MANAGEMENT SYSTEM							9
ntroduction—I Standards— Documentatior Introduction—I Benefits of EM	Benefits of ISO Registration—ISO AS 9100, TS16949 and TL 9000 n—Internal Audits—Registration- SO 14000 Series Standards—Conce S.	0 900 0 ISC ENVIR pts of	0 S 0 90 0NM ISO	eries 001 IENT 1400	s of S Require AL MA 1—Requ	tandards– ments—Ir NAGEME uirements	–Sector-Spec nplementatior ENT SYSTE of ISO 14001	ific M:
FEXT BOOK(S 1. Dale H.Be RashmiU Indian Re	<b>):</b> sterfiled, Carol B.Michna,Glen H. Bester Irdhwareshe, —Total Quality Managem eprint, Sixth Impression, 2013.	rfield,M entll, Pe	aryB. earso	Sacr n Ed	e,Heman ucation <i>A</i>	tUrdhware Asia, Revis	eshe and sed Third Edition	on,
<ul> <li><b>EFERENCE(S</b></li> <li>1. James F</li> <li>FirstIndi</li> <li>2. Janakira</li> <li>Pvt. Ltd.</li> <li>3. Sugapth</li> </ul>	5): R. Evans and William M. Lindsay, "The I an Edition, Cengage Learning, 2012. aman. B and Gopal .R.K., "Total Quality , 2006. ii L and Anand Samuel, "Total Quality M	Manage Manag	emen emer	t and nt - T	Control o	of Quality" Cases", Pro	, 8th Edition, entice Hall(Ind /t 1 td 2006	ia)
ISO900	1-2015 standards.			,		. (		
Chair	man - BoS					· rementer		
Dept.of	BME - ESEC							

Department	BIOMEDICAL ENGIN	EERIN	G			R 2019	Semester VI	PE
Course	Course Name	Hour	s/W	eek	Credit	Total	Maximum	1
Code		L	Т	Ρ	С	Hours	warks	
19BMX02	DISASTER MANAGEMENT	3	0	0	3	45	100	
Course Objec Provide Ensure t preventio Gain a p Enhance Develop where th Course Outco Different Assess v Draw the damagea Unit I INTE Natural resource Disasters, Geo Vater Related Juclear, Biolog Management c Unit II DIS Disaster manage Community ba Covernment: E	tive (s): The purpose of learning this constructions an exposure to disasters, their hat students begin to understand the reconstruction and risk reduction reliminary understanding of approaches awareness of institutional processes in rudimentary ability to respond to their sey live, with due sensitivity <b>mes:</b> At the end of this course, learners iate the types of disasters, causes and vulnerability and various methods of risk a hazard and vulnerability profile of India assessment and management. <b>CODUCTION TO DISASTERS</b> The set of the sensitive of the set of the	burse is signific lationsh s of Disa n the cou urround s will be their imp c reducti a, Scena g on frag arthqua clones, nd effect Disaste Roles & Central,	to ance ip be aster untry ings able pact of on m arios gile e akes, Tsun ts - D r Pre State	and tween Risk with p to: on en easu in the eco-s Volc amis isast pareo	types. n vulneral Reduction potential of vironmer res as we a Indian of ystem - of anic erup - Man M er Profile dness for sibilities of trict and l	bility, disas n (DRR) disaster re nt and soci ell as mitig ontext, Dis characteris tion, lands ade Disas of India - People a of Differen ocal admi	sters, disaster sponse in area ety ation. saster stics and types slides - Wind a ters: Forest fir Disaster nd Infrastructu nt Agencies a nistration, Arm	as s o ancies ure ancies
amage asses ouses and In valuation of R ole of Govern	sment — Development of Physical a frastructure due to Disasters - Fundin tehabilitation Work: Training, Rescue a ment and NGO's - Participative Rehabil	nd Eco g Arran nd plan litation F	nomi geme ning Proce	c Infi ents t the re ss: C	astructur or Recor escue act ase Stud	e - Natur nstruction tivities and ies	e of Damage - Monitoring a d rehabilitation	tc and s -
Unit IV DISA	STER RESPONSE AND DISASTER M	IANAGI	EME	NT				9
Disaster Respo Search, Rescu Management: F umour and Pa Minimum Stand Unit V DISA	onse Plan: Communication, Participatio ue, Evacuation and other logistic Psychological Response and Psycholog nic Management, Medical and Health ard of Relief, essential components of I STER MANAGEMENT IN INDIA	n and A manage gical Re Respor Relief M	Activa ement habili nse te lanag	tion tatior tatior Dif eme	of Emerg Human n, Trauma ferent Dis nt, and fu	ency Prep Behavior a and Stre sasters - I nding.	paredness Pla and Respor ess Manageme Relief Measur	ns, nse ent, es: 9
Disaster Manag NDMA), Natio Disaster Manag evel and classi management.	ement Act, Disaster Management Agen nal Executive Committee (NEC), Stat gement Authority (DDMA) & Local Aut fication, Prevention of Biological Hazard	ncies - N e Disas thorities ds, Mair	Nation ster M , Biol nstrea	nal D Mana ogica aming	isaster M gement al Disaste Covid -1	anagemer Authority ers — Age 19 panden	nt Authority (SDMA), Distr encies, Bio sa nic disaster	ict fety
<ol> <li>EXT BOOK(S</li> <li>1. Singhal 13:978-9</li> <li>2. Z. Tusha Ltd.,201</li> <li>3. Gupta NewDell</li> <li>4. Kapun Delhi, 20</li> </ol>	j: J.P. —Disaster Managementll, Laxmi F 9380386423 ar Bhattacharya, —Disaster Science an 2. ISBN-10: 1259007367, ISBN-13: 978 a Anil K, Sreeja S. Nair. Environmental I hi, 2011 Anu Vulnerable India: A Geographical S 010.	Publicati nd Mana 8-12590 Knowled Study of	ions, geme 0736 dge fo Disa	2010 entll, 1] or Dis sters	. ISBN-1 McGraw aster Ris , IIAS and	0: 938038 Hill India I k Manage I Sage Pu	6427 ISBN- Education Pvt. ment, NIDM, blishers, New	
C	hairman - Bos bt.of BME - ESTO					868 -m		

## **REFERENCE(S):**

- 1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
- 2. Government of India, National Disaster Management Policy, 2009.

Chairman - BoS Dept.of BME - ESEC

Dopuration	BIOMEDICAL ENGIN	EERIN	G			R 2019	Semester VI	PE
Course Code	Course Name	Hour	s/W	leek	Credit	Total Hours	Maximum Marks	
		L	Т	P	С			_
19BMX03	HOSPITAL WASTE MANAGEMENT	3	0	0	3	45	100	2
<ul> <li>Know also Understate</li> <li>Learn the</li> <li>Understate</li> <li>Understa</li></ul>	bout the healthcare hazard control and and and biomedical waste management e facility guidelines, infection control and and the hazardous materials used in hos and various waste disposal procedures a <b>omes:</b> At the end of this course, learners various hazards, accidents and its control vaste disposal procedures for different b ies different bio wastes based on its prop different safety facility in hospitals various regulations and safety norms	ccident l patien pital ar and ma will be ol io wast perties	s nt safe nd its nage able es	ety. impa ment to:	ICT on hea	Ith		9
Healthcare Ha Hazard Correc Theories, Acci Compensation <b>Unit II   BIC</b>	zard Control: Introduction, Hazard Contr ction, Personal Protective Equipment, dent Reporting, Accident Investigations , Orientation, Education, and Training <b>DMEDICAL WASTE MANAGEMENT</b>	ol: Mar Haza s, Accio	nager rd C dent	nent ontro Analy	& Respor I Commi /sis, Acci	nsibilities, ttees, Aco dent Prev	Hazard Analys cident Causati rention, Worke	is, on rs" 9
Categories an biomedical was Unit III HAZ Hazardous Ma Hazardous Ma Protection.	aste Management : Types of wastes d classification of biomedical waste, ste, waste minimization, waste segregati ARDOUS MATERIALS aterials : Hazardous Substance Safet aterial Regulations, Healthcare Hazard	s, majo hazard on and y, OS lous M	or an of I labe HA I lateria	d mi biome ling, v Hazai als, I	nor sour edical wa waste har rd Comm Medical (	ces of b iste, need indling and nunication Gas Syste	for disposal disposal. Standard, DO ems, Respirato	of 9 0T
Unit IV FAC	ILITY SAFETY		Ĩ.			e contractione de la contraction		9
Introduction, Fa Signs, Colors, Landscape and	acility Guidelines: Institute, Administrativ and Marking Requirements, Tool Safe Ground Maintenance, Fleet and Vehicle	e Area ty, Ele e Safet	Safe ctrica y.	ety, S al Sat	lip, Trip, a fety, Con	and Fall P trol of Ha	revention, Safe zardous Energ	ety Iy,
Unit V INFE	CTION CONTROL, PREVENTION AND	) PATI	ENT	SAFE	TY	(		9
Healthcare Imn Antiseptics, OS Healthcare-Ass	nunizations, Centers for Disease Con SHA Blood borne Pathogens Standard, sociated Infections, Medication Safety.	trol an Tubei	d Pre	event sis, H	ion, Disir lealthcare	nfectants, e Opportu	Sterilants, an nistic Infection	d s,
<b>TEXT BOOK(S</b> 1. Tweedy Francis 2. Anantpr	i): 7, James T., Healthcare hazard control a (2014). reet Singh, SukhjitKaur, Biomedical Was (2).	nd safe te Disp	ety ma osal,	anage Jayp	ement-CF	RC Press_ ers Medica	Taylor and al Publishers (P	)
Ltd (201								_

Department	BIOMEDICAL ENGINE	EERIN	G			R 2019	Semester VI	PE
Course	Course Name	Hour	s/W	eek	Credit	Total	Maximun	n
Code	oourse name	L	Т	Р	С	Hours	warks	
19BMX04	MULTIMEDIA COMPRESSION AND NETWORKS	3	0	0	3	45	100	
Course Objec Introduce Analyze Introduce Introduce Course Outco Ability to Ability to	tive (s): The purpose of learning this course probability related study of the characters various compression schemes for text, the compression schemes se communication protocols for voice over mes: At the end of this course, learners characterize the features of multimedia	urse is eristics voice, r interne will be compo	to of te imag et and able nents	xt, vc e and d mu to: 5.	vice, imag d video Itimedia r	e and vide	eo data	
<ul> <li>Ability to</li> <li>Ability to</li> <li>Ability to</li> </ul>	develop compression algorithms for pro tackle network issues in the transmission	cessing on of tex	g text kt. au	and dio a	images. nd video	sianals.		
Unit I MUL	TIMEDIA COMPONENTS		,			<u> </u>	12	9
Introduction- M graphics, anima	ultimedia skills- Multimedia components ation, video, hardware.	and th	eir cł	narac	teristics-	Text, sour	nd, images,	
Unit II AUI	DIO AND VIDEO COMPRESSION					7		9
Audio compres excited LPC-pe	sion-DPCM-Adaptive DPCM -adaptive p erpetual coding -Video compression pri	oredicti nciples	ve co s-H.2	ding∙ 61, ⊢	linear Pro I.263, MF	edictive co PEG 1, 2, 4	oding code 4.	0
Compression p encoding -sour coding -Lempel Unit IV VoIP	rinciples-source encoders and destination ce encoding- text compression -static H Ziv-Welsh Compression-image compre TECHNOLOGY	on enco Huffma ssion	oders n coc	loss ling (	less and dynamic	lossy con Huffman o	npression-entro coding -arithm	opy etic 9
Basics of IP tra and release, Vo	nsport, VoIP challenges, H.323/ SIP -Ne oIP and SS7, Quality of Service - CODE	etwork EC Met	Archi hods	tectu -VOI	re, Protoc P applica	cols, Call e bility.	establishment	
Unit V MUL	TIMEDIA NETWORKING				-			9
Multimedia Net real time intera Mechanisms-In	working- Applications-Streamed stored ctive Applications-distributing multimed ntegrated services-Differentiated Servi	and au ia-beyc ces-R\$	udio-r ond b SVP.	nakir est e	ng - Best effort serv	Effort ser vice seclue	vice protocols ding and Polic	for ing
TEXT BOOK(S 1. Fred Ha Pearsor 2. Tay Vau	): Ishall, "Multimedia Communication - App education, 2007. Ighan, "Multideai: Making It Work", TMH	plicatio , 8 th E	ns, N ditior	etwo n, 20(	rks, Proto	ocolsand S	Standards",	
REFERENCE(S 1. Kurose a 2005.	<ul> <li>s):</li> <li>and W. Ross, "Computer Networking a T</li> </ul>	op dow	/n Ap	proa	ch", Pear	son educa	ation, 3 rd Editi	on,
<ol> <li>Marcus</li> <li>KR. Rac Standar</li> <li>R. Steim</li> </ol>	Goncalves Voice over IP Networks, M ,Z S Bojkovic, D A Milovanovic, "Multime ds, and Networks", Pearson Education, metz, K. Nahrstedt, "Multimedia Comput	cGraw edia Co 2007 ing, Co	Hill, ommu ommu	unica nicat	tion Syste	ems:Tech Applicatio	niques, ns", Pearson	
Educatio 5. Ranjan I	on, 1st Edition, 1995. Parekh, "Principles of Multimedia", TMH	, 2006.						

CX 8

Department	BIOMEDICAL ENGINE	EERING	G			R 2019	Semester VI	PE
Course	Course Name	Hour	s/W	leek	Credit	Total	Maximum	n
Code	oourse nume	L	Т	Р	С	Hours	Marks	
19BMX05	HUMAN BODY AREA NETWORKS	3	0	0	3	45	100	
<ul> <li>Course Objec</li> <li>Know the</li> <li>Understate</li> <li>Know the</li> </ul>	tive (s): The purpose of learning this co e hardware requirement of BAN and the communication and security asp e applications of BAN in the field of medi	urse is ects in cine	to the E	3AN			4	
<ul> <li>Course Outco</li> <li>Comprei</li> <li>Design a</li> <li>Assess t</li> <li>Understa</li> <li>Extend t</li> </ul>	omes: At the end of this course, learners hend and appreciate the significance and a BAN for appropriate application in medi the efficiency of communication and the and the need for medical device regulation he concepts of BAN for medical application	will be I role o cine. security on and ons.	able f this / para regul	to: cours amete ation	se in the p ers. s followed	oresent co d in variou	ntemporary wo s regions.	orld
Unit I INTF	RODUCTION			1				9
Definition, BAN	and Healthcare, Technical Challenges- lacement, number of nodes, System sec	Senso curity a	r des nd re	sign, l liabili	biocompa ty, BAN A	tibility, En Architectur	ergy Supply, e - Introductio	n.
Unit II HA	RDWARE FOR BAN							9
Processor-Low Memory ,Anter Power sources	Power MCUs, Mobile Computing MCU nna-PCB antenna, Wire antenna, Cera - Batteries and fuel cells for sensor node	s ,Integ mic an s.	grate tenna	d pro a, Ex	ternal ar	rith radio t itenna, Se	ransceiver, ensor Interface	e,
Unit III WIRI	ELESS COMMUNICATION AND NETW	ORK						9
RF communica Stand -Alone E	ation in Body, Antenna design and tes BAN, Wireless personal Area Network T pee.	sting, F Fechno	Propa logie	igatio s-IEE	n, Base E 802.15	Station-N 5.1,IEEE F	letwork topolo 2802.15.13, IE	gy-
Unit IV COE	XISTENCE ISSUES WITH BAN				1.0.1			9
nterferences – ink layer, Reg 3acterial attack	Intrinsic - Extrinsic, Effect on transmis gulatory issues-Medical Device regulati s, Virus infection, Secured protocols, Secure	sion, C on in elf-prote	ount USA ectior	er m and n.	easures- Asia, Se	on physic ecurity and	al layer and d d Self-protecti	lata on-
Unit V APP	LICATIONS OF BAN		-					9
Monitoring pation Multi patient mo Multi	ents with chronic disease, Hospital patie onitoring systems, Multichannel Neural	ents, El recordi	derly ng, G	patie Gait a	ents, Caro nalysis, S	diac arryth Sports Me	imias monitorii dicine, Electroi	ng, nic
EXT BOOK(S 1. Annalisa 2. Sandee Safety,	<b>;):</b> a Bonfiglio, Danilo De Rossi, "Wearable p K.S. Gupta,Tridib Mukherjee, Krishna Security, and Sustainability", Cambridge	Monito Kumar 9 Unive	ring S Venk	Syste ata S Press	ms", Spri Subraman s, 2013.	nger, 201 ian, "Body	1. ⁄ Area Network	s
REFERENCE( 1. Zhang, 2. Guang- 3. Mehmet Applied	<b>S):</b> Yuan-Ting, "Wearable Medical Sensors : ZhongYang(Ed.), "Body Sensor Network t R. Yuce, JamilY.Khan, "Wireless Body / isons". Bon Stanford Publishing Dto. Ltd	and Sy s", Spr Area Ne	stem inger etwor	s", S , 200 ks Te	pringer, 2 16. echnology	013. /, Impleme	entation, and	

XX Chairman - BoS Dept.of BME - ESEC

Department	BIOMEDICAL ENGIN	EERIN	G		100.2	R 2019	Semester VI	PE
Course	Course Name	Hour	s / W	leek	Credit	Total	Maximu	m
Code	ooulse name	L	T	Р	С	Hours	Marks	5
19BMX06	MOBILE APPS DEVELOPMENT	3	0	0	3	45	100	Ref
<ul> <li>Understa</li> <li>Study De</li> <li>Understa</li> <li>Course Outco</li> <li>Apprecia</li> <li>Familiaria</li> <li>Design a experien</li> <li>Apprecia</li> </ul>	and Mobility landscape & Aspects of Mo esign and Develop of Mobile Apps and Mobile apps deployment <b>mes:</b> At the end of this course, learners the the Mobility landscape ze with Mobile apps development aspect and develop mobile apps, using Android ce design, native data handling and back tion of nuances such as native hardwar	bile App s will be cts as deve ckgroun e play, l	able elopn d tas locati	to: nent ks ar	platform, nd notifica wareness	with key fo tions. , graphics	ocus on user and multimed	ia.
Perform	testing, signing, packaging and distribut	tion of n	nobile	e app	S	-		9
Mobility landsca the mobile app	ape, Mobile platforms, Mobile apps development environment along with a	elopme n emula	nt, O itor, a	vervi case	ew of And e study or	Iroid platfo n Mobile a	orm, setting up pp developme	ont
Unit II   BUI								ant
App user interfa	LDING BLOCKS OF MOBILE APPS ace designing - mobile UI resources (La nteraction amongst activities. App func	ayout, L tionality	JI ele beyo	ment	s, Draw-a iser interf	able, Menu face - Thre	u), Activity- sta eads, Async ta	9 ates ask,
App user interfa and life cycle, in Services – state nandling – on-c access (via Inte Unit III SPF Graphics and a record location	LDING BLOCKS OF MOBILE APPS ace designing - mobile UI resources (La nteraction amongst activities. App func es and life cycle, Notifications, Broadc device file I/O, shared preferences, mo ernet/Intranet) RUCING UP MOBILE APPS nimation - custom views, canvas, anim- awareness, and native hardware access	ayout, L tionality ast rece obile da ation Al	JI ele beyo eivers tabas Pls, r	ment ond u s, Te ses s nultir	s, Draw-a iser interf lephony a such as S nedia - au	able, Menu face - Thre and SMS SQLite, and udio/video	u), Activity- sta eads, Async ta APIs Native o d enterprise o playback and nd gyroscope	9 ates ask, lata lata 9
App user interfa and life cycle, in Services – state handling – on-c access (via Inte Unit III SPF Graphics and a record, location Unit IV TES	LDING BLOCKS OF MOBILE APPS ace designing - mobile UI resources (La nteraction amongst activities. App func es and life cycle, Notifications, Broadc device file I/O, shared preferences, mo ernet/Intranet) RUCING UP MOBILE APPS nimation - custom views, canvas, anima awareness, and native hardware access TING MOBILE APPS	ayout, L tionality ast rece obile da ation Al ss (sens	JI ele beyo eivers itabas PIs, r sors s	ment ond u s, Te ses s nultir such	s, Draw-a iser interf lephony a such as S nedia - au as accele	able, Menu face - Thre and SMS GLite, and udio/video rometer an	u), Activity- sta eads, Async ta APIs Native o d enterprise o playback and nd gyroscope)	9 ates ask, lata lata 9 9
App user interfa and life cycle, in Services – state handling – on-co access (via Inte Unit III SPF Graphics and a ecord, location Unit IV TES Debugging mot Android, Roboti	LDING BLOCKS OF MOBILE APPS ace designing - mobile UI resources (La nteraction amongst activities. App func es and life cycle, Notifications, Broadc device file I/O, shared preferences, mo ernet/Intranet) RUCING UP MOBILE APPS nimation - custom views, canvas, anima awareness, and native hardware access TING MOBILE APPS bile apps, White box testing, Black box t tum, MonkeyTalk	ayout, L tionality ast rece obile da ation Al ss (sens esting,	JI ele beyo eivers tabas PIs, r sors s and t	ment ond u s, Te ses s nultir such est a	s, Draw-a iser interf lephony a such as S nedia - au as accele utomatior	able, Menu face - Thre and SMS GLite, and udio/video rometer and n of mobile	u), Activity- sta eads, Async ta APIs Native o d enterprise o playback and nd gyroscope) e apps, JUnit f	9 ates ask, lata lata 9 9 or
App user interfa and life cycle, in Services – stath handling – on-ca access (via Inte Unit III SPF Graphics and a record, location Unit IV TES Debugging mot Android, Roboti Unit V TAK	LDING BLOCKS OF MOBILE APPS ace designing - mobile UI resources (La nteraction amongst activities. App func es and life cycle, Notifications, Broadc device file I/O, shared preferences, mo ernet/Intranet) RUCING UP MOBILE APPS nimation - custom views, canvas, anima awareness, and native hardware access TING MOBILE APPS bile apps, White box testing, Black box t ium, MonkeyTalk KING APPS TO MARKET	ayout, L tionality ast rece obile da ation Al ass (sens esting,	JI ele beyo eivers itabas PIs, r sors s and t	ment ond u s, Te ses s nultir such est a	s, Draw-a iser interf lephony a such as S nedia – au as accele utomatior	able, Menu face - Thre and SMS SQLite, and udio/video rometer and n of mobile	u), Activity- sta eads, Async ta APIs Native o d enterprise o playback and nd gyroscope) e apps, JUnit f	9 ates ask, lata lata 9 9 0 7
App user interfa and life cycle, in Services – state handling – on-co access (via Inte Unit III SPF Graphics and a record, location Unit IV TES Debugging mote Android, Roboti Unit V TAK /ersioning, sign	LDING BLOCKS OF MOBILE APPS ace designing - mobile UI resources (La nteraction amongst activities. App func es and life cycle, Notifications, Broadc device file I/O, shared preferences, mo ernet/Intranet) RUCING UP MOBILE APPS nimation - custom views, canvas, anima awareness, and native hardware access STING MOBILE APPS bile apps, White box testing, Black box t ium, MonkeyTalk CING APPS TO MARKET ning and packaging mobile apps, distrib	ayout, L tionality ast rece obile da ation Al as (sens esting, uting ap	JI ele beyo eivers tabas PIs, r sors s and t	ment ond u s, Te ses s nultir such est a	s, Draw-a iser interf lephony a such as S nedia - au as accele utomatior bile mark	able, Menu face - Thre and SMS QLite, and udio/video rometer and n of mobile et place	u), Activity- sta eads, Async ta APIs Native o d enterprise o playback and nd gyroscope) e apps, JUnit f	9 ates ask, lata lata 9 9 or 9
App user interfa and life cycle, in Services – statch handling – on-co access (via Inte Unit III SPF Graphics and a record, location Unit IV TES Debugging mot Android, Roboti Unit V TAK Versioning, sign Practical Understa Set up the Develop a receivers Using em Testing m	LDING BLOCKS OF MOBILE APPS ace designing - mobile UI resources (La nteraction amongst activities. App func es and life cycle, Notifications, Broadc device file I/O, shared preferences, mo ernet/Intranet) RUCING UP MOBILE APPS nimation - custom views, canvas, anima awareness, and native hardware access TING MOBILE APPS bile apps, White box testing, Black box t tum, MonkeyTalk CING APPS TO MARKET hing and packaging mobile apps, distrib and the app idea and design user interfa e mobile app development environment and debug mobile app components - Us s, data components hulator to deploy and run mobile apps mobile app - unit testing, black box testing	ayout, L tionality ast rece obile da ation Al as (sens esting, uting ap ce/wiref t ser inter	JI ele beyo eivers itabas PIs, r sors s and t ops of frame rface	ment ond u s, Te ses s nultir such est a n mo es of , serv	s, Draw-a user interfile lephony a such as S nedia - au as accele utomation bile mark mobile ap vices, not	able, Menu face - Thre and SMS SQLite, and udio/video rometer and n of mobile et place op	u), Activity- sta eads, Async ta APIs Native o d enterprise o playback and nd gyroscope) e apps, JUnit f	9 ates ask, lata lata 9 9 0 0 7
App user interfa and life cycle, in Services – state handling – on-o access (via Inte Unit III SPF Graphics and a record, location Unit IV TES Debugging mot Android, Roboti Unit V TAK Versioning, sign Practical • Understa • Set up the • Develop a receivers • Using em • Testing m • Testing m • Testing m	LDING BLOCKS OF MOBILE APPS ace designing - mobile UI resources (La nteraction amongst activities. App func es and life cycle, Notifications, Broadc device file I/O, shared preferences, mo ernet/Intranet) RUCING UP MOBILE APPS nimation - custom views, canvas, anima awareness, and native hardware access TING MOBILE APPS bile apps, White box testing, Black box t tum, MonkeyTalk CING APPS TO MARKET ning and packaging mobile apps, distrib nd the app idea and design user interfa e mobile app development environment and debug mobile app components - Us s, data components ulator to deploy and run mobile apps nobile app - unit testing, black box testiri ): vPradhan, Anil V Deshpande, Mobile Ap urd, Android Application Development A	ayout, L tionality ast reco obile da ation Al as (sens esting, uting ap ce/wiref t ser inter ng and t	JI ele v beyo eivers tabas PIs, r sors s and t ops of frame rface est au velopi e for I	ment ond u s, Te ses s nultir such est a n mo es of , serv utom ment Dumr	s, Draw-a iser interf lephony a such as S nedia - au as accele utomation bile mark mobile ap vices, not ation•	able, Menu face - Thre and SMS QLite, and udio/video rometer and n of mobile et place op ifications,	u), Activity- sta eads, Async ta APIs Native of d enterprise of playback and nd gyroscope) e apps, JUnit f	9 ates ask, data data 9 9 9 0 0 7

CK.g

Department	BIOMEDICAL ENGIN	EERIN	G		1. 1. 1.	R 2019	Semester VI	PI
Course	Course Name	Hour	s/W	leek	Credit	Total	Maximum	1
Code	oourse wante	L	Т	Р	С	Hours	Marks	2
19BMX07	TELEHEALTH TECHNOLOGY	3	0	0	3	45	100	4
<ul> <li>Course Object</li> <li>Learn the</li> <li>Understation</li> <li>Know tell</li> </ul>	ive (s): The purpose of learning this co key principles for telemedicine and he nd telemedical technology. emedical standards, mobile telemedicin	ourse is ealth ne and it	to appl	icatio	ons.			
<ul> <li>Apply mu</li> <li>Explain p</li> <li>Apply tele</li> </ul>	<b>mes:</b> At the end of this course, learners Itimedia technologies in telemedicine rotocols behind encryption techniques ehealth in healthcare.	s will be for secu	able ire tra	to: ansm	ission of	data		
Unit I FUN	DAMENTALS OF TELEMEDICINE	-health	tolo-	caro	scone T	elemedici	ne Systems	9
benefits & limita	itions of telemedicine.	-nealur,	tere-	care,	scope, i	elemetici	ne oystems,	1
Unit II TYP	E OF INFORMATION & COMMUNICA EMEDICINE	ATION II	NFRA	ASTR	UCTURE	FOR		9
Unit III ETI Confidentiality, to medical reco rights.	IICAL AND LEGAL ASPECTS OF TE patient rights and consent: confidential rds, consent treatment - data protection	LEMED lity and to on & sec	ICINI the la urity,	E w, th juris	e patient- dictional i	doctor rel ssues, int	ationship, acc ellectual prope	9 ess erty
Introduction to r	adiology information system and ACS,	DICOM	, PA	CS st	rategic pl	an and ne	eds	9
assessment, tee	chnical Issues, PACS architecture.							-
Unit V   APP	LICATIONS OF THE EMEDICINE				tology Tr		o Hoolth and	9
Teleradiology 1	elepathology Telecardiology Teleono	T vpoloc	elede	erma	ICHCREV IP	lesurgerv	e neann ann	
Teleradiology, 7 Cyber Medicine	elepathology, Telecardiology, Teleonc	cology, T	elede	erma	tology, re	elesurgery	, e nealth and	
Teleradiology, T Cyber Medicine TEXT BOOK(S 1. Norris A ( 2. H K Huar 2010.	elepathology, Telecardiology, Teleonc 	cology, T elecare∥, asic Prir	Johr	erma n Wile es an	ey, New Y d Applica	ork, 2002 tions∥ Wile	e Health and	у,
Teleradiology, T Cyber Medicine TEXT BOOK(S 1. Norris A 2. H K Huar 2010. REFERENCE(S	Telepathology, Telecardiology, Teleono C. Essentials of Telemedicine and Tele Ig, PACS and Imaging Informatics: B	cology, T elecare∥, asic Prir	Johr	erma n Wile es an	ey, New Y d Applica	ork, 2002 tions∥ Wile	e Health and 2. ey, New Jerse	у,
Teleradiology, T Cyber Medicine TEXT BOOK(S 1. Norris A ( 2. H K Huar 2010. REFERENCE(S 1. Olga Ferr 2002.	Telepathology, Telecardiology, Teleono C. Essentials of Telemedicine and Tele Ig, TPACS and Imaging Informatics: B ): er Roca, Marcelo Sosa Iudicissa, Tha	cology, T elecare∥, asic Prir ndbook	Johr nciple	erma n Wile es an eleme	ey, New Y d Applica edicine∥, I	ork, 2002 tions∥ Wile OS Press,	, e rieatti and 2. ey, New Jerse , Netherland,	у,
Teleradiology, T Cyber Medicine TEXT BOOK(S 1. Norris A ( 2. H K Huar 2010. REFERENCE(S 1. Olga Ferr 2002. 2. 2. Khandj 3. 3. Keith J New York	elepathology, Telecardiology, Teleonc C, Essentials of Telemedicine and Te ig, PACS and Imaging Informatics: B er Roca, Marcelo Sosa Iudicissa, Ha our R S, Handbook of Biomedical Ins Dreyer, Amit Mehta, James H Thrall, . 2002.	cology, T elecare∥, asic Prin ndbook trumenta Pacs: /	Johr nciple of Te ation	erma n Wile es an eleme  , Tat ide to	ey, New Y d Applica edicine∥, I a McGrav	York, 2002 tions∥ Wile OS Press, w Hill, Nev al Revolu	, e rieattrand ey, New Jerse , Netherland, v Delhi, 2003. tion∥, Springer	y,

X &

Department	BIOMEDICAL ENG	INEERIN	G			R 2019	Semester VI	PI
Course	Course Name	Hour	s / W	eek	Credit	Total	Maximum	n
Code	oourse nume	L	Т	Р	С	nours	Marks	
19BMX08	BIOSTATISTICS	3	0	0	3	45	100	
Course Objecti     Introduce     Compare	<b>ve (s):</b> The purpose of learning this the techniques used in statistical & the various parameters used in stat	course is regressior istical sign	to n ana nificar	lysis. 1ce.				ł
Course Outcon - Classify c Distinguis Interpret c Explain th	nes: At the end of this course, learn ommon statistical tests and tools. h between p-values and confidence commonly used regression analysis. e data tables and its interpretations	ers will be intervals a in commu	able as me nity h	to: easur ealth	es of stat	istical sign	lificance.	
Evaluate	commonly used statistical and epide	emiologic r	neas	ures.		100	-	q
Biostatistics - St Variables - Basid	atistical problems in Biomedical res c probability, likelihood & odds, distr	earch-Ba ibution va	sic co riabili	oncep ty.	ots: Popul	ation, San	nples and	
					م المنامة الم	tion		9
Unit III REG	RESSION ANALYSIS	vei chi squ	are te	escar	ia distribi	uion.		9
Regression - Lin regression - No	ear regression - Multiple linear regr nlinear regression - Logistic regre	ression - M ession - P	/ultip oisor	le co 1 reg	linearity, ression.	Determin	ing Best	
Unit IV INTE	RPRETING DATA	S. Son			10 I.S. 104			9
_ife table: Interp	reting life table's clinical trials, epide	emical read	ling a	nd in	terpreting	g of epider	nical studies,	
Unit V MET	A ANALYSIS					-		9
META analysis f Radial plots, L'A	or research activities, purpose and ubbe plots, Criticisms of Meta analys	reading of	MET	A ana	alysis, Fo	rest graph	, Funnel plots,	,
<b>TEXT BOOK(S)</b> 1. Joseph A. Clinical Me 2. Gerald van for the Hea	Ingel finger, Frederick Mosteller, La edicine', Singapore, 3 rd Edition, 19 n Belle, Lloyd D. Fisher, Patrick J. H alth Sciences', John Wiley & Sons,	awrence A 194. Ieagerty, T 2004.	. Thit	oodea as Lu	au, James mley, 'Bio	s H. Ware	'Biostatistics in A Methodolog	n gy
<ul> <li><b>EFERENCE(S)</b></li> <li>1. Julien I.E.</li> <li>2. James F</li> <li>2007.</li> <li>2. Day M. Materia</li> </ul>	: Hoffman, 'Biostatistics for Medical a Jekel, 'Epidemiology, Biostatistics, a	and Biome and Prever	dical ntive	Prac Medi	titioners', cine', Els	Elsevier I evier Heal	Press,2015. Ith Sciences,	



Department	rtment BIOMEDICAL ENGINEERING					R 2019	Semester VI	PE
Course	Course Name	Hour	s / W	eek	Credit	Total Hours	Maximun Marks	n
Coue		L	Т	Ρ	С		Marks	1.5
19BMX09	EMBEDDED SYSTEMS IN MEDICINE	3	0	0	3	45	100	
<ul> <li>Basic co</li> <li>Various</li> <li>Real time</li> </ul>	tive (s): The purpose of learning this cou oncepts of Embedded Systems techniques used for designing an embed e system with an examples	ded sy	to im	part I	knowledg	e on		
<ul> <li>Course Outco</li> <li>Discuss</li> <li>Identify f</li> <li>Demons</li> <li>Summai</li> <li>Design a</li> </ul>	mes: At the end of this course, learners the basics of embedded systems and its he various tools and development proces trate the various I/O interfacing with micr ize the real time models, languages and a real time embedded system for biomedi	will be hardw ss of er ocontro operat cal app	able are u nbec oller ing s olicat	to: nits Ided ysten ions	system ns			
Unit I SY: Embedded sys system, Embed an embedded	STEM DESIGN stem, Processor embedded into a syst ided software in a system, Embedded sy system designer. Typical application scel BEDDED SYSTEMS DESIGN, DEVELO	tem, E /stem a nario o	mbe archit f eml	dded ectur bedde	hardwar e, Classi ed systen	e units a fications, s ns	nd devices ir Skills required	9 for
tools, Host and system, Design Unit III RE Study of micror	Target machine, Linking and Locating S process AL WORLD INTERFACING controller, Processor and memory organic vintorfacing. Data Acquisition system A	Softwar	re, G Swit	etting ch, K	eypad an	d LED inte	erfacing, Seve	get 9 n
Unit IV   TE	y Interfacing, Data Acquisition system, A CHNIQUES FOR EMBEDDED SYSTEM	7D, D/# S	on con	verte	rs, Timer	s, Countei	rs, Actuators.	9
State Machine systems. Real services, RTOS	and state Tables in embedded syster time models, Language and Operating of functions, Interrupt routine in RTOS env	m desi Syste vironm	gn, \$ ms-T ent.	Simul asks	ation and and tas	d Emulation k states, o	on of embedd operating syst	ded tem
Unit V BIO	MEDICAL APPLICATIONS	Embo	ddog	evet	om in hio	modical a	nnlication	9
Wireless senso	r technologies, Body sensor network, Pa	tient m	onito	oring	system.	medicara	pplication	
TEXT BOOK(S								
<ol> <li>Manyr V Third Ed</li> <li>Wayne V Morgan H</li> <li>Andrew N Optimizir</li> </ol>	): Volf, <sup>—</sup> Computers as Components - Prin ition <sup>—</sup> Morgan Kaufmann Publisher (An ir Nolf, "Computers as Components - Princ (aufmann Publisher (An imprint of Elsevi √ Sloss, Dominic Symes, Chris Wright, "A g System Software", Elsevier/Morgan Ka	ciples o mprint f iples o ier), 3ro ARM S aufmar	of En from f Em d Edi yster in Pu	nbedo Elsev bedd tion, n Dev blish	ded Com vier), 201: ed Comp 2008. veloper's er, 2008.	puting Sys 2. uting Syst Guide- De	stem Design∥, em Design", esigning and	
<ol> <li>Manyn V Third Ed</li> <li>Wayne V Morgan H</li> <li>Andrew N Optimizir</li> <li>REFERENCE(S</li> <li>LylaB.Da</li> <li>Jonathan Cengage</li> <li>Jane, W.</li> </ol>	<ul> <li>i):</li> <li>Volf, Computers as Components - Prindition Morgan Kaufmann Publisher (An ir Nolf, "Computers as Components - Princ Kaufmann Publisher (An imprint of Elseviel Sloss, Dominic Symes, Chris Wright, "Ang System Software", Elsevier/Morgan Kacitations, Embedded Systems: An Integrated A W.Valvano, Embedded Microcompute Learning, 2012.</li> <li>S. Liu, "Real-Time Systems", Pearson Embedded Systems", Pearson Embedded Systems (An Integrated A Strange, 2012).</li> </ul>	ciples o mprint f iples o ier), 3ro ARM S aufmar Approa r Syste	of En from f Em d Edi yster in Pu ich II F ems F	nbedd Elsev bedd tion, n Dev blish Pears Real	ded Comp vier), 201: ed Comp 2008. veloper's er, 2008. on Educa Time Inte 011.	puting Sys 2. uting Syst Guide- De ation, 2013 erfacing  , T	stem Design∥, em Design", esigning and 3. Fhird Edition	



