



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 – INFORMATION TECHNOLOGY

Choice Based Credit System (CBCS)

REGULATION 2019

ERODE SENGUNTHAR ENGINEERING COLLEGE
DEPARTMENT OF INFORMATION TECHNOLOGY

REGULATION – 2019
CHOICE BASED CREDIT SYSTEM
I TO VIII SEMESTERS CURRICULUM
(2020-2021)

Induction Program (Mandatory)	3 weeks duration
Induction program for students to be offered right at the start of the first year	<ul style="list-style-type: none"> • Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent People • Visits to local Areas • Familiarization to Dept. /Branch & Innovations

B.Tech. INFORMATION TECHNOLOGY
Minimum credits to be earned: 162 (for Eight Semester)

SEMESTER I

THEORY

Code No	Course	Objectives & Outcomes			L	T	P	C	Maximum Marks			Category
		PEO	PO	PSO					CA	ES	Tot.	
19BS101	Calculus and its Applications	I, III	1,2,3,4,12	2	3	1	0	4	40	60	100	BS
19BS102	Engineering Physics	I	1,2,4,5,6,8,9	-	2	0	2	3	40	60	100	BS
19BS103	Engineering Chemistry	I, III	1,2,3,4,5,7,12	-	3	0	0	3	40	60	100	BS
19HS101	Communicative English	II	2,3,6,9,10,12	3	3	0	0	3	40	60	100	HS
19ES101	Python Programming	I, III	1,2,3,4,12	1,2	3	0	0	3	40	60	100	ES
19TPS01	Soft Skills –I	II, III	8,9,10,12	3	1	0	1	1.5*	40	60	100	EEC

PRACTICAL

19ES104	Python Programming Laboratory	I, III	1,2,3,4,5,12	1,2	0	0	2	1	60	40	100	ES
19ES105	Computer Hardware Servicing and Maintenance Laboratory	I, II	1, 2, 3, 12	2	0	0	2	1	60	40	100	ES
19BS105	Chemistry Laboratory	III	1,2,3,4,5,12	-	0	0	4	2	60	40	100	BS
TOTAL					15	1	12	21.5	420	480	900	-

SEMESTER II

THEORY												
Code No	Course	Objective & Outcomes			L	T	P	C	Maximum Marks			Category
		PEO	PO	PSO					CA	ES	Tot.	
19BS201	Vector Calculus and Complex Variables	I,III	1,2,3,4,12	2	3	1	0	4	40	60	100	BS
19BS204	Physics for Information Science	I	1,3,4,5,7	-	3	0	0	3	40	60	100	BS
19MC201	Environmental Science and Engineering	I, II	1,2,3,4,5,6,7,8,12	-	3	0	0	0	40	60	100	MC
	Language Elective				3	0	0	3	40	60	100	HS
19ES202	Advanced C Programming	I, III	1,2,3,4,12	1,2	3	0	0	3	40	60	100	ES
19ES203	Fundamentals of Electrical and Electronics Engineering	I, IV	1,2,3,4	-	3	0	0	3	40	60	100	ES
19TPS02	Soft Skills –II	II,III	8,9,10,12	3	1	0	1	1.5*	40	60	100	EEC
PRACTICAL												
19ES214	Advanced C Programming Laboratory	I, II	1,2,3,4,12	1,2	0	0	4	2	60	40	100	ES
19ES221	Engineering Drawing Laboratory	I,IV	1,2,3,5,10,12	2	0	0	4	2	60	40	100	ES
TOTAL					19	1	10	21.5	400	500	900	-

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SEMESTER III

THEORY

Code No	Course	Objective & Outcomes			L	T	P	C	Maximum Marks			Category
		PEO	PO	PSO					CA	ES	Tot.	
19BS305	Discrete Mathematics	I	1,2,3,4,12	2	3	1	0	4	40	60	100	BS
19IT301	Data Structures and Algorithms	I, III	1,2,3,4,12	1,2	3	0	0	3	40	60	100	PC
19CS302	Computer Architecture	I, III	1,2,3,4,12	2	3	0	0	3	40	60	100	PC
19ES302	Digital Electronics	I, III, IV	1,2,3,4,12	1,2	3	0	0	3	40	60	100	ES
19IT304	Database Management System	I,III	1,2,3,4,12	1,2	3	0	0	3	40	60	100	PC
19TPS03	Quantitative Aptitude and Logical Reasoning - I	II,III	1,2,9,10,12	3	2	0	0	0	40	60	100	EEC
19MC301	Indian Constitution	II,III	6,8,10,11,12	-	2	0	0	0	40	60	100	MC
PRACTICAL												
19IT305	DBMS Laboratory	I, III	1,2,3,4,5,12	1,2	0	0	4	2	60	40	100	PC
19IT306	Data Structures and Algorithms Laboratory	I, III	1,2,3,4,5,9,11,12	1,2	0	0	4	2	60	40	100	PC
19ES308	Digital Electronics Laboratory	I, III,IV	1,2,3,4,12	1,2	0	0	4	2	60	40	100	ES
TOTAL					19	1	12	22	460	540	1000	-