Department	BIOMEDICAL ENGIN	EERIN	G			R 2019	Semester VI	PE
Course	Course Name	Hour	s/W	/eek	Credit	Total Hours	Maximun Marks	n .
Code		L	Т	Р	С	Trouro	Marks	
19BMX10	VIRTUAL INSTRUMENTATION	3	0	0	3	45	100	
Course Objec Introduc Train to Course Outco Compret	tive (s): The purpose of learning this concepts and a program virtual instrumentation concepts and a program virtual instrumentation software the source, learners hend and appreciate the significance ar	ourse is applicati e for bio s will be id role c	to ons. medi able of this	ical a to: cour	pplication se in the	s present co	ontemporaryw	vorld.
<ul> <li>Identify s</li> <li>Understate</li> <li>Experiment</li> <li>Apply the</li> </ul>	salient traits of a virtual instrument. and the use of VI for data acquisition. ent, analyze and document different typ e virtual instrumentation technologies fo	es of in r medic	terfac al ap	ces. plicat	ions.			
Unit I INI	RODUCTION							9
Programming environment.	al Instrumentation(VI), advantages, bl paradigms – Virtual Instrumentation -	Ck dia	gram EW s	and softw	architect are – La	bVIEW ba	isics – LabVI	ent, EW
Unit II VI U	JSING LABVIEW			12				9
Creating, Editin sequence stru	ng and debugging a VI in LabVIEW – 0 uctures – File I/O – VI customization	Creating	l a su	ıb VI	– Loops a	and charts	– Case and	
Unit III DA	TA ACQUISITION AND CONTROL IN	VI		-	NUN			9
Plug-in DAQ be Scanning multi Unit IV INS	oards – Organization of the DAQ VI Sy ple analog channels – Driving the digita TRUMENT INTERFACES	stem – al I/Os -	Perfo - Buf	ormin fered	g analog data acq	input and uisition –	analog outpu Simple proble	t – ms 9
Current loop, F for office & ind DIO, DMM, wa	RS 232C/RS 485, GPIB, System basics lustrial application VISA & IVI, image a veform generator.	s, Interfa acquisiti	ace b on &	proc	s: USB, F æssing, N	CMCIA, n Notion Col	etworking bas ntrol. ADC, D	sics AC,
Unit V API	PLICATION OF VI IN BIOMEDICAL EN	GINEE	RING	3				9
Design of virtua Volume, Heart Reality & 3D gr	al applications for Electrocardiography Rate variability analysis, Noninvasive aphical modeling, Virtual Prototyping.	(ECG), Blood	Elect Pres	tromy sure	ography Measure	(EMG), A ment, Biot	ir Flow and Lu feedback, Virt	ung tual
TEXT BOOK(S 1. Gary Joh 2. Lisa K. V	<b>5):</b> Inson, "LABVIEW Graphical Programmi Vells and Jeffrey Travis, "LABVIEW for I	ng", Mo Everyor	Grav	v Hill, PHI, 1	2 nd Edi 997.	tion, 1997		
3. Skolkoff,	"Basic concepts of LABVIEW 4", PHI,	1998.						
4. Jerome, 2010.	Jovitha, "Virtual Instrumentation and LA	BVIEW	", PH	ll Lea	arning, Ne	ew Delhi, 1	st Edition,	
5. Sanjay G Publishir	Supta and Joseph John, " Virtual Instrur ng Company Limited, New Delhi, 1st Ed	nentatio ition, 20	n usi 05.	ng La	abVIEW",	Tata McG	Braw – Hill	
REFERENCE(	S):							
1. Kevin Ja Instrume	mes, "PC Interfacing and Data Acquisiti ntationand Control", Newnes, 2000.	on: Tec	hniqu	ues fo	or Measu	rement,		
2. S. Gupta Edition 1	, J.P. Gupta," PC Interfacing for Data A 994.	cquisitic	on an	d Pro	cess Cor	ntrol", ISA,	2nd	
<ol> <li>Technica</li> <li>Jon B. O</li> </ol>	al Manuals for DAS Modules of Advante lansen, Eric Rosow, "Virtual Bio-Instrum	ch and I nentatio	Natio n: Bio	nal Ir omed	nstrument lical, Clini	is. ical, and H	lealthcare	
	ons in LabVIEW" Pearson Education, 2	001.	T.					
M.	T						5.4	

Department	BIOMEDICAL ENGI	NEERIN	G			R 2019	Semester VII	PE		
Course	العجا يجحون فنعط والانجاد	Hou	rs / V	Veek	Credit	Total	Maximum	1). 		
Code	Course Name	L	Т	Р	С	Hours	Marks			
19BMX11	ROBOTICS IN MEDICINE	3	0	0	3	45	100			
Course Object Understa Understa Know the Explore v Course Outco Understa Identify th Design b Construct	tive (s): The purpose of learning this c ind the basics of Robotics, Kinematics and the basics of Inverse Kinematics, vision of Robotics application in Med various kinematic motion planning solu- various applications of Robots in Media mes: At the end of this course, learner and the basics of robotic systems he principle of Kinematics and Inverse asic Robotics system and formulate K at Inverse Kinematic motion planning so	icine, itions for cine. rs will be Kinema inematic olutions	to im r vario e able tics, s, for va	part l ous R to:	obotic co	je on onfiguratic	ons,			
Design R	obotic systems for Medical application	1.		1						
Introduction Au Dot and cross equation – Five Unit II KIN	tomation and Robots, Classification, A products, Coordinate frames, Rotatio -axis robot, Four-axis robot, Six-axis re	Applications, Honobot	on, S noger	pecifi neous	cation, N coordin	lotations, ates Link	Direct Kinemati coordination a	ics rm		
Six axis Robot fixtures, Pick ar Unit III RO Robot Vision Im - Thresholding transformation, Unit IV PLA	, Workspace analysis and trajectory id place operations, Continuous path r BOT VISION nage representation, Template matching, region labeling, Shrink operato Structured illumination, Camera calibre	plannir motion, I ng, Poly rs, Swe ation.	nterp nterp hedra ell o	ork er olated al obje perat	nvelope d motion, ects, Sha ors, Eul	and exar Straight- ane analy er numb	nples, workspa line motion. sis, Segmentati bers, Perspecti	9 on ve		
Task Planning <sup>-</sup> Planning, Fine- simulation.	Task level programming, Uncertainty, motion planning, Simulation of plan	Configu ar motic	ratior on, S	i, Spa ource	ace, Gros and G	ss motion oal scene	, Planning, Gra es, Task Plann	sp er		
Unit V APP Applications in Rehabilitation - Neurosurgery	LICATIONS Biomedical Engineering – Bio Eng - Interactive Therapy, Bionic Arm, C	ineering Clinical	Biolo and \$	ogica Surgi	lly Inspir cal – G	red Robo ynaecolog	ts, Application gy, Orthopaedic	9 in cs,		
TEXT BOOK(S)	): · · · · · · · · · · · · · · · · · · ·	-	L.	21	n de la s	1.11	1. No amina i	-		
1. C. Burdea Inc.,2008	& Philippe Coiffet, "Virtual Reality Tech	hnology'	', Sec	ond E	Edition, C	Bregory, J	ohn Wiley & So	ns,		
2. J.J.Craig, -	-Introduction to RoboticsII, Pearson E	ducation	n, 200	5		6.00				
3. Andrew Da	vison, "Killer Game Programming in Ja	ava", Or	eilly S	SPD,	2005,		The second	6		
REFERENCE(S	i):		21-5			9.25	uters (trajl			
1. K. S. Fu, R	. C. Gonzales and C. S. G. Lee, -Rol	boticsII,	McGr	aw H	ill, 2008	19.3	111:20			
2. John Vince	, "Virtual Reality Systems", Pearson E	ducatior	n, 200	7						
3. William R.S Elsevier, M	Sherman, Alan Craig, "Understandin organ Kaufmann, 2002.	g Virtua	I Rea	ality,	interface	, Applica	tion and Desig	n",		
4. David H.El Elsevier, 20	perly, "3D Game Engine Design Pra 107.	actical A	Appro	ach	to Real-	Time Col	mputer Graphic	:s",		



and the second se	BIOMEDICAL ENGINE	R 2019	Semester VII F						
Course		Hours / Week Credit			Hours / Week Credit		Credit	Total	Maximum
Code	Course Name	L	T	P	С	Hours	Marks		
19BMX12	NANOTECHNOLOGY IN MEDICINE	3	0	0	3	45	100		
Course Object Underst Underst Underst Demons Apprecia operates Course Outco Thoroug a role or Underst Underst understa propertia Having a Demons Unit I INT Basic Structure	tive (s): The purpose of learning this cou and the basic scientific concepts underpi and the multidisciplinary aspects of synth and the different types of nano materials strate specifically the characterization too ate the emerging role of nanotechnology and the ethical issues it raises. <b>Innes:</b> At the end of this course, learners the knowledge of the general principles of the nanometer scale anding the essential concepts used in na anding of materials and their propertie anding of the intimate relationship es/functionality of materials, a sound grounding knowledge in the characterials that the socioeconomic impact of nanoteconomic <b>RODUCTION TO NANOTECHNOLOGY</b> e of Nano particles- Kinetics in Nano stra	urse is inning nesizin , uls used y in so y in so will be f physi notech betwee racteriz echnol <u>f</u> uctured	to nano g nan d in n ociety able cs, ch nolog he at en m zation ogy a	scier to ma anote , the to: nemis gy, sy omic nateria tech and to erials	aterials, echnology regulator atry, elect anthesis a and nar al scale niques, xicologic	y, ry framew tronics an and fabric nometer (nanost al issues imensiona	vork within which d biology that pla ation, level, including a ructure) and th <u>associated with it</u>		
emiconductor Unit II GE Jano particles liffusion proce processes: Mil Sol – gel meth	s, bio nano-particles. <b>NERAL METHODS OF SYNTHESIS</b> through homogeneous and heterogen ss- Oswald ripening process - influence ling, lithographics, Machining process, v ods, electro deposition, Self Assembly.	neous of redu apour	nucle icing depo	ation agen sition	-Growth ts. Fabric . Bottom	controlle cation me –Up proc	d by surface and thods – Top down ess: Colloidal and		
Unit III NA Classification I bucky balls, r bxides) -Nanoc Unit IV EXI	NOMATERIALS based on dimensionality- Quantum Dots nano tubes, graphene) – Metal based composites- Nano polymers – Nano glass PERIMENTAL TECHNIQUES	s, Wel nano ses – N	ls an mate Nano	d Win rials cerar	res- Cart (nano go nics – Bi	oon- base old, nano ological n	ed nano materials silver and meta ano materials.		
		ning E	lectro		licroscon	- Canada			
Characterizatic ⁄licroscope, At SPM), Optical	on — X- ray diffraction (XRD), Scani omic force microscopy, Scanning Tunne and Raman spectroscopy.	eling m	icros	оп м сору	(STM), S	oy, Trans Scanning	mission Electror probe microscopy		
Characterizatic Aicroscope, Al SPM), Optical Unit V NAI Jano tubes, n nolecular elec lectromechan Janoshells – N	on – X- ray diffraction (XRD), Scan comic force microscopy, Scanning Tunne and Raman spectroscopy. NOTECHNOLOGY IN HEALTH CARE ano wires, and nano devices – Introdu tronics - Field emission and Shielding ical systems (NEMs) - Molecular and anobiotix – Cancer detection – Drug Del	eling m oction - - Micro Suprai	- Fun pelec molec	ctiona trome cular Nano	(STM), S al Nanos echanical Switches particles	by, Trans Scanning structures systems s – Biose and Mole	mission Electror probe microscopy – Introduction to (MEMs) – Nano ensors – Qdots – ecular Carriers.		
Characterizatic Microscope, At SPM), Optical Unit V NAI Vano tubes, n nolecular elec electromechan Vanoshells – N EXT BOOK(S 1. Bio-Nanot and Goldie	on – X- ray diffraction (XRD), Scan comic force microscopy, Scanning Tunne and Raman spectroscopy. NOTECHNOLOGY IN HEALTH CARE ano wires, and nano devices – Introdu tronics - Field emission and Shielding ical systems (NEMs) - Molecular and lanobiotix – Cancer detection – Drug Del b): echnology_ Concepts and applications. © Oza, Ane Books Pvt Ltd, 1 edition 2012	iction - - Micro Suprai livery u Madhu	- Fun pelec molec using	ctiona trome cular Nano	(STM), S al Nanos echanical Switches particles , Mahesl	etructures structures systems and Mole	mission Electror probe microscopy – Introduction to (MEMs) – Nanc ensors – Qdots – ecular Carriers.		



RE	FERENCE(S):
1.	Niemeyer C. M., "Nano biotechnology: Concepts, Applications and Perspectives", Wiley -VCH, 2006
2.	Handbook of Nano phase and Nano structured Materials (in four volumes), Eds: Z.L. Wang, Y. Liu, Z. Zhang, Kluwer Academic/Plenum Publishers, 2003
3.	Springer Handbook of Nanotechnology by Bharat Bhushan 2004.
4.	Encyclopedia of Nanotechnology - Hari Singh Nalwa 2004.

CKE

Department	BIOMEDICAL ENGI	R 2019	Semester VII	PE				
Course	0	Hou	rs / W	Veek	Credit	Total	Maximum	n
Code	Course Name	L	Т	Ρ	С	Hours	Warks	
19BMX13	BIOMETRIC SYSTEMS	3	0	0	3	45	100	
<ul> <li>Understar</li> <li>Understar</li> <li>identify iss</li> <li>Demonstri</li> <li>Distinguis</li> </ul> Course Outcon <ul> <li>Understar</li> <li>Illustrate ti</li> <li>Develop te</li> <li>Demonstri</li> <li>Distinguis</li> </ul>	ve (s): The purpose of learning this c and the concept of Biometrics and its a not the various methodologies involved sues in the realistic evaluation of biom ate the multimodal biometrics and the h the authentication mechanism of th nes: At the end of this course, learned the concept of Biometrics and its a he various methodologies involved in echniques for face recognition and has ate the multimodal biometrics and the h the authentication mechanism of th ODUCTION TO BIOMETRICS	pplicatic d in finge netrics-b e method e biome rs will be pplicatio fingerpr and geor e method e biome	ased ds for tric sy able ons, rint tem netry ds for tric sy	t tech syste evalu /stem to: chnol biom evalu /stem	onology, ems, uating the s. ogy, etrics, uating the s.	e perform	ance,	9
Systems – Enr Characteristics- Biometrics and F Unit II FING History of finge processing techr – computer ent extraction – finge	ollment – Templates – Algorithm Authentication Technologies – Nee Policy – Biometric Applications – Biom ERPRINT TECHNOLOGY rprint pattern recognition - Gener niques – finger print sensors using R nancement and modeling of finger erprint classification – fingerprint mate	<ul> <li>Verit</li> <li>d for St</li> <li>netric Ch</li> <li>al desci</li> <li>al desci</li> <li>F imaging</li> <li>print important</li> </ul>	ficatio rong naract riptior ng teo nages	n – Authe teristion n of chniqu – fi	Biometr entication cs. fingerpri ues – fin ngerprin	ic Applic n – Prote nts - Fir gerprint q t enhanc	ations –Biome octing Privacy nger print fea uality assessm ement – Fea	etric and 9 ture ent ture
Unit III   FACE Introduction to correspondence Based Feature E fusion.	ERECOGNITION AND HAND GEOM face recognition, Neural network maps – Hand geometry – scanning Extraction and Pattern Classification	<b>NETRY</b> ks for g – Feat i - featu	face ture E re ex	reco Extrac tractio	gnition ction - A on – typ	<ul> <li>face</li> <li>daptive C</li> <li>es of alg</li> </ul>	recognition f Classifiers -Vis orithm –Biome	9 rom ual- etric
Unit IV   MULT Voice Scan – phy - Integration stra examples of mult FAR – FRR – FT Unit V   BIOM	TIMODAL BIOMETRICS AND PERF ysiological biometrics –Behavioral Bi ategies – Architecture – level of fusion timodal biometric systems – Perform E – EER – Memory requirement and IETRIC AUTHENTICATION	ORMAN ometrics on – cor nance ev allocatio	ICE E s - Intr nbina /aluat on.	tion s	UATION ation to m strategy - Statistica	nultimodal –training I Measure	l biometric syst and adaptabilit es of Biometric	9 em y - s - 9
ntroduction - E authentication by heory - Support geometry- Secur	Biometric Authentication Methods / fingerprint – Biometric Authenticat Vector Machines. Biometric authentic	- Biom tion by cation by tion – m	netric Face / finge natchi	Auti Reco erprin ing lo	henticatio ognition. t – biomo cation –	on Syste Expectat etric authe	ems – Biome ion- Maximiza entication by ha	tric tion and
server – match o	ing and trusting a biometric transac n card (MOC) – Multi biometrics and	Two-Fa	ctor A	uther	ntication	local not	autionition	ion

RE	FERENCE(S):
1.	Paul Reid, "Biometrics for Network Security", Pearson Education, 2004
2.	L C Jain, I Hayashi, S B Lee, U Halici, "Intelligent Biometric Techniques in Fingerprint and Face Recognition" CRC Press, 1999
3.	John Chirillo, Scott Blaul, "Implementing Biometric Security", John Wiley, 2003

Chairman - BoS Dept.of BME - ESEC

Department	BIOMEDICAL ENGI	NEERIN	G			R 2019	Semester VII
Course		Hou	rs / V	/eek	Credit	Total	Maximum
Code	Course Name	L	Т	Р	С	Hours	Warks
19BMX14	BIOMATERIALS AND APPLICATIONS	3	0	0	3	45	100
Course Object • Study the mechanis • Understa • Study the • Study the • Study the • Understa Course Outcor • Explain th • Identify m • Compare delivery, • Outline th • Demonstr Unit I INTE Definition and surface propert Foreign Body R	ive (s): The purpose of learning this c e characteristics of Biomaterials and is am, and different metals and ceramics used a different polymeric materials and the e different types of soft and hard tissue and the concept of biocompatibility and mes: At the end of this course, learner be properties of biomaterials and biom netals and ceramic implants used for m different polymeric materials, their a e concept behind the different tissue to rate various testing and evaluation tect <b>CODUCTION TO BIO – MATERIALS</b> classification of bio-materials, Char ies, visco elasticity. Host reactions esponse, Failure mechanisms: corros	ourse is its react as bion ir clinica implant the met replacent chniques replacent chniques racteriza to bion	to ion in nateri l appl ts, thods able tissue applic on in nents for b ttion nateri ture	the icatio of bid to: a read ation biom , iomation of bid ials: degra	host and n and rol omateria ttion, s, nedical fin terials. omateria Inflamma	understa le in drug l testing. eld and i ls: mech ation, Wo f Implante	and its degradat delivery, ts function in de anical propertie und Healing a
iological enviro	nment.			5		Timplant	
Diological environ       Unit II     MET       Metallic implant       Ceramic implant       Unit III     POL       Polymerization,       Dolymers, Bioad	ALLIC AND CERAMIC MATERIALS s: Stainless steels, co-based alloys, t: bioinert, biodegradable or bio resort YMERIC IMPLANT MATERIALS Polyethylene, Clinical study of synthe ctive polymers, Hydrogels; Methacry	, Ti-bas bable, bio etic poly /lates, [	ed al oactiv mers, Drug	loys, /e cer Bioe incor	shape r amics, a poration	nemory a pplication polymers, polymer	alloy, application is. Blood compatil gels, Biomedic
biological enviro Unit II MET Metallic implant Ceramic implant Unit III POL Polymerization, polymers, Bioac application of po Unit IV TISS Soft tissue replace augmentation, V ixation device, i	ALLIC AND CERAMIC MATERIALS ALLIC AND CERAMIC MATERIALS is: Stainless steels, co-based alloys, bioinert, biodegradable or bio resort YMERIC IMPLANT MATERIALS Polyethylene, Clinical study of synthe ctive polymers, Hydrogels; Methacry olymers outside the body and tempora OUE REPLACEMENT IMPLANTS acements, sutures, surgical tapes, ad Vascular grafts, Prosthetic Cardiac oint replacements, dental implants.	, Ti-bas bable, bio etic poly ylates, I ry in vivo hesive, Valves,	ed al oactiv mers, Drug o app Percu harc	loys, ve cer Bioe incor licatio utane	shape r ramics, a poration ons. ous and ue repla	nemory a pplication polymers, polymer skin impl acement	alloy, application is. Blood compatit gels, Biomedic ants, maxillofac Implants, Interr
biological enviro Unit II MET Metallic implant Ceramic implant Ceramic implant Unit III POL Polymerization, polymers, Bioard application of por Unit IV TISS Soft tissue replation, V ixation device, j Unit V TES Festing of blood compatibility: as assessment of esponse. Sterilit EXT BOOK(S) 1. BD Ratner Academic F	ALLIC AND CERAMIC MATERIALS ALLIC AND CERAMIC MATERIALS s: Stainless steels, co-based alloys, t: bioinert, biodegradable or bio resort YMERIC IMPLANT MATERIALS Polyethylene, Clinical study of synthe ctive polymers, Hydrogels; Methacry blymers outside the body and tempora <b>DE REPLACEMENT IMPLANTS</b> acements, sutures, surgical tapes, ad Vascular grafts, Prosthetic Cardiac oint replacements, dental implants. <b>TING OF BIOMATERIALS</b> -material interactions: blood compatible asay methods - direct contact test, tissue compatibility: mechanical test zation of implants: steam sterilization, AS Hoffmann,FJ Schoen, JE Le Press, Third Edition, 2013	, Ti-bas pable, bid etic poly /lates, I ry in vive hesive, Valves, Valves, ility and agar dif ing, crite EtO ste mmons,	ed al pactiv mers, Drug o app Percu harc thron fusion eria f erilizat	loys, ve cer Bioe incor licatio utane t tiss nboge n tes or as tion, r	shape r amics, a prodible p poration ons. ous and ue repla enicity, Ir t, elution sessing radiation	nemory a pplication polymers, polymers skin impl acement accement acceptab sterilization to Mate	alloy, application as. Blood compatit gels, Biomedic ants, maxillofac Implants, Interr eessment of tissu nical use. In vir ility of the tissu on.

Department	BIOMEDICAL ENGIN	EERIN	G		, Par	R 2019	Semester VII	PE
Course	Course Name	Hou	rs / V	Veek	Credit	Total	Maximum	
Code	oourse name	L	T	Р	С	Hours	Marks	
19BMX15	COMPUTER APPLICATION IN MEDICINE	3	0	0	3	45	100	
<ul> <li>Course Object</li> <li>Study the</li> <li>Understa</li> <li>Study the</li> <li>Learn the</li> <li>Understa</li> </ul>	<b>tive (s):</b> The purpose of learning this co e system of information managed in the and the application of software's employ e different types of medical imaging dat e concept of maintaining digital patient r and the delivering instructions in medicin	urse is hospita red in m a with a records ne using	to al, nedica an as: , a con	al dat sist o	a manag f comput rs.	ement, ers,		
Course Outcon Understa Demonst Examine Understa Acquire k	mes: At the end of this course, learners nd the system of information managed rate the application of software's emplo medical imaging data with an assist of nd the concept of maintaining digital pa knowledge in delivering instructions in n	will be in the h yed in comput atient re nedicine	able nospit medio ters, cords e usir	to: tal, cal da s, ng coi	ata mana mputers.	gement,		
Unit I HOS	SPITAL INFORMATION SYSTEM	_			S	4		9
Introduction – H use of internet i	Historical review of the development o n medicine –Internet vs online services	f comp -compu	uters iter b	and ased	informat medical	ics –Four informatic	ndation ontolog on retrieval.	y –
	IPUTERISED PATIENT DATABASE	IANAG	SEME	:NT				9
computer assis computerized E medical imaging Unit III COM Computer Assi Algorithms –An Analysis in Clir Effectiveness.	sted semen analysis-Radio immuno CG-computer aided analysis of ECG g-ultrasound –CT Radiation therapy pla <b>IPUTER ASSISTED MEDICAL IMAGI</b> sted Medical Decision Making-Mode alysis –CBR-Production Rule System nical Medicine –Hospital Information S Clinical Information System –Benefit	assay - comp nning-N NG AN el of C s-Cogn System s –Sou	vs-Interior MMR. D DE CMD- itive -Fundurces	CISIC Appro Mode Ctiona	nt labor EEG and DN MAK Daches-E els - Sor al Capab Data-Mo	ING ING Decision mantic Ne pilities –N des Of I	Support Syste atworks –Decis Decision –CIS	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
Obestrics and G	Synecology-Clinical Decision Support	1	1.0					•
Computerized F Computerized F Education And Patients-Importa Critically III Pati And Metabolic I Assisted Surger	Patient Record –Introduction-History T Prescriptions For Patients-Introduction- Health Care Information –Introductio ance Of Behavior Modification –Patient ients- Introduction –Cognitive System, Balance –Pulmonary Function Evaluat y.	aking I Advers n –Hea Self M Engin ion-Cor	By Co e Dru alth ( lanag eerin mpute	ompu ug Re Online jemei g –A g –A	tter-Dialc eactions- e –Elect nt Educa utomated Is For T	ogue With Computer ronic Cor tion-Com d Comput he Handid	The Compute r Assisted Pati nmunication W puters In Case ter Assisted Fl capped-Compu	ent Vith Of uid uter
Unit V CON	<b>IPUTER ASSISTED INSTRUCTION IN</b>	MEDI	CINE					9
Computer Assis Representation Screen –Com Metabolomics R	eted Drug Discovery And Developmer Of Molecules-Modeling GPCRS-Pharm binational Chemistry-Metabolomics- ole Of PET And SPECT In Drug Discov	nt, Mole nacoph Knowle /ery.	ecula ores- edge	r Moo New Ba	deling B Drugs F sed D	y Comput or Cance rug Dis	ter-Computatio r-0 from Gene covery-Pharma	nal To aco
TEXT BOOK(S)	•					1		
1. R. D. Lee, 0	Computers in Medicine, Tata McGraw H	Hill Pub	lishin	g Co	mpany L	imited, Ne	ew Delhi, 1993	
REFERENCE(S	):						( Shink	
1. S.K.Chacha	an, PC Organisation, S.K. Kataria and S	Sons, D	elhi 2	2000				



Department	BIOMEDICAL ENGI	NEERIN	G			R 2019	Semester VIII	PE
Course		Hou	rs / V	leek	Credit	Total	Maximum	1
Code	Course Name	L	L T P C	С	Hours	Marks		
19BMX16	HEALTHCARE PRODUCT DEVELOPMENT	3	0	0	3	45	100	
<ul> <li>Course Objec</li> <li>Study th</li> <li>Understation</li> <li>Make the Make the device,</li> <li>Make the Make the device,</li> </ul>	tive (s): The purpose of learning this of e basic concept of engineering design and the students understand various c e students understand various clinical the students understand the various s e students to produce product that suit	course is linical ne requirem steps an	to eeds nents, nd co t requ	nstra	ints invo ents	lved in (	developing me	dical
Course Outco Analyze Identify o Provide Abide re Develop	mes: At the end of this course, learne various strategies in product developm clinical need in various application, engineering solution for medical applic gulatory and ethical norms, product that suits market requirement	rs will be nent, cations, s.	able	to:				
Unit I BA	SICS ON PRODUCT DEVELOPMEN	Γ	-					9
washing a strain a fill and a strain and the second strain and	l de la blickier medere medere	n proces	ss -	vario	us phase	es of pro	duct developm	ent-
planning for pro       Unit II     IDE       Market survey       anatomy, phys       finance, techni       implementation	oducts –establishing markets- market <b>NTIFICATION OF CLINICAL NEEDS</b> , Conceptualizing the solution to cli iology, pathophysiology, epidemiology ical and market, New technologies –	nical rec , preser - brainst	ss – s- rele quirer nt pat ormin	varioi evano ment, hway ig, lit	us phase ce of mar Resear vs, setba erature a	es of pro cket resea ching the cks, Fea and R&D	duct developm arch. e disease stat sibility screenin ) forums, Ways	9 9 9 – g – s of
planning for pro         Unit II       IDE         Market survey         anatomy, phys         finance, techni         implementation         Unit III         EN0	oducts –establishing markets- market <b>NTIFICATION OF CLINICAL NEEDS</b> , Conceptualizing the solution to cli iology, pathophysiology, epidemiology cal and market, New technologies – <b>GINEERING SOLUTION TO CLINICA</b>	nical rec nical rec , preser - brainst	ss – rele quirer nt pat ormin	vario evano ment, hway ig, lit	us phase ce of mar Resear vs, setba erature a	es of pro rket resea ching the cks, Fea and R&D	duct developm arch. e disease stat sibility screenin ) forums, Ways	ent- 9 9 - 9 - 5 of 9
planning for product         Unit II       IDE         Market survey         anatomy, phys         finance, technic         implementation         Unit III         End         Document sket         correlation, Materia         Output visualize         engineering so	oducts –establishing markets- market <b>NTIFICATION OF CLINICAL NEEDS</b> , Conceptualizing the solution to cli iology, pathophysiology, epidemiology cal and market, New technologies – a. <b>GINEERING SOLUTION TO CLINICA</b> tching, Modeling – software and phaterial selection – sensors, actuators ration and calibration Case study: To lution.	nical red , preser - brainst L NEED nysical, f s, Instru identify	ss – rele s- rele quirer nt pat ormin <b>S</b> Mode menta a rea	nent, hway ng, lit for ation	us phase ce of mar Resear vs, setba erature a all strate circuit c ne proble	es of pro rket resea ching the cks, Fea and R&D egies, Te design, I m and te	duct developm arch. e disease stat sibility screenin o forums, Ways esting and clin nterface select o propose suita	ent- 9 9 - g - s of 9 ical ion, able
planning for pro         Unit II       IDE         Market survey         anatomy, phys         finance, techni         implementation         Unit III       ENG         Document ske         correlation, Ma         Output visualiz         engineering so         Unit IV       REG	bducts –establishing markets- market <b>NTIFICATION OF CLINICAL NEEDS</b> , Conceptualizing the solution to cli iology, pathophysiology, epidemiology ical and market, New technologies – <b>GINEERING SOLUTION TO CLINICA</b> tching, Modeling – software and phaterial selection – sensors, actuators ration and calibration Case study: To lution. <b>GULATORY AND ETHICAL ISSUES</b>	nical red , preser - brainst L NEED hysical, I s, Instru identify	ss – rele s- rele quirer nt pat ormin S Mode menta a rea	ment, hway ng, lit I for ation al tim	all strate circuit of circuit of circuit of circuit of circuit of circuit circuit of circuit of cir	es of pro rket resea ching the cks, Fea and R&D egies, Te lesign, I m and te	duct developm arch. e disease stat sibility screenin ) forums, Ways esting and clin nterface select o propose suita	9 9 9 9 9 ical ion, able 9
planning for pro-         Unit II       IDE         Market survey         anatomy, phys         finance, techni         implementation         Unit III         ENG         Document ske         correlation, Ma         Output visualiz         engineering so         Unit IV       REG         Regulations an         Biocompatibility         approval, Func	oducts –establishing markets- market <b>NTIFICATION OF CLINICAL NEEDS</b> , Conceptualizing the solution to cli iology, pathophysiology, epidemiology cal and market, New technologies – a. <b>GINEERING SOLUTION TO CLINICA</b> tching, Modeling – software and physication and calibration Case study: To lution. <b>GULATORY AND ETHICAL ISSUES</b> and standards involved in the design y of the test probes, ISO 14155 stand tion and role of ethical committee, Medi	nical red nical red , preser - brainst L NEED nysical, f s, Instru identify – CE dards for dical ethi	ss – rele s- rele quirer nt pat ormin S Mode menta a rea mark clinic cs pro	ment, hway ng, lit I for ation al tim and cal in opose	us phase ce of mai Resear vs, setba erature a all strate circuit o re proble FDA, R nvestigati ed by ICM	es of pro rket resea ching the cks, Fea and R&D egies, Te design, I m and te Regulator ons, Ste MR.	duct developm arch. e disease stat sibility screenin o forums, Ways esting and clin nterface select o propose suita y bodies in In ps for getting F	ent- 9 9 - g - s of 9 ical ion, able 9 dia, DA
planning for pro         Unit II       IDE         Market survey         anatomy, phys         finance, techni         implementation         Unit III       ENG         Document ske         correlation, Ma         Output visualiz         engineering so         Unit IV       REG         Regulations ar         Biocompatibility         approval, Func         Unit V       MA	boducts –establishing markets- market a <b>INTIFICATION OF CLINICAL NEEDS</b> , Conceptualizing the solution to cli iology, pathophysiology, epidemiology ical and market, New technologies – a. <b>GINEERING SOLUTION TO CLINICA</b> tching, Modeling – software and phaterial selection – sensors, actuators action and calibration Case study: To lution. <b>GULATORY AND ETHICAL ISSUES</b> and standards involved in the design y of the test probes, ISO 14155 stand tion and role of ethical committee, Med <b>RKETING STRATEGY</b>	nical red , preser - brainst bysical, I s, Instru identify – CE dards for dical ethi	ss – rele s- rele quirer nt pat ormin S Mode menta a rea mark c clinic cs pro	and cal in popose	us phase ce of mai Resear vs, setba erature a all strate circuit c ne proble FDA, R nvestigati ed by ICM	es of pro rket resea ching the cks, Fea and R&D egies, Ta lesign, I m and ta Regulator ons, Ste AR.	duct developm arch. e disease stat sibility screenin ) forums, Ways esting and clin nterface select o propose suita y bodies in In ps for getting F	ent- 9 9 9 - - - - - - - - - - - - -
planning for pro-         Unit II       IDE         Market survey         anatomy, phys         finance, techni         implementation         Unit III         End         Document ske         correlation, Ma         Output visualiz         engineering so         Unit IV       REG         Regulations an         Biocompatibility         approval, Func         Unit V       MA         Post market S         Weibull plot, N         conference, Vig	boducts –establishing markets- market a <b>INTIFICATION OF CLINICAL NEEDS</b> , Conceptualizing the solution to cli iology, pathophysiology, epidemiology cal and market, New technologies – a. <b>GINEERING SOLUTION TO CLINICA</b> tching, Modeling – software and physical aterial selection – sensors, actuators ration and calibration Case study: To lution. <b>GULATORY AND ETHICAL ISSUES</b> and standards involved in the design y of the test probes, ISO 14155 stand tion and role of ethical committee, Med <b>RKETING STRATEGY</b> urveillance and its role in design, V leasles chart, Pareto analysis, Explo gilance, Promotion through media, Cor	nical red nical red , preser - brainst L NEED nysical, f s, Instru identify - CE dards for dical ethi 'arious to ring varion	ss – s- rele quirer nt pat ormin S Mode menta a rea mark clinic cs pro ools ools	and cal tim and cal in opose - Pro contac	us phase ce of mai Researd vs, setba erature a all strate circuit of re proble FDA, R nvestigati ed by ICM ocess co cts – ea ing produ	es of pro rket resea ching the cks, Fea and R&D egies, Te lesign, I m and te lesign, I m and te lesign, Ste AR. ontrol cha rly adopt ucts – me	duct developm arch. e disease stat sibility screenin ) forums, Ways esting and clin nterface select o propose suita y bodies in In ps for getting F art, bathtub cu erits and demer	ent- 9 9 9  9  5 of 9 ical ion, able 9 dia, DA 9 rve, ups, ts.
planning for pro-         Unit II       IDE         Market survey         anatomy, phys         finance, techni         implementation         Unit III         End         Document ske         correlation, Ma         Output visualiz         engineering so         Unit IV       REG         Regulations ar         Biocompatibility         approval, Func         Unit V       MA         Post market S         Weibull plot, M         conference, Vig         TEXT BOOK(S)	boducts –establishing markets- market a <b>INTIFICATION OF CLINICAL NEEDS</b> , Conceptualizing the solution to cli iology, pathophysiology, epidemiology ical and market, New technologies – <b>GINEERING SOLUTION TO CLINICA</b> tching, Modeling – software and phaterial selection – sensors, actuators ation and calibration Case study: To lution. <b>GULATORY AND ETHICAL ISSUES</b> and standards involved in the design y of the test probes, ISO 14155 stand tion and role of ethical committee, Med <b>RKETING STRATEGY</b> urveillance and its role in design, V leasles chart, Pareto analysis, Explo gilance, Promotion through media, Cor	nical red , preser - brainst L NEED ysical, I s, Instru identify - CE dards for dical ethi 'arious to mparison	ss – ss	and cal im popose exist	us phase ce of mai Researd vs, setba erature a all strate circuit o re proble FDA, R nvestigati ed by ICM ocess co cts – ea ing produ	es of pro rket resea ching the cks, Fea and R&D egies, Te design, I m and te design, I m and te design, Ste AR.	duct developm arch. e disease stat sibility screenin ) forums, Ways esting and clin nterface select o propose suita y bodies in In ps for getting F art, bathtub cu eris and demer	9 9 9 9 9 ical ion, able 9 dia, iDA 9 vve, ups, ts.
planning for pro-         Unit II       IDE         Market survey         anatomy, phys         finance, techni         implementation         Unit III         End         Document ske         correlation, Ma         Output visualiz         engineering so         Unit IV       REG         Regulations ar         Biocompatibility         approval, Func         Unit V       MA         Post market S         Weibull plot, N         conference, Vig         1. Beth Ann	boducts –establishing markets- market a <b>INTIFICATION OF CLINICAL NEEDS</b> , Conceptualizing the solution to cli iology, pathophysiology, epidemiology ical and market, New technologies – <b>GINEERING SOLUTION TO CLINICA</b> tching, Modeling – software and ph aterial selection – sensors, actuators ation and calibration Case study: To lution. <b>GULATORY AND ETHICAL ISSUES</b> nd standards involved in the design y of the test probes, ISO 14155 stand tion and role of ethical committee, Med <b>RKETING STRATEGY</b> urveillance and its role in design, V leasles chart, Pareto analysis, Explo gilance, Promotion through media, Cor <b>S):</b> Fiedler, Managing medical devices wit	nical rec nical rec , preser - brainst L NEED nysical, f s, Instru identify - CE dards for dical ethi 'arious to ring varion hin a reg	ss – s- rele quirer nt pat ormin S Mode menta a rea mark clinic cs pro ools ools ous c with	varior evano ment, hway ig, lit I for ation al tim and cal in opose - Pro contac exist	us phase ce of mai Researd vs, setba erature a all strate circuit of re proble FDA, R nvestigati ed by ICM ocess co cts – ea ing produ mework,	es of pro rket resea ching the cks, Fea and R&D egies, Te lesign, I m and te lesign, I m and te lesign, Ste AR. ontrol cha rly adopt ucts – me Elsevier	duct developm arch. e disease stat sibility screenin ) forums, Ways esting and clin nterface select o propose suita y bodies in In ps for getting F art, bathtub cu ers, focus grou erits and demer	ent- 9 9 9 - - - - - - - - - - - - -
planning for pro         Unit II       IDE         Market survey         anatomy, phys         finance, techni         implementation         Unit III         End         Document ske         correlation, Ma         Output visualiz         engineering so         Unit IV       REG         Regulations an         Biocompatibility         approval, Funct         Unit V       MA         Post market S         Weibull plot, M         conference, Vig         1. Beth Ann         2. Benjamin	boducts –establishing markets- market a <b>INTIFICATION OF CLINICAL NEEDS</b> , Conceptualizing the solution to cli iology, pathophysiology, epidemiology ical and market, New technologies – <b>GINEERING SOLUTION TO CLINICA</b> tching, Modeling – software and phaterial selection – sensors, actuators action and calibration Case study: To lution. <b>GULATORY AND ETHICAL ISSUES</b> and standards involved in the design y of the test probes, ISO 14155 stand tion and role of ethical committee, Med <b>RKETING STRATEGY</b> urveillance and its role in design, V leasles chart, Pareto analysis, Explo gilance, Promotion through media, Cor <b>S):</b> Fiedler, Managing medical devices witt Blass, Basic Principles of Drug Discov	nical rec segment nical rec , preser - brainst <b>L NEED</b> ysical, f s, Instru identify - CE dards for dical ethi farious to ring varie nparison hin a reg	ss – ss	varior evano ment, hway og, lit I for ation al tim and cal in opose – Pro contac exist	us phase ce of mai Researd vs, setbal erature a all strate circuit of re proble FDA, R nvestigati ed by ICM ocess co cts – ea ing produ mework, ent, 1st E	es of pro rket resea ching the cks, Fea and R&D egies, Te design, I m and te design, I m and te cegulator ons, Ste AR. Introl cha rly adopt icts – me Elsevier Edition, E	duct developm arch. e disease stat sibility screenin ) forums, Ways esting and clin nterface select o propose suita y bodies in In ps for getting F art, bathtub cu eris and demer , 2017 Isevier	ent- 9 9 9 - - - - - - - - - - - - -



## **REFERENCE(S):**

- 1. Des O'brien, Medical Device Regulations Roadmap: A Beginners Guide, 2017
- 2. A Peter J. Ogrodnik, Medical Device Design Innovation from Concept to Market, Elsevier, 2013

Department	BIOWEDICAL ENGI	NEERIN	G	-		K 2019	Semester VIII	P
Course Code	Course Name	Hou	rs / V T	Veek P	Credit C	Total Hours	Maximum Marks	ļ
19BMX17	PHYSIOLOGICAL MODELING	3	0	0	3	45	100	-
<ul> <li>Understa</li> <li>Understa</li> <li>Understa</li> <li>Model dy</li> <li>Develop</li> <li>Simulate</li> <li>Course Outco</li> <li>Explain a</li> </ul>	and the application of Physiological mo and methods and techniques for analys mamically varying physiological system differential equations to describe the d and visualize, dynamic responses of p mes: At the end of this course, learner application of Physiological models.	ourse is idels an isis and n, lynamic ohysiolo rs will be	d Vita synth mod ogical e able	al orga esis o els, mode e to:	ans, f dynami els using	c models software.		
<ul> <li>Model dy</li> <li>Analyze</li> <li>Develop</li> <li>Impleme</li> </ul>	namically varying physiological system and synthesize dynamic models of phy differential equations to describe the d nt physiological models using software	n, /siologio ynamic to get	cal sy mode dynar	stem, els, si nic re	mulate a sponses	nd visuali:	ze,	
Unit I SYS	STEM CONCEPT		-					9
Illustration- exa control systems combination of segments, lum system – dye d	mple of a physiological control systems, run s. System variables and properties – F resistance and compliance. Resistance ped model of physiological thermal sy ilution study of circulation	m. Diffe Resistar æ and o vstem, a	erenc ice – compl and s	e betw both s liance tep re	ween en static and models esponse	gineering d dynamic – respirat of resista	and physiologi c, Compliance a tory system, aou nce – complian	nd nd rtic
Unit II SYS	STEM ANALYSIS	din tak	i nu	5			the second second	9
sinusoidal anal pendelluft. Unit III TRA Review of trans Physiological F ransfer functio oop, pupillary h	vsis of second order system, analysis <b>NSIENTAND FEEDBACK</b> sient and stability analysis. Homeostas eedback systems – Hypophysis adre n analysis of pupillary control system hippus. DELING OF CARDIORIU MONARY S	of resp sis, repr enal sy as a c	resen stems losed	tation s. Noi	tem base , finger tr nlinear s and me	ed on sin racking. C ystems a thod of op	usoidal excitation Characterization nd linearization pening the close	on, 9 of ed
	Secting of CARDIOFOLMONARTS	Dhusia		. ifi		adar dama	nod roomonooo	of
oost systolic o	perations in aortic arch, model of c	ircadiar	n rhyt	thms,	chemica	al regulati	ion of ventilation	on,
Ineyne-Stoke t	FR RUXER OCION MODELS AND	CIMIL	ATI		-			9
Steady state a simulation, mod	analysis of regulation of glucose, Ho deling of eye movement- types of ey ction to digital control system.	odgin-H e move	uxley	moc t, sac	el, Ther cade mo	mal syste del, mod	em – model a el of occulomot	nd tor
TEXT BOOK(S 1. Micheal C. India , New	<b>):</b> K.Khoo ,"Physiological Control System / Delhi ,2001	n Analys	sis, S	imula	tion and	Estimatio	n", Prentice Hal	l of
2. William B.E	Blesser, "A System Approach to Biome	dicine",	McG	raw H	lill Book	Co., New	York, 1969.	
REFERENCE(S	5):	11					August 100	
1. Joseph D,E	Bronzino, "The Biomedical Engineering	g Handl	book'	, CRC	Press,3	Brd Edition	n, 2006	
2. F.C. Hopp Springer, 2	ensteadt and C.S.Peskin, "Modeling nd Edition, 2002	and S	imula	tion i	n Medici	ne and t	he Life Science	es"
CK . Chairm	an - BoS							

Course Code         19BMX18         Course Objective (s         • Understand the         • Learn the proje         • Study the vario         • Know the conc         • Study the vario         • Know the conc         • Study the aspe         Course Outcomes: /         • Formulate the pr         • Evaluate the pr         • Implement the         • Interpret the as         Unit I         INTRODU         Definition of Medical         CMA code of ethics-         Profession, Profession         Unit II       ETHICAL	Course Name MEDICAL ETHICS AND STANDARDS The purpose of learning this of Formulation of the project for the ct performance and analyze the us key financial indicators in pro- epts of infrastructure projects ba- cts of PPP in Infrastructure devi- At the end of this course, learne project for the approval of variou oject performance and analyze y financial indicators in project for infrastructure projects based on pects of PPP in Infrastructure devi- CTION TO MEDICAL ETHICS ethics, Scope of ethics in me Fundamental Responsibilities hal Independence, The Doctor A THEORIES & MORAL PRINCIF	Hou L 3 course is he appro- piect fina ased on f elopmen rs will be is author the risks nancing the diffe evelopm dicine, A - The [	rs / W T 0 to volved ncing the dif t proje able ities, invol	Veek P 0 f varied fferer ects to: ved, ypes roject	Credit C 3 ous autho nt types of of contra	Total Hours 45 orities of contract	Maximum Marks 100
Code 19BMX18 Course Objective (s Understand the Learn the proje Study the vario Know the conc Study the aspe Course Outcomes: / Formulate the pr Analyze the key Implement the Interpret the as Unit I INTRODU Definition of Medical CMA code of ethics- Profession, Profession Unit II ETHICAL	Course Name MEDICAL ETHICS AND STANDARDS The purpose of learning this of Formulation of the project for the ct performance and analyze the us key financial indicators in pro- epts of infrastructure projects based of PPP in Infrastructure device At the end of this course, learne project for the approval of variou oject performance and analyze of financial indicators in project for infrastructure projects based on pects of PPP in Infrastructure device CTION TO MEDICAL ETHICS ethics, Scope of ethics in me Fundamental Responsibilities hal Independence, The Doctor A THEORIES & MORAL PRINCIF	L 3 course is he appro- piect fina ased on t elopmen rs will be as author the risks in ancing the diffe evelopm dicine, A - The [	T 0 to oval of volved ncing the dif t proje able ities, invol	P 0 f varied fferer ects to: ved, vpes roject	C 3 ous autho nt types c of contra	45 orities of contract	Marks 100
19BMX18 Course Objective (s • Understand the • Learn the proje • Study the vario • Know the conc • Study the aspe Course Outcomes: / • Formulate the pr • Evaluate the pr • Analyze the key • Implement the • Interpret the as Unit I INTRODU Definition of Medical CMA code of ethics- Profession, Profession Unit II ETHICAL	MEDICAL ETHICS AND STANDARDS The purpose of learning this of Formulation of the project for the ct performance and analyze the us key financial indicators in pro- pets of infrastructure projects ba- cts of PPP in Infrastructure devi- At the end of this course, learner project for the approval of variour oject performance and analyze y financial indicators in project for infrastructure projects based on pects of PPP in Infrastructure devi- CTION TO MEDICAL ETHICS ethics, Scope of ethics in me Fundamental Responsibilities hal Independence, The Doctor A THEORIES & MORAL PRINCIF	3 sourse is he appro- pject fina ased on t elopmen rs will be us author the risks inancing the diffe evelopm dicine, A - The [	to volved ncing the dif t proje able ities, invol	0 f varie d fferer ects to: ved, vpes roject	3 ous autho nt types c of contra	45 orities of contract	100 t
Course Objective (s Understand the Learn the proje Study the vario Know the conc Study the aspe Course Outcomes: Formulate the pr Evaluate the pr Analyze the key Implement the Interpret the as Unit I INTRODU Definition of Medical CMA code of ethics- Profession, Profession Unit II ETHICAL Theories-Deontology	: The purpose of learning this of Formulation of the project for the ct performance and analyze the us key financial indicators in pro- epts of infrastructure projects ba- cts of PPP in Infrastructure develo- the end of this course, learne project for the approval of variou oject performance and analyze y financial indicators in project fi- infrastructure projects based on pects of PPP in Infrastructure develo- <b>CTION TO MEDICAL ETHICS</b> ethics, Scope of ethics in me Fundamental Responsibilities nal Independence, The Doctor A <b>THEORIES &amp; MORAL PRINCIF</b>	ourse is he appro- risks in- oject fina ased on t elopmen rs will be is author the risks inancing, the diffe evelopm dicine, A - The [	to volved ncing the dir t proje able ities, invol rent t ent pr	f vari d fferer ects to: ved, vpes roject	ous authors of contra	orities of contract	t
Theories-Deontology		And Soci	Docto	can r r and	nedical / I the Pa	Associatio tient, The	on code of ethics Doctor And Th
Maleficence, Benefic practice, Ethical Issu Medicine Unit III HOSPITA Accreditation - JCI	ence, Autonomy, Veracity, Ju- es in biomedical research ,Bi <u>ACCREDITATION STANDRA</u> Accreditation & its Policies. F	stice. Ai oethical DS Patient c	issue issue	my 8 ∋s in  ed s	k Confid Human tandards	Genetics Genetics	ssues in medica s & Reproductive care Organizatio
	SAFETY STANDARDS		-1-1	_			
Life Safety Standard Protecting Individuals Extinguishing Fires Ei Hazardous Material a Inspecting Medical Eq Unit V MEDICAL E	s- Protecting Occupants, Pro From Fire and Smoke, Provide nvironment of Care Standards-I and Waste, Maintaining Fire Sa uipment. QUIPMENT SAFETY STANDA	tecting ing and Minimizir afety Eq	the H Maint ng EC uipme	lospit ainin Risl ent, F	tal From g Fire Al ks, Smok Features,	n Fire, Si larm Syst king Prohi Testing,	moke, and Heat ems, Systems fo ibitions, Managing Maintaining, and
General requirements standards- Base Star radiation protection &	s for basic safety & essenti dard-general requirement of e programmable medical device s	al perfo lectrical ystem, P	rman medi 'articu	ce o cal d ılar S	f medic levices, ( tandards	al equipr Collateral s-type of r	ments.IEC 6060 <sup>°</sup> Standards- EM0 medical device.
<ol> <li>TEXT BOOK(S):</li> <li>W.Ronald Hudso Construction, Ma</li> <li>Raina V.K, "Con Limited, 2009</li> </ol>	on, Ralph Haas, Waheed Udo intenance, Rehabilitation and R struction Management Practic	lin, "Infr enovatio e – The	astruc n", M insi	cture cGra de S	Manage <u>w Hill Pu</u> tory", Ta	ement: In blisher, 20 ata McGra	tegrating, Desigr 013 aw Hill Publishin
REFERENCE(S): 1. Prasanna Chand Hill Publishing Co	ra, "Projects – Planning, Analy mpany Ltd., New Delhi. 2019	sis, Sele	ection	, Imp	lementat	tion Revie	ew", Tata McGrav
Department	BIOMEDICAL ENGINE	ERING	1	6		R 2019	Semester VII
--	---	---	------------------------------	--------------------------------	--	--	---
Course	Course Name	Hou	rs / V	Veek	Credit	Total	Maximum Marks
oout		L	Т	Р	С	nours	
19BMX19	BIO MEMS	3	0	0	3	45	100
Ourse Objec     Understa     Understa     Choose	tive (s): The purpose of learning this cou and the operation of different types of ser and the design issues at micro scale leve the material for any application.	urse is to nsors an el	) d act	uator	rs at mic	ro scale l	evel.
<ul> <li>Apply the</li> </ul>	e concepts to the design of different type	s of mic	ro sy	stems	S.		
Apply the	e knowledge of CAD tools for MEMS des	sign.					
<ul> <li>Describe</li> <li>Outline of Explain of Analyze</li> </ul>	the various MEMS fabrication technique lifferent types of mechanical and thermal different types of electrostatic and piezoe the fluid dynamics in Micro conduits and	will be a es, l actuato lectric a its appli	rs ar ctuat catio	o: Id ser ors a ns,	nsors, nd sens	ors,	
•= Illustrate	various medical applications of MEMS.		A.	_			
Typical MEMs compounds, Si thin film deposi	and Microsystems, materials for ME licon piezoresistors, Gallium Arsenide, o tion, doping, etching, bulk machining, wa	MS - a quartz, p afer bond	active olym ding,	e sub ers. l LIGA	ostrate i Microma	materials achining-	- Silicon and it photolithography
Unit II ME	CHANICAL AND THERMAL SENSORS	S AND A	CTU	ATO	RS		
and thin film m pressure and f thermal couples <b>Unit III</b> EL Parallel plate c	nechanics. Mechanical sensors and actu low measurements, Thermal sensors ar s, thermal resistor, Shape memory alloys ECTROSTATIC AND PIEZOELECTRIC apacitor, pull in effect, Electrostatic sens	uators – nd actua - Inertia SENSC sors and	bea tors- sens RS /	m an actu sor, fl AND	d cantile ator bas ow sens ACTUA - Inertia	ever – m sed on th sor <b>TORS</b> sensor,	icroplates, strair ermal expansior Pressure senso
low sensor, ta actuator – inchy	actile sensor, comb drive. Properties o worm motor, inertia sensor, flow sensor.	f piezoe	electr	ic ma	aterials,	Piezoele	ectric sensor and
Unit IV MIC	CROFLUIDIC SYSTEMS				<u>Bat</u>		
-luid dynamics conduits, fluid f low in a cha nicropumps-co	continuity equation, momentum equation, momentum equation in microconduits, in submicrometer a annel, fluid actuation methods, diele ntinuous flow system, micromixers,	ation, ed and nanc ectropho	quation pscale resis	on of e. Mic , mic	motion croscale crofluid	, lamina fluid, exp dispens	r flow in circula pression for liquid er, microneedle
Unit V AP	PLICATIONS OF BIOMEMS		1.00				9
CAD for MEN Nicrosystem ap Emerging Bio-N	As, micro total analysis systems (M oproaches to polymerase chain reaction MEMS technology: Minimally invasive sur	icroTAS (PCR) gery, O	) de DN/ ncolo	tectic A ser gy, T	on and nsor, ME issue Ei	measur EMS bas ngineerin	ement methods ed drug delivery g, Biosensors.
1. Wanjun W 2007.	ang, Stephen A. Soper, "BioMEMs: Te	chnolog	ies a	nd A	pplicatic	ons", CRO	CPress, New Yo
2. Nitaigour F	Premchand Mahalik, " MEMS", Tata McG	raw Hill	Publ	shing	g Compa	any, New	Delhi, 2007
REFERENCE(S	5):						
1. Chang Liu, 2. Tai Ran H	' Foundations of MEMS', Pearson Educa Hsu, "MEMS and Microsystems Desig	n and	ernati Manı	onal, Ifacti	New Je ire", Ta	ta McGr	A, 2006. aw Hill Publishi
Company, 3. Nadim Mal Edition, Art	New Delhi, 2002 uf, Kirt Williams. "An introduction to Mic tech House Inc, MA, 2004	ro electi	ro Me	echar	nical Sys	stems En	gineering", Seco
Edition, Art	ech House Inc, MA, 2004						

Department	BIOMEDICAL ENGIN	EERING	G			R 2019	Semester VII	I PE
Course		Hour	s / W	leek	Credit	Total	Maximur	n
Code	Course Name	L	Т	Ρ	С	Hours	Marks	
19BMX20	RESEARCH METHODOLOGY	3	0	0	3	45	100	
<ul> <li>Study the</li> <li>Understate</li> <li>understate</li> <li>Know the</li> <li>Study the</li> <li>Course Outco</li> <li>Formulate</li> </ul>	e Project formulation and report prepara and the Project performance and apprai and various Financing infrastructure pro- e concepts of Contracts, bidding process e Impacts of private sector participation <b>mes:</b> At the end of this course, learners te the project for the approval of various	ation pro isal proc jects ss and in s will be s authori	npler able	es menta to:	ition type	°S		
<ul> <li>Analyze</li> <li>Impleme</li> <li>Interpret</li> </ul>	the key financial indicators in project fin nt the infrastructure projects based on t the aspects of PPP in Infrastructure de	the difference	rent t	ypes roject	of contra s.	act,		
Unit I RES	SEARCH FORMULATION AND DESIG	SN .	111	-	/	1	1 2 2 1	9
Conceptual vs Defining and for importance of reviews, monog review, identify Unit II DAT Accepts of me methods, data	. Empirical, concept of applied and ormulating the research problem, select literature review in defining a problem graph, patents, research databases, w ing gap areas from literature and resear <b>TA COLLECTION AND ANALYSIS</b> thod validation, observation and colle processing and analysis strategies and	basic re cting the m, litera reb as a rch data ection of nd tools,	esea pro ture sou base data	rch p blem revie rce, s , dev a, dev a, me anal	erocess, necessi w-primar searching elopmen ethods of ysis with	criteria o ity of defi y and se the web t of workin f data co statically	of good resean ning the proble condary source o, critical literation ng hypothesis.	rch. em, ces, ture <b>9</b> ling ma
Unit III SOI Computer and evolutionary alg optimization, O	FT COMPUTING its role in research, Use of statistical so gorithms - Fundamentals of Genetic alg ptimization of fuzzy systems.	oftware a	9. SPS: , Sim	S, GF iulate	RETL etc d Annea	in researd ling, Neur	ch. Introductior ral Network bas	9 n to sed
Unit IV RES	SEARCH ETHICS, IPR AND SCHOLAR	RY PUB	LISH	IING	10.15	1.16.2		9
Ethics-ethical is commercializati publishing- IMF reproducibility a	ssues, ethical committees (human & an ion, copy right, royalty, trade related as RAD concept and design of research and accountability	imal); IP pects of paper,	PR- ir intel cita	ntelle lectu tion	ctual pro al proper and acki	perty righ ty rights ( nowledge	ts and patent la TRIPS); schola ment, plagiaris	aw, arly sm,
Unit V   INTI	ERPRETATION AND REPORT WRITH	NG						9
Meaning of Inte Writing, Differen Reports, Oral F Reports, Conclu	erpretation, Technique of Interpretation nt Steps in Writing Report, Layout of Presentation, Mechanics of Writing a usions.	, Precai the Res Researc	ution searc sh Re	in In h Re eport,	terpretat port, Typ Precaut	ion, Signi bes of L tions for	ficance of Rep T P C 45 15 ( Writing Resea	oort 04 rch
TEXT BOOK(S 1. Garg, B.L Methodolog	): ., Karadia, R., Agarwal, F. and A gy, RBSA Publishers	garwal,	U.K	., 20	02. An	introduct	tion to Resea	arch
2. Trochim, W	v.M.K., 2005. Research Methods: the co	oncise k	nowl	edge	base, At	omic Dog	Publishing.	-
REFERENCE(S1.Sinha, S.C2.Wadehra,indications	5): . and Dhiman, A.K., 2002. Research Me B.L. 2000. Law relating to patents . Universal Law Publishing	ethodolo , trader	ogy, E narks	Ess E s, co	ss Public pyright	cations. designs	and geograph	ical
(	Chairman - BoS ept.of BME - ESEC				1 N 1		an Constantian Alt to to	

Department	BIOMEDICAL ENGI	NEERIN	G			R 2019	Semester VIII	PE
Course		Hou	rs / W	/eek	Credit	Total	Maximum	1
Code	Course Name	L	Т	Р	С	Hours	Marks	_
19BMX21	CLINICAL ENGINEERING	3	0	0	3	45	100	
<ul> <li>Study the</li> <li>Understan</li> <li>Understan</li> <li>Understan</li> <li>Get knowl</li> </ul>	classification of Hospitals and its Arc id the Electrical power systems in Ho id Air Conditioning & Gas Supply Sys id the basic concepts of Hospital man edge about the Hospital information	chitecture ospital, stems in nagemer	e, Hosp nt and	ital, I Eng	ineering			
Course Outcom Classify th Understan Understan Know abo Attain knov	nes: At the end of this course, learne the architecture and types of hospitals ad how an electrical system should be ad the air conditioning and gas system the importance of Biomedical Engli wledge about the Hospital informatio	rs will be e in a hos ns ineer n.	able spital	to:				
Unit I CLAS	SSIFICATION OF HOSPITAL & ARC	CHITECT	TURE					9
services – inpation and paramedica hospital building	ent, outpatient and emergency. Loca I staff & their functions and respo , design of ward, intensive care unit	ntion and nsibilities s, air co	envii s. Mo nditio	ronm odern ning,	ent of ho Hospita plumbir	spital, Hie al Archite g & sanit	erarchy of medi cture- space ir ation, gas supp	cal n a olv
waste disposal, Central labs, Blo	cleaning, dietary, sterilizing, laundry od banks, OPD, Causality.	y, storag	e an	a ope	eration t	neatre sy	stems, Radiolo	gy,
waste disposal, Central labs, Blo Unit II ELEC	cleaning, dietary, sterilizing, laundry od banks, OPD, Causality. CTRICAL POWER SYSTEMS IN HO	y, storag	e an S			neatre sy	stems, Radiolo	gy, 9
waste disposal, Central labs, Blo Unit II ELEC Safety of electric sub stations, bi Uninterrupted por hospital wiring - s Unit III AIR C Air conditioning Deodorization, d nitrous oxide & va Unit IV HOSI	cleaning, dietary, sterilizing, laundry od banks, OPD, Causality. CTRICAL POWER SYSTEMS IN HO cal systems, Protective systems - int reakers, Surge protectors, EMI fil ower supply for ICU and computer small case study. CONDITIONING & GAS SUPPLY SY and refrigeration systems for small isinfection, dehumidification and cr acuum - Principle of production of liq PITAL ENGINEERING & MANAGEM	y, storag SPITALS terference ters, vol ized mo /STEMS and lar yogenic uid oxyge /ENT	e an e of j ltage nitori ge a syste en. M	oatier stab ng u reas. ems. lanag	Air cha Centrali	ection gro generator ecification nges, filte zed supp fts fire figl	stems, Radiolo unding. Design sets and UF & estimation ering and steril ly of air, oxyge hting equipment	9 9 0f 2S. for 9 ity. en, ts. 9
waste disposal, Central labs, Blo Unit II ELEC Safety of electric sub stations, bi Uninterrupted por hospital wiring - s Unit III AIR C Air conditioning Deodorization, d nitrous oxide & vi Unit IV HOSI Definition of bio department - se preventive mainter maintenance pro 9000 Certificates	cleaning, dietary, sterilizing, laundry od banks, OPD, Causality. CTRICAL POWER SYSTEMS IN HO cal systems, Protective systems - int reakers, Surge protectors, EMI fillower supply for ICU and computer small case study. CONDITIONING & GAS SUPPLY SY and refrigeration systems for small isinfection, dehumidification and cr acuum - Principle of production of liq PITAL ENGINEERING & MANAGEN medical Engineering, clinical enginervicing and maintenance, testing, enance planning, MROs. Training of tocedures. Preparation of estimates, - Obtaining ISO certificates in hospit	y, storag SPITALS terference ters, vol- ized mo- <b>/STEMS</b> and lar yogenic uid oxygenic uid oxygenic uid oxygenic uid oxygenic acceptar men for specificat tals. Prop	e and e of p ltage nitorin ge an syste en. M & hos nce 8 media ations	patier stab ng un reas. ems. lanag spital k mai cal ec s, ten l prot	Air cha Centraliz ement li emgine dintenanc quipmen der deta ocols.	ection gro generator ecification nges, filte zed supp fts fire figl ering. Imp e protoco ts prevent nils etc. Ir	stems, Radiolo unding. Design sets and UF & estimation ering and sterili ly of air, oxyge nting equipment portance of BN ols, Computeriz tive and periodic mportance of IS	9 of pS. for 9 ity. 9 ME ed cal SO
waste disposal, Central labs, Blo Unit II ELEC Safety of electric sub stations, bi Uninterrupted po hospital wiring - s Unit III AIR C Air conditioning Deodorization, d nitrous oxide & v Unit IV HOSI Definition of bio department - se preventive mainter maintenance pro 9000 Certificates Unit V HOSI	cleaning, dietary, sterilizing, laundry od banks, OPD, Causality. CTRICAL POWER SYSTEMS IN HO cal systems, Protective systems - int reakers, Surge protectors, EMI fil ower supply for ICU and computer small case study. CONDITIONING & GAS SUPPLY SY and refrigeration systems for small isinfection, dehumidification and cri acuum - Principle of production of liq PITAL ENGINEERING & MANAGEN medical Engineering, clinical engin ervicing and maintenance, testing, enance planning, MROs. Training of bcedures. Preparation of estimates, - Obtaining ISO certificates in hospit PITAL INFORMATION SYSTEM	y, storag SPITALS terference ters, vol ized mo <b>(STEMS</b> and lar yogenic uid oxygenic uid oxygenic uid oxygenic acceptar men for specifica tals. Prop	e an e of p ltage nitori ge al syste en. M & hos nce 8 media ations	oatier stab ng ui reas. ems. lanag spital k mai cal eo s, ten I prot	Air cha centraliz engine der deta ocols.	ection gro generator ecification nges, filte zed supp fts fire figl ering. Imp e protoco ts prevent tils etc. Ir	stems, Radiolo unding. Design sets and UF & estimation ering and sterili ly of air, oxyge nting equipment portance of BM ols, Computeriz tive and periodic mportance of IS	9 of S. for 9 ity. en, ts. 9 AE ed cal 50 9
waste disposal,         Central labs, Blo         Unit II       ELEC         Safety of electric         sub stations, bi         Uninterrupted point         hospital wiring - s         Unit III       AIR C         Air conditioning         Deodorization, d         nitrous oxide & v.         Unit IV       HOSI         Definition of bio         department - se         preventive mainter         maintenance pro         9000 Certificates         Unit V       HOSI         Role of database         configuration. St         nistory etc. Com         nformation syste	cleaning, dietary, sterilizing, laundry od banks, OPD, Causality. CTRICAL POWER SYSTEMS IN HO cal systems, Protective systems - int reakers, Surge protectors, EMI fillower supply for ICU and computer small case study. CONDITIONING & GAS SUPPLY SY and refrigeration systems for small isinfection, dehumidification and cri- acuum - Principle of production of liq PITAL ENGINEERING & MANAGEN medical Engineering, clinical engine ervicing and maintenance, testing, enance planning, MROs. Training of iccedures. Preparation of estimates, - Obtaining ISO certificates in hospit PITAL INFORMATION SYSTEM se in HIS. Need of Networking in ructuring medical records to carry puterization in pharmacy & billing. m.	y, storag SPITALS terference ters, vol ized mo <b>(STEMS</b> and lar yogenic uid oxygenic uid oxygenic uid oxygenic acceptar men for specificat tals. Prop HIS. Co out func Automa	e and e of p ltage nitorin ge an syste en. M & hos nce 8 medications oosed	oatier stab ng ui reas. ems. lanag spital k mai cal eo s, ten l prot like clinic	Air cha Centralia engine dintenanc quipmen der deta ocols.	ection gro generator ecification nges, filte zed supp fts fire figl ering. Imp e protoco ts prevent nils etc. Ir orking, to ons, discl atory syst	stems, Radiolo unding. Design sets and UF & estimation ering and sterili ly of air, oxyge nting equipment portance of BN ols, Computeriz tive and periodic mportance of IS opologies and harges, treatment tems & radiolo	9 of S. for 9 ity. en, ts. 9 ME ed cal SO 9 its ent gy
waste disposal, Central labs, Blo Unit II ELEC Safety of electric sub stations, bi Uninterrupted por hospital wiring - s Unit III AIR C Air conditioning Deodorization, d nitrous oxide & v Unit IV HOSI Definition of bio department - se preventive mainter maintenance pro 9000 Certificates Unit V HOSI Role of databas configuration. St history etc. Com	cleaning, dietary, sterilizing, laundry od banks, OPD, Causality. CTRICAL POWER SYSTEMS IN HO cal systems, Protective systems - intreakers, Surge protectors, EMI fil ower supply for ICU and computer small case study. CONDITIONING & GAS SUPPLY SY and refrigeration systems for small isinfection, dehumidification and cr acuum - Principle of production of liq PITAL ENGINEERING & MANAGEM medical Engineering, clinical enginervicing and maintenance, testing, enance planning, MROs. Training of cedures. Preparation of estimates, - Obtaining ISO certificates in hospite PITAL INFORMATION SYSTEM Se in HIS. Need of Networking in- ructuring medical records to carry aputerization in pharmacy & billing. m.	y, storag SPITALS terference ters, vol- ized mo <b>/STEMS</b> and lar yogenic uid oxygenic uid oxygenic uid oxygenic uid oxygenic acceptar men for specificat tals. Prop HIS. Co out func Automa	e and e of p ltage nitorin ge an syste en. M & hos nce 8 media ations oosed	oatier stab ng un reas. ems. lanag spital k mai cal eo s, ten l prote like clinic	Air cha Centraliz engined intenanc quipmen der deta ocols.	ection gro generator ecification nges, filte zed supp fts fire figl ering. Imp e protoco ts prevent nils etc. Ir orking, to ons, discl atory syst	stems, Radiolo unding. Design sets and UF & estimation ering and sterili ly of air, oxyge nting equipment portance of BM ols, Computeriz tive and periodic mportance of IS opologies and harges, treatment tems & radiolo	9 of S. for 9 ity. ed cal SO 9 its ent gy

RE	FERENCE(S):
1.	Gupta, Kant, Chandrashekhar, Satpathy, Modern Trends in Planning and Designing of Hospitals
	Principles and Practice with CD-ROM, Jaypee Medical publishers, 1/e, 2007
2.	Sharma, Essentials for Hospital Support Services and Physical Infrastructure, 1/e, Jaypee Medical
	Publishers 2003
3.	Harold E. Smalley, "Hospital Management Engineering – A guide to the improvement of hospital management system", PHI.

CX &

Department	BIOMEDICAL ENGIN	NEERIN	G			R 2019	Semester VIII	PE
Course	it i must specialized and	Hou	rs / V	Veek	Credit	Total	Maximum	I
Code	Course Name	L	T	Р	С	Hours	Marks	
19BMX22	PRINCIPLES OF TISSUE ENGINEERING	3	0	0	3	45	100	
Demons     Demons     Understa     understa     Study th Course Outcom     Formula	trate knowledge of the difference betwee and the Project performance and appra nd various Financing infrastructure pro and different synthetic and biomaterials <u>e Impacts of private sector participation</u> les: At the end of this course, learners te the project for the approval of variou	een cell isal pro ojects n will be a s autho	s and cedur able to	tissu res o:	es			
<ul> <li>Evaluate</li> <li>Analyze</li> <li>Impleme</li> <li>Interpret</li> </ul>	the project performance and analyze to the key financial indicators in project fir nt the infrastructure projects based on the aspects of PPP in Infrastructure de	the risks nancing the diffe evelopm	s invo , erent t ient p	lved, types roject	of contra	act,		
	DAMENTALS OF TISSUE ENGINEE	RING				112		9
Tissue exchan engineering. C aggregation an	ge and tissue development - Objective ell cycle and differentiation - cell adho d tissue equivalent.	es of tis esion -	sue e cell a	engine Idhes	eering - l ion mole	_aborator cules - c	y set up for tiss ell migration - c	ue cell
Unit II STE	EM CELLS						a han nev	9
pluripotency ar bone marrow - Unit III   CO Cell and Drug	d immortalization. Sources of stem c primordial germ cells - cancer stem cel MPONENTS OF TISSUE ENGINEERI delivery systems - Transplantation – Ir	ells: ha lls - indu <b>NG</b> nplantat	emate uced   tion -	opoet pleuri Syntl	ic – feta potent st hetic con	I - cord b em cells. nponents	olood – placenta	a - 9 9
in tissue engine	ering – Imaging methods: SEM, TEM,	Fluores	scent	and (	Confocal	microsco	py.	-
Unit IV   MA	FERIALS IN TISSUE ENGINEERING			-				9
Biological mate	rials – degradable and non degradable	e – extra	a celli	ular n	natrix – d	ecellulari	zation - Polyme	rs:
Init V AD		- applica	ations	orpo	biymer.	1		9
Replacement E engineering: Ne	ngineering: Artificial organs – cartilage erve regeneration – cardiac tissue rege	e, skin b neration	lood, n – m	panc uscle	reas, kidi regenera	ney and li ation.	ver. Regenerati	ive
1. KetulPopa Francis 20	/· t "Nanotechnology in Tissue Engineerin 11.	ng and	Rege	nerat	ive Medio	cine" CRC	C Press Taylor a	and
2. R Cato T. Taylor and	Laurencin, Lakshmi S "Nanotechnolog Francis 2008.	gy and	lissu	e En	gineering	: The Sc	attold "CRC Pre	ess
1. Nair "Biolo Science ar	<ul> <li>i):</li> <li>i):</li></ul>	Tissue (Ed.) 20	Engin 12	eerin	ıg", Sprir	iger Seri	es in Biomateri	als
2. R. Lanza,	I. Weissman, J. Thomson, and R. F 2: Volume 1 Embryonic Stem Cells: V	Pederse	n, "H 2. Ad	andb ult &	ook of S Fetal St	stem Cell em Cells,	s", Two Volum Academic Pre	es,
Volume 12 2004								33.