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SEMESTER IV

THEORY												
Code No	Course	Objective & Outcomes			L	T	P	C	Maximum Marks			Category
		PEO	PO	PSO					CA	ES	Tot.	
19BS401	Probability and Statistics	I	1,2,3,4	2	3	1	0	4	40	60	100	BS
19IT401	Object Oriented Programming	I, III	1,2,3,4,12	1, 2	3	0	0	3	40	60	100	PC
19CS402	Software Engineering	I,III	1,2,3,4,5,8,9,10,11,12	1,2	3	0	0	3	40	60	100	PC
19HS402	Universal Human Values 2: Understanding Harmony	II,III	9,12	3	2	1	0	3	40	60	100	HS
19CS404	Operating Systems	I,III	1,2,3,4,12	1,2	3	0	0	3	40	60	100	PC
19TPS04	Quantitative Aptitude and Logical Reasoning - II	II, III	1,2,9,10,12	1,2, 3	2	0	0	0	40	60	100	EEC
PRACTICAL												
19IT403	Operating Systems Laboratory	I,III	1,2,3,4,12	1,2	0	0	4	2	60	40	100	PC
19IT404	Object Oriented Programming Laboratory	I,III	1,2,3,4,12	1,2	0	0	4	2	60	40	100	PC
19HS401	Language Skills	II	5,9,10,12	3	0	0	2	0	100	-	100	HS
TOTAL					17	1	10	20	460	440	900	-



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SEMESTER V												
THEORY												
Code No	Course	Objective & Outcomes			L	T	P	C	Maximum Marks			Category
		PEO	PO	PSO					CA	ES	Tot.	
19IT501	Computer Communication Networks	I	1,2,3,4,12	2	3	0	0	3	40	60	100	PC
19IT502	Internet Programming	I,III	1,2,3,4,5,12	1,2	3	0	0	3	40	60	100	PC
19IT503	Formal Languages and Automata Theory	I,III	1,2,3,4,12	1,2	3	0	0	3	40	60	100	PC
19IT506	Communication Engineering	I,III, IV	1,2,3,8,10,12	2	3	0	0	3	40	60	100	PC
	Professional Elective I				3	0	0	3	40	60	100	PE
	Open Elective I				3	0	0	3	40	60	100	OE
19TPS05	Quantitative Aptitude and Logical Reasoning - III	II, III	1,2,9,10,12	3	2	0	0	0	40	60	100	EEC
PRACTICAL												
19IT504	Internet Programming Laboratory	I,II,III	1,2,3,4,5,8,9,12	1,2	0	0	4	2	60	40	100	PC
19IT505	Computer Networking Laboratory	I,II,III	1,2,3,4,5,12	1,2	0	0	4	2	60	40	100	PC
19HS504	Professional Skills for Software Engineer	II	2,3,6,8,9,12	1,2	0	0	2	-	100	-	100	EEC
TOTAL					20	0	10	22	500	500	1000	-

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SEMESTER VI

THEORY

Code No	Course	Objective & Outcomes			L	T	P	C	Maximum Marks			Category
		PEO	PO	PSO					CA	ES	Tot.	
19IT601	Machine Learning	I,III	1,2,3,4,5,8,12	1,2	3	0	1	4	40	60	100	PC
19IT602	Wireless Sensor Networks	I,III	1,2,3,4,5,12	1,2	3	0	0	3	40	60	100	PC
19CS604	Cloud Computing	I,III	1,2,3,4,5,10,12	1,2	3	0	0	3	40	60	100	PC
19IT603	Big Data and Analytics	I,III	1,2,3,4,5,12	1,2	3	0	1	4	40	60	100	PC
	Open Elective II				3	0	0	3	40	60	100	OE
	Professional Elective II				3	0	0	3	40	60	100	PE
19TPS06	Quantitative Aptitude and Logical Reasoning - IV	II,III	1,2,9,10,12	3	2	0	0	0	40	60	100	EEC

PRACTICAL

19IT604	Cloud Computing Laboratory	I,III	1,2,3,4,5,8,12	1,2	0	0	4	2	60	40	100	PC
19IT605	Comprehensive Review1	I, II,III,IV	1,2,3,4,5,6,7,8,9,10,11,12	1,2,3	0	0	2	0	100	-	100	EEC
19IT606	Mini Project	I, II, III,IV	1,2,3,4,5,6,7,8,9,10,11,12	1,2,3	0	0	2	1	100	-	100	EEC
TOTAL					19	0	10	23	540	460	1000	-



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SEMESTER VII

THEORY												
CodeNo	Course	Objective & Outcomes			L	T	P	C	Maximum Marks			Category
		PEO	PO	PSO					CA	ES	Tot.	
19IT701	Cryptography and Network Security	I, III	1,2,3,4,5,7,8,9,12	1,2	3	0	0	3	40	60	100	PC
19IT702	Internet of Things	I, III, V	1,2,3,4,5,6,7,10,11,12	1,2	3	0	0	3	40	60	100	PC
19IT703	Research Methodology	I, II	1,2,3,4,12	2	3	0	0	3	40	60	100	PE
	Professional Elective III				3	0	0	3	40	60	100	PE
	Professional Elective IV				3	0	0	3	40	60	100	PE
PRACTICAL												
19IT704	IOT Laboratory	I, III	1,2,3,4,5,7,8,9,12	2	0	0	4	2	60	40	100	PC
19IT705	Security Laboratory	I, II	1,2,3,4,5,7,8,9,12	2	0	0	4	2	60	40	100	PC
19IT706	Project Phase I	I, II, III, V	5,6,7,8,9,10,11,12	1,2,3	0	0	12	1	60	40	100	EEC
TOTAL					17	0	10	20	380	420	800	-

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SEMESTER VIII												
THEORY												
Code No	Course	Objective & Outcomes			L	T	P	C	Maximum Marks			Category
		PEO	PO	PSO					CA	ES	Tot.	
	Elective V				3	0	0	3	40	60	100	PE
	Elective VI				3	0	0	3	40	60	100	PE
PRACTICAL												
19IT801	Project Phase II	I,II,III,IV	1,2,3,4,5,6,7,8,9,10,11,12	1,2,3	0	0	12	6	60	40	100	EEC
TOTAL					6	0	14	12	240	160	400	-

S. No.	Category	Credits Per Semester								Total Credit	Credits in %	Range of Total Credits (AICTE)	
		I	II	III	IV	V	VI	VII	VIII			Min	Max
1	BS	12	7	4	4	-	-	-	-	27	16.77	15%	20%
2	ES	5	10	5	-	-	-	-	-	20	12.42	10%	15%
3	HS	3	3	-	3	-	-	-	-	9	5.59	5%	10%
4	PC	-	-	13	13	16	16	13	-	71	44.0	40%	45%
5	PE	-	-	-	-	3	3	6	6	18	11.18	10%	15%
6	OE	-	-	-	-	3	3	-	-	6	3.72	5%	10%
7	EEC	1.5	1.5	-	-	-	-	1	1	6	6.83	5%	10%
Total		21.5	21.5	22	20	22	23	20	21	162	100	90%	125%

PE- Professional Elective **OE-** Open Elective **PC-** Professional Core
MC – Mandatory course **CA** – Continuous Assessment
ES- End Semester Examination **EEC-** Employability Enhancement Course



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MANDANTORY COURSE

Code No	Course	Objective & Outcomes			L	T	P	C	Maximum Marks			Category
		PEOs	POs	PSOs					CA	ES	Tot.	
19MC201	Environmental Science and Engineering	I, II	1,2,3,4, 5,6,7, 8,12	-	3	0	0	0	40	60	100	BS
19MC301	Indian Constitution	II,III	6,8,10, 11,12	-	2	0	0	0	40	60	100	MC

LANGUAGE ELECTIVE

Code No	Course	Objectives & Outcomes			L	T	P	C	Maximum Marks			Category
		PEOs	POs	PSOs					CA	ES	Tot.	
19HX201	English for Engineers	II	2,3,6, 9,10,12	3	3	0	0	3	40	60	100	HS
19HX202	Hindi	II	2,3,6, 9,10,12	3	3	0	0	3	40	60	100	HS
19HX203	Japanese	II	2,3,6, 9,10,12	3	3	0	0	3	40	60	100	HS
19HX204	French	II	2,3,6, 9,10,12	3	3	0	0	3	40	60	100	HS

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Code No	Course	Objectives & Outcomes			L	T	P	C	Maximum Marks			Category
		PEO	PO	PSO					CA	ES	Tot.	
PROFESSIONALELECTIVEI												
19ITP01	Web Application development using C#and.NET	I,III	1,2,3,4,5,12	1,2	3	0	0	3	40	60	100	PE
19ITP02	Advanced Java Programming	I,III	1,2,3,4,5,12	1,2	3	0	0	3	40	60	100	PE
19ITP03	Open Source Systems	I,III	1,2,3,4,5,12	1,2	3	0	0	3	40	60	100	PE
19ITP04	Compiler Design Principles	I,III	1,2,3,4,12	1,2	3	0	0	3	40	60	100	PE
19ITP05	Data warehousing and Data Mining	I,III	1,2,3,4,5,12	2	3	0	0	3	40	60	100	PE
19ITP06	Computer Graphics And Multimedia Systems	I,III	1,2,3,4,5,12	1,2	3	0	0	3	40	60	100	PE
19ITP07	Distributed Systems	I,III	1,2,3,4,5,12	1,2	3	0	0	3	40	60	100	PE
PROFESSIONALELECTIVEII												
19ITP08	GraphTheory	I,IV	1,2,3,4	1,2	3	0	0	3	40	60	100	PE
19ITP09	Human ComputerInteracti on	I,IV	1,2,3,4	1,2	3	0	0	3	40	60	100	PE
19ITP10	BioInformatics	I,II	1,2,3,4,12	1,2	3	0	0	3	40	60	100	PE
19ITP11	Information StorageManageme nt	I,II	1,2,3,4,5,12	1,2	3	0	0	3	40	60	100	PE
19ITP12	Object Oriented Analysis and Design	I,II	1,2,3,4,12	1,2	3	0	0	3	40	60	100	PE
19ITP13	Service OrientedArchitec ture	I,II	1,2,3,4,12	1,2	3	0	0	3	40	60	100	PE
19ITP14	Web ServicesProgramming andXML	I,II	1,2,3,4,12	1,2	3	0	0	3	40	60	100	PE

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CodeNo	Course	Objectives&O utcomes			L	T	P	C	Maximum Marks			Category
		PEO	PO	PSO					CA	ES	Tot.	
PROFESSIONALELECTIVEIII												
19ITP15	Software Testing	I,III	1,2,3,4, 5,12	1,2	3	0	0	3	40	60	100	PE
19ITP16	High Performance Computing	I,III	1,2,3 4,5,12	1,2	3	0	0	3	40	60	100	PE
19ITP17	Green Computing	I,III	1,2,3 4,5,12	1,2	3	0	0	3	40	60	100	PE
19ITP18	Digital Signal Processing	I,III	1,2,3 4,12	1,2	3	0	0	3	40	60	100	PE
19ITP19	Information Retrieval	I,III	1,2,3 4,5,12	2	3	0	0	3	40	60	100	PE
19ITP20	Multi Core And Computing Communication Systems	I,III	1,2,3,4, 5,12	1,2	3	0	0	3	40	60	100	PE
19ITP21	Artificial Intelligence	I,III	1,2,3,4, 5,12	1,2	3	0	0	3	40	60	100	PE
PROFESSIONALELECTIVEIV												
19ITP22	R Programming	I,IV	1,2,3,4	1,2	3	0	0	3	40	60	100	PE
19ITP23	Block Chain Technology	I,IV	1,2,3,4	1,2	3	0	0	3	40	60	100	PE
19ITP24	Embedded System	I,II	1,2,3 4,12	1,2	3	0	0	3	40	60	100	PE
19ITP25	Video Analytics	I,II	1,2,3 4,5,12	1,2	3	0	0	3	40	60	100	PE
19ITP26	Embedded Security	I,II	1,2,3 4,12	1,2	3	0	0	3	40	60	100	PE
19ITP27	Robotics	I,II	1,2,3 4,12	1,2	3	0	0	3	40	60	100	PE
19ITP28	Information Coding Techniques	I,II	1,2,3 4,12	1,2	3	0	0	3	40	60	100	PE