Course Code         Course Name         Hours / Week         Credit L         Total Hours         Maximum Marks           19BMX23         MEDICAL TEXTILES         3         0         0         3         45         100           Course Objective (s): The purpose of learning this course is to Understand the technologies of medical textiles         5         100         3         45         100           Course Objective (s): The purpose of learning this course is to Understand the general property of fabric materials         5         5         5         5         5         100         10         3         45         100           Course Outcomes: At the end of this course, learners will be able to: Demonstrate knowledge on basics of medical textiles         5	Department	BIOMEDICAL ENGI	NEERIN	G			R 2019	Semester VIII	PE
Code         Course Name         L         T         P         C         Hours         Marks           19BMX23         MEDICAL TEXTILES         3         0         0         3         45         100           Course Objective (s): The purpose of learning this course is to         Understand the technologies of medical textiles         45         100           Course Objective (s): The purpose of learning this course is to         Understand the technologies of fabric materials         5           Understand the technologies of medical textiles         5         5         5         5         5         5         5         5         100         5         6	Course	a de la compañía de l	Hou	rs / V	leek	Credit	Total	Maximum	1
19BMX23       MEDICAL TEXTILES FUNDAMENTALS       3       0       0       3       45       100         Course Objective (s): The purpose of learning this course is to Understand the technologies of medical textiles             100       3       45       100         Course Objective (s): The purpose of learning this course is to Understand the general property of fabric materials   <	Code	Course Name	L	Т	P	С	Hours	Marks	
Course Objective (s): The purpose of learning this course is to Understand the technologies of medical textiles Understand the general property of fabric materials Know the various medical applications of textiles Study the development and applications of smart medical textiles Explore the various healthcare applications of smart medical textiles Course Outcomes: At the end of this course, learners will be able to: Demonstrate knowledge on basics of medical textile fabrication, Develop different fabrics and technology for specific medical applications, Design and apply Nanofibers technology in medical textile fabrication, Develop different fabrics and technology for specific medical applications, Design and implement wearable sensors in the textiles using modern technology, Determine new ways to use medical textiles with advancements for patient care. Unit 1 INTRODUCTION TO MEDICAL TEXTILES 9 Characteristics of textile fibers - structures of natural and man-made fibers - physical, chemical and morphological structures. Molecular conformations - planar zig-zag, helical, lamellar, and spherulites conformations. Medical textiles - An overview, classification: Implants, Non implants, Extra corporeal, Health care and hygiene. 9 Unit 11 MEDICAL TEXTILE SCIENCE AND TEXTILE COATING 9 Medical textile products, processes and their applications - sutures - bandages - surgical implants - ontracorporeal devices - non-woven technology - medical textile testing. Testing methods and international standards. Fabric coating: properties - polymer coatings - coating methods - medical applications of Nanofibers - Biopolymers Used for Nanofibers - Modification of Nanofibers - Biomedical Applications of Nanofibers - Biopolymers Used for Nanofibers - Modification for Nanofibers - Biomedical Applications of Nanofibers - Biopolymers Used for Nanofibers - Modification Kindney. Human skin wounds - Wound dressing - Pressure gaments. 9 Sutures - Vascular Grafts - Ligament Prosthesis - Hernia Repair Mesh Grafts - Artificial Kidney. Human ski	19BMX23	MEDICAL TEXTILES FUNDAMENTALS	3	0	0	3	45	100	
Determine new ways to use medical textiles with advancements for patient care.     Unit 1 INTRODUCTION TO MEDICAL TEXTILES     9 Characteristics of textile fibers - structures of natural and man-made fibers – physical, chemical and morphological structures. Molecular conformations – planar zig-zag, helical, lamellar, and spherulites conformations. Medical textiles – An overview, classification: Implants, Non implants, Extra corporeal, Health care and hygiene.     Unit II MEDICAL TEXTILE SCIENCE AND TEXTILE COATING     9 Medical textile products, processes and their applications - sutures - bandages – surgical implants - non- surgical implants - extracorporeal devices- non-woven technology – medical textile testing. Testing methods and international standards. Fabric coating: properties - polymer coatings - coating methods - medical applications – lamination.     Unit III MEDICAL AND HEALTHCARE NANOFIBERS     9 Fabrication of Nanofibers - Biopolymers Used for Nanofibers - Modification of Nanofibers - Biomedical Applications of Nanofibers.     Unit IV BIOTEXTILES AND WOUND CARE TEXTILES     9 Patient specific smart medical textiles - Hernia Repair Mesh Grafts – Artificial Kidney. Human skin wounds – Wound dressing – Pressure garments. Unit V SMART MEDICAL TEXTILES AND ITS APPLICATIONS     9 Patient specific smart medical textiles - Smart medical textiles in rehabilitation – Monitoring pregnancy – Monitoring hospitalized children – Wearable textiles for mobile health monitoring. TEXT BOOK(S):     1. Wen Zong, "An introduction to healthcare and medical Textiles", DEStech Publications,Inc. 2013.     2. Volkmar T. Bartels, "Handbook of Medical Textiles", Wood head Publishing, 2011.     3. Daniel Vallero, J. Jeffrey Peirce , "Engineering The Risks of Hazardous Wastes 1st Edition, Kindle Edition, 2003. REFERENCE(S):     Subhash Anand, "Medical textiles and biomaterials for healthcare", Woodhead, 2006     Vool heagenbeuro L (2007) Semet textiles for medicine and horeflaterer", Woodhead, 2006	<ul> <li>Understan</li> <li>Understan</li> <li>Understan</li> <li>Know the</li> <li>Study the</li> <li>Explore the</li> <li>Course Outcome</li> <li>Demonstration</li> <li>Design and</li> <li>Design and</li> <li>Design and</li> </ul>	d the technologies of medical textiles d the general property of fabric mate various medical application of textiles development and applications of hea <u>e various healthcare applications of s</u> s: At the end of this course, learners ate knowledge on basics of medical to d apply Nanofibers technology in medi ifferent fabrics and technology for spid d implement wearable sensors in the	rials sinthcare r smart me will be a extiles, dical tex ecific me textiles	nano edical able to tile fa edical using	fibers texti brica appl g mod	tion, ications,	nology,		
Unit I       INTRODUCTION TO MEDICAL TEXTILES       9         Characteristics of textile fibers - structures of natural and man-made fibers - physical, chemical and morphological structures. Molecular conformations - planar zig-zag, helical, lamellar, and spherulites conformations. Medical textiles - An overview, classification: Implants, Non implants, Extra corporeal, Health care and hygiene.       9         Unit II       MEDICAL TEXTILE SCIENCE AND TEXTILE COATING       9         Medical textile products, processes and their applications - sutures - bandages - surgical implants - non-surgical implants - extracorporeal devices- non-woven technology - medical textile testing. Testing methods and international standards. Fabric coating: properties - polymer coatings - coating methods - medical applications - lamination.       9         Fabrication of Nanofibers - Biopolymers Used for Nanofibers - Modification of Nanofibers - Biomedical Applications of Nanofibers.       9         Sutures - Vascular Grafts - Ligament Prosthesis - Hernia Repair Mesh Grafts - Artificial Kidney. Human skin wounds - Wound dressing - Pressure garments.       9         Unit V       SMART MEDICAL TEXTILES AND ITS APPLICATIONS       9         Patient specific smart medical textiles - Smart medical textiles in rehabilitation - Monitoring pregnancy - Monitoring hospitalized children - Wearable textiles for mobile health monitoring.       9         Patient specific smart medical textiles - Smart medical Textiles", DEStech Publications, Inc. 2013.       2. Volkmar T. Bartels, "Handbook of Medical Textiles", Wood head Publishing, 2011.       3. Daniel Vallero, J. Jeffrey Peirce , "Engineering T	Determine	new ways to use medical textiles wit	th advan	ceme	ents f	or patient	t care.		-
Onit III   MEDICAL AND HEALTHCARE NANOFIBERS       9         Fabrication of Nanofibers - Biopolymers Used for Nanofibers - Modification of Nanofibers - Biomedical Applications of Nanofibers.       9         Unit IV       BIOTEXTILES AND WOUND CARE TEXTILES       9         Sutures - Vascular Grafts - Ligament Prosthesis - Hernia Repair Mesh Grafts - Artificial Kidney. Human skin wounds - Wound dressing - Pressure garments.       9         Unit V       SMART MEDICAL TEXTILES AND ITS APPLICATIONS       9         Patient specific smart medical textiles - Smart medical textiles in rehabilitation - Monitoring pregnancy - Monitoring hospitalized children - Wearable textiles for mobile health monitoring.       9         TEXT BOOK(S):       1.       Wen Zong, "An introduction to healthcare and medical Textiles", DEStech Publications,Inc. 2013.       2.         Volkmar T. Bartels, "Handbook of Medical Textiles", Wood head Publishing, 2011.       3.       Daniel Vallero, J. Jeffrey Peirce , "Engineering The Risks of Hazardous Wastes 1st Edition, Kindle Edition, 2003.         REFERENCE(S):       1.       Subhash Anand, "Medical textiles and biomaterials for healthcare", Woodhead, 2006       2.         Van Langenderico L. (2007). Smoot textiles for medicing and healthcare", Woodhead, 2006       3.	morphological st conformations. M Health care and I Unit II MEDI Medical textile pr surgical implants and international applications – lan	ructures. Molecular conformations Aedical textiles – An overview, clany nygiene. CAL TEXTILE SCIENCE AND TEXT roducts, processes and their applica - extracorporeal devices- non-wover standards. Fabric coating: propert nination.	<ul> <li>plana</li> <li>ssification</li> <li>FILE CC</li> <li>tions - single</li> <li>techno</li> <li>techno</li> <li>tes - pc</li> </ul>	ar zig on: Ir oATIN suture logy - olyme	j-zag nplar IG es - k - me r coa	, helical, hts, Non pandages dical text atings - o	lamellar implants, s – surgic ile testing coating m	, and spheruli , Extra corpore al implants - ne . Testing metho nethods - medi	tes eal, 9 on- ods cal
Pablication of Nahonbers - Biopolymers Used for Nahonbers - Modification of Nahonbers - Biomedical Applications of Nanofibers.         Unit IV       BIOTEXTILES AND WOUND CARE TEXTILES       9         Sutures - Vascular Grafts - Ligament Prosthesis - Hernia Repair Mesh Grafts - Artificial Kidney. Human skin wounds - Wound dressing - Pressure garments.       9         Unit V       SMART MEDICAL TEXTILES AND ITS APPLICATIONS       9         Patient specific smart medical textiles - Smart medical textiles in rehabilitation - Monitoring pregnancy - Monitoring hospitalized children - Wearable textiles for mobile health monitoring.       9         TEXT BOOK(S):       1       Wen Zong, "An introduction to healthcare and medical Textiles", DEStech Publications,Inc. 2013.       2         2. Volkmar T. Bartels, "Handbook of Medical Textiles", Wood head Publishing, 2011.       3       Daniel Vallero, J. Jeffrey Peirce , "Engineering The Risks of Hazardous Wastes 1st Edition, Kindle Edition, 2003.         REFERENCE(S):       1       Subhash Anand, "Medical textiles and biomaterials for healthcare", Woodhead, 2006         2       Von Lagraphore L (2007). Smart textiles for medicine and healthcare", Woodhead, 2006	Unit III   MEDI	CAL AND HEALTHCARE NANOFIE	BERS		Madi	Gentlen	f Manafil	nana Diamadi	9
Unit IV       BIOTEXTILES AND WOUND CARE TEXTILES       9         Sutures – Vascular Grafts – Ligament Prosthesis – Hernia Repair Mesh Grafts – Artificial Kidney. Human skin wounds – Wound dressing – Pressure garments.       9         Unit V       SMART MEDICAL TEXTILES AND ITS APPLICATIONS       9         Patient specific smart medical textiles – Smart medical textiles in rehabilitation – Monitoring pregnancy – Monitoring hospitalized children – Wearable textiles for mobile health monitoring.       9         TEXT BOOK(S):       1       Wen Zong, "An introduction to healthcare and medical Textiles", DEStech Publications,Inc. 2013.         2. Volkmar T. Bartels, "Handbook of Medical Textiles", Wood head Publishing, 2011.       3         3. Daniel Vallero, J. Jeffrey Peirce , "Engineering The Risks of Hazardous Wastes 1st Edition, Kindle Edition, 2003.         REFERENCE(S):       1         1. Subhash Anand, "Medical textiles and biomaterials for healthcare", Woodhead, 2006	Applications of N	anolibers - Biopolymers Used for h	vanonbe	ers -	woai	lication c	n nanoni	bers - Biomedi	car
<ul> <li>Sutures – Vascular Grafts – Ligament Prosthesis – Hernia Repair Mesh Grafts – Artificial Kidney. Human skin wounds – Wound dressing – Pressure garments.</li> <li>Unit V SMART MEDICAL TEXTILES AND ITS APPLICATIONS 9</li> <li>Patient specific smart medical textiles – Smart medical textiles in rehabilitation – Monitoring pregnancy – Monitoring hospitalized children – Wearable textiles for mobile health monitoring.</li> <li>TEXT BOOK(S): <ol> <li>Wen Zong, "An introduction to healthcare and medical Textiles", DEStech Publications,Inc. 2013.</li> <li>Volkmar T. Bartels, "Handbook of Medical Textiles", Wood head Publishing, 2011.</li> <li>Daniel Vallero, J. Jeffrey Peirce, "Engineering The Risks of Hazardous Wastes 1st Edition, Kindle Edition, 2003.</li> </ol> </li> <li>REFERENCE(S): <ol> <li>Subhash Anand, "Medical textiles and biomaterials for healthcare", Woodhead, 2006</li> </ol> </li> </ul>	Unit IV   BIOT	EXTILES AND WOUND CARE TEX	TILES						9
Unit V       SMART MEDICAL TEXTILES AND ITS APPLICATIONS       9         Patient specific smart medical textiles – Smart medical textiles in rehabilitation – Monitoring pregnancy –         Monitoring hospitalized children – Wearable textiles for mobile health monitoring.         TEXT BOOK(S):         1. Wen Zong, "An introduction to healthcare and medical Textiles", DEStech Publications,Inc. 2013.         2. Volkmar T. Bartels, "Handbook of Medical Textiles", Wood head Publishing, 2011.         3. Daniel Vallero, J. Jeffrey Peirce, "Engineering The Risks of Hazardous Wastes 1st Edition, Kindle Edition, 2003.         REFERENCE(S):         1. Subhash Anand, "Medical textiles and biomaterials for healthcare", Woodhead, 2006	Sutures – Vascu skin wounds – W	lar Grafts – Ligament Prosthesis – F ound dressing – Pressure garments.	Hernia F	Repair	Mes	sh Grafts	- Artificia	al Kidney. Hum	an
<ul> <li>Patient specific smart medical textiles – Smart medical textiles in rehabilitation – Monitoring pregnancy – Monitoring hospitalized children – Wearable textiles for mobile health monitoring.</li> <li>TEXT BOOK(S): <ol> <li>Wen Zong, "An introduction to healthcare and medical Textiles", DEStech Publications,Inc. 2013.</li> <li>Volkmar T. Bartels, "Handbook of Medical Textiles", Wood head Publishing, 2011.</li> <li>Daniel Vallero, J. Jeffrey Peirce, "Engineering The Risks of Hazardous Wastes 1st Edition, Kindle Edition, 2003.</li> </ol> </li> <li>REFERENCE(S): <ol> <li>Subhash Anand, "Medical textiles and biomaterials for healthcare", Woodhead, 2006</li> </ol> </li> </ul>	Unit V SMAF	RT MEDICAL TEXTILES AND ITS A	PPLICA	TION	IS		1. M.	in the set	9
<ol> <li>TEXT BOOK(S):         <ol> <li>Wen Zong, "An introduction to healthcare and medical Textiles", DEStech Publications,Inc. 2013.</li> <li>Volkmar T. Bartels, "Handbook of Medical Textiles", Wood head Publishing, 2011.</li> <li>Daniel Vallero, J. Jeffrey Peirce, "Engineering The Risks of Hazardous Wastes 1st Edition, Kindle Edition, 2003.</li> </ol> </li> <li>REFERENCE(S):         <ol> <li>Subhash Anand, "Medical textiles and biomaterials for healthcare", Woodhead, 2006</li> <li>Van Langenboya, L. (2007). Smort textiles for medicine and healthcare. Woodhead, 2006</li> </ol> </li> </ol>	Patient specific s Monitoring hospit	mart medical textiles – Smart medical textiles for a lized children – Wearable textiles for	cal texti or mobile	les in heal	reha th mo	abilitation onitoring.	– Monito	pring pregnancy	1-
<ol> <li>Wen Zong, "An introduction to healthcare and medical Textiles", DEStech Publications, Inc. 2013.</li> <li>Volkmar T. Bartels, "Handbook of Medical Textiles", Wood head Publishing, 2011.</li> <li>Daniel Vallero, J. Jeffrey Peirce, "Engineering The Risks of Hazardous Wastes 1st Edition, Kindle Edition, 2003.</li> <li>REFERENCE(S):         <ol> <li>Subhash Anand, "Medical textiles and biomaterials for healthcare", Woodhead, 2006</li> <li>Van Langenboyo, L. (2007). Smort textiles for medicine and healthcare", Woodhead, 2006</li> </ol> </li> </ol>	TEXT BOOK(S):		. ÷.						(* s.
<ol> <li>Volkmar T. Bartels, "Handbook of Medical Textiles", Wood head Publishing, 2011.</li> <li>Daniel Vallero, J. Jeffrey Peirce, "Engineering The Risks of Hazardous Wastes 1st Edition, Kindle Edition, 2003.</li> <li>REFERENCE(S):         <ol> <li>Subhash Anand, "Medical textiles and biomaterials for healthcare", Woodhead, 2006</li> <li>Van Langenboya, L. (2007). Smort textiles for medicine and healthcare. Woodhead, 2006</li> </ol> </li> </ol>	1. Wen Zong, "	An introduction to healthcare and me	edical Te	xtiles	", DE	Stech Pu	ublication	s,Inc. 2013.	
Edition, 2003. <b>REFERENCE(S):</b> 1. Subhash Anand, "Medical textiles and biomaterials for healthcare", Woodhead, 2006 2. Ven Longenboye, L. (2007). Smort textiles for medicine and healthcare. Wead head mubliching 1 to 11/2	<ol> <li>Volkmar T. E</li> <li>Daniel Valle</li> </ol>	Bartels, "Handbook of Medical Textile ro, J. Jeffrey Peirce , "Engineering	s", Woo The Ri	d hea sks c	d Pu f Ha	blishing, zardous	2011. Wastes 1	Ist Edition, Kin	dle
KEFERENCE(S):     Subhash Anand, "Medical textiles and biomaterials for healthcare", Woodhead, 2006     Von Langenbeve, L. (2007). Smort textiles for medicine and healthcare. Wood head publishing Ltd. LV(	Edition, 2003	3.			1	- and the second		1	
Subhash Ananu, Medical textiles and biomatenais for healthcare, Woodhead, 2006	1 Subbach Ar	and "Madical taxtilas and hismataria	lo for h-	altha	are"	Maadha	ad 2006	*	
Von Longonnovo L ////// Smort toutiles ter medicine and heatherers Weed head nublishing in the	1. Subnash Aha	and, iviedical textiles and biomateria	is for ne	aiinc	are,	vvoodnea	au, 2006		

CK S Chairman - BoS Dept.of BME - ESEC

a filling of the second s	BIOMEDICAL ENGI	NEERIN	G		0.13	R 2019	Semester VII	PE
Course		Hou	rs / V	Veek	Credit	Total	Maximur	n
Code	Course Name	L	Т	Ρ	С	Hours	Iviarks	
19BMX24	WEARABLE SYSTEMS	3	0	0	3	45	100	
<ul> <li>Study the</li> <li>Understa</li> <li>Know the</li> <li>Study the</li> <li>Study the</li> <li>Explore the</li> <li>Differenti</li> <li>Process the</li> <li>Utilize differenti</li> <li>Analyze the</li> <li>Apply the</li> <li>Unit I</li> <li>WEA</li> <li>Need for weara</li> <li>sensor, Induction</li> <li>Biosensors, E-1</li> <li>Unit I</li> <li>SIG</li> </ul>	a various types of sensors that can be and the Process the signals picked by a sources of energy to be used for weat a technical aspects of wireless health the wearable sensors into novel medic es: At the end of this course, learners ate the sensors that can be used for weat the signals picked by the wearable se ferent sources of energy to be used for the technical aspects of wireless health wearable sensors into novel medical <b>ARABLE DEVICES SENSORS</b> able systems, Sensors for wearable se ive plethysmography, Impedance p sensor, GSR, Radiant thermal se fextiles, Bio compatibility. <b>NAL PROCESSING FOR WEARABL</b>	used for the wear arable sy systems al applic will be a vearable nsors, or weara h system applicat ystems- olethysmensor, V	r wea rable vstem able to syste ble sy ns, ions. Inertia ograp Veara	rable sense s o: ems, vstem a mov ohy, able	systems ors s, vement s pneumo motion	ensors, F graphy, V sensors,	Respiration act Wearable gro CMOS – Ba	9 vity und sed
Nearability issu	les -physical shape and placement o	f sensor	Tec	hnica	l challen	ges - sen	isor design, sig	nal
acquisition, Co	nstraint on sampling frequency for	reduce	ed er	nergy	consum	nption, lig	ght weight sig	nal
processina. Rei	ection of irrelevant information. Data i	nining						
	eeden er melevant mermation, Bata i	mining.		_				
	RGY HARVESTING FOR WEARABI	E DEVI	CES					9
Unit III ENE	RGY HARVESTING FOR WEARABI	E DEVI source	CES for p	owei	r genera	tion, Hyb	rid thermoeled	9 tric:
Unit III ENE Solar cell, The photovoltaic ene	RGY HARVESTING FOR WEARABI rmal based human body as a heat ergy harvests, Thermopiles.	E DEVI source	CES for p	owei	r genera	tion, Hyb	rid thermoeled	9 tric
Unit III ENE Solar cell, The photovoltaic ene Unit IV HEA	RGY HARVESTING FOR WEARABI rmal based human body as a heat ergy harvests, Thermopiles. LTH CARE SYSTEMS	E DEVI source	for p	oowei N and	r genera	tion, Hyb	rid thermoeled	9 tric 9 es-
Unit III ENE Solar cell, The photovoltaic ene Unit IV HEA Need for wireles System security	RGY HARVESTING FOR WEARABI rmal based human body as a heat ergy harvests, Thermopiles. ALTH CARE SYSTEMS as monitoring, Definition of Body area and reliability, BAN Architecture – Int	LE DEVI source network	CES for p c, BA	N and	r genera I Healthc s commu	tion, Hyb are, Tech nication t	nical Challeng echniques.	9 tric 9 es-
Unit III     ENE       Solar cell, The     photovoltaic ene       Unit IV     HEA       Need for wireles       System security       Unit V     APP	RGY HARVESTING FOR WEARABI rmal based human body as a heat ergy harvests, Thermopiles. ALTH CARE SYSTEMS and reliability, BAN Architecture – Int PLICATIONS OF WEARABLE SYSTE	network	for p for p c, BA n, Wi	N and reless	genera I Healthc s commu	tion, Hyb are, Tech nication t	nical Challeng echniques.	9 tric 9 es-
Unit III       ENE         Solar cell, The       photovoltaic ene         Unit IV       HEA         Need for wireles       System security         Unit V       APP         Medical Diagno       Multi parameter         Application – Mi       TEXT BOOK(S)         1.       Sandeep H         Safety,Sec       2	RGY HARVESTING FOR WEARABI rmal based human body as a heat ergy harvests, Thermopiles. LTH CARE SYSTEMS as monitoring, Definition of Body area and reliability, BAN Architecture – Inter- LICATIONS OF WEARABLE SYSTE stics, Medical Monitoring-Patients with r monitoring, Neural recording, Gait litary Clothing, Tracking Devices and S. Gupta, Tridib Mukherjee, Krishna urity, and Sustainability," Cambridge I Yuce Jamil Y Khan "Wireless Bo	network roductio MS th chron analysi Biometri Kumar Jniversit	CES for p c, BA n, Wi ic dis s, Sp c Ser Ven y Pre	N and reless ease ports nsors katas ss, 20 work	Healthc s commu , Hospita Medicine for Healt ubraman 013. s Techn	tion, Hyb are, Tech nication t I patients a, Smart th Moniton ian, "Boo	nnical Challeng echniques. 5, Elderly patie Fabrics, Defe ring. dy Area Netwo	9 es- 9 nts, nse orks
Unit III       ENE         Solar cell, The       photovoltaic ene         Unit IV       HEA         Need for wireles       System security         Unit V       APP         Medical Diagno       Multi parameter         Application – Mi       TEXT BOOK(S)         1.       Sandeep H         Safety,Sec       2.         Mehmet R       Application	RGY HARVESTING FOR WEARABI rmal based human body as a heat ergy harvests, Thermopiles. ALTH CARE SYSTEMS as monitoring, Definition of Body area and reliability, BAN Architecture – International Content of Body area and reliability, BAN Architecture – International Content LICATIONS OF WEARABLE SYSTE stics, Medical Monitoring-Patients with r monitoring, Neural recording, Gait litary Clothing, Tracking Devices and Content of Mukherjee, Krishna urity, and Sustainability," Cambridge I . Yuce, Jamil Y.Khan, "Wireless Bo s", Pan Stanford Publishing Pvt.Ltd, S	E DEVI source network roductio MS th chron analysi Biometri Biometri Jniversit dy Area ingapore	CES for p c, BA n, Wi ic dis s, Sp c Ser Ven y Pre a Net c, 201	N and reless ease ports nsors katas ss, 20 work 2	Healthc s commu , Hospita Medicine for Healt ubraman 013. s Techn	tion, Hyb care, Tech nication t I patients b, Smart th Moniton ian, "Boo ology, Im	nnical Challeng echniques. s, Elderly patie Fabrics, Defe ring. dy Area Netwo plementation	9 es- 9 nts, nse orks and
Unit III       ENE         Solar cell, The       Solar cell, The         photovoltaic ene       Unit IV       HEA         Need for wireles       System security         Unit V       APP         Medical Diagno       Multi parameter         Application – Mi       Safety,Sec         2.       Mehmet R         Application       REFERENCE(S)         1.       Annalisa Book	RGY HARVESTING FOR WEARABI rmal based human body as a heat ergy harvests, Thermopiles. ALTH CARE SYSTEMS as monitoring, Definition of Body area and reliability, BAN Architecture – Inf CLICATIONS OF WEARABLE SYSTE stics, Medical Monitoring-Patients wi r monitoring, Neural recording, Gait litary Clothing, Tracking Devices and clication of Sustainability," Cambridge I . Yuce, Jamil Y.Khan, "Wireless Bo s",Pan Stanford Publishing Pvt.Ltd, S c): configlio, Danilo De Rossi ."Wearable M	E DEVI source network roductio MS th chron analysi Biometri Jniversit dy Area ingapore	CES for p for p c, BAI n, Wi ic dis s, Sp c Ser Ven y Pre a Net e, 201	N and reless ease oorts nsors katas ss, 20 work: 2	d Healtho s commu , Hospita Medicine for Healt ubraman 013. s Techn	tion, Hyb care, Tech nication t il patients b, Smart th Moniton ian, "Boo ology, Im er, 2011.	nnical Challeng echniques. 5, Elderly patie Fabrics, Defe ring. dy Area Netwo pplementation	9 es- 9 nts, nse orks and
Unit III       ENE         Solar cell, The       Photovoltaic ene         Unit IV       HEA         Need for wireles       System security         Unit V       APP         Medical Diagno       Multi parameter         Application – Mi       Safety,Sec         1.       Sandeep H         Safety,Sec       Safety,Sec         2.       Mehmet R         Application       REFERENCE(S)         1.       Annalisa Be         2.       Hang,Yuan	RGY HARVESTING FOR WEARABI rmal based human body as a heat ergy harvests, Thermopiles. LTH CARE SYSTEMS as monitoring, Definition of Body area and reliability, BAN Architecture – Inter- LICATIONS OF WEARABLE SYSTE stics, Medical Monitoring-Patients with r monitoring, Neural recording, Gait litary Clothing, Tracking Devices and S. Gupta, Tridib Mukherjee, Krishna urity, and Sustainability," Cambridge I . Yuce, Jamil Y.Khan, "Wireless Bot s", Pan Stanford Publishing Pvt.Ltd, S ): onfiglio, Danilo De Rossi, "Wearable M -Ting,"wearable medical sensors and	E DEVI source network roductio MS th chron analysi Biometri Kumar Jniversit dy Area ingapore	CES for p for p k, BA n, Wi ic dis s, Sp c Ser Ven y Pre a Net e, 201 g Sys s", Sp	N and reless ease oorts nsors katas ss, 20 works 2 tems	Healthc s commu , Hospita Medicine for Healt ubraman 013. s Techn ", Spring -2013	tion, Hyb are, Tech nication t I patients a, Smart th Moniton ian, "Boo ology, Im er, 2011.	nnical Challeng echniques. 5, Elderly patie Fabrics, Defe ring. dy Area Netwo plementation	9 es- 9 nts, nse orks and
Unit III       ENE         Solar cell, The       photovoltaic ene         Unit IV       HEA         Need for wireles       System security         Unit V       APP         Medical Diagno       Multi parameter         Application – Mi       TEXT BOOK(S)         1.       Safety,Sec         2.       Mehmet R         Application       REFERENCE(S)         1.       Annalisa Book         2.       Hang,Yuan         3.       Guang-Zho	RGY HARVESTING FOR WEARABI rmal based human body as a heat ergy harvests, Thermopiles. ALTH CARE SYSTEMS as monitoring, Definition of Body area and reliability, BAN Architecture – Inter- CLICATIONS OF WEARABLE SYSTE stics, Medical Monitoring-Patients with r monitoring, Neural recording, Gait litary Clothing, Tracking Devices and clication of Sustainability, "Cambridge I . Yuce, Jamil Y.Khan, "Wireless Bo s",Pan Stanford Publishing Pvt.Ltd, S .): onfiglio, Danilo De Rossi, "Wearable M -Ting, "wearable medical sensors and ong Yang (Ed.), "Body Sensor Network	E DEVI source network roductio MS th chron analysi Biometri Biometri Jniversit dy Area ingapore lonitoring systems s. "Sprin	CES for p for p k, BA n, Wi ic dis s, Sp c Ser Ven y Pre a Net c, 201 g Sys s", Spi ger, 3	N and reless ease oorts nsors katas ss, 20 works 2 tems ringer 2006	d Healtho s commu , Hospita Medicine for Healt ubraman 013. s Techn ", Spring -2013	tion, Hyb care, Tech nication t I patients b, Smart th Moniton ian, "Boo ology, Im er, 2011.	nnical Challeng echniques. s, Elderly patie Fabrics, Defe ring. dy Area Netwo plementation	9 es- 9 nts, nse orks and

CK:0 Chairman - BoS Dept.of BME - ESEC

	BIOMEDICAL ENGI	NEERIN	G			R 2019	Semester VII	PE
Course	Course Name	Hou	rs / V	/eek	Credit	Total	Maximur	n
oue	oourse Name	L	T	P	С	nours	Marks	
19BMX25	MEDICAL OPTICS	3	0	0	3	45	100	
Course Objective Establish a Employ qua Understand Develop the questions Explore the Course Outcomes Implement, models for o Describe ar applications Applying an therapeutic Applying fu and imaging Understand	(s): The purpose of learning this con- basic background of tissue optics antitative approaches to analyze pho- the basic principles, capabilities, a e capability of applying the right m advanced methods in optical imagi At the end of this course, learners model, value and verify light-tissue diagnostic and therapeutic use, and choose suitable light sources, de and demands, and understanding the role of lase processes, ndamental processes of light inter g, ing the advanced topics in optical in AMENTALS OF TISSUE OPTICS	urse is to oton-tiss nd limita nicroscop ing and a will be a will be a le interac etectors a ers in m raction w maging	ue inf tions by teo applic able to ction and v nedici	teracion of va chniq ation o: mod vavel ne, f iolog	tions rious ligh ue(s) to els and a engths a their app ical tissu	apply ligh pplicable dications	opy techniques specific biome t tissue intera- to specific me in diagnostic otical spectrose	s dica dica and copy
Dreparties Math	nt with Matter-Characteristics of L	.ight – V	Vhat	is Bi	omedica	I Optics?	– Tissue Op	ical
Properties – Math Equation: First C Theory – Laser C Photoabalative Pro Unit II BASIC Instrumentation for pressure Arc Lan Polarizer, Optical and Phase Resolv	nt with Matter-Characteristics of L nematical Models for Light Transpo- order Approximation – Diffusion / characteristics – Laser Tissue Inter ocesses. INSTRUMENTATION IN BIOPHO or Absorption-Scattering and Emission of Light Emitting Diode (LED) Detectors: Single Channel and Mul ed Detection Methods.	ight – V ort in Tu Approxin raction – TONICS sion Mea – Lase Itichanne	Vhat Irbid natior - Che asure ers, F el Det	is Bi Medi a-Mor emica ment Photo ector	omedica a like Tii nte Cark I – Ther s, Excita plethysm s – Optic	I Optics? ssues: Ra Modellin mal – Ele ation Ligh ography, cal Fibers	<ul> <li>Tissue Op adiative Trans ng, KubelkaM ectromechanic</li> <li>t Sources – H Optical Filter = Time Resol</li> </ul>	ical port unk al – 9 ligh s – ved
Properties – Math Equation: First C Theory – Laser C Photoabalative Pro Unit II BASIC Instrumentation for pressure Arc Lan Polarizer, Optical and Phase Resolv Unit III MEDIC	nt with Matter-Characteristics of L nematical Models for Light Transport order Approximation – Diffusion A characteristics – Laser Tissue Inter occesses. INSTRUMENTATION IN BIOPHO or Absorption-Scattering and Emission op – Light Emitting Diode (LED) Detectors: Single Channel and Mul ed Detection Methods. AL APPLICATIONS OF LASERS	ight – V ort in Tu Approxin raction – <b>TONICS</b> sion Mea – Lase Itichanne	Vhat urbid natior - Che asure ers, F el Det	is Bi Medi a-Mor emica ment Photo ector	omedica a like Ti nte Carlo I – Ther s, Excita plethysm s – Optio	I Optics? ssues: Ra Modellin mal – Ele ntion Ligh ography, cal Fibers	<ul> <li>Tissue Op</li> <li>adiative Trans</li> <li>ng, KubelkaM</li> <li>ectromechanica</li> <li>t Sources – H</li> <li>Optical Filter</li> <li>Time Resol</li> </ul>	ical port unk al – 9 ligh s – ved
Properties – Math Equation: First C Theory – Laser C Photoabalative Pro Unit II BASIC Instrumentation for pressure Arc Lan Polarizer, Optical and Phase Resolv Unit III MEDIC Laser Tissue We Endometriosis-Ste Tattoo and Hair Re Angle-Iris and Le Hard Tissues and	nt with Matter-Characteristics of L nematical Models for Light Transpo- order Approximation – Diffusion / characteristics – Laser Tissue Inter- ocesses. INSTRUMENTATION IN BIOPHO or Absorption-Scattering and Emiss onp – Light Emitting Diode (LED) Detectors: Single Channel and Mul ed Detection Methods. AL APPLICATIONS OF LASERS Iding-Applications of Lasers in: G rilization-Dermatology and Cosme emoval-Laser Skin Resurfacing-Op ns-Neurosurgery: Concept of Ster Root Canal Treatment.	ight – V ort in Tu Approxim raction – TONICS sion Mea – Lase litichanne Gynaecol etics: for hthalmol reotactic	Vhat Irbid natior - Che asure ers, F el Det logy: Lase	is Bi Medi a-Mor emica ment Photo ector Trea ating Surger Ne	omedica a like Tii nte Carke I – Ther s, Excita plethysm s – Optio tment or Port W ery of the eurosurge	I Optics? ssues: Ra Modellin mal – Ele ation Ligh ography, cal Fibers f Intraepin /ine Stain e Cornea- ery-Dentis	<ul> <li>Tissue Op adiative Trans ng, KubelkaM ectromechanic</li> <li>t Sources – H Optical Filter</li> <li>Time Resol</li> <li>thelial Neoplans, Hemangion</li> <li>Anterior Chams</li> <li>Stry: Treatmen</li> </ul>	ical bort unk al – <b>9</b> ligh s – ved <b>9</b> sia- ma- ber c of
Properties – Math Equation: First C Theory – Laser C Photoabalative Pro Unit II BASIC Instrumentation for pressure Arc Lan Polarizer, Optical and Phase Resolv Unit III MEDIC Laser Tissue We Endometriosis-Ste Tattoo and Hair Re Angle-Iris and Le Hard Tissues and Unit IV OPTIC	nt with Matter-Characteristics of L nematical Models for Light Transpo- order Approximation – Diffusion / characteristics – Laser Tissue Inter- ocesses. <b>INSTRUMENTATION IN BIOPHO</b> or Absorption-Scattering and Emission of Absorption-Scattering and Emission of Light Emitting Diode (LED) Detectors: Single Channel and Mul- ed Detection Methods. <b>AL APPLICATIONS OF LASERS</b> Iding-Applications of Lasers in: Co- rilization-Dermatology and Cosme emoval-Laser Skin Resurfacing-Op- ns-Neurosurgery: Concept of Ster Root Canal Treatment. <b>AL SPECTROSCOPY AND IMAGI</b>	ight – V ort in Tu Approxim raction – TONICS sion Mea – Lase ltichanne Gynaecol etics: for hthalmol reotactic	Vhat urbid natior - Che asure ers, F el Det logy: r Tre logy: Lase	is Bi Medi n-Mor emica ment Photo ector Trea ating Surger Ne	omedica a like Ti- nte Carlo il – Ther s, Excita plethysm s – Optio tment of Port W ery of the eurosurge	I Optics? ssues: Ra b Modellin mal – Ele ation Ligh ography, cal Fibers f Intraepir ine Stair e Cornea- ery-Dentis	<ul> <li>Tissue Op adiative Trans ng, KubelkaM ectromechanica</li> <li>t Sources – H Optical Filter</li> <li>Time Resol</li> <li>thelial Neopla</li> <li>thelial Neopla</li> <li>Anterior Cham stry: Treatmen</li> </ul>	ical port unk al – <b>9</b> ligh s – ved <b>9</b> sia- ma- ber of <b>9</b>
Properties – Math         Equation: First C         Theory – Laser C         Photoabalative Pro         Unit II       BASIC         Instrumentation for         pressure Arc Land         Polarizer, Optical         and Phase Resolv         Unit III         MEDIC         Laser Tissue We         Endometriosis-Ste         Tattoo and Hair Re         Angle-Iris and Le         Hard Tissues and         Unit IV       OPTIC         Spectroscopy – In         Optical Elastogra         Photoacoustic Mic	nt with Matter-Characteristics of L nematical Models for Light Transpo- order Approximation – Diffusion / characteristics – Laser Tissue Inter- ocesses. INSTRUMENTATION IN BIOPHO or Absorption-Scattering and Emiss onp – Light Emitting Diode (LED) Detectors: Single Channel and Mul- ed Detection Methods. AL APPLICATIONS OF LASERS Iding-Applications of Lasers in: G rilization-Dermatology and Cosme emoval-Laser Skin Resurfacing-Op ns-Neurosurgery: Concept of Ster Root Canal Treatment. AL SPECTROSCOPY AND IMAGI Definition – Diagnostic Application naging: Basic Principles and Clinic phy – Fluorescence Microscopy roscopy	ight – V ort in Tu Approxim raction – TONICS sion Mea – Lase litichanne etics: for hthalmol reotactic NG TEC s of Flu cal Appli y – Ba	Vhat Irbid natior - Che asure ers, F el Det logy: r Tre logy: Lase cation sic I	is Bi Medi a-More emica ment Photo ector Trea ating Surg Surg Surg er Ne QUES cence ns of Princ	omedica a like Ti- nte Carlo I – Ther s, Excita plethysm s – Optic s – Optic tment of Port W ery of the eurosurge a, Raman optical ples of:	I Optics? ssues: Ra b Modellin mal – Ele tion Ligh ography, cal Fibers f Intraepir cal Fibers f Intraepir cornea- ery-Dentis	<ul> <li>Tissue Op adiative Trans ng, KubelkaM ectromechanica</li> <li>t Sources – H Optical Filter s – Time Resol</li> <li>thelial Neoplans, Hemangion Anterior Cham stry: Treatmen</li> <li>ffuse Reflectance ce Tomograph al Microscopy</li> </ul>	ical port unk al - 9 ligh s - ved 9 sia- ma- ber of 9 sia- tof 9 gice y -
Properties       – Mathematical Mathmatexteree Mathematical Mathmatematical Mathem	nt with Matter-Characteristics of L nematical Models for Light Transpo- order Approximation – Diffusion / characteristics – Laser Tissue Inter- ocesses. INSTRUMENTATION IN BIOPHO or Absorption-Scattering and Emiss inp – Light Emitting Diode (LED) Detectors: Single Channel and Mul- ed Detection Methods. AL APPLICATIONS OF LASERS Iding-Applications of Lasers in: G rilization-Dermatology and Cosme emoval-Laser Skin Resurfacing-Op ins-Neurosurgery: Concept of Ster Root Canal Treatment. AL SPECTROSCOPY AND IMAGI Definition – Diagnostic Applications inaging: Basic Principles and Clinic phy – Fluorescence Microscopy INCED METHODS IN BIOMEDICAL	ight – V ort in Tu Approxim raction – TONICS sion Mea – Lase ltichanne etics: for hthalmol reotactic ING TEC s of Flu cal Appli ( – Ba	Vhat urbid hatior - Che asure ers, F el Det logy: r Tre logy: Lase cation sic I S	is Bi Medi a-Mor emica ment Photo ector Trea ating Surg er Ne QUES cence ns of Princ	omedica a like Ti- nte Carlo il – Ther s, Excita plethysm s – Optio tment of Port W ery of the eurosurge b, Raman Optical ples of:	I Optics? ssues: Ra b Modellin mal – Ele tion Ligh ography, cal Fibers f Intraepir ine Stair e Cornea- ery-Dentis n and Dif Coherence Confoca	<ul> <li>Tissue Op adiative Trans ng, KubelkaM ectromechanica</li> <li>t Sources – H Optical Filter a – Time Resol</li> <li>thelial Neoplans, Hemangion Anterior Cham stry: Treatmen</li> <li>ffuse Reflectance ce Tomograph al Microscopy</li> </ul>	ical port unk al - <b>9</b> ligh s - ved <b>9</b> sia- ma- ber of <b>9</b> nce y - <b>9</b>

CK&

TEX	TB	ook	(S):		
	-		200	 14	-

1. Gerd Keiser, "Biophotonics-Concepts to Applications" 1st Edition, Springer, 2016

 Irving J. Bigio, Sergio Fantini, "Quantitative Biomedical Optics Theory, Methods, and Applications", 1st Edition, Cambridge University Press, 2016.