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Code No	Course	Objectives & Outcomes			L	T	P	C	Maximum Marks			Category
		PEO	PO	PSO					CA	ES	Tot.	
PROFESSIONALELECTIVE V												
19ITP29	Software Project and Quality Management	I,III	1,2,3,4,5,12	1,2	3	0	0	3	40	60	100	PE
19ITP30	Quantum Computing	I,III	1,2,3,4,5,12	1,2	3	0	0	3	40	60	100	PE
19ITP31	Natural Language Processing	I,III	1,2,3,4,5,12	1,2	3	0	0	3	40	60	100	PE
19ITP32	Soft Computing	I,III	1,2,3,4,12	1,2	3	0	0	3	40	60	100	PE
19ITP33	Deep Learning	I,III	1,2,3,4,5,12	2	3	0	0	3	40	60	100	PE
19ITP34	Mobile and Pervasive Computing	I,III	1,2,3,4,5,12	1,2	3	0	0	3	40	60	100	PE
19ITP35	Data Visualization Techniques	I,III	1,2,3,4,5,12	1,2	3	0	0	3	40	60	100	PE
PROFESSIONALELECTIVEVI												
19ITP36	Ethical Hacking	I,IV	1,2,3,4	1,2	3	0	0	3	40	60	100	PE
19ITP37	E-Commerce	I,IV	1,2,3,4	1,2	3	0	0	3	40	60	100	PE
19ITP38	Computer Vision	I,II	1,2,3,4,12	1,2	3	0	0	3	40	60	100	PE
19ITP39	Cyber Forensics	I,II	1,2,3,4,5,12	1,2	3	0	0	3	40	60	100	PE
19ITP40	Information Security	I,II	1,2,3,4,12	1,2	3	0	0	3	40	60	100	PE
19ITP41	Fundamentals of Nano Science	I,II	1,2,3,4,12	1,2	3	0	0	3	40	60	100	PE
19ITP42	Image Processing	I,II	1,2,3,4,12	1,2	3	0	0	3	40	60	100	PE

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Department	INFORMATION TECHNOLOGY					R 2019	Semester	I
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19BS101	CALCULUS AND ITS APPLICATIONS	3	1	0	4	60	100	

Course Objective (s): The purpose of learning this course is to

- Interpret the introductory concepts of Limit and continuity
- Interpret the introductory concepts of calculus, this will enable them to model and analyze physical phenomena involving continuous change of variables
- Find eigen values and eigen vectors which is one of the powerful tools to handle practical problems arising in the field of engineering.
- Summarize and apply the methodologies involved in solving problems related to functions of several variables.
- Develop enough confidence to identify surface and area there by solving using integration

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

- Apply differentiation to solve maxima and minima problems use both the limit definition and rules of differentiation to differentiate functions
- Identify and model the real time problems using first order linear differential equations. Recognize and solve the higher order ordinary differential equations.
- Analyze the characteristics of a linear system with Eigen values and Eigen vectors.
- Characterize the functions of several variables and get the solutions of the same.
- Integrate the functions for evaluating the surface area and volume.

Unit I **LIMITS AND CONTINUITY** **12**

Representation of a function-Limit of a function-Continuity-Derivatives-Differentiation rules-Maxima and Minima of one variable

Unit II **ORDINARY DIFFERENTIAL EQUATIONS** **12**

Linear differential equations of second and higher order with constant coefficients. Linear differential equations of higher order with variable coefficients: Cauchy's linear differential equation - Method of variation of parameters for second order differential equations-Vibrating string-Electrical circuits

Unit III **MULTIVARIABLE CALCULUS** **12**

Functions of Two Variables - Total Differential - Derivative of implicit functions- Jacobian's- constrained maxima and minima

Unit IV **MULTIPLE INTEGRALS** **12**

Double integration with constant and variable limits-Region of integration -Change the order of integration - Area as double integral in cartesian coordinates. Triple integral in Cartesian coordinates.

Unit V **EIGEN VALUES AND EIGEN VECTORS** **12**

Eigen Values and Eigen Vectors of a real matrix - Properties of Eigen Values- Cayley - Hamilton Theorem Orthogonal matrix- Diagonalisation-Quadratic form: Reduction of a quadratic form to a canonical form.

REFERENCE(S):


1. Thomas Calculus, 14th Edition by Pearson
2. Erwin Kreyszig , Advanced Engineering Mathematics, Tenth Edition, Wiley India Private Limited, New Delhi 2015.
3. Peter V. O Neil , Advanced Engineering Mathematics, Eight Edition , Cengage Learning India Private Limited, 2018
4. C. Ray Wylie and C Louis Barrett, Advanced Engineering Mathematics, Sixth Edition, Tata McGraw-Hill Publishing Company Ltd, 2003.
5. Glyn James, Advanced Engineering Mathematics, Third Edition, Wiley India, 2014.