3. Markolf H.Niemz, "Laser-Tissue Interaction Fundamentals and Applications", 4th Edition Springer, 2019

4. Tuan Vo-Dinh, "Biomedical Photonics Handbook", 2nd Edition, Taylor & Francis,

## **REFERENCE(S):**

1. Francesco Pavone, Paul Campagnola, "Second Harmonic Generation Imaging", Taylor & Francis, 2019

2. Kevin Tsia, "Understanding Biophotonics: Fundamentals, Advances, and Applications', 1stEdition, Taylor& Francis, 2015

3. Ashley JWelch, Martin JCvan Gemert, "Optical-Thermal Response of Laser- Irradiated Tissue", 2nd Edition, Springer, 2011

4. Robert Splinter, "An Introduction to Biomedical Optics", 1st Edition, Taylor & Francis, 2007.

Chairman - BoS Dept.of BME - ESEC

## LANGUAGE ELECTIVE

Department	BIOMEDICAL ENGIN	NEERIN	G			R 2019	Semester II H
Course	Course Name	Hour	s / W	leek	Credit	Total	Maximum
Code	Course Name	L	Т	Р	С	Hours	Marks
19HX201	ENGLISH FOR ENGINEERS	3	0	0	3	45	100
<ul> <li>Acquire</li> <li>Develop</li> <li>Enhance</li> <li>Improve</li> <li>Help lea</li> <li>Course Outco</li> <li>1. Improve</li> <li>2. Develop</li> <li>3. Acquire</li> <li>4. Enhance</li> </ul>	usage of grammar in English language listening skills which will enable to liste the reading skill to comprehend techn writing skills to express thoughts freely rners develop their speaking skills and <b>mes:</b> At the end of this course, learner their language usage in LSRW skills. listening skills to understand sentence the ability to understand different writte the writing skills to express the ideas	stress an texts.	es an ngs. <u>uently</u> able nd in	d cor <u>/ in re</u> to: tonat	mprehend eal contex tions.	different	types of texts.
Unit I LAN	IGUAGE FOCUS		-			-	9
Prepositions - Collocations -E	Articles - Conjunctions - Voice(Active & Discourse markers - One word substitu	& Passive tion - Ph	e) - R rasal	epor verb	ted speed s	h - Condi	tionals -
Unit II LIS	TENING						9
Listening to i	dentify topic, content, function - Senter	nce stres	ss - F	hyth	m – Intona	ation	-
Unit III REA	DING						9
Reading graph Understanding	s and charts - Skimming and scanning the structure of a text - Error identifica	texts - F tion	Read	busir	ness artic	les for spe	ecific information
Unit IV WR	TING	E.	1	1	1		9
Application for movie) - Trans	a job - Recommendations - Report writ	ting (acc	ident	and	survey) -	Writing re	view ( book and
Unit V SPE	AKING						. 9
Collaborative Language Fun opinions - Com	ask - Turn taking (initiating and res ctions: suggesting - comparing and co monly mispronounced words	sponding ntrasting	app – ex	ropri pres	ately) - 1 sing - Fin	Negotiatin ding out fa	g - Exchanging acts, attitudes an
TEXT BOOK(S	):						
1. Communie	cative English by KN Shoba ,Lourdes J	oavaniR	ayen	Publi	sed by Ca	ambridge	university 2017
REFERENCE( 1. Jeremy C Speaking 2. Eric H. G Purposes 3. Murphy, Intermed 4. Seely, Jo Press 20	5): Comfort, Pamela Rogerson, Trish Stott, Skills for Business English, Cambridge lendinning and Beverly Holmstrom, Stu S.United Kingdom: Cambridge Universi Raymond. English Grammar in Use - A iate learners Of English .lved. United K whn. Oxford Guide to Effective Writing a	and Der e: Camb udy Read ty Press A Self-St ingdom: nd Spea	rek U ridge Jing: , 200 udy F Carr king.	tley, s Univ A Co 4. Referen India	Speaking versity Pre ourse In R ence and ge Univers an Ed. Ne	Effectivel ess, 2002. eading for Practice I sity Press w Delhi: C	y and Developing Academic Book for . 2012. Dxford University

CK.92

Department	BIOMEDICAL ENG	INEER	ING			R 2019	Semester II	HS
Course	Course Name	Hou	rs / V	Veek	Credit	Total	Maximu	m
Code		L	Т	Ρ	С	Hours	Marks	
19HX202	HINDI	3	0	0	3	45	100	
<ul> <li>To help s</li> <li>To teach</li> <li>To help le</li> <li>To help le</li> <li>Course Outcon</li> <li>An ability</li> </ul>	twe (s): The purpose of learning this count tudents to acquire the basics of Hindi them how to converse in Hindi on various earners acquire the ability to understand mes: At the end of this course, learners to communicate effectively with: (a) Imp	urse is us occa l a sim will be proved	to asior ple te able flue	ns echnie to: ncy ir	cal text ir 1 Hindi (b	n Hindi •) Clarity c	on the basic sc	ound
of the Hir	idi language (c) Proper vocabulary		_	-				9
Senders (Masc	uline & Feminine Nouns ending in a le i	0 11)-	Mas	culine	& Femi	nine - Res	ading	5
Exercises Introc	fuction - Vowels - Consonants - Plosive	s - Fric	ative	es - N	asal sou	nds - Vov	vel Signs - Cha	andr
8indu&Visarg -1	Table of Alphabet -Vocabulary.	• • • •••	atir e		ucui cou		iei eigne eine	ai
Unit II NOUN			1	-				9
Genders (Mascu	uline & Feminine Nouns ending in a ,e,i,	o, u,)-	Mas	culine	& Femil	nine - Rea	ading Exercise	s.
Unit III PROM	OUNS AND TENSES	,					Ale In	9
Categories of P ronouns - Rela nterrogative Se	ronouns - Personal Pronouns - Second tive pronouns - Present tense - Past ter ntences.	d perso 1se - F	on (y uture	/ou & e tens	honorific e - Asse	c) - Defin rtive & Ne	ite & Indefinite	e ces 9
Parts of body - F	Relatives - Spices- Eatables- Fruit & Ver	aetable	es - C	Clothe	s - Direc	tions-Sea	asons - Profess	sion
Unit V SPEA	KING	9						9
Aodel Sentence	es - Speaking practice for various occasi	ons.						
EXT BOOK(S): 1. Elementa 2013 2. Colloquia	ry Hindi: Learn to Communicate in Ever I Hindi: The Complete Course for Begin	yday S ners by	Situat / Tej	ions   K. Bł	by Richa natia	rd Delacy	Tuttle Publica	ition
EFERENCE(S)	i ka				14 J.		11 8 1	
<ol> <li>B. R. Kish (P) Ltd., N</li> <li>Syed, Pra</li> <li>Bamdey</li> </ol>	ore, Self Hindi Teacher for Non-Hindi Sj Iew Delhi, 2009. yojanMulak Hindi, RahamathullahVaniF WyakaranPradeen, SaraswathiPrakasar	peakin Prakasa	g Pe an, N nasi	ople, lew D	Vee Kur elhi, 200	nar Public 2.	cations	



Department	BIOMEDICAL E	NGINEER	ING			R 2019	Semester II	HS
Course	Course Name	Hou	rs / V	Veek	Credit	Total	Maximu	m
Code		L	Т	Р	С	Hours	Warks	
19HX203	JAPANESE	3	0	0	3	45	100	
Course Objectiv	re (s): The purpose of learning this	course is	to				1	
<ul> <li>help stude</li> </ul>	nts acquire the basics of Japanese	language						
<ul> <li>teach then</li> </ul>	η how to converse in Japanese in v	arious occ	asio	ns				
<ul> <li>teach the s</li> </ul>	tudents the Japanese cultural face	ets and so	cial e	tique	tte	14 110	(Hilado)	1.7
Course Outcom	es: At the end of this course, learn	ers will be	able	to co	ommunic	ate effecti	vely with:	
<ul> <li>Improved f</li> </ul>	luency in Japanese							
<ul> <li>Clarity on</li> </ul>	he basic sounds of the Japanese la	anguage						
<ul> <li>Proper voo</li> </ul>	abulary							
Unit I Introd	uction to Japanese							
Introduction to Ja	panese - Japanese script - Pro	onunciation	n of	Japa	nese (Hi	iragana) -	Long vowels	5 -
Pronunciation of	in,tsu,ga - Letters combined with y	a,yu,yo - [	Daily	Gree	tings and	d Express	ions Numeral	s. N1
wa N2 des - N1 v	va N2 jaarimasen - S ka - N1mo - I	V1 no N2	sar	n - Ka	nji - Tec	hnical Jap	panese Vocab	ulary
(25 Numbers) - F	honetic and semantic resemblance	es betwee	n Ta	mil ar	nd Japan	ese		
Unit II Introdu	iction - Kore					- Alexandra		
Introduction - Ko	e - Sore - are - Kono N1 - Sono N	1 - ano N'	1 - sc	o des	<ul> <li>so jaar</li> </ul>	imasen -	S1 ka - S2 ka	- N1
no N1 - so des k	a ' koko - soko - asoko - kochira -	sochira -	achi	ra - N	11 wa N2	2 (Place)	des - dhoko-N	1 no
N2 - Kanji-10 - i	naji-fun des - Introduction of ver	b - V mas	s - V	mas	en - V n	nashitha-\	/ masendeshi	tha -
N1(Time)ne V - N	I1 kara N2 des - N1 tho N2 / S ne I	Kanji-10 -	Tech	nical	Japanes	se Vocabu	ulary (25 Num	pers)
<ul> <li>Dictionary Usag</li> </ul>	е.	6						
Unit III Techn	cal Japanese Vocabulary					12		9
N1 (Place) ye iki	mas - ki mas - kayerimasu - Dhol	ko ye moil	kima	sen -	ikimase	ndheshith	a - N1(vehicle	e) de
ikimasu - kimasu	- kayerimasu - N1(Personal or A	nimal) the	o V i	thsu	- S yo. ·	- N1 wo \	/ (Transitive)	- N1
woshimus - Nani	woshimasuka - Nan &Nani - N1(P	lace) de V	- V	mase	enka - V	masho -	Oo. Kanji-10	N1(
tool - means ) de	e V - Word / Sentence wa go nar	n des ka -	· N1(	Pers	son) ne	agemus	- N1( Person	) ne
moraimus - mo	V shimashitha - , Kanji-10 - Jap	anese Ty	pewi	riting	using J	WPCE S	oftware, Tech	
Japanese Vocab								nical
Unit IV Introdu	ulary (25 Numbers)		1.1				And so the C	nical
ntroduction to Adj	ulary (25 Numbers) Ic <b>tion to Adjectives</b>		1					nical
vadho des ka - N	ulary (25 Numbers) I <b>ction to Adjectives</b> ectives - N1wanaadj des. N1 wa ii	adj des -	naad	ljna N	l1 - ii adj	ii N1 - Th	othemo - ama	nical s ari - N
tid and bit on the second	ulary (25 Numbers) Iction to Adjectives ectives - N1wanaadj des. N1 wa ii 1 wadhonna N2 des ka - S1 ka S2	adj des - ! - dhore -	naad N1 (	ljna N gaarir	11 - ii adj nasu - w	ii N1 - Th /akarimas	nothemo - ama u - N1 gasuki	nical s ari - N ması
11 gakiraimasu -	ulary (25 Numbers) Iction to Adjectives ectives - N1wanaadj des. N1 wa ii I wadhonna N2 des ka - S1 ka S2 ozu des - hetha des - dhonna N1 S2 dhoshitha N1 gaarimaau	adj des - 2 - dhore - - Usages	naad N1 g of yo	ljna N gaarir oku -	I1 - ii adj nasu - w dhaithai	ii N1 - Th /akarimas - thakusa	nothemo - ama u - N1 gasuki n - sukoshi - i	nical ari - N masu amar
11 gakiraimasu - enzen - S1 kara 12(Place) ne arim	ulary (25 Numbers) Iction to Adjectives ectives - N1wanaadj des. N1 wa ii I wadhonna N2 des ka - S1 ka S2 ozu des - hetha des - dhonna N1 S2 - dhoshithe, N1 gaarimasu - i asu - iimasu - N1(Person Place or	adj des - 2 - dhore - - Usages masuN1(F	naad N1 g of yc Place	ljna N gaarir oku - e) ne (Pos	I1 - ii adj nasu - w dhaithai N2 gaai ition) - N	ii N1 - Th /akarimas - thakusa /imasu - i 1 ya N2	nothemo - ama u - N1 gasuki n - sukoshi - a imasu - N1 w Kanii-10 - Jan	nical ari - N masi amar amar
11 gakiraimasu - enzen - S1 kara 12(Place) ne arim Dictionary usage u	ulary (25 Numbers) <b>Iction to Adjectives</b> ectives - N1wanaadj des. N1 wa ii 1 wadhonna N2 des ka - S1 ka S2 ozu des - hetha des - dhonna N1 S2 - dhoshithe, N1 gaarimasu - i asu - iimasu - N1(Person,Place,or sing JWPCE Software, Technical	adj des - 2 - dhore - - Usages masuN1(F Thing ) no Japanese	naad N1 g of yc Place o N2 Voca	ljna N gaarir oku - e) ne (Pos abula	11 - ii adj nasu - w dhaithai N2 gaai ition) - N rv (25 Nu	ii N1 - Th vakarimas - thakusa rimasu - i 1 ya N2, umbers)	nothemo - ama u - N1 gasuki in - sukoshi - imasu - N1 w Kanji-10 - Jap	nical ari - N masu amar a anes
I1 gakiraimasu - enzen - S1 kara I2(Place) ne arim Dictionary usage u Unit V Saying	ulary (25 Numbers) Iction to Adjectives ectives - N1wanaadj des. N1 wa ii 1 wadhonna N2 des ka - S1 ka S2 ozu des - hetha des - dhonna N1 S2 - dhoshithe, N1 gaarimasu - i asu - iimasu - N1(Person,Place,or sing JWPCE Software, Technical . Numbers	adj des - 2 - dhore - - Usages masuN1(F Thing ) no Japanese	naad N1 g of yc Place o N2 Voca	ljna N gaarir oku - ) ne (Pos abula	I1 - ii adj nasu - w dhaithai N2 gaai ition) - N ry (25 Nu	ii N1 - Th /akarimas - thakusa /imasu - i 1 ya N2, umbers)	nothemo - ama u - N1 gasuki n - sukoshi - imasu - N1 w Kanji-10 - Jap	nical sari - N masu amar anes
I1 gakiraimasu - enzen - S1 kara I2(Place) ne arim Dictionary usage u Unit V Saying Saying Numbers	ulary (25 Numbers) action to Adjectives ectives - N1wanaadj des. N1 wa ii 1 wadhonna N2 des ka - S1 ka S2 ozu des - hetha des - dhonna N1 S2 - dhoshithe, N1 gaarimasu - i asu - iimasu - N1(Person,Place,or sing JWPCE Software, Technical Numbers Counter Suffixes, Usages of Qua	adj des - - dhore - - Usages masuN1(F Thing ) no Japanese	naad N1 g of yc Place o N2 Voca	ljna N gaarir oku - e) ne (Pos abula ogativ	11 - ii adj nasu - w dhaithai N2 gaar ition) - N ry (25 Nu ves - Dho	ii N1 - Th vakarimas - thakusa rimasu - i 1 ya N2, umbers) onokurai -	nothemo - ama u - N1 gasuki in - sukoshi - ; imasu - N1 w Kanji-10 - Jap gurai - Quant	nical
I1 gakiraimasu - enzen - S1 kara I2(Place) ne arim Dictionary usage u Unit V Saying Saying Numbers (Period) nekai	ulary (25 Numbers) action to Adjectives ectives - N1wanaadj des. N1 wa ii 1 wadhonna N2 des ka - S1 ka S2 ozu des - hetha des - dhonna N1 S2 - dhoshithe, N1 gaarimasu - i asu - iimasu - N1(Person,Place,or sing JWPCE Software, Technical of Numbers , Counter Suffixes , Usages of Qua V - Quantifier dhake / N1 dhake	adj des - - dhore - - Usages masuN1(F Thing ) no Japanese antifiers -li Kanji - Pa	naad N1 g of yc Place o N2 Voca	ljna N gaarin oku - ) ne (Pos abula ogativ nse c	I1 - ii adj nasu - w dhaithai N2 gaar ition) - N ry (25 Nu ry (25 Nu res - Dho of Noun	ii N1 - Th vakarimas - thakusa imasu - i 1 ya N2, umbers) onokurai - sentences	nothemo - ama u - N1 gasuki in - sukoshi - i imasu - N1 w Kanji-10 - Jap gurai - Quant s and na Adje	nical ari - N masu amar anes ifier- ctive
I1 gakiraimasu - enzen - S1 kara I2(Place) ne arim Dictionary usage u Unit V Saying Saying Numbers (Period) nekai sentences - Past	ulary (25 Numbers) action to Adjectives ectives - N1wanaadj des. N1 wa ii 1 wadhonna N2 des ka - S1 ka S2 ozu des - hetha des - dhonna N1 S2 - dhoshithe, N1 gaarimasu - i asu - iimasu - N1(Person,Place,or sing JWPCE Software, Technical Numbers , Counter Suffixes , Usages of Qua V - Quantifier dhake / N1 dhake tense of ii-adj sentences - N1 wa N	adj des - - dhore - - Usages masuN1(F Thing ) no Japanese antifiers -li Kanji - Pa	naad N1 g of yc Place N2 Voca nterro st te des	ljna N gaarir oku - e) ne (Pos abula ogativ nse c - N1 t	11 - ii adj nasu - w dhaithai N2 gaai ition) - N ry (25 Nu ry (25 Nu)ry (25 Nu ry (25 Nu)ry (25 Nu ry (25 Nu)ry (25 Nu)ry (25	ii N1 - Th vakarimas - thakusa imasu - i 1 ya N2, umbers) onokurai - sentences	nothemo - ama u - N1 gasuki imasu - N1 w Kanji-10 - Jap gurai - Quant s and na Adje agaadj des ka	nical
I1 gakiraimasu - enzen - S1 kara I2(Place) ne arim Dictionary usage u Unit V Saying Saying Numbers (Period) nekai sentences - Past its answering me	ulary (25 Numbers) action to Adjectives ectives - N1wanaadj des. N1 wa ii 1 wadhonna N2 des ka - S1 ka S2 ozu des - hetha des - dhonna N1 S2 - dhoshithe, N1 gaarimasu - i asu - iimasu - N1(Person,Place,or sing JWPCE Software, Technical of Numbers , Counter Suffixes , Usages of Qua V - Quantifier dhake / N1 dhake tense of ii-adj sentences - N1 wa N thod - N1 [ no naka ] de {nani/dho	adj des - - dhore - - Usages masuN1(F Thing ) no Japanese antifiers -In Kanji - Pa V2 yoriadj oko/dhare	naad N1 g of yc Place N2 Voca nterro st te des	ljna N gaarir oku - ) ne (Pos abula ogativ nse c - N1 t u} ga	11 - ii adj nasu - w dhaithai N2 gaar ition) - N ry (25 Nu ry (25 Nu res - Dho of Noun of Noun ho N2 th ichiban	ii N1 - Th vakarimas - thakusa rimasu - i 1 ya N2, umbers) onokurai - sentences oDhochir adj des k	oothemo - ama u - N1 gasuki in - sukoshi - i imasu - N1 w Kanji-10 - Jap gurai - Quant s and na Adje agaadj des ka a - answering	nical
11 gakiraimasu - enzen - S1 kara V2(Place) ne arim Dictionary usage u Unit V Saying Saying Numbers (Period) nekai sentences - Past its answering me gahoshi des- V1	ulary (25 Numbers) action to Adjectives ectives - N1wanaadj des. N1 wa ii 1 wadhonna N2 des ka - S1 ka S2 ozu des - hetha des - dhonna N1 S2 - dhoshithe, N1 gaarimasu - i asu - iimasu - N1(Person,Place,or sing JWPCE Software, Technical Numbers , Counter Suffixes , Usages of Qua V - Quantifier dhake / N1 dhake tense of ii-adj sentences - N1 wa N hod - N1 [ no naka ] de {nani/dho nas form dhake mas - N1 (Place )	adj des - - dhore - - Usages masuN1(F Thing ) no Japanese antifiers -li Kanji - Pa V2 yoriadj oko/dhare/ ye V mas	naad N1 g of yc Place D N2 Voca nterro st te des	ljna N gaarin oku - ) ne (Pos abula ogativ nse c - N1 t J} ga m ne	11 - ii adj nasu - w dhaithai N2 gaar ition) - N ry (25 Nu ry (25 Nu)ry (25 Nu ry (25 Nu)ry (25 Nu ry (25 Nu)ry (25 Nu)ry (25 Nu)ry (25	ii N1 - Th vakarimas - thakusa imasu - i 1 ya N2, umbers) onokurai - sentences oDhochir adj des k /kimasu/k	nothemo - ama u - N1 gasuki in - sukoshi - imasu - N1 w Kanji-10 - Jap gurai - Quan s and na Adje agaadj des ka a - answering ayerimasu - N	nical ari - N masu amar aanes g s anes s s anes s anes - v a n d - N 1 ne
I1 gakiraimasu - enzen - S1 kara J2(Place) ne arim Dictionary usage u Unit V Saying Saying Numbers (Period) nekai sentences - Past its answering me gahoshi des- V1 V/N1 wo V - Dhol	ulary (25 Numbers) iction to Adjectives ectives - N1wanaadj des. N1 wa ii 1 wadhonna N2 des ka - S1 ka S2 ozu des - hetha des - dhonna N1 S2 - dhoshithe, N1 gaarimasu - i asu - iimasu - N1(Person,Place,or sing JWPCE Software, Technical & Numbers , Counter Suffixes , Usages of Qua V - Quantifier dhake / N1 dhake tense of ii-adj sentences - N1 wa N thod - N1 [ no naka ] de {nani/dho nas form dhake mas - N1 (Place ) oka - Nanika - gojumo - Technical	adj des - - dhore - - Usages masuN1(F Thing ) no Japanese antifiers -lı Kanji - Pa N2 yoriadj oko/dhare, ye V mas Japanese	naad N1 g of yc Place N2 Voca nterro st te des /ithsu u for	ljna N gaarin oku - e) ne (Pos abula ogativ nse c - N1 t u} ga m ne cabula	11 - ii adj nasu - w dhaithai N2 gaar ition) - N ry (25 Nu yes - Dho yes - D	ii N1 - Th /akarimas - thakusa /imasu - i 1 ya N2, umbers) onokurai - sentences oDhochir adj des k /kimasu/k	nothemo - ama u - N1 gasuki in - sukoshi - imasu - N1 w Kanji-10 - Jap gurai - Quant s and na Adje agaadj des ka a - answering ayerimasu - N	nical strict - N masu amar anes ifier- ctive and -N1 1 ne
11 gakiraimasu - enzen - S1 kara V2(Place) ne arim Dictionary usage u Unit V Saying Saying Numbers (Period) nekai sentences - Past its answering me gahoshi des- V1 V/N1 wo V - Dhol EXT BOOK(S):	ulary (25 Numbers) iction to Adjectives ectives - N1wanaadj des. N1 wa ii 1 wadhonna N2 des ka - S1 ka S2 ozu des - hetha des - dhonna N1 S2 - dhoshithe, N1 gaarimasu - i asu - iimasu - N1(Person,Place,or sing JWPCE Software, Technical . Numbers , Counter Suffixes , Usages of Qua V - Quantifier dhake / N1 dhake tense of ii-adj sentences - N1 wa N thod - N1 [ no naka ] de {nani/do mas form dhake mas - N1 (Place ) oka - Nanika - gojumo - Technical	adj des - - dhore - - Usages masuN1(F Thing ) no Japanese antifiers -lu Kanji - Pa N2 yoriadj oko/dhare, ye V mas Japanese	naad N1 ( of yc Place N2 Voca nterro st te des 'ithsu u for	ljna N gaarir oku - e) ne (Pos abula ogativ nse c - N1 t J} ga m ne cabula	11 - ii adj nasu - w dhaithai N2 gaar ition) - N ry (25 Nu yes - Dho of Noun wes - Dho of Noun ichiban ichiban ikimasu ary (25 N	ii N1 - Th vakarimas - thakusa imasu - i 1 ya N2, umbers) onokurai - sentences oDhochir adj des k /kimasu/k	nothemo - ama u - N1 gasuki imasu - N1 w Kanji-10 - Jap gurai - Quant s and na Adje agaadj des ka a - answering ayerimasu - N	nical stri-1 masu amar anes ifier- ctive and -N1 1 ne
11 gakiraimasu - enzen - S1 kara V2(Place) ne arim Dictionary usage u Unit V Saying Saying Numbers (Period) ne - kai sentences - Past its answering me gahoshi des- V1 V/N1 wo V - Dhol EXT BOOK(S):	ulary (25 Numbers) Inction to Adjectives ectives - N1wanaadj des. N1 wa ii 1 wadhonna N2 des ka - S1 ka S2 ozu des - hetha des - dhonna N1 S2 - dhoshithe, N1 gaarimasu - i asu - iimasu - N1(Person,Place,or ising JWPCE Software, Technical of Numbers , Counter Suffixes , Usages of Qua V - Quantifier dhake / N1 dhake tense of ii-adj sentences - N1 wa N thod - N1 [ no naka ] de {nani/dho nas form dhake mas - N1 (Place ) toka - Nanika - gojumo - Technical	adj des - - dhore - - Usages masuN1(F Thing ) no Japanese antifiers -lu Kanji - Pa V2 yoriadj oko/dhare, ye V mas Japanese	naad N1 ( of yc Place o N2 Voca st te des (ithsu u for o Voc	ljna N gaarin oku - e) ne (Pos abula ogativ nse c - N1 t u} ga m ne abula	11 - ii adj nasu - w dhaithai N2 gaar ition) - N ry (25 Nu ves - Dho of Noun tes - Dho of Noun to N2 th ichiban ikimasu ary (25 N	ii N1 - Th vakarimas - thakusa imasu - i 1 ya N2, umbers) onokurai - sentences oDhochir adj des k /kimasu/k umbers)	nothemo - ama u - N1 gasuki in - sukoshi - imasu - N1 w Kanji-10 - Jap gurai - Quan garai - Quan agaadj des ka a - answering ayerimasu - N	nical string of the second se
<ul> <li>I1 gakiraimasu - enzen - S1 kara</li> <li>I2(Place) ne arim</li> <li>Dictionary usage u</li> <li>Unit V Saying</li> <li>Saying Numbers</li> <li>(Period) nekai</li> <li>sentences - Past</li> <li>its answering me</li> <li>gahoshi des- V1 m</li> <li>V/N1 wo V - Dhole</li> <li>EXT BOOK(S):</li> <li>1. Modern Jap</li> <li>Trimnell Pu</li> </ul>	ulary (25 Numbers) action to Adjectives ectives - N1wanaadj des. N1 wa ii 1 wadhonna N2 des ka - S1 ka S2 ozu des - hetha des - dhonna N1 S2 - dhoshithe, N1 gaarimasu - i asu - iimasu - N1(Person,Place,or ising JWPCE Software, Technical - Numbers , Counter Suffixes , Usages of Qua V - Quantifier dhake / N1 dhake tense of ii-adj sentences - N1 wa N thod - N1 [ no naka ] de {nani/dho nas form dhake mas - N1 (Place ) oka - Nanika - gojumo - Technical Danese Vocabulary: A Guide for 21 blisher:Beechmont Crest Publishir	adj des - - dhore - - Usages masuN1(F Thing ) no Japanese antifiers -li Kanji - Pa V2 yoriadj oko/dhare/ ye V mas Japanese st Century ng (April 23	naad N1 ( of yc Place o N2 Voca st te des (ithsu u for o Voc	ljna N gaarir oku - (Pos abula ogativ nse c - N1 t u} ga m ne cabula dents	11 - ii adj nasu - w dhaithai N2 gaar ition) - N ry (25 Nu ves - Dho of Noun of Noun ichiban ikimasu ary (25 N	ii N1 - Th vakarimas - thakusa imasu - i 1 ya N2, umbers) onokurai - sentences oDhochir adj des k kimasu/k umbers) d P.	nothemo - ama u - N1 gasuki in - sukoshi - imasu - N1 w Kanji-10 - Jap gurai - Quan gurai - Quan gaadj des ka a - answering ayerimasu - N	nical stricture ani - N masu amar amar amar amar amar amar amar amar amar amar amar amar amar a ani - N 1 ne

Chairman - BoS Dept.of BME - ESEC

## REFERENCE(S):

1. Japanese for Everyone: Elementary Main Textbook1-1, Goyal Publishers and Distributors Pvt. Ltd., Delhi, 2007.

Chairman - BoS Dept.of BME - ESEC

Department	BIOMEDICAL EN	GINEER	ING			R 2019	Semester	H
Course	Course Name	Hou	rs / V	Veek	Credit	Total	Maxim	um
Code		L	Т	Р	С	Hours	Marks	
19HX204	FRENCH	3	0	0	3	45	100	
Course Objecti	ve (s): The purpose of learning this	course is	to	J				-1
Help stude	ents acquire the basics of French lar	iguage						
<ul> <li>Teach the</li> </ul>	m how to converse in French in varie	ous occas	sions				<u>_</u> * •	
Course Outcom	nes: At the end of this course, learne	rs will be	able	to:		1.1.2.20		
<ul> <li>The stude</li> </ul>	nts will become familiar with the basi	cs of Frei	nch l	angu	age and	start conv	ersing in Fre	nch.
Unit I Alpha	bet Français				12 A			6
Alphabet Françai	is (alphabets) - Les Accents Françai	s (the acc	ents	in Fr	ench) - a	igu - grav	e - circonflex	(e -
rémacédille - éci	rire son nom dans le français (spellir	igone -sn	ame	in Fr	ench) - L	es noms	de jours de la	a
semaine (Days o	f the week)		6.4	0.03				
Unit II Gram	maire							6
_es noms de moi	is de l'année (Months) - Numéro 1 à	100 (Nun	nbers	s 1 to	100) GR	AMMAIR	E :Conjugais	on
Unit III Moyer	ns de transport							10
Écouter et répond Lireles phrases s Unit IV Pron	dre PARLER (Speaking)Présntation simples oms	- même /	I - a Prés	ilphal entez	bet asso z - Vous	ciéà des (Introduci	prénomsfrar ngoneself)Ll	nçais RE <b>12</b>
Écouter et répond Lireles phrases s <b>Unit IV Pron</b> Pronoms (Pronou /erbescommuns lialogues LIRE : profession	dre PARLER (Speaking)Présntation simples oms uns) - Nomscommunsmasculins et d (Common verbs)COUTER :couter e Lire les profilsd'utilisateursd'interling	- même / e femme t crier les ua (alter o	I - a Prés (Con s prnc ego)I	nmon oms - PARL	et asso z - Vous masculi Observe ER :Parl	ciéà des (Introduci ne and Fe er les des er de sav	prénomsfrar ngoneself)Ll emininenoun sins et coute ille - Parler d	nçais RE <b>12</b> s) - r les e sa
Écouter et répond Lireles phrases s Unit IV Prom Pronoms (Pronou Verbescommuns dialogues LIRE : profession Unit V Euro	dre PARLER (Speaking)Présntation simples oms uns) - Nomscommunsmasculins et d (Common verbs)COUTER :couter e Lire les profilsd'utilisateursd'interling pe PARLER	- même / e femme t crier les ua (alter	I - a Prés (Con prnc ego)I	nmon oms - PARL	et asso - Vous masculi Observe ER :Parl	ciéà des (Introduci ne and Fe er les des er de sav	prénomsfrar ngoneself)Ll emininenoune sins et coute ille - Parler d	nçais RE 12 s) - r les e sa 11
Écouter et répond         Lireles phrases s         Unit IV       Prono         Pronoms (Pronou         Probles communs         dialogues LIRE :         profession         Unit V       Euro         Narration de son         Narration du tem         COUTER :	dre PARLER (Speaking)Présntation simples oms uns) - Nomscommunsmasculins et d (Common verbs)COUTER :couter e Lire les profilsd'utilisateursd'interling pe PARLER nom et l'endroitoù on vit - Son âge e aps - La France en Europe PARLER iter les conversations (CD alter ego)	e femme t crier les ua (alter Convers ÉCRIRE	I - a Prés (Con prnc ego)I nais ation :Écrii	nmon oms - PARL sance entre	e - Numé e carte po	ciéà des (Introduci ne and Fe er les des er de sav ero de télé nis - Joue ostale	prénomsfrar ngoneself)Ll emininenouns sins et coute ille - Parler d phoneet'dres r la scène	nçais RE 12 s) - r les e sa 11 sse
Écouter et répond Lireles phrases s Unit IV Prom Pronoms (Pronou Verbescommuns dialogues LIRE : profession Unit V Euro Narration de son Narration du tem ÉCOUTER :Ecou	dre PARLER (Speaking)Présntation simples oms uns) - Nomscommunsmasculins et d (Common verbs)COUTER :couter e Lire les profilsd'utilisateursd'interling pe PARLER nom et l'endroitoù on vit - Son âge e ps - La France en Europe PARLER iter les conversations (CD alter ego)	e femme t crier les a (alter de Convers ÉCRIRE	I - a Prése (Con prnc ego)I nais ation :Écrii	nmon oms - PARL sance entre	e - Numé e deuxan	ciéà des (Introduci ne and Fe er les des er de sav ero de télé nis - Joue ostale	prénomsfrar ngoneself)Ll emininenouns sins et coute ille - Parler d phoneet'dres r la scène	nçais RE 12 s) - r les e sa 11 sse
Écouter et répond Lireles phrases s Unit IV Prom Pronoms (Pronou Verbescommuns dialogues LIRE : profession Unit V Euro Narration de son Narration du tem ÉCOUTER :Ecou EXT BOOK(S): 1. Le Bon Us	dre PARLER (Speaking)Présntation simples oms uns) - Nomscommunsmasculins et d (Common verbs)COUTER :couter e Lire les profilsd'utilisateursd'interling pe PARLER nom et l'endroitoù on vit - Son âge e ps - La France en Europe PARLER iter les conversations (CD alter ego)	e femme t crier les ua (alter de :Convers ÉCRIRE	I - a Prése (Con prnce ego)I nais ation :Écrii	alphal entez nmon oms - PARL sance reune	e - Numé e deuxan carte po anuary 20	ciéà des (Introduci ne and Fe er les des er de sav ero de télé nis - Joue ostale	prénomsfrar ngoneself)Ll emininenouns sins et coute ille - Parler d phoneet'dres r la scène	nçais RE 12 s) - r les e sa 11 sse
Écouter et répond         Lireles phrases s         Unit IV       Prono         Pronoms (Pronou         Verbescommuns         dialogues LIRE :         profession         Unit V       Euro         Narration de son         Narration du tem         ÉCOUTER :Ecou         EXT BOOK(S):         1.       Le Bon Us         2.       Advanced	dre PARLER (Speaking)Présntation simples oms uns) - Nomscommunsmasculins et d (Common verbs)COUTER :couter e Lire les profilsd'utilisateursd'interling pe PARLER nom et l'endroitoù on vit - Son âge e ps - La France en Europe PARLER iter les conversations (CD alter ego) age by M. Grevisse Publisher- Ducu French by Monique L'Huillier, Camb	e femme t crier les a (alter de Convers ÉCRIRE	I - a Prése (Con prnce ego)I nais ation :Écrii	alphal entez nmon oms - PARL sance entre reune	e - Numé e deuxan carte po anuary 20 ess,2013	ciéà des (Introduci ne and Fe er les des er de sav ero de télé nis - Joue ostale	prénomsfrar ngoneself)Ll emininenouns sins et coute ille - Parler d phoneet'dres r la scène	nçais RE 12 s) - r les e sa 11 sse
Écouter et répond         Lireles phrases s         Unit IV       Prono         Pronoms (Pronou         Profession         Unit V       Euro         Variation de son         Narration du tem         ÉCOUTER :Ecou         EXT BOOK(S):         1.       Le Bon Us         2.       Advanced         EFERENCE(S):	dre PARLER (Speaking)Présntation simples oms uns) - Nomscommunsmasculins et d (Common verbs)COUTER :couter e Lire les profilsd'utilisateursd'interling pe PARLER nom et l'endroitoù on vit - Son âge e nps - La France en Europe PARLER ter les conversations (CD alter ego) age by M. Grevisse Publisher- Ducu French by Monique L'Huillier, Camb	e femme t crier les ua (alter t date de :Convers ÉCRIRE	I - a Prése (Con prnce ego)I nais ation :Écrin tion ( versi	alphal entez nmon oms - PARL sance entre reune	e - Numé e deuxan carte po anuary 20 ess,2013	ciéà des (Introduci ne and Fe er les des er de sav ero de télé nis - Joue ostale	prénomsfrar ngoneself)LI emininenouns sins et couter ille - Parler d ephoneet'dres r la scène	nçais RE 12 s) - r les e sa 11 sse
Ecouter et répond Lireles phrases s Unit IV Prono Pronoms (Pronou /erbescommuns lialogues LIRE : profession Unit V Euro Narration de son Narration de son Narration du tem ECOUTER :Ecou EXT BOOK(S): 1. Le Bon Us 2. Ádvanced EFERENCE(S): 1. Alter ego+	dre PARLER (Speaking)Présntation simples oms uns) - Nomscommunsmasculins et d (Common verbs)COUTER :couter e Lire les profilsd'utilisateursd'interling pe PARLER nom et l'endroitoù on vit - Son âge e ops - La France en Europe PARLER ter les conversations (CD alter ego) age by M. Grevisse Publisher- Ducu French by Monique L'Huillier, Camb	e femme t crier les ua (alter Convers ÉCRIRE	I - a Prése (Con ego)I nais ation :Écrin tion ( versi	alphal entez nmon oms - PARL sanco entro reune (25 Ja ty Pre	e - Numé e deuxan canuary 20 anuary 20 ess,2013	ciéà des (Introduci ne and Fe er les dess er de sav ero de télé nis - Joue ostale	prénomsfrar ngoneself)LI emininenouns sins et couter ille - Parler d phoneet'dres r la scène	nçais RE 12 s) - r les e sa 11 sse
Couter et répond Lireles phrases s Unit IV Prom Pronoms (Pronou /erbescommuns dialogues LIRE : profession Unit V Euro Narration de son Narration du terr COUTER :Ecou EXT BOOK(S): 1. Le Bon Us 2. Ádvanced EFERENCE(S): 1. Alter ego+ 2. Grammaire	dre PARLER (Speaking)Présntation simples oms uns) - Nomscommunsmasculins et d (Common verbs)COUTER :couter e Lire les profilsd'utilisateursd'interling pe PARLER nom et l'endroitoù on vit - Son âge e nps - La France en Europe PARLER iter les conversations (CD alter ego) age by M. Grevisse Publisher- Ducu French by Monique L'Huillier, Camb Niveau a1 e Progressive du Français	e femme t crier les ua (alter de :Convers ÉCRIRE	I - a Prése (Con s proc ego)I nais ation :Écrin tion ( versi	alphal entez nmon oms - PARL sance reune (25 Ja ty Pre	e - Numé e deuxan carte po anuary 20 ess,2013	ciéà des (Introduci ne and Fe er les des er de sav ero de télé nis - Joue ostale	prénomsfrar ngoneself)LI emininenouns sins et coute ille - Parler d phoneet'dres r la scène	nçais RE 12 s) - r les e sa 11 sse
Écouter et répond Lireles phrases s Unit IV Prom Pronoms (Pronou Verbescommuns dialogues LIRE : profession Unit V Euro Narration de son Narration du tem ECOUTER :Ecou EXT BOOK(S): 1. Le Bon Us 2. Advanced EFERENCE(S): 1. Alter ego+ 2. Grammaire 3. Collins Eas	dre PARLER (Speaking)Présntation simples oms uns) - Nomscommunsmasculins et d (Common verbs)COUTER :couter e Lire les profilsd'utilisateursd'interling pe PARLER nom et l'endroitoù on vit - Son âge e ops - La France en Europe PARLER iter les conversations (CD alter ego) age by M. Grevisse Publisher- Ducu French by Monique L'Huillier, Camb Niveau a1 e Progressive du Français sy Learning French Verbs& Practice	e femme t crier les ua (alter de :Convers ÉCRIRE	I - a Prése (Con s prnc ego)I nais ation :Écrin	(25 Ja	e - Numé e deuxan carte po anuary 20 ess,2013	ciéà des (Introduci ne and Fe er les dess er de sav ero de télé nis - Joue ostale	prénomsfrar ngoneself)LI emininenouns sins et couter ille - Parler d ephoneet'dres r la scène	nçais RE 12 s) - r les e sa 11 sse
Écouter et répond Lireles phrases s Unit IV Prono Pronoms (Pronou Verbescommuns dialogues LIRE : orofession Unit V Euro Narration de son Narration du tem ÉCOUTER :Ecou EXT BOOK(S): 1. Le Bon Us 2. Ádvanced EFERENCE(S): 1. Alter ego+ 2. Grammaire 3. Collins Eas 4. Français L	dre PARLER (Speaking)Présntation simples oms uns) - Nomscommunsmasculins et d (Common verbs)COUTER :couter et Lire les profilsd'utilisateursd'interling pe PARLER nom et l'endroitoù on vit - Son âge et ps - La France en Europe PARLER iter les conversations (CD alter ego) age by M. Grevisse Publisher- Ducu French by Monique L'Huillier, Camb Niveau a1 e Progressive du Français sy Learning French Verbs& Practice inguaphone	e femme t crier les ua (alter t date de :Convers ÉCRIRE	I - a Prés (Con ego)I nais ation :Écrin tion ( versi	alphal entez nmon oms - PARL sance reune	e - Numé e carte po anuary 20 ess,2013	ciéà des (Introduci ne and Fe er les dess er de sav ero de télé nis - Joue ostale	prénomsfrar ngoneself)LI emininenouns sins et couter ille - Parler d phoneet'dres r la scène	nçais RE 12 s) - r les e sa 11 sse