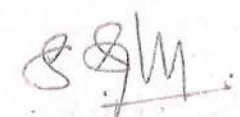
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Department	INFORMATION TECHNOLOGY					R 2019	Semester I	BS
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19BS102	ENGINEERING PHYSICS	2	0	2	3	60	100	
<p>Course Objective (s): The purpose of learning this course is</p> <ul style="list-style-type: none"> To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology To get the basic knowledge on the properties of matters To acquire knowledge in Ultrasonics, Laser and fibers To enhance the knowledge in quantum theory To understand basic concepts of thermal properties of materials 								
<p>Course Outcomes: At the end of this course, learners will be able to :</p> <ul style="list-style-type: none"> To gain knowledge on the basics of properties of matter and its applications To acquire knowledge on the concepts of Ultrasonics and their applications To have adequate knowledge on the concepts of fiber & Laser and their applications To get knowledge on advanced Physics concepts of quantum theory and its applications in tunneling microscopes and To understand knowledge on the concepts of thermal properties of materials and their applications in expansion of joints and heat exchangers 								
Unit I	PROPERTIES OF MATTER							6
Elasticity – Stress-strain diagram and its uses - torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders.								
Unit II	ULTRASONICS							6
Introduction–Classification of Sound- Ultrasonics Production - Magnetostriction generator - Piezo electric generator-cavitations-ultrasonic cleaning-Non Destructive Testing- Pulse echo system through transmission and reflection modes- A, B and C – scan displays- Engineering Applications-Cutting, welding and drilling.								
Unit III	LASER AND FIBRE OPTICS							6
Lasers: population of energy levels, Einstein's A and B coefficients derivation – Semiconductor lasers: homojunction and heterojunction – Industrial applications of laser. Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibres (material, refractive index, mode) – fibre optic sensors: pressure and displacement.								
Unit IV	QUANTUM PHYSICS							6
Black body radiation – Planck's theory (derivation) – Compton effect: theory and experimental verification–waveparticle duality–electron diffraction–concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box.								
Unit V	THERMAL PHYSICS							6
Transfer of heat energy – thermal expansion of solids and liquids – expansion joints - bimetallic strips - thermal conduction, convection and radiation – heat conduction in solids – thermal conductivity - Lee's disc method: theory and experiment - conduction through compound media (series and parallel) – applications: heat exchangers, ovens and solar water heaters.								


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TEXT BOOK(S):	
1.	Bhattacharya, D.K. & Poonam, T. —Engineering PhysicsII. Oxford University Press, 2015
2.	Gaur, R.K. & Gupta, S.L. —Engineering PhysicsII. Dhanpat Rai Publishers, 2012
3.	Pandey, B.K. & Chaturvedi, S. —Engineering PhysicsII. Cengage Learning India, 2012

REFERENCE(S):	
1.	Halliday, D., Resnick, R. & Walker, J. —Principles of PhysicsII. Wiley, 2015
2.	Serway, R.A. & Jewett, J.W. —Physics for Scientists and EngineersII. Cengage Learning, 2010
3.	Tipler, P.A. & Mosca, G. - Physics for Scientists and Engineers with Modern Physics'.W.H. Freeman, 2007

List of Experiments

PHYSICS (ANY FIVE)

30 hrs

1. Determination of rigidity modulus – Torsionpendulum
2. Determination of Young's modulus by non-uniform bendingmethod
3. Determination of Young's modulus by uniform bendingmethod
4. Determination of wavelength and particle size usingLaser
5. Determination of acceptance angle and numerical aperture in an opticalfiber
6. Determination of thermal conductivity of a bad conductor – Lee's Discmethod
7. Determination of velocity of sound and compressibility of liquid – Ultrasonicinterferometer
8. Determination of wavelength of mercury spectrum – spectrometergrating
9. Determination of band gap of asemiconductor
10. Determination of thickness of a thin wire – Air wedgemethod



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Department	INFORMATION TECHNOLOGY				R 2019	Semester I	BS
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19BS103	ENGINEERING CHEMISTRY	3	0	0	3	45	100
<p>Course Objective (s): The purpose of learning this course is to</p> <ul style="list-style-type: none"> Understand the basic concepts of water characterization and treatment methods. Know the fundamental concepts of electrochemistry and corrosion. Understand the principles and generation of energy in batteries and nuclear reactors. Gain knowledge on polymers. Know the types of fuels and the manufacture of solid, liquid and gaseous fuels. 							
<p>Course Outcomes: At the end of this course, learners will be able to:</p> <ul style="list-style-type: none"> Make the students conversant with water treatment techniques Know the reaction involved in corrosion and corrosion protection methods Impart knowledge on renewable energy sources like nuclear and to impart knowledge on energy storage devices Aware the synthesis & industrial application of polymers Impart knowledge on different types of fuels (solid liquid, gas, primary, secondary and synthetic) and combustion process. 							
Unit I	WATER CHEMISTRY						9
Hardness of water – types – Estimation of hardness of water by EDTA method – Domestic water treatment-boiler troubles (scales, sludge, priming, foaming, caustic embrittlement) – Internal conditioning (carbonate, phosphate, sodium aluminate and calgon) .External treatment – Demineralization process – Reverse Osmosis.							
Unit II	ELECTROCHEMISTRY AND CORROSION						9
Electrochemical cell - redox reaction, electrode potential- Nernst equation (derivation and problems). Standard hydrogen electrode-Calomel Electrode. Corrosion: chemical & electrochemical corrosion (galvanic, differential aeration) - types-factors influencing corrosion rate corrosion control - sacrificial anode and impressed current cathodic protection method.							
Unit III	ENERGY SOURCES						9
Introduction- nuclear energy- nuclear fission- nuclear fusion- nuclear chain reactions- light water reactor-breeder reactor. Batteries and fuel cells: Types of batteries- alkaline battery- lead storage battery- lithium ion battery. Fuel cell :H ₂ -O ₂ fuel cell.							
Unit IV	POLYMER CHEMISTRY						9
Monomers - polymers - polymerization - functionality - degree of polymerization - classification of polymers based on source and applications. Types of polymerization: addition, condensation and copolymerization. Preparation, properties and applications of thermosetting (epoxy resin and bakelite) and thermoplastics (poly vinyl chloride, poly tetrafluoroethylene and PMMA). Rubber: SBR. Compounding of plastics (blow moulding, injection, extrusion) .							
Unit V	FUELS AND COMBUSTION						9
Fuel: Introduction- classification of fuels- solid fuels-coal- proximate and ultimate analysis- manufacture of metallurgical coke (Otto Hoffmann method) – Liquid fuels: Refining of petroleum- synthetic petrol Fischer-Tropsch and Bergius processes- knocking- octane number- cetane number – Gaseous fuels: liquefied petroleum gases(LPG)- water gas- bio diesel. Combustion- flue gas analysis (ORSAT Method).							