CK.Q



Department	BIOMEDICAL ENGIN	NEERIN	G			R 2019	OE
Course		Hou	rs / W	/eek	Credit	Total	Maximum
Code	Course Name	L	Т	Р	С	Hours	Marks
198MY01	BASICS OF BIOMEDICAL INSTRUMENTATION	3	0	0	3	45	100
Course Objective Study ab Understa Study the Learn the Familiariz Course Outcom Learn the get Famil Students Students Understa Understa Understa Unit I BIO Pio signals cha	ve (s): The purpose of learning this cou out the different bio potential and its pr and the different types of electrodes an e design of bio amplifier for various phy e different measurement techniques for ze the different biochemical measurem es: At the end of this course, learners e different bio potential and its propaga liarize the different electrode placemer will be able design bio amplifier for va will understand various technique non and the different types of biochemical n <b>POTENTIAL GENERATION AND EL</b> tential and its propagation. Types of e circuits. Recording problems - measure <b>SIGNAL CHARACTERISTICS AND E</b>	ropagati d its pla ysiologic r non-ph eents will be a tion, nt for van rious ph electric electrode rement v LECTRO	on ceme al rec iysiol ble to ious ysiol al ph ments DES es - s with ty ODE	nt for cordir ogica o: physiolo s. <b>TYP</b> surfac wo el <b>CON</b>	various Ig I parame ological I I recordin ogical me ES ce, needle ectrodes FIGURAT othoven	recording ters recording, g, easurements e and micro	S, 9 9 electrodes and 9 12 lead
system. EEG – mode. Unit III SIG Need for bio-an interference, Ri	<ul> <li>10-20 electrode system, unipolar, bit</li> <li>NAL CONDITIONING CIRCUITS</li> <li>nplifier - differential bio-amplifier, Impe</li> <li>ght leg driven ECG amplifier, Band pase</li> </ul>	polar an dance n ss filterir	natchi	erage	rcuit, isol	=MG– unip ation ampli	olar and bipolar 9 fiers, Power line
Unit IV ME/	ASUREMENT OF NON-ELECTRICAL	PARAN	IETE	RS			9
Auscultatory m cardiac output measurement.	respiration rate and pulse rate me ethod, direct methods: electronic man measurement: Indicator dilution,	easurem nometer and dy	, Sys e di	BIO tolic, lution	diastolic method	sure: Indir pressure, d, ultrasou	Blood flow and nd blood flow
Blood das al	nalyzers and Non-Invasive monit	oring	colori	mete	r Sodii	im Potass	sium Analyser
spectrophotome	eter, blood cell counter, auto analyzer.	oning,	001011	moto	r, 000m	in rotade	Juin 7 analyson,
TEXT BOOK(S	):						
<ol> <li>Leslie Cro 2007.</li> <li>John G. W 2004</li> </ol>	mwell, "Biomedical Instrumentation a ebster, "Medical Instrumentation Appl	nd mea lication a	surer and E	nent" Desigi	, Prentic n", John	e hall of In Wiley and s	dia, New Delhi, sons, New York,
REFERENCE(S	3):	1111	T.C.	115		7134.0	7 . 12 . 10
1. Myer Kutz,	"Standard Handbook of Biomedical Er	ngineeri	ng an	d De	sign", Mo	Graw Hill P	ublisher, 2003.
2. Khandpur I	R.S, "Handbook of Biomedical Instrum	entation	", Tat	a Mc	Graw-Hil	l, New Delh	i, 2003.
3. Joseph J. Education,	Carr and John M. Brown, "Introduct 2004.	tion to	Biom	edica	I Equipn	nent Techn	ology", Pearson

CK.g

Department	BIOMEDICAL ENGINE	ERIN	G			R 2019	OE
Course	Course Name	Hou	rs / V	Veek	Credit	Total	Maximum
Code		L	T	Р	С	Hours	Marks
19BMY02	BIOSENSORS AND TRANSDUCERS	3	0	0	3	45	100
Course Objecti Underst Analyze applicati Study th Expose Encoura develop Course Outcon Gain a b Describe Underst Develop types o physiolo Critically analyze Unit I TR Classification temperature de transducers: pr gauge transdu	ive (s): The purpose of learning this cours and the fundamental concepts various type how biosensors are characterized, com- ions, ne biochemical functionality is coupled to a students to several of the most important age the practice of critical thinking whe the ability to communicate well-research nes: At the end of this course, learners w broad knowledge of the applications of va- e the fundamental transduction and bio-se- and various measurement devices and te- o a clear concept and perform logical ana of sensors, electrodes, signal condition gical parameters, verview the literature in the application a simple bio-sensing and transduction prote <b>ANSDUCERS PRINCIPLES AND MEDIC</b> of transducers, characteristic of tra- etector (RTD), Thermistor, Thermocouple potentiometer, resistive strain gauges, ressure transducer: variable capacitanc ucers, semiconductor transducers, ca ransducers: photo-emissive tubes, photo-	se is to pes of a biose t emer ed opi ill be a rious s ensing echniqu lysis o ning of area an olems. CAL A insduc e, p-n induc	biose to ensor ging I nsider nions able to senso prind ues, f varii circuit nd ap <b>.PPLI</b> ers, juncti ctive ssure tip	ensor ach co trans biose ring a to ot ciples ous r ciples ous r ts fo ous r ts fo ts fo ous r ts fo ous r ts fo ous r ts fo ous r ts fo ous r ts fo ts	s, sther, and sducer, nsor tech a new d hers. d transdu d transdu , neasurer r acquiri nowledge ONS perature hemical t lacement sducers, sducers,	d designed nologies etection tec ucers, nent system ing and re e gained fro transduce thermometr c, capacitiv LVDT tran Piezoelect	to suit particula chnology and to ns using different ecording various om the course to 9 ers: Resistance y, Displacement e displacement nsducers, strain tric transducer, otodiodes Flow
ransducers: m	agnetic, resistive and ultrasonic.						N
Unit II BIC	POTENTIAL ELECTRODES						9
Electrode elect and, Circuit M Internal Electro micropipette (r Electrodes for I <b>Unit III CH</b>	trolyte interface, polarization, polarizable lodels, Electrode-skin Interface and Mo odes: Needle & wire electrodes, Electroo metal filled glass and glass micropipe Electric Stimulation of Tissue (i.e. for ECO EMICAL BIOSENSORS	and n otion / de Arr tte ele G, EM	on-po Artifao rays, ectroo G & E	olariz ct, Bo Micro les) a EEG).	able elec ody-Surfa pelectrode and prop	ctrodes, Ele ace Record es: Metal s perties of r	ctrode Behavior ling Electrodes, upported metal, microelectrodes.
Electrochemica Monitoring, Bla Reference electore Melectrodes,	al sensors (Amperometric, Potention ood-Glucose Sensors, Transducers for ctrodes - Hydrogen electrodes, Silver- S Measurement of PO2, PCO2 - Catheter	netric, r the Silver ( type e	Cor meas Chlori lectro	nduct suren de e des.	imetric), nent of lectrode,	Noninvas ion and di Calomel e	ive Blood-Gas ssolved gases, lectrodes, glass
Unit IV OP	TICAL SENSOR AND RADIATION DET	ЕСТО	RS	5.00			9
Principles of op ensors, Propo	otical sensors, optical fiber sensors, Indic ortional counter, Gas-ionisation chamber, DI OGICAL SENSORS	ator m Geige	nediat r cou	ed tra nters	ansducer and Scir	s, optical fin ntillation det	ber temperature tectors.
Sensors / rece system-neural sound, vision a sensors, Princi	eptors in the human body and their ba mechanism, Chemoreceptor: hot & cold and taste, lon exchange membrane elect ples of MOSFET & BIOMEMS, Basic idea	isic m recept rodes, a abou	echai ors, k enzy it Sm	nism barro rme e art se	of action receptor electrode ensors.	n, organiza s, sensors f , glucose se	tion of nervous for smell, touch, ensors, Immuno



TE)	KT BOOK(S):
1.	Leslie Cromwell, "Biomedical Instrumentation and measurement", Prentice hall of India, New Delhi, 2007.
2.	John G. Webster, "Medical Instrumentation Application and Design" 4th Ed, Wiley, 2011
3.	Shakti Chatterjee & Aubert Miller, "Biomedical Instrumentation Systems", Delmer Cengage Learning, 1St Ed, 2010.
RE	FERENCE(S):
1.	Deric P. Jones, "Biomedical Sensors", Momentum press, 1St Ed, 2010.
2.	Carr & Brown, Introduction to Biomedical Equipment Technology Pearson Edn, Asia.
3.	Rao & Guha,"Principles of Medical Electronics & Biomedical Instrumentation", University Press, India.

CK.9

	BIOMEDICAL ENGINI	EERIN	G			R 2019	19 OE		
Course		Hou	rs / V	Veek	Credit	Total	Maximun	n	
Code	Course Name	L	Т	P	С	Hours	Marks		
19BMY03 BIOT	ELEMETRY & TELEMEDICINE	3	0	0	3	45	100	100	
<ul> <li>Study about the Understand the</li> <li>Study the designed Learn the difference</li> <li>Familiarize the</li> <li>Course Outcomes: At</li> <li>Learn the difference</li> <li>get Familiarize</li> <li>Students will be</li> <li>Students will up</li> </ul>	e different bio potential and its pro a different types of electrodes and gn of bio amplifier for various phys rent measurement techniques for different biochemical measurement the end of this course, learners w rent bio potential and its propagati the different electrode placement e able design bio amplifier for vari- nderstand various technique non e	pagation its places isologic non-ph ents vill be a on, for var ous ph electric	on ceme al rec ysiol ble to ious ysiolo al ph	ont fo cordin ogica o: phys ogica ysiolo	r various ng I parame iological i I recordin ogical me	recording ters recording, g, asurement	S,	í	
Understand the	e different types of biochemical me	easurer	ment	S.	and i		13		
Fundamental concept Methods of telemetry standards. Unit II BIOTELE Components of telem	ts - Significance, Principle, funct - Electrical, Pneumatic, Hydrauli METRY netry system, Bio-telemetry and its	ional b c and o s impo	olocks Optic	s of <sup>-</sup> al Te	Felemetry	/ and Tele - State of t	control syste he art-Teleme	em, etry 9	
celemetry, Multi-patie ransmission of physic Unit III FUNDAM	em, Temperature telemetry sys ent telemetry, Ambulatory pat blogical signals over telephone line ENTALS OF TELEMEDICINE	ient n e, Tele	Felen nonito medi	oring, cine	of ECG Implan and appli	and Res table tele cations,	met blotelernet piration, Spo metry systen	try orts ns, 9	
Lecg telemetry systemetry systemetry, Multi-patient transmission of physice Unit III FUNDAM History of telemedicin Functional diagram, Elepathology, telecar Unit IV TELEMEE Principles of Multimed PSTN, POTS, ANT, Is and ubiquitous health - local and centralized	em, Temperature telemetry sys ent telemetry, Ambulatory patrological signals over telephone line ENTALS OF TELEMEDICINE ne, definition of telemedicine, tele benefits & limitations of telemedic diology, teleoncology, teledermato DICINE TECHNOLOGIES lia - Audio, video, still images, tex SDN, internet, air/ wireless commission care. Internet technology and tele d, PACS architecture. Encryption,	tem, T ient n e, Tele e-healt icine, A blogy, t t and d unication emedici Crypto	Felen nonito medi h, tel Applic elesu lata, t ons, i ine us	fax-ty GSM sing v	of ECG Implan and appli re, scope as of Tele y, e Healt ype of con satellite, world wid	and Res table tele cations, , Telemed emedicine h and Cybe mmunicatic micro wav e web (ww	icine Systems - Teleradiolog er Medicine.	try, orts ms, <b>9</b> s – gy, <b>9</b> ork: alth ata	
telemetry, Multi-patie transmission of physic Unit III FUNDAM History of telemedicin Functional diagram, telepathology, telecar Unit IV TELEMED Principles of Multimed PSTN, POTS, ANT, Is and ubiquitous health - local and centralized Unit V TELEMED	em, Temperature telemetry sys ent telemetry, Ambulatory pat ological signals over telephone line <b>ENTALS OF TELEMEDICINE</b> ne, definition of telemedicine, tele benefits & limitations of telemedic diology, teleoncology, teledermato <b>DICINE TECHNOLOGIES</b> lia - Audio, video, still images, tex SDN, internet, air/ wireless commi- care. Internet technology and tele d, PACS architecture. Encryption, <b>DICAL APPLICATIONS</b>	tem, T ient n e, Tele e-healt icine, A blogy, t t and d unication emedicion Crypto	Felen nonito medi h, tel Applic elesu lata, f ons, ine us ograp	fax-ty GSM sing v	of ECG Implan and appli re, scope is of Tele v, e Healt vpe of con satellite, world wid	and Res table tele cations, , Telemed emedicine h and Cybe mmunicatic micro wav e web (ww	icine Systems - Teleradiolog er Medicine.	try, prts ms, <b>9</b> gy, gy, <b>9</b> ork: alth ata <b>9</b>	

Chairman - BoS Dept.of BME - ESEC

REFERENCE(S):
1. Rajarao C and Guha S.K. "Principles of Medical Electronics and Bio-medicalInstrumentation",
Universities press (India) Ltd, First Edition, Orient LongmanLtd, 2001
2. Ferrer-Roca, O., Sosa - Iudicissa, M. (Eds.), Handbook of Telemedicine. IOS Press (Studies in Health
Technology and Informatics, Volume 54, 2002
3. Mohan Bansal, "Medical Informatics", Tata McGraw-Hill, 2004

CX.92

1

Department	BIOMEDICAL ENGIN	EERING	G			R 2019	OE	
Course		Hour	rs / W	/eek	Credit	Total	Maximum	
Code	Course Name	L	Т	Р	С	Hours	Marks	
19BMY04	BIOMEDICAL ENGINEERING IN FITNESS 3 0 0 3	45	100					
<ul> <li>Study the</li> <li>Understa</li> <li>Understa</li> <li>Learn the</li> <li>Understa</li> <li>Course Outcome</li> <li>Illustrate</li> <li>Analyze t</li> <li>Distinguis</li> <li>Interpret f</li> </ul>	a basics of soft tissue mechanics nd the mechanics of head and neck aft nd the mechanics of different joints of t different gait analysis of a human nd the functions of human organs durin es: At the end of this course, learners v the basics of soft tissue mechanics, he mechanics of head and neck after h sh the mechanics of different joints of th the gait analysis,	er havir he hum ng Yoga vill be a naving a ne body	ng an ian bo ble to in inju	i injur ody o: ury,	у	ano krodi 4 M		
Unit I CON	ICEPT OF PHYSICAL EDUCATION A	ND HE	ALT	-	-			
inetic Disease	s and its Management				3.16.2			
Unit II         CON           Physical fitness         Physical fitness           Physical Fitness         Physical Fitness           Unit III         PRIN           Activities for de         Nutritional           Nuscular relaxa         Parlaxa	s and its Management <b>IPONENTS OF PHYSICAL FITNESS</b> components - Speed, Strength, Endu s - Health related Physical Fitness, P Balance. <b>NCIPLES OF EXERCISE PROGRAMM</b> veloping Physical Fitness Components Balance. Stress control exercise – S tion, Gentle stretches and Massage.	irance, erforma <b>1E</b> s, Exerc Sitting	Flexi ance cise a medi	bility Rela and H tatior	and Coc ted Phys leart rate n, Walkir	ordinative A sical Fitnes e Zones, P ng meditati	bilities Types o s and Cosmetions rinciples of Firston, Progressive	
Unit II       COM         Physical fitness       Physical fitness         Physical Fitness       Physical Fitness         Unit III       PRIM         Activities for de       Physical relaxa         Unit IV       YOG	s and its Management <b>IPONENTS OF PHYSICAL FITNESS</b> components - Speed, Strength, Endu s - Health related Physical Fitness, P Balance. <b>ICIPLES OF EXERCISE PROGRAMIV</b> veloping Physical Fitness Components Balance. Stress control exercise – S tion, Gentle stretches and Massage. <b>A AND STRESS MANAGEMENT</b>	rance, erforma <b>1</b> E s, Exerc Sitting	Flexi ance cise a medi	bility Rela and H tatior	and Coc ted Phys leart rate n, Walkir	ordinative A sical Fitnes e Zones, P ng meditati	bilities Types o s and Cosmetio rinciples of Firs on, Progressive	
Unit II     CON       Physical fitness     Physical fitness       Physical Fitness     Physical Fitness       Unit III     PRIM       Activities for de     PRIM	s and its Management <b>IPONENTS OF PHYSICAL FITNESS</b> components - Speed, Strength, Endu s - Health related Physical Fitness, P Balance. <b>NCIPLES OF EXERCISE PROGRAMM</b> veloping Physical Fitness Components Balance. Stress control exercise – S tion, Gentle stretches and Massage. <b>A AND STRESS MANAGEMENT</b> on Muscular system, Respiratory System docrine system, Physiology of Stress alamus, Cerebral Cortex and Neurohur	Irance, Performa <b>IE</b> s, Exerc Sitting stem, Ci on: Au nours.	Flexi ance cise a medi ircula	bility Rela and H tatior	and Coc ted Phys Heart rate n, Walkir system, Nervous	ordinative A sical Fitnes e Zones, P ng meditati Nervous sy System (A	bilities Types o s and Cosmetio s and Cosmetio s and Cosmetio s and Cosmetio s and Cosmetion s	
Unit II       CON         Physical fitness       Physical fitness         Physical Fitness       Physical Fitness         Unit III       PRIN         Activities for de       Nutritional         nuscular relaxa       Unit IV       YOG         Unact of Yoga       ystem and En-         tystem, Hypoth       Unit V       HEA         ardiac and Dia       Sessment and	s and its Management <b>IPONENTS OF PHYSICAL FITNESS</b> components - Speed, Strength, Endu s - Health related Physical Fitness, P Balance. <b>NCIPLES OF EXERCISE PROGRAMIV</b> veloping Physical Fitness Components Balance. Stress control exercise – S tion, Gentle stretches and Massage. <b>A AND STRESS MANAGEMENT</b> on Muscular system, Respiratory Sys docrine system, Physiology of Stress alamus, Cerebral Cortex and Neurohur <b>LTH CARE FITNESS</b> abetes Health Care, Respiratory Care Maintenance (HFAM) System. Mental	Irance, Performa IE s, Exerc Sitting otem, Ci on: Au nours.	Flexi ance cise a medi ircula utono	bility Rela and H tation tory mic d An	and Coc ted Phys Heart rate n, Walkir system, Nervous xiety Ma I Rehabil	ordinative A sical Fitnes e Zones, P ng meditati Nervous sy System (A nagement, litation.	bilities Types o s and Cosmetic s and Cosmetic rinciples of Firs on, Progressive (stem, Digestive (NS), Endocrine (S) Health Fitness	
Unit II       CON         Physical fitness       Physical fitness         Physical Fitness       Physical Fitness         Unit III       PRIN         Activities for de       Print         Actis for de       Print <td>s and its Management <b>IPONENTS OF PHYSICAL FITNESS</b> components - Speed, Strength, Endu s - Health related Physical Fitness, P Balance. <b>NCIPLES OF EXERCISE PROGRAMIV</b> veloping Physical Fitness Components Balance. Stress control exercise – S tion, Gentle stretches and Massage. <b>A AND STRESS MANAGEMENT</b> on Muscular system, Respiratory Sys docrine system, Physiology of Stress alamus, Cerebral Cortex and Neurohur <b>LTH CARE FITNESS</b> abetes Health Care, Respiratory Care Maintenance (HFAM) System, Mental <b>:</b></td> <td>Irance, Performa IE s, Exerc Sitting otem, Ci on: Au nours.</td> <td>Flexi ance cise a medi ircula utono s an eurole</td> <td>bility Rela and H tation tory mic d An ogica</td> <td>and Coc ted Phys Heart rate h, Walkir system, Nervous xiety Ma I Rehabil</td> <td>ordinative A sical Fitnes e Zones, P ng meditati Nervous sy System (A nagement, litation.</td> <td>bilities Types o s and Cosmetio rinciples of Firs on, Progressive (stem, Digestive (NS), Endocrine Health Fitness</td>	s and its Management <b>IPONENTS OF PHYSICAL FITNESS</b> components - Speed, Strength, Endu s - Health related Physical Fitness, P Balance. <b>NCIPLES OF EXERCISE PROGRAMIV</b> veloping Physical Fitness Components Balance. Stress control exercise – S tion, Gentle stretches and Massage. <b>A AND STRESS MANAGEMENT</b> on Muscular system, Respiratory Sys docrine system, Physiology of Stress alamus, Cerebral Cortex and Neurohur <b>LTH CARE FITNESS</b> abetes Health Care, Respiratory Care Maintenance (HFAM) System, Mental <b>:</b>	Irance, Performa IE s, Exerc Sitting otem, Ci on: Au nours.	Flexi ance cise a medi ircula utono s an eurole	bility Rela and H tation tory mic d An ogica	and Coc ted Phys Heart rate h, Walkir system, Nervous xiety Ma I Rehabil	ordinative A sical Fitnes e Zones, P ng meditati Nervous sy System (A nagement, litation.	bilities Types o s and Cosmetio rinciples of Firs on, Progressive (stem, Digestive (NS), Endocrine Health Fitness	
Unit II       CON         Physical fitness       Con         Physical fitness       Con         Physical fitness       Con         Unit III       PRIM         Activities for de       Con         Init III       PRIM         Activities for de       Con         Init IV       YOG         Mactivities       YOG         Mactis       HEA	s and its Management <b>IPONENTS OF PHYSICAL FITNESS</b> components - Speed, Strength, Endu s - Health related Physical Fitness, P Balance. <b>NCIPLES OF EXERCISE PROGRAMM</b> veloping Physical Fitness Components Balance. Stress control exercise – S tion, Gentle stretches and Massage. <b>A AND STRESS MANAGEMENT</b> on Muscular system, Respiratory System, Context alamus, Cerebral Cortex and Neurohur <b>LTH CARE FITNESS</b> abetes Health Care, Respiratory Care Maintenance (HFAM) System, Mental <b>:</b> ir.N.S., (2001). Yoga for Health. New D	Irance, Performa IE s, Exerc Sitting Sitting on: Au nours. e, Stres I and Ne Delhi: Pu	Flexi ance cise a medi ircula utono s and eurole	bility Rela and H tation atory mic d An ogica Mah	and Coc ted Phys Heart rate n, Walkir system, Nervous xiety Ma I Rehabil	ordinative A sical Fitnes e Zones, P ng meditati Nervous sy System (A nagement, litation.	bilities Types o s and Cosmetion s and Cosmeti	
Unit II       CON         Physical fitness         Physical Fitness         Unit III       PRIN         Activities for de         Init III       PRIN         Activities for de         Init IV       YOG         Mpact of Yoga         ystem and En-         ystem, Hypoth         Init V       HEA         ardiac and Dia         ssessment and         EXT BOOK(S)         1.       Ravishanka         2.       ACSM's "H         2005	s and its Management <b>IPONENTS OF PHYSICAL FITNESS</b> components - Speed, Strength, Endu s - Health related Physical Fitness, P Balance. <b>NCIPLES OF EXERCISE PROGRAMIV</b> veloping Physical Fitness Components Balance. Stress control exercise – S tion, Gentle stretches and Massage. <b>A AND STRESS MANAGEMENT</b> on Muscular system, Respiratory Sys docrine system, Physiology of Stress alamus, Cerebral Cortex and Neurohur <b>LTH CARE FITNESS</b> abetes Health Care, Respiratory Care Maintenance (HFAM) System, Mental <b>:</b> ur.N.S., (2001). Yoga for Health. New D ealth Related Physical Fitness Assess	Irance, Performa IE s, Exerc Sitting otem, Ci on: Au nours. on: Au nours.	Flexi ance cise a medi ircula utono s an eurole ustak Manu	bility Rela and H tation tory mic d An ogica Mah ial Li	and Coc ted Phys Heart rate n, Walkir system, Nervous xiety Ma I Rehabil a opincott V	ordinative A sical Fitnes e Zones, P ng meditati Nervous sy System (A nagement, litation.	bilities Types o s and Cosmetic s and Cosmetic rinciples of Firs on, Progressive (stem, Digestive (NS), Endocrine Health Fitness Health Fitness	
Unit II       CON         Physical fitness       Con         Physical fitness       Con         Physical fitness       Con         Unit III       PRIN         Activities for de       Con         Init III       PRIN         Activities for de       Con         Init IV       YOG         Nactivities for de       Con         Init IV       YOG         Npact of Yoga       Ystem and End         ystem and End       Con         ystem, Hypoth       Unit V         Unit V       HEA         ardiac and Dia       Ssessment and         Ssessment and       Con         1.       Ravishanka         2.       ACSM"s "H         2005       EFERENCE(S)	s and its Management <b>IPONENTS OF PHYSICAL FITNESS</b> components - Speed, Strength, Endu s - Health related Physical Fitness, P Balance. <b>NCIPLES OF EXERCISE PROGRAMIV</b> veloping Physical Fitness Components Balance. Stress control exercise – S tion, Gentle stretches and Massage. <b>A AND STRESS MANAGEMENT</b> on Muscular system, Respiratory Sys docrine system, Physiology of Stress alamus, Cerebral Cortex and Neurohur <b>LTH CARE FITNESS</b> abetes Health Care, Respiratory Care i Maintenance (HFAM) System, Mental <b>:</b> ir.N.S., (2001). Yoga for Health. New D ealth Related Physical Fitness Assess ):	Irance, Performa IE s, Exerc Sitting etem, Ci on: Au mours. e, Stres I and Ne Delhi: Pu sment N	Flexi ance cise a medi ircula utono s and eurole ustak Manu	bility Rela and H tation atory mic d An ogica Mah al Li	and Coc ted Phys Heart rate n, Walkir system, Nervous xiety Ma I Rehabil a opincott V	ordinative A sical Fitnes e Zones, P ng meditati Nervous sy System (A nagement, litation.	bilities Types o s and Cosmetion rinciples of Firs on, Progressive (stem, Digestive (NS), Endocrine Health Fitness Health Fitness	
Unit II       CON         Physical fitness       Physical fitness         Physical Fitness       Physical Fitness         Unit III       PRIN         Activities for de       Nutritional         Nuscular relaxa       Physical Fitness         Unit III       PRIN         Activities for de       Nutritional         Nuscular relaxa       Physical Fitness         Unit IV       YOG         Mpact of Yoga       ystem and En         system, Hypoth       Phead         Ardiac and Dia       Ssessment and         Sardiac and Dia       Ssessment and         Activishanka       ActosM"s "H         2.       ACSM"s "H         2005       EFERENCE(S         1.       Yogendra,         Mumbai: Dr       Numbai: Dr	s and its Management <b>IPONENTS OF PHYSICAL FITNESS</b> components - Speed, Strength, Endu s - Health related Physical Fitness, P Balance. <b>ICIPLES OF EXERCISE PROGRAMIV</b> veloping Physical Fitness Components Balance. Stress control exercise – S tion, Gentle stretches and Massage. <b>A AND STRESS MANAGEMENT</b> on Muscular system, Respiratory Sys docrine system, Physiology of Stress alamus, Cerebral Cortex and Neurohur <b>LTH CARE FITNESS</b> abetes Health Care, Respiratory Care Maintenance (HFAM) System, Mental <b>:</b> ur.N.S., (2001). Yoga for Health. New D ealth Related Physical Fitness Assess ): Hansa Jayadeva and Desai, Armaiti N Jayadeva Yogendra for the yoga instit	Irance, Performa IE s, Exerco Sitting otem, Ci on: Au mours. e, Stress I and Ne Delhi: Pu sment M Sment M	Flexi ance cise a medi ircula utono s and autono ustak Vanu nd.,	bility Rela and H tation atory mic d An ogica Mah ial Li	and Coc ted Phys Heart rate h, Walkir system, Nervous xiety Ma I Rehabil a opincott V	ordinative A sical Fitnes e Zones, P ng meditati Nervous sy System (A nagement, litation. Williams ar for back ar	bilities Types o s and Cosmetio rinciples of Firs on, Progressive (stem, Digestive (NS), Endocrine Health Fitness, d Walkins USA	

CX.g Chairman - BoS Dept.of BME - ESEC

1

Department	BIOMEDICAL ENGIN	NEERIN	G			R 2019	OE
Course		Hou	rs / V	Veek	Credit	Total	Maximum
Code	Course Name	L	Т	P	С	Hours	Warks
19BMY05	PRINCIPLES OF GENETIC ANALYSIS	3	0	0	3	45	100
<ul> <li>Learn di</li> <li>Get know</li> <li>Understation</li> <li>Study the</li> </ul>	ferent forms of inheritance patterns and vledge in evolutionary analysis of gene and outcomes of statistical analysis ass e molecular genetic information to conc	d identif tic sequ sociated duct a re	y the lence with esearce	m in g the re ch pro	genetic d esearch p oject	ata, project	
<ul> <li>Study the</li> </ul>	e Impacts of genetic variation			la la	N. Salar		filling and the
<ul> <li>Interpret</li> <li>Acquire</li> <li>Interpret project</li> <li>Exploit re involving</li> </ul>	different forms of inheritance patterns a in depth knowledge in evolutionary and and critically evaluate the outcomes elevant molecular genetic information w the analysis of real molecular genetic	and ider lysis of s of sta with skil data wit	ntify tl genet tistica I and h min	hem tic se al ana confi imal	in genetio quence alysis as idence to supervisi	c data sociated w conduct a ion	ith the researd
<ul> <li>Interpret</li> </ul>	the aspects of genetic variation.					-	
Unit I GEI				- Re-	<u></u>		
Organization o	of DNA, Chromosomal inheritance, E	Eukaryo	tic ge	enom	es – re	petitive an	d non-repetitiv
equence, Gen	etic mapping - restriction cleavage, RF	I P and	SNP	S.			
	11 0 01	Li ana	0111	••			
Unit II DN	A AND PHENOTYPE						
Unit II DN/	A AND PHENOTYPE and replication, DNA sequencing, amp	lificatio	n and	l hybi	ridization	. DNA Poly	morphism, RN/
Unit II DN/ NA structure anscription a	A AND PHENOTYPE and replication, DNA sequencing, amp nd processing, translation and its	plification post tr	n and ansla	hybi htion	ridization modifica	. DNA Poly tion. Regu	morphism, RN/ Ilation of gen
Unit II DN/ NA structure anscription a xpression.	A AND PHENOTYPE and replication, DNA sequencing, amp nd processing, translation and its	post tr	n and ansla	l hybi ition	ridization modifica	. DNA Poly ttion. Regu	morphism, RN/ Ilation of gen
Unit II DN/ DNA structure canscription a xpression. Unit III ENC	A AND PHENOTYPE and replication, DNA sequencing, amp nd processing, translation and its BINEERING OF GENES	post tr	n and ansla	l hybi ition	ridization modifica	. DNA Poly ation. Regu	morphism, RN/ Ilation of gen
Unit II     DN/       DNA structure     anscription     a       xpression.     Unit III     ENC       Gene     isolation	A AND PHENOTYPE and replication, DNA sequencing, amp nd processing, translation and its BINEERING OF GENES and manipulation, mutations, repair a	plification post tr	n and ansla	l hybr ation	ridization modifica , site dire	. DNA Poly ttion. Regu	morphism, RN/ Ilation of gen genesis, in vive
Unit IIDN/DNA structure ranscription a xpression.Unit IIIENC Ence isolation echniques of	A AND PHENOTYPE and replication, DNA sequencing, amp nd processing, translation and its GINEERING OF GENES and manipulation, mutations, repair a genetic manipulation, tools for and	post tr	n and ansla ombin gene	I hybration ation	ridization modifica , site dire pression	. DNA Poly ation. Regu ected muta and gene	morphism, RN/ Ilation of gen genesis, in vive
Unit II DN/ NA structure anscription a xpression. Unit III ENC iene isolation echniques of rganisms.	A AND PHENOTYPE and replication, DNA sequencing, amp nd processing, translation and its BINEERING OF GENES and manipulation, mutations, repair a genetic manipulation, tools for ana	plification post tr and reco	n and ansla ombin gene	l hybr ation ation	ridization modifica , site dire pression	. DNA Poly ation. Regu ected muta and gene	morphism, RN/ Ilation of gen genesis, in vive
Unit IIDN/DNA structure anscription a xpression.Unit IIIENCene isolation echniques of rganisms.Unit IVHUN	A AND PHENOTYPE and replication, DNA sequencing, amp nd processing, translation and its BINEERING OF GENES and manipulation, mutations, repair a genetic manipulation, tools for ana MAN GENOME PROJECT	plification post tr and reco alyzing	n and ransla ombin gene	ation	ridization modifica , site dire pression	. DNA Poly ation. Regu ected muta and gene	morphism, RN/ Ilation of gen genesis, in vive
Unit IIDN/DNA structure ranscription a xpression.Unit IIIENCGene isolation echniques of rganisms.Unit IVHUI HUI uman Genom approaches icrosatellite m roject.	A AND PHENOTYPE and replication, DNA sequencing, amp nd processing, translation and its BINEERING OF GENES and manipulation, mutations, repair a genetic manipulation, tools for ana MAN GENOME PROJECT e Project (HGP) – an overview of the p used in HGP, physical mapping, gen parkers, STS, EST, DNA sequencing an	blification post tr and reco alyzing project, ne ontol d DNA	n and ransla ombin gene goals logy, micro	ation ation e exp of th gene array	ridization modifica , site dire pression e project annotat , scientifi	. DNA Poly ation. Regu ected muta and gene t, major scie tion, techni ic & medica	morphism, RN/ Ilation of gen genesis, in vive tically modified entific strategie ques in HGP
Unit IIDN/DNA structure ranscription a xpression.Unit IIIENCSene isolation echniques of rganisms.Unit IVHURluman Genom approaches nicrosatellite m roject.Unit VIMP	A AND PHENOTYPE and replication, DNA sequencing, amp nd processing, translation and its BINEERING OF GENES and manipulation, mutations, repair a genetic manipulation, tools for ana MAN GENOME PROJECT e Project (HGP) – an overview of the p used in HGP, physical mapping, gen barkers, STS, EST,DNA sequencing and ACT OF GENETIC VARIATION	plification post tr and recc alyzing project, ne ontol d DNA	n and ransla ombin gene goals logy, micro	ation ation e exp of th gene array	ridization modifica , site dire pression e project annotat , scientif	. DNA Poly ation. Regu ected muta and gene t, major scie tion, techni ic & medica	morphism, RN/ Ilation of gen genesis, in vive tically modified entific strategie ques in HGP I benefits of this
Unit II     DN/       DNA structure     ranscription a       expression.     Unit III       Unit III     ENC       Sene isolation     echniques of       echniques of     of       rganisms.     Unit IV       Unit IV     HUI       luman Genom     approaches       nicrosatellite m     roject.       Unit V     IMP       ienetic variatic     acterial and V	A AND PHENOTYPE and replication, DNA sequencing, amp nd processing, translation and its BINEERING OF GENES and manipulation, mutations, repair a genetic manipulation, tools for ana MAN GENOME PROJECT e Project (HGP) – an overview of the p used in HGP, physical mapping, gen tarkers, STS, EST, DNA sequencing and ACT OF GENETIC VARIATION on in wild and agricultural population, B irrus cytogenetic evaluation.	blification post tr and reco alyzing project, ne ontol d DNA	n and ransla ombin gene goals logy, micro to-Ge	ation ation e exp of th gene array	ridization modifica , site dire pression e project annotat , scientifi s Techni	. DNA Poly ation. Regu ected muta and gene t, major scie tion, techni ic & medica ques, Immu	morphism, RN/ Ilation of gen genesis, in vive stically modified entific strategie ques in HGP Il benefits of this unology Testing
Unit II     DN/       DNA structure     ranscription a       expression.     Unit III       Unit III     ENC       Gene isolation     echniques of       echniques of     of       rganisms.     Unit IV       Unit IV     HUN       luman Genom     approaches       nicrosatellite m     roject.       Unit V     IMP       Genetic variatic     acterial and V       EXT BOOK(S       1. Anthony J	A AND PHENOTYPE and replication, DNA sequencing, amp nd processing, translation and its <b>SINEERING OF GENES</b> and manipulation, mutations, repair a genetic manipulation, tools for ana <b>MAN GENOME PROJECT</b> e Project (HGP) – an overview of the p used in HGP, physical mapping, gen markers, STS, EST, DNA sequencing an <b>ACT OF GENETIC VARIATION</b> on in wild and agricultural population, B irrus cytogenetic evaluation. ): .F. Griffiths, Susan R. Wessler, Sear – W.H Freeman & company. New York	blification post tr and recc alyzing project, ne ontol d DNA asic Cy	n and ransla ombin gene goals logy, micro to-Ge	ation ation ation e exp array enetic Johr – 20	ridization modifica , site dire- pression e project e annotat , scientifi s Techni n Doeble 15.	. DNA Poly ttion. Regu ected muta and gene t, major scie tion, techni ic & medica ques, Immu y, Introduc	morphism, RN/ Ilation of gen genesis, in vive tically modified entific strategie ques in HGP Il benefits of this unology Testing
Unit II       DN/         DNA structure       ranscription a         xpression.       Unit III       ENC         Gene isolation       echniques of       rganisms.         Unit IV       HUR         Juman Genom       approaches         actoristellite m       roject.         Unit V       IMP         Genetic variatic       acterial and V         EXT BOOK(S       Analysisll,         2.       Watson, J.	A AND PHENOTYPE and replication, DNA sequencing, amp nd processing, translation and its <b>BINEERING OF GENES</b> and manipulation, mutations, repair a genetic manipulation, tools for ana <b>MAN GENOME PROJECT</b> e Project (HGP) – an overview of the p used in HGP, physical mapping, gen arkers, STS, EST,DNA sequencing and <b>ACT OF GENETIC VARIATION</b> on in wild and agricultural population, B irus cytogenetic evaluation. ): .F. Griffiths, Susan R. Wessler, Sear – W.H Freeman & company, New York etal, — Molecular Biology of the Gene	blification post tr and reco alyzing project, ne ontol d DNA asic Cy n B. Ca <u>11th En</u>	n and ransla ombin gene goals logy, micro to-Ge	ation ation ation e exp array enetic Johr – 20 on, Pe	ridization modifica , site dire- pression e project a annotat , scientifi s Techni s Techni n Doeble 15. earson P	. DNA Poly ation. Regu ected muta and gene t, major scie tion, techni ic & medica ques, Immu y, Introduc	morphism, RN/ ilation of gen genesis, in vive tically modified entific strategie ques in HGP il benefits of this unology Testing tion to Genetic 2014.
Unit II     DN/       DNA structure     ranscription a       expression.     Unit III       Unit III     ENC       Gene isolation     echniques of       organisms.     Unit IV       Human Genom     approaches       nicrosatellite m     moject.       Unit V     IMP       Genetic variatic     Bacterial and V       EXT BOOK(S     1. Anthony J       Analysisll,       2. Watson. J.	A AND PHENOTYPE and replication, DNA sequencing, amp nd processing, translation and its <b>EINEERING OF GENES</b> and manipulation, mutations, repair a genetic manipulation, tools for ana <b>MAN GENOME PROJECT</b> e Project (HGP) – an overview of the p used in HGP, physical mapping, gen markers, STS, EST,DNA sequencing an <b>ACT OF GENETIC VARIATION</b> on in wild and agricultural population, B irus cytogenetic evaluation. ): .F. Griffiths, Susan R. Wessler, Sear – W.H Freeman & company, New York etal, — Molecular Biology of the Gene	blification post tr and recc alyzing project, ne ontol d DNA i asic Cy n B. Ca <u>11th Ed</u> -, 7th	n and ransla ombin gene goals logy, micro to-Ge	ation ation ation ation ation ation ation gene array enetic Johr - 20 on, Po	ridization modifica , site dire pression e project e annotat , scientifi s Techni n Doeble 15. earson P	. DNA Poly tition. Regu ected muta and gene t, major scie tion, techni ic & medica ques, Immu y, Introduc ublication, :	morphism, RN/ Ilation of gen genesis, in vive tically modified entific strategie ques in HGP Il benefits of this unology Testing tion to Genetic 2014.
Unit II     DN/       DNA structure     ranscription a       expression.     Unit III       Unit III     ENC       Gene isolation     echniques of       organisms.     Unit IV       Human Genom     approaches       nicrosatellite moroject.     IMP       Genetic variatic     Bacterial and V       EXT BOOK(S     1. Anthony J       Analysisli,       2. Watson. J.       REFERENCE(S       1. Karp, Gera       2013.	A AND PHENOTYPE and replication, DNA sequencing, amp nd processing, translation and its <b>SINEERING OF GENES</b> and manipulation, mutations, repair a genetic manipulation, tools for ana <b>MAN GENOME PROJECT</b> e Project (HGP) – an overview of the p used in HGP, physical mapping, gen barkers, STS, EST,DNA sequencing and <b>ACT OF GENETIC VARIATION</b> on in wild and agricultural population, B irrus cytogenetic evaluation. ): .F. Griffiths, Susan R. Wessler, Sear – W.H Freeman & company, New York etal, — Molecular Biology of the Gene <b>S):</b> and - Cell and Molecular Biology. Conc	blification post tr and recc alyzing project, ne ontol d DNA asic Cy n B. Ca <u>11th En</u> -, 7th	n and ansla ombin gene goals logy, micro to-Ge	ation ation ation ation ation ation ation gene array enetic Johr – 20 on, Po	ridization modifica , site dire- pression e project e annotat , scientifi s Techni n Doeble 15. earson P	. DNA Poly ation. Regu ected muta and gene t, major scie tion, techni ic & medica ques, Immu y, Introduc ublication, Jo	morphism, RN/ ilation of gen genesis, in vive stically modified entific strategie ques in HGP I benefits of this unology Testing tion to Genetic 2014.

dy Chairman - BoS Dept.of BME - ESTC

AND MA GAR

Department	BIOMEDICAL ENGI	NEERIN	G			R 2019	OE
Course	Course Name	Veek	Credit	Total	Maximum		
Code	Course Name	L	Т	Р	С	Hours	Marks
19BMY06	MEDICAL ELECTRONICS	3	0	0	3	45	100
<ul> <li>Understa</li> <li>Know the</li> <li>Study the</li> <li>Learn the</li> <li>Know the</li> <li>Course Outcom</li> <li>Know the</li> <li>Comprehes</li> <li>blood prehes</li> <li>Interpret ventilator</li> <li>Comprehes</li> <li>Interpret ventilator</li> <li>Comprehes</li> <li>Know ab</li> <li>Unit I</li> </ul>	and the human body electro- physiolog e non-electrical physiological parameter e various assist devices used in the ho- e physical medicine methods and Biot e recent trends in medical instrumentar nes: At the end of this course, learners e human body electro- physiological pro- nend the non-electrical physiological pro- passure, pulse, blood cell count, blood to the various assist devices used in the rs nend physical medicine methods eg. In the physical medicine methods eg. In the trends in medical instrumer ECTRO-PHYSIOLOGY AND BIO-POT	gical para ers and t ospitals elemetry tion will be a arameter flow meter e hospita ultrasonic ntation	amete heir r princ ible to rs and rs an er etc ls viz c, sho REC	ers ar neas ciple o: d reco d the . pac ortwa	nd record urement ording of ir measu emakers, ve, micro DING	ing of bio-po bio-potentia rement – bo , defibrillato wave surgio	otentials Ils, ody temperature rs, dialyzers an cal diathermies
ources of bio	medical signals, Bio-potentials, Bio pical waveforms and signal characteris	potential tics	elec	trode	s, biolog	ical amplifie	ers, ECG, EEG
Unit II BIO	-CHEMICAL AND NON ELECTRICA	L PARA	MET	ER M	EASURE	MENT	9
H, PO2, PCO	2, Colorimeter, Blood flow meter, Ca surement, Blood Cell Counters.	rdiac ou	tput,	respi	ratory, bl	ood pressu	re, temperature
Unit III ASS	SIST DEVICES				30.00		9
ardiac pacen	nakers, DC Defibrillator, Dialyser, V	Ventilator	rs, N	lagne	etic Reso	onance Ima	aging Systems,
Iltrasonic Imag		TOV	5	-14			
	Shortwaya ultrasonia and misrowa		and	their	onnling	tiona Sura	ical Diathormy
Riotelemetry	Shortwave, ultrasonic and microwa	ive type	anu	uiei	applica	uons, Surg	ical Diathenny,
	CENT TRENDS IN MEDICAL INSTRU		TION				9
elemedicine, l	nsulin Pumps, Radio pill, Endomicroso	copy, Bra	in ma	achin	e interfac	e, Lab on a	chip.
EXT BOOK(S	):					Y	
1. Leslie Cro 2007	mwell, "Biomedical Instrumentation a	and Mea	suren	nent"	, Prentice	e Hall of In	dia, New Delhi
2. John G.W 2007	ebster, "Medical Instrumentation App	lication a	and [	Desig	n", 3rd E	Edition, Wile	ey India Edition
EFERENCE(S	3):	S. In St.			1. n.L.w		
1. Khandpur,	R.S., "Handbook of Biomedical Instru	mentatio	n", TA	ATA	Mc Graw-	-Hill, New D	elhi, 2003
<ol><li>Joseph J.C Sons. New</li></ol>	Carr and John M.Brown, "Introduction / York, 2004.	to Biome	dical	Equi	pment Te	echnology",	John Wiley and

CK)

Department	BIOMEDICAL ENGI	NEERIN	G			R 2019	OE	
Course	Course Name	Hou	rs / V	Veek	Credit	Total	Maximu	m
Code	oourse name	L	Т	Р	С	Hours	Marks	
19BMY07	MEDICAL INFORMATICS	3	0	0	3	45	100	
Course Objective Understar Explore th Study the Understar formats Learn ICT Course Outcome Gain know Learn abo Discuss a Explain th Discuss a Unit I INTE Structure of Me	e (s): The purpose of learning this cound the structure of medical informatics in patient record digitization technique clinical approaches and advancement of the theories and practices adoped applications in medicine with an intra- ses: At the end of this course, learners wedge on the structure of medical information system combout automatic computerization in different la function of Hospital Information System to bout health informatics and different la <b>COUCTION TO MEDICAL INFORM</b> edical Informatics —Internet and Missival Hospital Magnetics —Internet —	urse is to s and its es nts in ap ted in H oduction will be a ormatics nputeriza ferent bio stems CT appl ATICS edicine	syste plying lospit able to an it ation o sign icatio	ems g infoi tal In ealth i o: s fund nal ac nal ac ns in curity	rmatics u formatior nformatic ctioning, equisition medicine issues,	sing compu Systems ss. Computer	iters in imagi in medical based med	ng dat
Unit II COM	S, e-health services, Health Informati	ics – Me	dical	Infor	natics, B	ioinformatic	S	
ntroduction - H CPR, Developm	istory taking by computer, Dialogue nent tools, Intranet, CPR in Radiolo	with the ogy- Ap	e con olicat	npute ion s	r, Compo erver pro	onents and ovider, Clin	l functionality nical informa	y of tion
ntroduction - H CPR, Developm system, Comput Unit III COM	istory taking by computer, Dialogue nent tools, Intranet, CPR in Radiolo erized prescriptions for patients. PUTERS IN CLINICAL LABORATO	with the ogy- App <b>RY AND</b>	e con plicat <b>) MEI</b>	npute ion s DICA	r, Compo erver pro	onents and ovider, Clin <b>NG</b>	l functionality ical informa	y of tion 9
ntroduction - H CPR, Developm system, Comput Unit III COM Automated clinic aboratory Informuclear medicine lanning, Nuclea Unit IV COM leuro computer Computer – assi	istory taking by computer, Dialogue nent tools, Intranet, CPR in Radiolo erized prescriptions for patients. <b>PUTERS IN CLINICAL LABORATO</b> cal laboratories-Automated methods mation System - Computerized ECG, e, ultrasound imaging ultrasonograph in Magnetic Resonance <b>PUTER ASSISTED MEDICAL DECI</b> is and Artificial Neural Networks ap- isted decision support system-produc	with the ogy- App <b>RY AND</b> s in her , EEG an y-compu- sion Al oplication ction rule	e con plicat <b>MEI</b> matol nd EN uted ) <b>ND M</b> n, Ex	DICA ogy, MG, C (-ray AKIN pert	r, Compo erver pro L IMAGII cytology Computer tomogra IG system - cognitive	onents and ovider, Clin <b>NG</b> and histo assisted n phy, Radiat - General model, ser	I functionality nical information ology, Intellig nedical imagi tion therapy a model of Cl mester netwo	y of tior genting- and 9 MD, orks
ntroduction - H CPR, Developm system, Comput Unit III COM Automated clinic aboratory Informuclear medicine planning, Nuclea Unit IV COM Jeuro computer Computer – assi nalysation, dec	istory taking by computer, Dialogue nent tools, Intranet, CPR in Radiolo erized prescriptions for patients. <b>PUTERS IN CLINICAL LABORATO</b> cal laboratories-Automated methods mation System - Computerized ECG, e, ultrasound imaging ultrasonograph in Magnetic Resonance <b>PUTER ASSISTED MEDICAL DECI</b> is and Artificial Neural Networks ap- isted decision support system-produc- isions analysis in clinical medicine- designing	with the ogy- App RY AND s in her , EEG an y-compu- sion an oplication ction rule compute	MEI matol matol nd EN uted 2 ND M n, Ex e sys ers in	DICA ogy, MG, C (-ray AKIN pert tem c the	r, Compo erver pro L IMAGII cytology Computer tomogra IG system - cognitive care of	AG and histo assisted n phy, Radiat - General model, ser critically pa	I functionality lical information logy, Intellig nedical imagi tion therapy a model of Cl mester netwo atients-compo	y of tior gent ing- and 9 MD, orks uter
ntroduction - H CPR, Developm system, Comput Unit III COM Automated clinic aboratory Informuclear medicine blanning, Nuclear Unit IV COM Neuro computer Computer – assisted surgery Unit V RECI	istory taking by computer, Dialogue nent tools, Intranet, CPR in Radiolo erized prescriptions for patients. <b>PUTERS IN CLINICAL LABORATO</b> cal laboratories-Automated methods mation System - Computerized ECG, e, ultrasound imaging ultrasonograph in Magnetic Resonance <b>PUTER ASSISTED MEDICAL DECI</b> is and Artificial Neural Networks ap- isted decision support system-produc- designing. <b>ENT TRENDS IN MEDICAL INFORM</b>	with the ogy- App RY AND s in her , EEG an y-compu- SION AI oplication ction rule compute	e con olicat <b>D MEI</b> matol nd EN uted D <b>ND M</b> n, Ex e sys ers in	DICA ogy, MG, C (-ray AKIN pert tem c the	r, Compo erver pro L IMAGII cytology Computer tomogra IG system - cognitive care of	onents and ovider, Clin AG and histo assisted n phy, Radiat - General model, ser critically pa	I functionality lical information logy, Intellig nedical imagi tion therapy a model of Cl mester netwo atients-compo	y o tior gen ing anc anc 9 MD, orks uter 9
ntroduction - H CPR, Developm system, Comput Unit III COM Automated clinic aboratory Informuclear medicine blanning, Nuclea Unit IV COM Veuro computer Computer – assisted surgery Unit V RECI Virtual reality ap ssisted surgery omputer assisted Medical educat	istory taking by computer, Dialogue nent tools, Intranet, CPR in Radiolo erized prescriptions for patients. <b>PUTERS IN CLINICAL LABORATO</b> cal laboratories-Automated methods mation System - Computerized ECG, e, ultrasound imaging ultrasonograph in Magnetic Resonance <b>PUTER ASSISTED MEDICAL DECI</b> is and Artificial Neural Networks applications analysis in clinical medicine- designing. <b>ENT TRENDS IN MEDICAL INFORM</b> oplications in medicine, IOT health r, Surgical simulation Telemedicine ed instrumentation in Medical Informa- tion and health care information.	with the ogy- App RY AND s in her , EEG an y-compu- sion Al oplication ction rule compute IATICS care an - Tele tics – Co	MEI matol ma	DICA ogy, MG, C (-ray AKIN pert tem of the edical ery of ter as	r, Compo erver pro L IMAGII cytology Computer tomogra IG system - cognitive care of informa computer ssisted pa	onents and ovider, Clin NG and histo assisted n phy, Radiat - General model, ser critically pa tion distrib aids for th atient educa	I functionality nical information ology, Intellig nedical imagination therapy a model of CI mester netwo atients-compu- ution Compu- e handicapp ation and hea	y o tior tior gen ing- anc anc yD, orks uter uter ed, alth
ntroduction - H CPR, Developm system, Comput Unit III COM Automated clinic aboratory Inform buclear medicine blanning, Nuclea Unit IV COM Neuro computer Computer – assisted surgery Unit V RECI (irtual reality appressisted surgery computer assisted Medical educat EXT BOOK(S):	istory taking by computer, Dialogue nent tools, Intranet, CPR in Radiolo erized prescriptions for patients. <b>PUTERS IN CLINICAL LABORATO</b> cal laboratories-Automated methods mation System - Computerized ECG, e, ultrasound imaging ultrasonograph in Magnetic Resonance <b>PUTER ASSISTED MEDICAL DECI</b> is and Artificial Neural Networks ap- isted decision support system-produc- isions analysis in clinical medicine- designing. <b>ENT TRENDS IN MEDICAL INFORM</b> oplications in medicine, IOT health f, Surgical simulation Telemedicine ision and health care information.	with the ogy- App RY AND s in her , EEG an y-compu- SION AI oplication ction rule compute IATICS care an - Tele tics – Co	MEI matol nd EN uted ) ND M n, Ex ers in d me surge	DICA ogy, MG, C (-ray AKIN pert tem c the edical ery c ter as	r, Compo erver pro L IMAGII cytology Computer tomogra IG system - cognitive care of informa omputer ssisted pa	onents and ovider, Clin NG and histo assisted n phy, Radiat - General model, ser critically pa tion distrib aids for th atient educa	I functionality nical information ology, Intellig nedical imagination therapy a model of Cl mester netwo atients-compu- ution Compu- e handicapp ation and hea	y o tior tior gen ing anc anc MD, orks uter ed, alth
Introduction - H CPR, Developm system, Comput Unit III COM Automated clinic aboratory Inform nuclear medicine blanning, Nuclea Unit IV COM Neuro computer Computer – assisted surgery Unit V RECI /irtual reality ap issisted surgery computer assisted surgery issisted surgery issisted surgery computer assisted Medical education EXT BOOK(S): 1. OrpitaBosu University p	istory taking by computer, Dialogue nent tools, Intranet, CPR in Radiolo erized prescriptions for patients. <b>PUTERS IN CLINICAL LABORATO</b> cal laboratories-Automated methods mation System - Computerized ECG, a, ultrasound imaging ultrasonograph in Magnetic Resonance <b>PUTER ASSISTED MEDICAL DECI</b> is and Artificial Neural Networks ap- isted decision support system-produc- isions analysis in clinical medicine- designing. <b>ENT TRENDS IN MEDICAL INFORM</b> oplications in medicine, IOT health r, Surgical simulation Telemedicine ad instrumentation in Medical Informa- tion and health care information. and Simminder Kaur Thukral, "Bioin ress, 2007	with the ogy- App RY AND s in here , EEG an y-compute SION AI oplication ction rule compute IATICS care an - Tele tics – Compute	e con plicat <b>MEI</b> matol nd EN uted ) <b>ND M</b> n, Ex e sys ers in d me surge ompu	DICA ogy, MG, C (-ray AKIN pert tem o the edical ery c ter as	r, Compo erver pro L IMAGII cytology Computer tomogra IG system - cognitive care of informa omputer ssisted pa ses, Too	onents and ovider, Clin AG and histo assisted m phy, Radiat - General model, ser critically pa tion distrib aids for th atient educa	I functionality nical information ology, Intellig nedical imagination therapy a model of Cl mester netwo atients-compu- ution Compu- e handicapp ation and hea orithms", Ox	y o tior tior gen ing- anc wD orks uter ed, alth

CX:0 Chairman - BoS Dept.of BME - ESEC

<b>REFERENCE(S</b>	):
--------------------	----

1. Yi Ping Phoebe Chen, "Bioinformatics Technologies", Springer International Edition, New Delhi, 2007.

2. Mohan Bansal, Medical informatics Tata McGraw Hill Publishing computers Ltd, 2003 New Delhi.

3. Alain Venot -Medical Informatics, e-Health, Fundamental and Applications, Springer-Verlag Paris, 2013.

1

4. H M Dietel, Internet and World W ide Web, AB Goldberg publishers, New Delhi, 2007

Course Code         Course Name         Hours / Week         Credit         Total         Maximum Marks           19BMY08         DESIGN OF MEDICAL ELECTRONIC         3         0         0         3         45         100           Course Objective (s): The purpose of learning this course is to         -	Department	BIOMEDICAL ENGINE	ERIN	G			R 2019	OE	
Code         L         T         P         C         Hours         Marks           19BMY08         DESIGN OF MEDICAL ELECTRONIC DEVICES         3         0         0         3         45         100           Course Objective (s): The purpose of learning this course is to         •         Understand the human body electro- physiological parameters and their measurement         •         Study the various assist devices used in the hospitals           •         Learn the physical medicine methods and Biotelemetry principle         •         Know the recent trends in medical instrumentation           Course Outcomes: At the end of this course, learners will be able to:         •         Comprehend the non-electrical physiological parameters and their measurement           •         Interpret the various assist devices used in the hospitals         •         Comprehend physical medicine methods eg. ultrasonic, shortwave, microwave surgical diathermies and bio-elemetry principles of Sensing, Sensor Interfacing, Driving Bridges, Signal Conditioning Amplifiers, Data Acquisition: Sample and Hold Conversion, Multi channel Acquisition, Internal Noise In OPAMPS, Bypass Capacitors and Resonances, Electromagnetic Interference, interference from external electric field, onductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power Failure Warning         9           •         Unit II         DAGNOTIC EQUIPMENT DESIGN         9           •         DResign methodologies, PCB assembly, mechanical assembly, product	Course	Course Name	Hou	rs / V	Veek	Credit	Total	Maximum	
19BMY08         DESIGN OF MEDICAL ELECTRONIC         3         0         0         3         45         100           Course Objective (s): The purpose of learning this course is to <ul> <li>Understand the human body electro- physiological parameters and their measurement</li> <li>Study the various assist devices used in the hospitals</li> <li>Learn the physical medicine methods and Biotelemetry principle</li> <li>Know the recent trends in medical instrumentation</li> </ul> Course Outcomes: At the end of this course, learners will be able to:               Know the human body electro- physiological parameters and their measurement <li>Interpret the various assist devices used in the hospitals</li> <li>Comprehend physical medicine methods eg. ultrasonic, shortwave, microwave surgical diathermies and biotelemetry principles and methods</li> <li>Know about recent trends in medical instrumentation</li> Unit1         DATA ACQUISTION AND NOISE ISSUES         9           Physical Principles of Sensing, Sensor Interfacing, Driving Bridges, Signal Conditioning Amplifiers, Data Acquisition: Sample and Hold Conversion, Multi channel Acquisition, Internal Noise In OPAMPS, Bypass Capacitors and Resonances, Electromagnetic Interference, Interference from external electric field, conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power Failure Warning         9               ECG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory a	Code		L	T	Ρ	С	Hours	Marks	
Course Objective (s): The purpose of learning this course is to  Understand the human body electro- physiological parameters and recording of bio-potentials  Know the non-electrical physiological parameters and their measurement  Study the various assist devices used in the hospitals  Learn the physical medicine methods and Biotelemetry principle  Know the nearent trends in medical instrumentation  Course-Outcomes: At the end of this course, learners will be able to:  Know the human body electro- physiological parameters and their measurement  Interpret the various assist devices used in the hospitals  Comprehend physical medicine methods eg. Ultrasonic, shortwave, microwave surgical diathermies and bio-telemetry principles and methods Know about recent trends in medical instrumentation Unit I DATA ACQUISITION AND NOISE ISSUES  Physical Principles of Sensing, Sensor Interfacing, Driving Bridges, Signal Conditioning Amplifiers, Data Acquisition: Sample and Hold Conversion, Multi channel Acquisition, Internal Noise In OPAMPS, Bypass Capacitors and Resonances, Electromagnetic Interference, interference from external electric field, conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power Failure Warning Unit II DEIGN METHODOLOGIES  PGC design methodologies, PCB assembly, mechanical assembly, product design and modeling, fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications Unit IV DIAGNOSTIC EQUIPMENT DESIGN  Unit IV THERAPEUTIC EQUIPMENT DESIGN  Paecemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventiade  Intraoular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement  FEXTBOOK(S):  Antin Ouljat, Rahul Singh, Hua Lee, "Medical Devices: Surgic	19BMY08	DESIGN OF MEDICAL ELECTRONIC DEVICES	3	0	0	3	45	100	
<ul> <li>Understand the human body electro- physiological parameters and recording of bio-potentials</li> <li>Know the non-electrical physiological parameters and their measurement</li> <li>Study the various assist devices used in the hospitals</li> <li>Learn the physical medicine methods and Biotelemetry principle</li> <li>Know the recent trends in medical instrumentation</li> <li>Course-Outcomes: At the end of this course, learners will be able to:</li> <li>Know the human body electro- physiological parameters and their measurement</li> <li>Interpret the various assist devices used in the hospitals</li> <li>Comprehend the non-electrical physiological parameters and their measurement</li> <li>Interpret the various assist devices used in the hospitals</li> <li>Comprehend the non-electrical physiological parameters and their measurement</li> <li>Interpret the various assist devices used in the hospitals</li> <li>Comprehend the non-electrical physiological parameters and their measurement</li> <li>Interpret the various assist devices used in the hospitals</li> <li>Comprehend the non-electrical Instrumentation</li> <li>Unit I</li> <li>DATA ACQUISITION AND NOISE ISSUES</li> <li>9 Physical Principles of Sensing, Sensor Interfacing, Driving Bridges, Signal Conditioning Amplifiers, Data Acquisition: Sample and Hold Conversion, Multi channel Acquisition, Internal Noise In OPAMPS, Bypass Capacitors and Resonances, Electromagnetic Interference, interference from external electric field, conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power Failure Warning</li> <li>Unit II</li> <li>DEIR design methodologies, PCB assembly, mechanical assembly, product design and modeling, fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications</li> <li>Unit II</li> <li>DIAGNOSTIC EQUIPMENT DESIGN</li> <li>9</li> <li>Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Function</li></ul>	Course Object	ive (s): The purpose of learning this cours	se is to	)					
<ul> <li>Know the non-electrical physiological parameters and their measurement</li> <li>Study the various assist devices used in the hospitals</li> <li>Learn the physical medicine methods and Biotelemetry principle</li> <li>Know the recent trends in medical instrumentation</li> <li>Course-Outcomes: At the end of this course, learners will be able to:</li> <li>Know the human body electro- physiological parameters and recording of bio-potentials,</li> <li>Comprehend the non-electrical physiological parameters and their measurement</li> <li>Interpret the various assist devices used in the hospitals</li> <li>Comprehend physical medicine methods eg. ultrasonic, shortwave, microwave surgical diathermies and biot-telemetry principles and methods</li> <li>Know about recent trends in medical instrumentation</li> <li>Unit I DATA ACQUISITION AND NOISE ISSUES 9</li> <li>Physical Principles of Sensing, Sensor Interfacing, Driving Bridges, Signal Conditioning Amplifiers, Data Acquisition: sample and Hold Conversion, Multi channel Acquisition, Internal Noise In OPAMPS, Bypass Capacitors and Resonances, Electromagnetic Interference, interference from external electric field, conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power Failure Warning</li> <li>Unit II DESIGN METHODOLOGIES 9</li> <li>BCDR design methodologies, PCB assembly, mechanical assembly, product design and modeling, fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications</li> <li>Unit II DIAGNOSTIC EQUIPMENT DESIGN 9</li> <li>GecG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI) tardware design</li> <li>Unit IV THERAPEUTIC EQUIPMENT DESIGN 9</li> <li>Theodore R, Kucklick, —The Medical Device Ramp-D Handbookil, Taylor &amp;Francis Group LLC, 3rd edition 2013.</li> <li>Antrino Culjat, Rahul Singh, Hua Lee, "Medical D</li></ul>	<ul> <li>Underst</li> </ul>	and the human body electro- physiologica	al para	amete	ers ar	d record	ing of bio-po	otentials	
Study the various assist devices used in the hospitals     Learn the physical medicine methods and Biotelemetry principle     Know the recent trends in medical instrumentation Course: At the end of this course, learners will be able to:     Know the human body electro- physiological parameters and their measurement     Interpret the various assist devices used in the hospitals     Comprehend physical medicine methods eg. ultrasonic, shortwave, microwave surgical diathermies, and bio-telemetry principles and methods     Know about recent trends in medical instrumentation     Unit! DATA ACQUISTION AND NOSE ISSUES     9 Physical Principles of Sensing, Sensor Interfacing, Driving Bridges, Signal Conditioning Amplifiers, Data Acquisition: Sample and Hold Conversion, Multi channel Acquisition, Internal Noise In OPAMPS, Bypass Capacitors and Resonances, Electromagnetic Interference, interference from external electric field, conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power Failure Warning     Unit II DESIGN METHODOLOGIES     9 ECG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI) Hardware design     Unit V THERAPEUTIC EQUIPMENT DESIGN     9 Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator     Unit V IMPLANT AND PROSTHESIS DESIGN     9 Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulator, Functional electric al stimulator (FES), Hemodialysis delivery system, Mechanical ventilator     Unit V IMPLANT AND PROSTHESIS DESIGN     9 Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delive	<ul> <li>Know th</li> </ul>	e non-electrical physiological parameters	and t	heir r	neasi	urement			
<ul> <li>Learn the physical medicine methods and Biotelemetry principle <ul> <li>Know the recent trends in medical instrumentation</li> </ul> </li> <li>Course Outcomes: At the end of this course, learners will be able to: <ul> <li>Know the human body electro- physiological parameters and recording of bio-potentials,</li> <li>Comprehend the non-electrical physiological parameters and their measurement</li> <li>Interpret the various assist devices used in the hospitals</li> <li>Comprehend physical medicine methods eg. ultrasonic, shortwave, microwave surgical diathermies and bio-telemetry principles and methods</li> <li>Know about recent trends in medical instrumentation</li> </ul> </li> <li>Unit!   DATA ACQUISITION AND NOISE ISSUES [9]</li> <li>Physical Principles of Sensing, Sensor Interfacing, Driving Bridges, Signal Conditioning Amplifiers, Data Acquisition: Sample and Hold Conversion, Multi channel Acquisition, Internal Noise In OPAMPS, Bypass Capacitors and Resonances, Electromagnetic Interference, interference from external electric field, conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power Failure Warning</li> <li>Unit II DESIGN METHODOLOGIES [9]</li> <li>EDR design methodologies, PCB assembly, mechanical assembly, product design and modeling, fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specificatons</li> <li>Unit II] DIAGNOSTIC EQUIPMENT DESIGN [9]</li> <li>Pacemaker, External cardio-vector defibrilliator, Implantable cardio-vector defibrillator, Deep brain stimulator (FES), Hemodialysis delivery system, Mechanical ventilator</li> <li>Unit V IMPLANT AND PROSTHESIS DESIGN [9]</li> <li>Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Sengin eleuting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement</li> <li>Theodore R. Kucklick, —The Medical Device Ramp-D Handbookil, Taylor &amp;Francis Group LLC, 3rd edition 2013.</li> <li>An</li></ul>	<ul> <li>Study th</li> </ul>	e various assist devices used in the hosp	oitals		1				
Know the freedent trends in medical instrumentation     Course. Uncomes: At the end of this course, learners will be able to:     Know the human body electro- physiological parameters and their measurement     Interpret the various assist devices used in the hospitals     Comprehend physical medicine methods eg. ultrasonic, shortwave, microwave surgical diathermies     and bio-telemetry principles and methods     Know about recent trends in medical instrumentation     Unit! DATA ACQUISITION AND NOISE ISSUES     Physical Principles of Sensing, Sensor Interfacing, Driving Bridges, Signal Conditioning Amplifiers, Data     Acquisition: Sample and Hold Conversion, Multi channel Acquisition, Internal Noise In OPAMPS, Bypass     Capacitors and Resonances, Electromagnetic Interference, interference from external electric field,     conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power Failure Warning     Unit II DESIGN METHODOLOGIES     9 EDR design methodologies, PCB assembly, mechanical assembly, product design and modeling,     fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications     Unit II DIAGNOSTIC EQUIPMENT DESIGN     9 Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain     stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator     Unit V IMPLANT AND PROSTHESIS DESIGN     9 Pacemaker, External, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent     and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement     TEXEDOOK(S):     1. Thecodere R. Kucklick, —The Medical Device Ramp-D Handbookil, Taylor &Francis Group LLC, 3rd     edition 2013.     2. Anthony Y.K.Chan, —Biomedical device technology: principles and design!, Charles C Thomas, 2008.     REFERENCE(S):     1. Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided	Learn th	e physical medicine methods and Biotele	emetry	princ	siple				
Conservent       At the end of this Course, tearners will be able to.         • Know the human body electro-physiological parameters and recording of bio-potentials,         • Comprehend the non-electrical physiological parameters and recording of bio-potentials,         • Comprehend physical medicine methods eg. ultrasonic, shortwave, microwave surgical diathermies and bio-telemetry principles and methods         • Know about recent trends in medical instrumentation         Unit11       DATA ACQUISITION AND NOISE ISSUES       9         Physical Principles of Sensing, Sensor Interfacing, Driving Bridges, Signal Conditioning Amplifiers, Data Acquisition: Sample and Hold Conversion, Multi channel Acquisition, Internal Noise In OPAMPS, Bypass Capacitors and Resonances, Electromagnetic Interference, interference from external electric field, conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power Failure Warning       9         Unit 11       DESIGN METHODOLOGIES       9         ECR, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI) Hardware design       9         Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulator interplacement       9         Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulator (FES), Hemodialysis delivery system, Mechanical ventilator       9         Pacemaker, External cardio-vector defibrillat	Know th	e recent trends in medical instrumentatio	n ill ho c	bla t					
Comprehend the non-electrical physiological parameters and their measurement     Interpret the various assist devices used in the hospitals     Comprehend physical medicine methods eg. ultrasonic, shortwave, microwave surgical diathermies and bio-telemetry principles and methods     Know about recent trends in medical instrumentation     Unit!  DATA ACQUISITION AND NOISE ISSUES     9 Physical Principles of Sensing, Sensor Interfacing, Driving Bridges, Signal Conditioning Amplifiers, Data Acquisition: Sample and Hold Conversion, Multi channel Acquisition, Internal Noise In OPAMPS, Bypass Capacitors and Resonances, Electromagnetic Interference, interference from external electric field, conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power Failure Warning     Unit !! DESIGN METHODOLOGIES     9 EDR design methodologies, PCB assembly, mechanical assembly, product design and modelling, fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications     Unit II DIAGNOSTIC EQUIPMENT DESIGN     9 Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain     simulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator     Unit V IMPLANT AND PROSTHESIS DESIGN     9 Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain     simulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator     Unit V IMPLANT AND PROSTHESIS DESIGN     9 Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain     atimulation, Functional electrical stimulator, Heat valves, Design of artificial pancreas, Drug eluting stent     and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement     111     112     112     112     112     112     112     112     112     112     112     112     112     112     112	Course Outcon	a human hody electro, physiological para	ill be a		). I rocc	ording of	hia notantia	le	
<ul> <li>Interpret the various assist devices used in the hospitals</li> <li>Comprehend physical medicine methods eg. ultrasonic, shortwave, microwave surgical diathermies, and bio-telemetry principles and methods</li> <li>Know about recent trends in medical instrumentation</li> <li>Unit II DATA ACQUISITION AND NOISE ISSUES</li> <li>9</li> </ul> Physical Principles of Sensing, Sensor Interfacing, Driving Bridges, Signal Conditioning Amplifiers, Data Acquisition: Sample and Hold Conversion, Multi channel Acquisition, Internal Noise In OPAMPS, Bypass Capacitors and Resonances, Electromagnetic Interference, interference from external electric field, conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power Failure Warning <ul> <li>Unit III DESIGN METHODOLOGIES</li> <li>9</li> <li>EDR design methodologies, PCB assembly, mechanical assembly, product design and modeling, fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications</li> <li>Unit III DIAGNOSTIC EQUIPMENT DESIGN</li> <li>9</li> <li>ECG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI) Hardware design</li> <li>Unit IV THERAPEUTIC EQUIPMENT DESIGN</li> <li>9</li> <li>Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator Unit V IMPLANT AND PROSTHESIS DESIGN</li> <li>9</li> <li>Pineodore R, Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &amp;Francis Group LLC, 3rd edition 2013.</li> <li>2: Anthony Y.K.Chan, —Biomedical device technology: principles and designI, Charles C Thomas, 2008.</li> <li>REFERENCE(S):</li> <li>1: Mreio Cuija, Rahul Singh, Hua Lee, "Medical Device: Surgical and Image-Guided Technologies], Joh Willey &amp; Sons, Reinaldo Perez, Design of m</li></ul>	Compre	hend the non-electrical physiological para	amete	rs and	d thei	r measur	ement	15,	
Comprehend physical medicine methods eg. ultrasonic, shortwave, microwave surgical diathermies , and bio-telemetry principles and methods     Know about recent trends in medical instrumentation     UnitUI DATA ACQUISITION AND NOISE ISSUES     9 Physical Principles of Sensing, Sensor Interfacing, Driving Bridges, Signal Conditioning Amplifiers, Data Acquisition: Sample and Hold Conversion, Multi channel Acquisition, Internal Noise In OPAMPS, Bypass Capacitors and Resonances, Electromagnetic Interference, interference from external electric field, conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power Failure Warning     Unit II DESIGN METHODOLOGIES     9 EDR design methodologies, PCB assembly, mechanical assembly, product design and modeling, fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications     Unit III DIAGNOSTIC EQUIPMENT DESIGN     9 ECG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI) Hardware design     Unit IV THERAPEUTIC EQUIPMENT DESIGN     9 Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator     Unit V IMPLANT AND PROSTHESIS DESIGN     9 Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator     Unit V IMPLANT AND PROSTHESIS DESIGN     9 Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Sorge 2005.     1. Theodore R, Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &Francis Group LLC, 3rd edition 2013.     Anthony Y.K.Chan, —Biomedical device technology: principles and designI, Charles C Thomas, 2	<ul> <li>Interpret</li> </ul>	the various assist devices used in the ho	ospital	s	a unci	measu	omont		
and bio-telemetry principles and methods Know about recent trends in medical instrumentation Unit1 DATA ACQUISITION AND NOISE ISSUES Physical Principles of Sensing, Sensor Interfacing, Driving Bridges, Signal Conditioning Amplifiers, Data Acquisition: Sample and Hold Conversion, Multi channel Acquisition, Internal Noise In OPAMPS, Bypass Capacitors and Resonances, Electromagnetic Interference, interference from external electric field, conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power Failure Warning Unit 11 DESIGN METHODOLOGIES 9 EDR design methodologies, PCB assembly, mechanical assembly, product design and modeling, fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications Unit 11 DIAGNOSTIC EQUIPMENT DESIGN 9 ECG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI) Hardware design Unit V THERAPEUTIC EQUIPMENT DESIGN 9 Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator Unit V IMPLANT AND PROSTHESIS DESIGN 9 Pracemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator 0 Intaocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement 1 EXT BOOK(S): 1. Theodore R. Kucklick, —The Medical Device Ramp-D HandbookII, Taylor &Francis Group LLC, 3rd edition 2013. 2. Anthony Y.K.Chan, —Biomedical device technology: principles and designII, Charles C Thomas, 2008. 1 EFERENCE(S): 1. Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies , Joh Wiley & Sons, Reinaldo Perez, Design of medical electronic device], Elsevier science,	Compre	hend physical medicine methods eq. ultr	asoni	c. sha	ortwa	ve. micro	wave surgi	cal diathermies	
Know about recent trends in medical instrumentation Unit11 DATA ACQUISITION AND NOISE ISSUES Physical Principles of Sensing, Sensor Interfacing, Driving Bridges, Signal Conditioning Amplifiers, Data Acquisition: Sample and Hold Conversion, Multi channel Acquisition, Internal Noise In OPAMPS, Bypass Capacitors and Resonances, Electromagnetic Interference, interference from external electric field, conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power Failure Warning Unit 11 DESIGN METHODOLOGIES S DR design methodologies, PCB assembly, mechanical assembly, product design and modeling, fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications Unit 11 DIAGNOSTIC EQUIPMENT DESIGN 9 ECG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI) Hardware design Unit IV THERAPEUTIC EQUIPMENT DESIGN 9 Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator Unit V IMPLANT AND PROSTHESIS DESIGN 9 Intraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement 1. Theodore R. Kucklick, —The Medical Device Ramp-D Handbookil, Taylor &Francis Group LLC, 3rd edition 2013. 2. Anthony Y.K.Chan, —Biomedical device technology: principles and designII, Charles C Thomas, 2008. <b>REFERENCE(S):</b> 1. Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies  , Joh Wiley & Sons, Reinaldo Perez, Design of medical electronic device  , Elsevier science, 2002. 2. Richard C. Fries, "Handbo	and bio-	telemetry principles and methods					J	4.1.1	
Unit11       DATA ACQUISITION AND NOISE ISSUES       9         Physical Principles of Sensing, Sensor Interfacing, Driving Bridges, Signal Conditioning Amplifiers, Data         Acquisition: Sample and Hold Conversion, Multi channel Acquisition, Internal Noise In OPAMPS, Bypass         Capacitors and Resonances, Electromagnetic Interference, interference from external electric field, conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power         Failure Warning       9         Unit II       DESIGN METHODOLOGIES       9         EDR design methodologies, PCB assembly, mechanical assembly, product design and modeling, fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications       9         Unit III       DIAGNOSTIC EQUIPMENT DESIGN       9         ECG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI)         Hardware design       9         Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator       9         Intraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement       9         Intraocular lens implant, Cochlear implants, Heart valves, Design of art	<ul> <li>Know at</li> </ul>	pout recent trends in medical instrumentation	tion		1.		1.24		
Physical Principles of Sensing, Sensor Interfacing, Driving Bridges, Signal Conditioning Amplifiers, Data         Acquisition: Sample and Hold Conversion, Multi channel Acquisition, Internal Noise In OPAMPS, Bypass         Capacitors and Resonances, Electromagnetic Interference, interference from external electric field, conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power         Failure Warning       9         Unit II       DESIGN METHODOLOGIES       9         EDR design methodologies, PCB assembly, mechanical assembly, product design and modeling, fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications       9         ECG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI)       9         Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator       9         Init IV       THERAPEUTIC EQUIPMENT DESIGN       9         Intraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement       9         Intraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement       9	Unit I DA	TA ACQUISITION AND NOISE ISSUES		dis	1			5	
Acquisition: Sample and Hold Conversion, Multi channel Acquisition, Internal Noise In OPAMPS, Bypass Capacitors and Resonances, Electromagnetic Interference, interference from external electric field, conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power Failure Warning Unit II DESIGN METHODOLOGIES 9 EDR design methodologies, PCB assembly, mechanical assembly, product design and modeling, fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications Unit III DIAGNOSTIC EQUIPMENT DESIGN 9 ECG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI) Hardware design 9 acmaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator 1 Unit V IMPLANT AND PROSTHESIS DESIGN 9 ntraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement 1 FEXT BOOK(S): 1 Theodore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &Francis Group LLC, 3rd edition 2013. 2 Anthony Y.K.Chan, —Biomedical device technology: principles and designII, Charles C Thomas, 2008. 3 EFERENCE(S): 1 Theodore R. Kucklick, Hua Lee, "Medical Device: Surgical and Image-Guided Technologies], Joh Wiley & Sons, Reinaldo Perez, Design of medical electronic device], Elsevier science, 2002. 3 Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005. 3 David Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: / Predical nersporetive of the design construction and text of medical device length of devices].	Physical Princ	iples of Sensing, Sensor Interfacing, Dr	riving	Bridg	es, S	ignal Co	nditioning A	Amplifiers, Data	
Capacitors and Resonances, Electromagnetic Interference, interference from external electric field, conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power Failure Warning Unit II DESIGN METHODOLOGIES 9 EDR design methodologies, PCB assembly, mechanical assembly, product design and modeling, fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications Unit III DIAGNOSTIC EQUIPMENT DESIGN 9 ECG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI) Hardware design Unit IV THERAPEUTIC EQUIPMENT DESIGN 9 Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator Unit V IMPLANT AND PROSTHESIS DESIGN 9 Intraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement <b>TEXT BOOK(S):</b> 1. Theodore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &Francis Group LLC, 3rd edition 2013. 2. Anthony Y.K.Chan, —Biomedical device technology: principles and designII, Charles C Thomas, 2008. <b>REFERENCE(S):</b> 1. Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies  , Joh Wiley & Sons, Reinaldo Perez, Design of medical electronic device  , Elsevier science, 2002. 2. Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005. 3. David Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: / Practical parsnetive of the design construction and test of medical devices of medical devices on structions and test of medical Electronic Instrumentation: / Practical parsnetive of the design construction and test of medical	Acquisition: Sa	ample and Hold Conversion, Multi chann	nel Ac	quisit	ion, I	nternal N	loise In OF	AMPS, Bypass	
conductive interference, electrical safety and signal isolation, Overload Protection, Output Filtering, Power         Failure Warning         Unit II       DESIGN METHODOLOGIES       9         EDR design methodologies, PCB assembly, mechanical assembly, product design and modeling, fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications       9         ECG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI)       9         Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator       9         Init IV       IMPLANT AND PROSTHESIS DESIGN       9         Intraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement       9         ITEX BOOK(S):       1       The dore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &Francis Group LLC, 3rd edition 2013.       2         2:       Anthony Y.K.Chan, —Biomedical device technology: principles and designII, Charles C Thomas, 2008.       3         REFERENCE(S):       1       Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies], Joh Wiley & Sons, Reinaldo Perez, Design of medical electronic device], Elsevier science, 2002.       <	Capacitors an	d Resonances, Electromagnetic Interf	ferenc	e, in	terfer	ence fro	om externa	l electric field,	
Failure Warning       9         Unit II       DESIGN METHODOLOGIES       9         EDR design methodologies, PCB assembly, mechanical assembly, product design and modeling, fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications       9         EDR design methodologies, PCB assembly, Advanced OrCAD design, Design rule specifications       9         ECG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI) Hardware design       9         Unit IV       THERAPEUTIC EQUIPMENT DESIGN       9         Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator       9         Unit IV       IMPLANT AND PROSTHESIS DESIGN       9         Intracocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement       9         TEXT BOOK(S):       1       1       Theodore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &Francis Group LLC, 3rd edition 2013.       2         2:       Anthony Y.K.Chan, —Biomedical device technology: principles and designl, Charles C Thomas, 2008.       8         EFERENCE(S):       1       Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices:	conductive inte	erference, electrical safety and signal iso	lation	, Ove	rload	Protectio	on, Output	Filtering, Power	
Unit II       DESIGN METHODOLOGIES       9         EDR design methodologies, PCB assembly, mechanical assembly, product design and modeling, fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications       9         Unit III       DIAGNOSTIC EQUIPMENT DESIGN       9         ECG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI) Hardware design       9         Unit IV       THERAPEUTIC EQUIPMENT DESIGN       9         Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator       9         Intraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement       9         TEXT BOOK(S):       1       1       Theodore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &Francis Group LLC, 3rd edition 2013.       2         2. Anthony Y.K.Chan, —Biomedical device technology: principles and designll, Charles C Thomas, 2008.       3         REFERENCE(S):       1       Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies], Joh Wiley & Sons, Reinaldo Perez, Design of medical electronic device], Elsevier science, 2002.       2       2       Richard C. Fries, "Handbook of Medica	Failure Warnin	g						1	
EDR       design       methodologies,       PCB       assembly, mechanical assembly, product design and modeling, fabrication and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications         Unit III       DIAGNOSTIC EQUIPMENT DESIGN       9         ECG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI)       9         Hardware design       9         Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator       9         Intraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement       9         TEXT BOOK(S):       1       Theodore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &Francis Group LLC, 3rd edition 2013.       2         Anthony Y.K.Chan, —Biomedical device technology: principles and designll, Charles C Thomas, 2008.       REFERENCE(S):       1         1       Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies]], Joh Wiley & Sons, Reinaldo Perez, Design of medical electronic device]], Elsevier science, 2002.       2       Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.       3       3       David Prutchi, Michael Norris, "Desi	Unit II DE	SIGN METHODOLOGIES						S	
fabrication       and assembly, Multi-layer circuit design, Advanced OrCAD design, Design rule specifications         Unit III       DIAGNOSTIC EQUIPMENT DESIGN       9         ECG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI)         Hardware design       9         Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator         Unit IV       IMPLANT AND PROSTHESIS DESIGN       9         Intraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement       9         TEXT BOOK(S):       1       7         1.       Theodore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &Francis Group LLC, 3rd edition 2013.       2         2.       Anthony Y.K.Chan, —Biomedical device technology: principles and designII, Charles C Thomas, 2008.         REFERENCE(S):       1       Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies]], Joh Wiley & Sons, Reinaldo Perez, Design of medical electronic device], Elsevier science, 2002.       2         2.       Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.       3         3.	EDR design	methodologies, PCB assembly, mech	anical	ass	embl	y, produ	ct design	and modeling,	
Unit III       DIAGNOSTIC EQUIPMENT DESIGN       9         ECG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI) Hardware design         Unit IV       THERAPEUTIC EQUIPMENT DESIGN       9         Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator       9         Intraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement       9         TEXT BOOK(S):       1       Theodore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &Francis Group LLC, 3rd edition 2013.       3rd edition 2013.         2:       Anthony Y.K.Chan, —Biomedical device technology: principles and designII, Charles C Thomas, 2008.         REFERENCE(S):       1       Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies], Joh Wiley & Sons, Reinaldo Perez, Design of medical electronic device], Elsevier science, 2002.       2         2:       Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.       3         3:       David Prutchi, Michael Norris, "Design and Development of Medical Lectronic Instrumentation: / Practical perspective of the design construction and test of medical deviced. John Wilov & Sons 2005 <td>fabrication and</td> <td>assembly, Multi-layer circuit design, Adv</td> <td>ancec</td> <td>OrC.</td> <td>AD d</td> <td>esign, De</td> <td>esign rule sp</td> <td>pecifications</td>	fabrication and	assembly, Multi-layer circuit design, Adv	ancec	OrC.	AD d	esign, De	esign rule sp	pecifications	
<ul> <li>ECG, EEG, Blood pressure monitor, Thermometer, System description and diagram of pulse oximeter, Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI) Hardware design</li> <li>Unit IV THERAPEUTIC EQUIPMENT DESIGN 9</li> <li>Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator</li> <li>Unit V IMPLANT AND PROSTHESIS DESIGN 9</li> <li>Intraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement</li> <li>TEXT BOOK(S):</li> <li>Theodore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &amp;Francis Group LLC, 3rd edition 2013.</li> <li>Anthony Y.K.Chan, —Biomedical device technology: principles and designll, Charles C Thomas, 2008.</li> <li>REFERENCE(S):</li> <li>Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies  , Joh Wiley &amp; Sons, Reinaldo Perez, Design of medical electronic device  , Elsevier science, 2002.</li> <li>Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 205.</li> <li>David Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: / Practical perspective of the design, construction and test of medical Electronic Instrumentation: / Practical perspective of the design, construction and test of medical devices</li> </ul>	Unit III DIA	GNOSTIC EQUIPMENT DESIGN						9	
Optical fiber optics for circulatory and respiratory system measurement, Magnetic resonance imaging (MRI)         Hardware design         Unit IV       THERAPEUTIC EQUIPMENT DESIGN       9         Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator       9         Intraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement       9         IEXT BOOK(S):       1.       Theodore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &Francis Group LLC, 3rd edition 2013.       2.         Anthony Y.K.Chan, —Biomedical device technology: principles and designll, Charles C Thomas, 2008.       REFERENCE(S):         1.       Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies  , Joh Wiley & Sons, Reinaldo Perez, Design of medical electronic device  , Elsevier science, 2002.         2.       Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.         3.       David Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: / Practical nerspective of the design construction and test of medical deviceal Lehr Wiley & Sons 2005.	ECG, EEG, B	lood pressure monitor, Thermometer, S	ystem	des	criptio	on and d	liagram of	pulse oximeter,	
<ul> <li>Hardware design</li> <li>Unit IV THERAPEUTIC EQUIPMENT DESIGN</li> <li>Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator</li> <li>Unit V IMPLANT AND PROSTHESIS DESIGN</li> <li>Implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement</li> <li>TEXT BOOK(S):</li> <li>Theodore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &amp;Francis Group LLC, 3rd edition 2013.</li> <li>Anthony Y.K.Chan, —Biomedical device technology: principles and designll, Charles C Thomas, 2008.</li> <li>REFERENCE(S):</li> <li>Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies  , Joh Wiley &amp; Sons, Reinaldo Perez, Design of medical electronic device  , Elsevier science, 2002.</li> <li>Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.</li> <li>David Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: / Practical perspective of the design construction and test of medical deviceal labor Wiley &amp; Sons 2005.</li> </ul>	Optical fiber op	otics for circulatory and respiratory system	n mea	surer	nent,	Magneti	c resonance	e imaging (MRI)	
Unit IV       THERAPEUTIC EQUIPMENT DESIGN       9         Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator       Unit V       IMPLANT AND PROSTHESIS DESIGN       9         Intraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement       9         Intraocular lens Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &Francis Group LLC, 3rd edition 2013.       3         2. Anthony Y.K.Chan, —Biomedical device technology: principles and designll, Charles C Thomas, 2008.         REFERENCE(S):         1. Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies  , Joh Wiley & Sons, Reinaldo Perez, Design of medical electronic device  , Elsevier science, 2002.         2. Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.         3. David Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: / Practical perspective of the design construction and test of medical deviceal length wiley & Sons 2005	Hardware desig	gn	-				a manufacture		
<ul> <li>Pacemaker, External cardio-vector defibrillator, Implantable cardio-vector defibrillator, Deep brain stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator</li> <li>Unit V IMPLANT AND PROSTHESIS DESIGN 9</li> <li>Intraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement</li> <li>TEXT BOOK(S): <ol> <li>Theodore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &amp;Francis Group LLC, 3rd edition 2013.</li> <li>Anthony Y.K.Chan, —Biomedical device technology: principles and designll, Charles C Thomas, 2008.</li> </ol> </li> <li>REFERENCE(S): <ol> <li>Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies  , Joh Wiley &amp; Sons, Reinaldo Perez, Design of medical electronic device  , Elsevier science, 2002.</li> <li>Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.</li> </ol> </li> </ul>	Unit IV THI	ERAPEUTIC EQUIPMENT DESIGN						9	
<ul> <li>stimulation, Functional electrical stimulator (FES), Hemodialysis delivery system, Mechanical ventilator</li> <li>Unit V IMPLANT AND PROSTHESIS DESIGN</li> <li>Intraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement</li> <li>TEXT BOOK(S): <ol> <li>Theodore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &amp; Francis Group LLC, 3rd edition 2013.</li> <li>Anthony Y.K.Chan, —Biomedical device technology: principles and designll, Charles C Thomas, 2008.</li> </ol> </li> <li>REFERENCE(S): <ol> <li>Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies  , Joh Wiley &amp; Sons, Reinaldo Perez, Design of medical electronic device  , Elsevier science, 2002.</li> <li>Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.</li> <li>David Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: A Practical perspective of the design construction and test of medical devices!</li></ol></li></ul>	Pacemaker, E	External cardio-vector defibrillator, Imp	planta	ble	cardi	o-vector	defibrillato	r, Deep brain	
Unit V       IMPLANT AND PROSTHESIS DESIGN       9         Intraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement       1         TEXT BOOK(S):       1       Theodore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &Francis Group LLC, 3rd edition 2013.         2.       Anthony Y.K.Chan, —Biomedical device technology: principles and designll, Charles C Thomas, 2008.         REFERENCE(S):       1         1.       Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies], Joh Wiley & Sons, Reinaldo Perez, Design of medical electronic device], Elsevier science, 2002.         2.       Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.         3.       David Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: / Practical perspective of the design, construction and test of medical devices] Lohn Wiley & Sons, 2005.	stimulation, Fu	nctional electrical stimulator (FES), Hemo	odialys	sis de	livery	system,	Mechanica	l ventilator	
<ul> <li>Intraocular lens implant, Cochlear implants, Heart valves, Design of artificial pancreas, Drug eluting stent and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement</li> <li><b>TEXT BOOK(S):</b> <ol> <li>Theodore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &amp;Francis Group LLC, 3rd edition 2013.</li> <li>Anthony Y.K.Chan, —Biomedical device technology: principles and designll, Charles C Thomas, 2008.</li> </ol> </li> <li><b>REFERENCE(S):</b> <ol> <li>Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies  , Joh Wiley &amp; Sons, Reinaldo Perez, Design of medical electronic device  , Elsevier science, 2002.</li> <li>Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.</li> </ol> </li> <li>David Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: A Practical perspective of the design construction and test of medical devices!</li></ul>	Unit V IMF	PLANT AND PROSTHESIS DESIGN		18		S. Level	S. P.	9	
<ul> <li>and its engineering design, synthetic crafts, Total hip prosthesis, Joint replacement</li> <li>TEXT BOOK(S): <ol> <li>Theodore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &amp;Francis Group LLC, 3rd edition 2013.</li> <li>Anthony Y.K.Chan, —Biomedical device technology: principles and designll, Charles C Thomas, 2008.</li> </ol> </li> <li>REFERENCE(S): <ol> <li>Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies  , Joh Wiley &amp; Sons, Reinaldo Perez, Design of medical electronic device  , Elsevier science, 2002.</li> <li>Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.</li> </ol> </li> <li>David Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: A Practical perspective of the design, construction and test of medical devices!</li></ul>	Intraocular lens	s implant, Cochlear implants, Heart valv	es, De	esign	of ar	tificial pa	increas, Dru	ug eluting stent	
<ol> <li>TEXT BOOK(S):         <ol> <li>Theodore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &amp;Francis Group LLC, 3rd edition 2013.</li> <li>Anthony Y.K.Chan, —Biomedical device technology: principles and designll, Charles C Thomas, 2008.</li> </ol> </li> <li>REFERENCE(S):         <ol> <li>Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies  , Joh Wiley &amp; Sons, Reinaldo Perez, Design of medical electronic device  , Elsevier science, 2002.</li> <li>Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.</li> <li>David Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: A Practical perspective of the design, construction and test of medical devices!</li></ol></li></ol>	and its enginee	ring design, synthetic crafts, Total hip pro	osthes	is, Jo	int re	placeme	nt		
<ol> <li>Theodore R. Kucklick, —The Medical Device Ramp-D Handbookll, Taylor &amp;Francis Group LLC, 3rd edition 2013.</li> <li>Anthony Y.K.Chan, —Biomedical device technology: principles and designll, Charles C Thomas, 2008.</li> <li>REFERENCE(S):         <ol> <li>Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies  , Joh Wiley &amp; Sons, Reinaldo Perez, Design of medical electronic device  , Elsevier science, 2002.</li> <li>Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.</li> <li>David Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: A Practical perspective of the design, construction and test of medical devices!". John Wiley &amp; Sons, 2005.</li> </ol> </li> </ol>	TEXT BOOK(S	3):	5.1						
<ul> <li>edition 2013.</li> <li>2. Anthony Y.K.Chan, —Biomedical device technology: principles and designll, Charles C Thomas, 2008.</li> <li>REFERENCE(S): <ol> <li>Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies  , Joh Wiley &amp; Sons, Reinaldo Perez, Design of medical electronic device  , Elsevier science, 2002.</li> <li>Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.</li> </ol> </li> <li>Bavid Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: A Practical perspective of the design, construction and test of medical devices!", John Wiley &amp; Sons, 2005.</li> </ul>	1. Theodore	R. Kucklick, -The Medical Device Rai	mp-D	Hand	book	I, Taylor	&Francis	Group LLC, 3rd	
<ol> <li>Anthony Y.K.Chan, —Biomedical device technology: principles and designll, Charles C Thomas, 2008.</li> <li>REFERENCE(S):         <ol> <li>Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies  , Joh Wiley &amp; Sons, Reinaldo Perez, Design of medical electronic device  , Elsevier science, 2002.</li> <li>Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.</li> </ol> </li> <li>David Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: A Practical perspective of the design, construction and test of medical devices!", John Wiley &amp; Sons, 2005.</li> </ol>	edition 20	13.	ander her						
<ol> <li>REFERENCE(S):</li> <li>Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies∥, Joh Wiley &amp; Sons, Reinaldo Perez, Design of medical electronic device∥, Elsevier science, 2002.</li> <li>Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.</li> <li>David Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: A Practical perspective of the design, construction and test of medical devices∥, John Wiley &amp; Sons, 2005.</li> </ol>	2. Anthony Y	.K.Chan, —Biomedical device technology	y: prin	ciples	s and	designll,	Charles C	Thomas, 2008.	
<ol> <li>Martin Culjat, Rahul Singh, Hua Lee, "Medical Devices: Surgical and Image-Guided Technologies  , Joh Wiley &amp; Sons, Reinaldo Perez, Design of medical electronic device  , Elsevier science, 2002.</li> <li>Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.</li> <li>David Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: A Practical perspective of the design construction and test of medical devices   John Wiley &amp; Sons, 2005.</li> </ol>	REFERENCE(	S):	e interest		-24	12.13	and the	A August	
<ol> <li>Richard C. Fries, "Handbook of Medical Device Design", Marcel Dekker AG, 2nd edition 2005.</li> <li>David Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: A Practical perspective of the design construction and test of medical devices." John Wiley &amp; Sons, 2005.</li> </ol>	1. Martin Cul Wiley & So	jat, Rahul Singh, Hua Lee, "Medical Devions, Reinaldo Perez, Design of medical	ices: S electro	Surgio onic c	cal an levice	id Image ⊯, Elsevi	-Guided Te er science, 2	chnologies∥, Jol 2002.	
3. David Prutchi, Michael Norris, "Design and Development of Medical Electronic Instrumentation: /	2. Richard C.	Fries, "Handbook of Medical Device Des	sign", l	Marce	el Del	ker AG,	2nd edition	2005.	
raducal perspective of the design, construction and test of medical devices, John Wiley & Sons, 2005	3. David Pru Practical p	tchi, Michael Norris, "Design and Deverspective of the design, construction and	velopn d test	nent of me	of M dical	edical E devices	lectronic In , John Wiley	strumentation: / & Sons, 2005	