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TEXT BOOK(S):	
1.	Jain P.C. and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2019
2.	Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hi-tech Publishing Company Pvt. Ltd. Chennai, 2019
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.	Gowariker V.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., "Nano chemistry: A Chemical Approach to Nanomaterials", RSC Publishing, 2017.
5.	Ashima Srivastava and Janhavi N N., "Concepts of Engineering Chemistry", ACME Learning Private Limited., New Delhi., 2015.



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Department	INFORMATION TECHNOLOGY					Semester I	HS
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19HS101	COMMUNICATIVE ENGLISH	3	0	0	3	45	100
Course Objective (s):							
<ul style="list-style-type: none"> To acquire basic English grammar. To develop listening skills to listen lectures and basic videos. To enhance the reading skill to comprehend technical writings. To improve writing skills to express thoughts freely. To develop speaking skills to speak fluently in real contexts. 							
Course Outcomes: At the end of this course, learners will be able to:							
<ul style="list-style-type: none"> Improve language usage in LSRW skills. Develop listening skills to comprehend general / technical talks. Acquire the ability to understand different written texts. Enhance the writing skills to express the ideas of the learners. Communicate fluently in real time context. 							
Unit I	LANGUAGE FOCUS						9
Parts of speech - Word formation - Sentence types (declarative, imperative, exclamatory & interrogative) - Tense forms - Subject - Verb agreement							
Unit II	LISTENING						9
Listening for specific information: Short conversations / monologues - Gap filling - Telephone conversations - Telephone etiquette - Note-taking - Listening for gist / interviews - Listening to songs and completing the lyrics - Clear individual sounds - Word stress							
Unit III	READING						9
Completing the sentences - Prediction - Skimming for gist - Scanning for specific information - Understanding text and sentence structure - Close reading							
Unit IV	WRITING						9
Paragraph writing (descriptive, narrative, expository & persuasive) - Letter (formal and informal) - Dialogue writing - E-mail - Instructions							
Unit V	SPEAKING						9
Self-introduction - Giving personal and factual information - Talking about present circumstances, past experiences and future plans - Mini-presentation - Expressing opinions and justifying opinions - Agreement / disagreement - Likes and dislikes							
TEXT BOOK(S):							
1.	Communicative English by KN Shoba ,Lourdes Joavani Rayen Published by Cambridge university 2017.						
REFERENCE(S):							
1	Murphy, Raymond. English Grammar in Use – A Self-Study Reference and Practice Book For Intermediate learners Of English .Ived. United Kingdom: Cambridge University Press. 2012.						
2	Seely, John. Oxford Guide to Effective Writing and Speaking. Indian ed. New Delhi: Oxford University Press. 2005.						
3	Anderson, Kenneth et al. Study Speaking: A Course in Spoken English for Academic Purposes. United Kingdom: Cambridge University Press 1992.						


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Department	INFORMATION TECHNOLOGY					R 2019	Semester I	ES
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ES101	PYTHON PROGRAMMING	3	0	0	3	45	100	
Course Objective (s):								
The purpose of learning this course is								
<ul style="list-style-type: none"> To understand problem solving concepts. To understand why Python is a useful scripting language for developers and to read and write simple Python programs. To develop Python programs with conditionals and loops To use Python data structures — lists, tuples, dictionaries. To do input/output with files in Python 								
Course Outcomes:								
At the end of this course, learners will be able to								
<ul style="list-style-type: none"> Apply problems solving techniques to real world problems. Recognize and construct common programming idioms: variables, loop, branch, and input/output. To design, code, and test Python programs using List, Tuples and Strings To write code using dictionaries and functions To read and write data from/to files in Python Programs. 								
Unit I	COMPUTATIONAL THINKING							9
Introduction to Computational Thinking – From abacus to machine – The first Software – First Modern Computer- Information and data - Converting information into data -Data Capacity Problem Solving Techniques: General problem Solving concepts-: Algorithm, Pseudo-code and Flowchart Problem Solving with Sequential Logic Structure - Problem Solving with Decisions - Problem Solving with Loops Case Study: Raptor and Scratch Tools.								
Unit II	INTRODUCTION TO PYTHON							9
History- Features - Setting up path - Working with Python- Basic Syntax- Variable and Data Types - Operator - Conditional Statements – Looping – Control Statements.								
Unit III	STRING MANIPULATION, LIST AND TUPLES							9
Creating String - Accessing Strings- Basic Operations - String slices - Function and Methods – Creating List- Accessing list- Operations on List - Working with lists- Function and Methods – Creating tuple- Tuple Operations – Functions and Methods.								
Unit IV	DICTIONARIES AND FUNCTIONS							9
Creating Dictionaries - Accessing values in dictionaries - Working with dictionaries - Properties – Functions - Defining a function - Calling a function- Types of functions - Function Arguments- Anonymous functions- Global and local variables.								
Unit V	MODULES, FILES AND EXCEPTION HANDLING							9
Modules - Importing module - Math module - Random module - Packages- Composition Files - Opening and closing file- File Opening Modes- Reading and writing files – Functions Exception Handling- Exception - Exception Handling - Except clause - Try , finally clause User Defined Exceptions.								
TEXT BOOK(S)								
1,	David Riley and Kenny Hunt, "Computational Thinking for the Modern Problem Solver", Chapman & Hall/CRC, 2014.							
2,	Michael Dawson, "Python Programming for the Absolute Beginner", 3rd Edition, 2010.							
REFERENCE(S)								
1.	M. Sprankle, "Problem Solving and Programming Concepts", 9th Edition, Pearson Education, New Delhi, 2011.							
2.	Brian Heinold, "Introduction to Programming Using Python", Mount St. Mary's University, 2013.							
3.	Allen Downey, Green Tea Press Needham, "Think Python, How to Think Like a Computer Scientist", Massachusetts.							
4.	Cunningham, Sams teach yourself python in 24 hours, Second edition Pearson, 2014							