CK.9

	BIOMEDICAL ENGIN	EERING	G			R 2019	OE	
Course	Course Name	Hour	rs/W	Veek	Credit	Total	Maximum	
19BMY09	HOSPITAL ENGINEERING AND	3	0	P 0	3	45	100	
19BMY09       Course Object       Provide       Underst       Learn th       Enlighte       Underst       Ourse Outcor       Explain       Underst       Explain       Compre       Knowled       Unit I       Ov       Sole proprietor       Volution of m	MANAGEMENT ve (s): The purpose of learning this court knowledge an overview of hospital adm and the principles, practices and areas of e quality aspect specified by the interna n with the Quality and safety issues in h and the principles, practices and areas of nes: At the end of this course, learners w the principles, practices and areas of ap and the biomedical waste disposal conce the importance of supportive services hend the quality aspect specified by the lige on Hospital safety <b>ERVIEW OF HOSPITAL ADMINISTRA</b> ship, Partnership, Company-public and anagement.	3 rse is to inistratio of applic tional st ospital of applic vill be a plication ept internat TION private	on cation tanda ble to n in H tional secto	0 n in H ards n in H o: Hospi I stan	3 ospital m tal Manag dards.	45 anagement gement Principles o	100	
Tospital, impo	Tance to reall your, Legal aspect in n		VIALIC	uem				
Unit III MA DA Regulatio Standard, IRP Unit IV HO	RKETING STANDARDS & CONSUME on, joint commission on Accreditation C. SPITAL INFORMATION SYSTEMS & S intenance Operations, Paper Work Con	R BEH/ for Ho SUPPO	AVIO spita RTIV ainte	UR Is, N E SE	ational F RVICES	Fire Protect	ion Associatio	
Unit III MA FDA Regulatio Standard, IRPO Unit IV HO Organizing Ma Veasurement Vaintenance T	RKETING STANDARDS & CONSUME on, joint commission on Accreditation C. SPITAL INFORMATION SYSTEMS & S intenance Operations, Paper Work Con and Standards, Preventive Mainter raining, Contract Mainframe.	R BEH/ for Ho SUPPOI ntrol, M nance,	AVIO spita RTIV ainte Mair	UR Is, N E SE nanc ntena	ational F RVICES e Job, P nce Bud	Fire Protect lanning Ma dgeting an	ion Associatio	
Unit III       MA         DA       Regulation         Standard, IRPO       HO         Unit IV       HO         Organizing       Ma         Aeasurement       Maintenance T         Unit V       QU         Quality system       Standards. He         DA. Health In	RKETING STANDARDS & CONSUME on, joint commission on Accreditation C. SPITAL INFORMATION SYSTEMS & S intenance Operations, Paper Work Con and Standards, Preventive Mainter raining, Contract Mainframe. ALITY AND SAFETY ASPECTS IN HO – Elements, implementation of quality s alth and Safety Standard, Environment I surance & Managing Health Care - Med	R BEH/ for Ho SUPPOI ntrol, M nance, SPITAL system, Vanage ical Auc	AVIO spita RTIV ainte Mair Docu	E SE nanc ntena umen t Sys Haza	ational F RVICES e Job, P nce Bud tation, Qu tems. NA rd and Sa	ire Protect lanning Ma dgeting an uality auditir BA, JCI, N/ afety in a ho	ion Association intenance Wo d Forecastin ag, Internation ABL, NABH an aspital Setup.	
Unit III       MA         DA       Regulation         DA       Regulation         Standard, IRPO       Unit IV         Unit IV       HO         Organizing Ma       Measurement         Maintenance T       Unit V         Unit V       QU         Quality system       Standards. He         DA. Health In       EXT BOOK(\$         1.       R.C.Goya         2.       G.D.Kund	RKETING STANDARDS & CONSUME on, joint commission on Accreditation C. SPITAL INFORMATION SYSTEMS & S intenance Operations, Paper Work Con and Standards, Preventive Mainter raining, Contract Mainframe. ALITY AND SAFETY ASPECTS IN HO – Elements, implementation of quality s alth and Safety Standard, Environment I surance & Managing Health Care - Med S): I, "Hospital Administration and Human R ers, "Hospitals – Facilities Planning and	R BEH/ for Ho SUPPOI ntrol, M nance, SPITAL system, Manage ical Auc Resource Manag	AVIO spita RTIV ainte Mair Docu ment dit – I	E SE manc ntena umen t Sys Haza nage nt", T	ational F <b>RVICES</b> e Job, P nce Bud tation, Qu tation, Qu ta	Fire Protect lanning Ma dgeting an uality auditin BA, JCI, N/ afety in a ho HI-4th edition	ion Association intenance Wo d Forecastin ng, Internation ABL, NABH an ospital Setup. on h edition Repl	

1 C ~~~ Chairman - BoS Dept.of BME - ESEC

Department	BIOMEDICAL ENC	SINEERIN	G			R 2019	OE
Course	Course Name MEMS AND NEMS	Hou	Hours / Week C			Total	Maximum
Code		L	Т	Р	С	Hours	Marks
19BMY10		3	0	0	3	45	100
Course Objective Provide kn Introduce t Know the f Know the c Introduce t Course Outcomes Gain know Interpret tl advantages Recognize surface mic Analyze th actuators Compreher Unit I	(s): The purpose of learning this c owledge an MEMS and NEMS he concepts of micro and nano ele abrication process of Microsystem lesign concepts of micro sensors a he concepts of quantum mechanic s: At the end of this course, learned ledge on the MEMS and NEMS, ne basics of micro/nano electro s the use of materials in micro fab cromachining, bulk micromachining le key performance aspects of ad the theoretical foundations of que DUCTION TO MEMS AND NEMS	ourse is to ectromechas and micro es and nan rs will be a pmechanic rication ar g and LIG/ electrome uantum mo	anica actua lo sys able to cal sy able to cal sy ad de A echan	l devi itors items o: ystem scribe iical nics a	ces is includ the fab transduc nd nano	ing their a rication proc ers includin systems	applications a cesses includ ng sensors a
the second s							
ntroduction to De	esign of MEMS and NEMS, Ove	rview of N	lano	and	Micro ele	ectro mecha	anical System
ntroduction to De Applications of Mi	esign of MEMS and NEMS, Ove cro and Nano electro mechanical	rview of N systems, I	Vano Mater	and ials fo	Micro ele or MEMS	ectro mecha and NEMS	anical System : Silicon, silico
Introduction to De Applications of Mi compounds, polyr	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals.	rview of N systems, I	Vano Mater	and ials fo	Micro ele or MEMS	ectro mecha and NEMS	anical System : Silicon, silice
Introduction to De Applications of Mi compounds, polyr Unit II   MEMS	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals. S FABRICATION TECHNOLOGIE	rview of N systems, I <b>S</b>	Nano Mater	and ials fo	Micro ele or MEMS	ectro mecha and NEMS	anical System : Silicon, silico
Introduction to De Applications of Mi compounds, polyr Unit II MEMS Photolithography,	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals. <b>5 FABRICATION TECHNOLOGIE</b> lon Implantation, Diffusion,	rview of N systems, I S Oxidation	Nano Mater n, C	and ials fo	Micro ele or MEMS	ectro mecha and NEMS ing Etchin	anical System : Silicon, silico g technique
Introduction to De Applications of Mi compounds, polyr Unit II MEMS Photolithography, Vicromachining: E	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals. <b>5 FABRICATION TECHNOLOGIE</b> lon Implantation, Diffusion, Bulk Micromachining, Surface Micr	rview of N systems, I S Oxidation romachinin	Nano Mater n, C ng, Ll	and ials fo VD, GA.	Micro ele or MEMS Sputter	ectro mecha and NEMS ing Etchin	anical System : Silicon, silico g technique
Introduction to De Applications of Mi compounds, polyr Unit II MEMS Photolithography, Vicromachining: E Unit III MICRO	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals. <b>5 FABRICATION TECHNOLOGIE</b> lon Implantation, Diffusion, Bulk Micromachining, Surface Micr <b>5 SENSORS</b>	rview of N systems, I S Oxidation romachinin	Vano Mater n, C ng, Ll	and ials fo VD, GA.	Micro ele or MEMS Sputter	and NEMS	anical System : Silicon, silico g technique
Introduction to De Applications of Mi compounds, polyr Unit II MEMS Photolithography, Micromachining: E Unit III MICRO MEMS Sensors: Dase study: Piezo	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals. <b>5 FABRICATION TECHNOLOGIE</b> lon Implantation, Diffusion, Bulk Micromachining, Surface Micr <b>5 SENSORS</b> Design of Acoustic wave sensor	rview of N systems, I S Oxidation romachinin rs, Vibrato	Nano Mater n, C ng, Lle ory g	and ials fo VD, GA. yrosc	Micro ele or MEMS Sputter ope, Caj	ectro mecha and NEMS ing Etchin pacitive Pre	anical System : Silicon, silico g technique ssure sensor
Introduction to De Applications of Mi compounds, polyr Unit II MEMS Photolithography, Micromachining: E Unit III MICRO MEMS Sensors: Case study: Piezo Unit IV MICRO	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals. <b>5 FABRICATION TECHNOLOGIE</b> lon Implantation, Diffusion, Bulk Micromachining, Surface Micr <b>5 SENSORS</b> Design of Acoustic wave sensor pelectric energy harvester.	rview of N systems, I S Oxidation romachinin rs, Vibrato	Vano Mater n, C ng, Ll pry g	and ials fo VD, GA. yrosc	Micro ele or MEMS Sputter ope, Cap	ectro mecha and NEMS ing Etchin pacitive Pre	anical System : Silicon, silico g technique ssure sensor
Introduction to De Applications of Mi compounds, polyr Unit II MEMS Photolithography, Micromachining: E Unit III MICRO MEMS Sensors: Case study: Piezo Unit IV MICRO	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals. <b>5 FABRICATION TECHNOLOGIE</b> lon Implantation, Diffusion, Bulk Micromachining, Surface Micr <b>5 SENSORS</b> Design of Acoustic wave sensor pelectric energy harvester. <b>5 ACTUATORS</b> rs: Actuation using thermal forces	rview of N systems, I S Oxidation romachinin rs, Vibrato	Nano Mater n, C ng, Ll <sup>i</sup> ory g	and ials fo CVD, GA. yrosc	Micro ele or MEMS Sputter ope, Cap	ectro mecha and NEMS ing Etchin pacitive Pre	anical System : Silicon, silico g technique ssure sensor
Introduction to De Applications of Mi compounds, polyr Unit II MEMS Photolithography, Micromachining: E Unit III MICRO MEMS Sensors: Dase study: Piezo Unit IV MICRO Design of Actuato	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals. <b>5 FABRICATION TECHNOLOGIE</b> lon Implantation, Diffusion, Bulk Micromachining, Surface Micr <b>D SENSORS</b> Design of Acoustic wave sensor pelectric energy harvester. <b>D ACTUATORS</b> rs: Actuation using thermal forces als. Actuation using Electrostatic f	rview of N systems, I S Oxidation romachinin rs, Vibrato , Actuation orces	Nano Mater n, C ng, Ll ory g	and ials fo VD, GA. yrosc	Micro ele or MEMS Sputter ope, Cap	ectro mecha and NEMS ing Etchin pacitive Pre	anical System : Silicon, silico g technique ssure sensor
Introduction to De Applications of Micompounds, polyr Unit II MEMS Photolithography, Micromachining: E Unit III MICRO MEMS Sensors: Case study: Piezo Unit IV MICRO Design of Actuato Diezoelectric cryst Unit V NANO	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals. <b>5 FABRICATION TECHNOLOGIE</b> lon Implantation, Diffusion, Bulk Micromachining, Surface Micr <b>D SENSORS</b> Design of Acoustic wave sensor pelectric energy harvester. <b>D ACTUATORS</b> rs: Actuation using thermal forces als, Actuation using Electrostatic f <b>DEVICES</b>	rview of N systems, I Oxidation romachinin rs, Vibrato , Actuation orces.	Vano Mater n, C ng, Ll pry gy	and ials fo VD, GA. yrosc	Micro ele or MEMS Sputter ope, Cap	ectro mecha and NEMS ing Etchin pacitive Pre	anical System : Silicon, silico g technique ssure sensor
Introduction to De Applications of Micompounds, polyr Unit II MEMS Photolithography, Micromachining: E Unit III MICRO MEMS Sensors: Case study: Piezo Unit IV MICRO Design of Actuato Diezoelectric cryst Unit V NANO Atomic Structures	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals. <b>5 FABRICATION TECHNOLOGIE</b> lon Implantation, Diffusion, Bulk Micromachining, Surface Micr <b>5 SENSORS</b> Design of Acoustic wave sensor belectric energy harvester. <b>5 ACTUATORS</b> rs: Actuation using thermal forces als, Actuation using Electrostatic f <b>DEVICES</b> and Quantum Mechanics, Shrodin	rview of N systems, I Oxidation romachinin rs, Vibrato , Actuation orces.	Nano Mater n, C ng, Ll ory g n usin	and ials fo VD, GA. yrosc	Micro ele or MEMS Sputter ope, Cap ape mem	ectro mecha and NEMS ing Etchin pacitive Pre ory Alloys, <i>i</i>	anical System : Silicon, silico g technique ssure sensor Actuation usir
Introduction to De Applications of Mi compounds, polyr Unit II MEMS Photolithography, Micromachining: E Unit III MICRO MEMS Sensors: Dase study: Piezo Unit IV MICRO Design of Actuato Diezoelectric cryst Unit V NANO Atomic Structures sensor.	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals. <b>FABRICATION TECHNOLOGIE</b> Ion Implantation, Diffusion, Bulk Micromachining, Surface Micr <b>D SENSORS</b> Design of Acoustic wave sensor pelectric energy harvester. <b>D ACTUATORS</b> rs: Actuation using thermal forces als, Actuation using Electrostatic f <b>DEVICES</b> and Quantum Mechanics, Shrodin	rview of N systems, I Oxidation romachinin rs, Vibrato , Actuation orces.	Nano Mater n, C ng, Ll ory gy n usin	and ials fo VD, GA. yrosc	Micro ele or MEMS Sputter ope, Cap ape mem	ectro mecha and NEMS ing Etchin pacitive Pre ory Alloys, /	anical System : Silicon, silico g technique ssure sensor Actuation usir
Introduction to De Applications of Mi compounds, polyr Unit II MEMS Photolithography, Micromachining: E Unit III MICRO MEMS Sensors: Case study: Piezo Unit IV MICRO Design of Actuato Diezoelectric cryst Unit V NANO Atomic Structures sensor.	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals. <b>FABRICATION TECHNOLOGIE</b> lon Implantation, Diffusion, Bulk Micromachining, Surface Micr <b>D SENSORS</b> Design of Acoustic wave sensor belectric energy harvester. <b>D ACTUATORS</b> rs: Actuation using thermal forces als, Actuation using Electrostatic f <b>DEVICES</b> and Quantum Mechanics, Shrodin	rview of N systems, I Oxidation romachinin rs, Vibrato , Actuation orces.	Nano Mater n, C ng, Ll ory g n usin	and ials fo VD, GA. yrosc	Micro ele or MEMS Sputter ope, Cap ape mem	ectro mecha and NEMS ing Etchin pacitive Pre ory Alloys, / based NEM	anical System : Silicon, silico g technique ssure sensor Actuation usir
Introduction to De Applications of Mi compounds, polyr Unit II MEMS Photolithography, Micromachining: E Unit III MICRO MEMS Sensors: Case study: Piezo Unit IV MICRO Design of Actuato Diezoelectric cryst Unit V NANO Atomic Structures sensor. <b>TEXT BOOK(S):</b> 1. Chang Liu, "F	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals. <b>FABRICATION TECHNOLOGIE</b> Ion Implantation, Diffusion, Bulk Micromachining, Surface Micr <b>D SENSORS</b> Design of Acoustic wave sensor belectric energy harvester. <b>D ACTUATORS</b> rs: Actuation using thermal forces als, Actuation using Electrostatic f <b>DEVICES</b> and Quantum Mechanics, Shrodin Foundations of MEMS", Pearson e	rview of N systems, I Oxidation romachinin rs, Vibrato , Actuation orces. nger Equa	Nano Mater n, C ng, Ll ory gy n usin tion, i	and ials fo VD, GA. yrosc ag sha ZnO i	Micro ele or MEMS Sputter ope, Cap ape mem nanorods	ectro mecha and NEMS ing Etchin pacitive Pre ory Alloys, <i>i</i> based NEM	anical System : Silicon, silico g technique ssure sensor Actuation usir
Introduction to De Applications of Mi compounds, polyr Unit II MEMS Photolithography, Micromachining: E Unit III MICRO MEMS Sensors: Case study: Piezo Unit IV MICRO Design of Actuato Diezoelectric cryst Unit V NANO Atomic Structures sensor. TEXT BOOK(S): 1. Chang Liu, "F 2. Sergey Edwa	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals. <b>FABRICATION TECHNOLOGIE</b> lon Implantation, Diffusion, Bulk Micromachining, Surface Micr <b>D SENSORS</b> Design of Acoustic wave sensor belectric energy harvester. <b>D ACTUATORS</b> rs: Actuation using thermal forces als, Actuation using Electrostatic f <b>DEVICES</b> and Quantum Mechanics, Shrodir Foundations of MEMS", Pearson energy Lysheyski, "MEMS and NEMS"	rview of N systems, I Oxidation romachinin rs, Vibrato , Actuation orces. nger Equa	Nano Mater n, C ng, Ll ory g n usin tion, i ndia I	and ials fo VD, GA. yrosc ag sha ZnO i imiteo	Micro ele or MEMS Sputter ope, Cap ape mem nanorods	ectro mecha and NEMS ing Etchin pacitive Pre ory Alloys, / based NEM	anical System : Silicon, silico g technique ssure sensor Actuation usir MS device: Ga
Introduction to De Applications of Mi compounds, polyr Unit II MEMS Photolithography, Micromachining: E Unit III MICRO MEMS Sensors: Case study: Piezo Unit IV MICRO Design of Actuato Diezoelectric cryst Unit V MICRO Design of Actuato Design of Ac	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals. <b>FABRICATION TECHNOLOGIE</b> Ion Implantation, Diffusion, Bulk Micromachining, Surface Micr <b>D SENSORS</b> Design of Acoustic wave sensor belectric energy harvester. <b>D ACTUATORS</b> rs: Actuation using thermal forces als, Actuation using Electrostatic f <b>DEVICES</b> and Quantum Mechanics, Shrodir Foundations of MEMS", Pearson e rd Lyshevski, "MEMS and NEMS:	rview of N systems, I Oxidation romachinin rs, Vibrato , Actuation orces. nger Equa ducation In Systems,	Nano Mater n, C ng, Ll ory gy n usin tion, i ndia I Devir	and ials fo VD, GA. yrosc ag sha ZnO i imiteo ces, a	Micro ele or MEMS Sputter ope, Cap ape mem nanorods d, 2006 and Struc	ectro mecha and NEMS ing Etchin pacitive Pre ory Alloys, / based NEM	anical System : Silicon, silico g technique ssure sensor Actuation usir MS device: Ga
Introduction to De Applications of Mi compounds, polyr Unit II MEMS Photolithography, Micromachining: E Unit III MICRO MEMS Sensors: Case study: Piezo Unit IV MICRO Design of Actuato Diezoelectric cryst Unit V MICRO Design of Actuato Diezoelectric cryst Unit V NANO Atomic Structures sensor. TEXT BOOK(S): 1. Chang Liu, "F 2. Sergey Edwa REFERENCE(S): 1. Tai Ran Hsu	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals. <b>FABRICATION TECHNOLOGIE</b> Ion Implantation, Diffusion, Bulk Micromachining, Surface Micr <b>D SENSORS</b> Design of Acoustic wave sensor belectric energy harvester. <b>D ACTUATORS</b> rs: Actuation using thermal forces als, Actuation using Electrostatic f <b>DEVICES</b> and Quantum Mechanics, Shrodir foundations of MEMS", Pearson er rd Lyshevski, "MEMS and NEMS: ,"MEMS and Microsystems Design	rview of N systems, I Oxidation romachinin rs, Vibrato , Actuation orces. nger Equa ducation In Systems, n and Man	Nano Mater n, C ng, Ll ory g n usin tion, i ndia l Devia	and ials fo CVD, GA. yrosc ag sha ZnO i imiteo ces, a	Micro ele or MEMS Sputter ope, Cap ape mem nanorods d, 2006 and Struc	ectro mecha and NEMS ing Etchin pacitive Pre ory Alloys, / based NEM tures" CRC	anical System : Silicon, silico g technique ssure sensor Actuation usir MS device: Ga
Introduction to De Applications of Mic compounds, polyr Unit II MEMS Photolithography, Micromachining: E Unit III MICRO MEMS Sensors: Case study: Piezo Unit IV MICRO Design of Actuato Diezoelectric cryst Unit V MICRO Design of Actuato Diezoelectric cryst Unit V MANO Atomic Structures Sensor. TEXT BOOK(S): 1. Chang Liu, "F 2. Sergey Edwa REFERENCE(S): 1. Tai Ran Hsu 2. Stephen D. S	esign of MEMS and NEMS, Ove cro and Nano electro mechanical mers, metals. <b>FABRICATION TECHNOLOGIE</b> Ion Implantation, Diffusion, Bulk Micromachining, Surface Micr <b>D SENSORS</b> Design of Acoustic wave sensor pelectric energy harvester. <b>D ACTUATORS</b> rs: Actuation using thermal forces als, Actuation using Electrostatic f <b>DEVICES</b> and Quantum Mechanics, Shrodir foundations of MEMS", Pearson end rd Lyshevski, "MEMS and NEMS: "MEMS and Microsystems Design". KI	rview of N systems, I Oxidation romachinin rs, Vibrato , Actuation orces. nger Equa ducation In Systems, n and Man uwer Acae	Nano Mater n, C ng, Ll ory g n usin tion, J ndia I Devia	and ials fo VD, GA. yrosc ag sha znO i imiteo ces, a ure", ces, a	Micro ele or MEMS Sputter ope, Cap ape mem nanorods d, 2006 and Struc Tata Mcr lishers, 20	ectro mecha and NEMS ing Etchin pacitive Pre ory Alloys, / based NEM tures" CRC aw Hill, 200	anical System : Silicon, silico g technique ssure sensor Actuation usir MS device: Ga

Chairman - BoS Dept.of BME - ESEC