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Department	INFORMATION TECHNOLOGY					R 2019	Semester I	ES
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ES104	PYTHON PROGRAMMING LABORATORY	0	0	2	1	30	100	

Course Objective (s):

The purpose of learning this course is

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python.

Course Outcomes:

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

- Write, test, and debug simple Python programs.
- Implement Python programs with conditionals and loops.
- Develop Python programs step-wise by defining functions and calling them.
- Use Python lists, tuples, dictionaries for representing compound data.
- Read and write data from/to files in Python.

List of Experiments

- Find the Greatest among three numbers without using third variable
- Sum of the Digits of a Number
- Generation of Prime Numbers
- Implement a sequential search
- Create a calculator program
- Explore string functions
- Implement Selection Sort
- Implement Stack
- Read and write into a file
- Demonstrate usage of basic regular expression
- Demonstrate use of advanced regular expressions for data validation.
- Demonstrate use of List
- Demonstrate use of Dictionaries
- Create Comma Separate Files (CSV), Load CSV files into internal Data Structure

Platforms needed : Python 3 interpreter for Windows / Linux

TEXT BOOK(S)

1,	David Riley and Kenny Hunt, "Computational Thinking for the Modern Problem Solver", Chapman & Hall/CRC, 2014.
2	Michael Dawson, "Python Programming for the Absolute Beginner", 3rd Edition, 2010.

REFERENCE(S)

1.	M. Sprankle, "Problem Solving and Programming Concepts", 9th Edition, Pearson Education, New Delhi, 2011.
2.	Brian Heinold, "Introduction to Programming Using Python", Mount St. Mary's University, 2013.
3.	Allen Downey, Green Tea Press Needham, "Think Python, How to Think Like a Computer Scientist", Massachusetts.
4.	Cunningham, Sams teach yourself python in 24 hours, Second edition Pearson, 2014



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Department	INFORMATION TECHNOLOGY				R 2019	Semester I	EEC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19TPS01	SOFT SKILLS - I	1	0	1	1.5	30	100
Course Objective (s): The purpose of learning this course is <ul style="list-style-type: none"> To develop basic grammar knowledge in English. To enhance Speaking Skills in English To improve Verbal and Non-verbal Communication Skills To develop Confidence and Emotional Intelligence To develop Inter Personal Skills. 							
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Have competent knowledge of grammar Speak fluent English by enriching Vocabulary Knowledge. Have good Presentation Skills through verbal and non verbal communication. Handle any Situation with confidence by being emotionally stable. Work in a team by having team coherence and dealing with people. 							
UNIT 1	Effective English – Written English						6
Basic rules of Grammar - Parts of Speech – Tenses – Verbs. Sentence Construction. Dialogues and Conversations – Writing. Exercises to practice and improve these skills.							
UNIT 2	Effective English – Spoken English						6
Vocabulary – Idioms & Phrases – Synonyms–Antonyms. Dialogues and Conversations – Writing. Exercises to practice and improve these skills.							
UNIT 3	Art of Communication & The Hidden Data Involved						6
Verbal Communication - Effective Communication - Active listening –Paraphrasing – Feedback. Non Verbal Communication - Body Language of self and others. Importance of feelings in communication - dealing with feelings in communication.							
UNIT 4	World of Teams – Part -01						6
Self Enhancement - importance of developing assertive skills- developing self confidence – developing emotional intelligence.							
UNIT 5	World of Teams – Part -02						6
Importance of Team work – Team vs. Group - Attributes of a successful team – Barriers involved Working with Groups – Dealing with People- Group Decision Making.							
REFERENCES: <ol style="list-style-type: none"> The Seven Habits of Highly Effective People - Stephen R. Covey. All the books in the "Chicken Soup for the Soul" series. Man's search for meaning – Viktor Frankl The greatest miracle in the world – Og Mandino Goal - Eliyahu Goldratt. Working with Emotional Intelligence - David Goleman. Excel in English – Sundra Samuel, Samuel Publications Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillan India Ltd., Delhi Essentials of Effective Communication, Ludlow and Panthon; Prentice Hall of India. Effective Presentation Skills (A Fifty-Minute Series Book) by Steve Mandel "Strategic interviewing" by Richard Camp, Mary E. Vielhaber and Jack L. Simonetti – Published by Wiley India Pvt. Ltd "Effective Group Discussion: Theory and Practice" by Gloria J. Galanes, Katherine Adams, John K. Brillhart 							


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Department	INFORMATION TECHNOLOGY					R 2019	Semester I	ES
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ES105	COMPUTER HARDWARE SERVICING AND INSTALLATION LABORATORY	0	0	2	1	30	100	
Course Objective (s):								
The purpose of learning this course is								
<ul style="list-style-type: none"> To understand the basic concepts & structure of computer hardware & networking. To identify the existing configuration of the computers and peripherals. To apply their knowledge about computer peripherals to identify/rectify problems onboard. To integrate the PCs into Local Area Network & re-install operating systems and various Shipboard applications. To perform routine maintenance and upgrades. 								
Course Outcomes:								
At the end of this course, learners will be able to:								
<ul style="list-style-type: none"> Explain how a PC works, and understand the relationship between hardware and software. Classify and explain the function of different computer hardware components. Understand purpose and functions of an operating system. Understand the purpose and functions of the computer peripherals. Understand diagnostic procedures and troubleshooting techniques to personal computers, portable devices, operating systems and computer peripherals. 								
List of Experiments								
<ol style="list-style-type: none"> 1 Introducing Hardware & Operating Systems 2 Form Factors and Power Supplies –SMPS 3 Processors and Chipsets Motherboard types 4 PC Repair Fundamentals 5 Hard disk Partitioning and Disk Defragmentation 6 Installing Windows OS, Linux & Maintaining Windows OS, Linux 7 Upgrading Memory and Hard Drives 8 Installing and Supporting I/O Devices 9 Installing Multimedia Devices and Mass Storage 10 Installing Device Drivers – Sound, Display, Printer and Scanner Drivers 11 Install and configure the necessary components for a small peer-to-peer network for sharing files and printers. 12 Install and configure PC with internet for sharing data. 13 Securing the PC and LAN. 								
TEXT BOOK(S)								
1.	Scott Mueller "Upgrading and Repairing PCs", 22nd Edition, QUE, Pearson Education, New Delhi, 2015.							
2.	Mike Meyers, Scott Jernigan, "A+ Guide to Managing and Troubleshooting PCs", Sixth Edition, Tata McGraw Hill, 2019							
REFERENCE(S)								
1.	Ron Gilster, "PC Hardware – a beginner's guide" – Tata McGraw Hill, 2001							
2.	Govindaraju B. "IBM PC and Clones: Hardware, Trouble Shooting and Maintenance", 2 nd Edition, Tata McGraw Hill Pub. Co., New Delhi, 2002							



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Department	INFORMATION TECHNOLOGY				R 2019	Semester I	BS
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
19BS105	CHEMISTRY LABORATORY	L	T	P	C	60	50
		0	0	4	2		

Course Objective (s): The purpose of learning this course is to

- Determination of total, temporary & permanent hardness of water by EDTA method.
- Determination of chloride content of water sample by Argentometric method.
- Estimation of iron content of the given solution using potentiometer.
- Determination of strength of given hydrochloric acid using pH meter
- Conductometric titration of strong acid vs strong base.

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

- Make the student to acquire practical skills in the determination of water quality through volumetric analysis.
- Acquire the knowledge about chloride content in water sample.
- Make the student to acquire practical skills about strength of iron using potentiometric titrations.
- Understand the how to estimate hydrochloric acid in water sample using pH meter.
- Gain the knowledge about conductance of ions.

Exp No.	Name of Experiments (Any Ten)
1	Determination of Total, Temporary & Permanent hardness of water by EDTA method.
2	Determination of chloride content of water sample by Argentometric method.
3	Determination of Dissolved oxygen content in water sample using Winklers Method
4	Determination of Alkalinity in Water Sample
5	Determination of strength of given hydrochloric acid using pH meter.
6	Determination of strength of acids in a mixture of acids using conductivity meter.
7	Conductometric titration of Weak acid vs Weak base.
8	Estimation of iron content of the given solution using potentiometer.
9	Conductometric titration of strong acid vs strong base.
10	Determination of Molecular weight of polyvinyl alcohol using Ostwald viscometer
11	Estimation of iron content of the water sample using spectrophotometer
12	Estimation of Copper in Brass



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Department	INFORMATION TECHNOLOGY				R 2019	Semester II	BS
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P			
19BS201	VECTOR CALCULUS AND COMPLEX VARIABLES	3	1	0	4	60	100
Course Objective (s): The purpose of learning this course is to <ul style="list-style-type: none"> Summarize and apply the methodologies involved in solving problems related to fundamental principles of Calculus viz: Vector, Vector Differentiation and Vector Integration. Implement the Complex Analysis, an elegant method in the study of heat flow, fluid dynamics and electrostatics. Develop enough confidence to identify and model mathematical patterns in real world and offer appropriate solutions, using the skills learned in their interactive and supporting environment. Defining a complex function and solving through complex integration 							
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Characterize the calculus of vectors. Apply the theoretical aspects of vector integral calculus in their core areas. Recognize the differentiation properties of complex functions. Identify the complex functions and their mapping in certain complex planes. Use the concepts of integration to complex functions in certain regions. 							
Unit I	DIFFERENTIATION OF VECTORS						12
Vector point function- Directional derivative - Gradient -Divergence -Curl - Solenoidal – Irrotational vector fields –Scalar potential							
Unit II	INTEGRATION OF VECTORS						12
Work done - Line Integral - Surface integral- Green's theorem in a plane- Stoke's Theorem- Gauss divergence theorem- Applications involving cubes and parallelepiped.							
Unit III	ANALYTIC FUNCTIONS						12
Analytic Functions- Necessary and Sufficient conditions of Analytic Function- Properties of Analytic function - Determination of Analytic Function using Milne Thompson method -Applications to the problems of Potential Flow.							
Unit IV	MAPPING OF COMPLEX FUNCTIONS						12
Conformal mapping- Application of transformation: translation, rotation, magnification and inversion of multi valued functions - Linear fractional Transformation (Bilinear transformation).							
Unit V	COMPLEX INTEGRATION						12
Cauchy's Fundamental Theorem - Cauchy's Integral Formula - Taylor's and Laurent's series- Classification of Singularities - Cauchy's Residue Theorem							
REFERENCE(S):							
1.	Erwin Kreyszig , Advanced Engineering Mathematics, Tenth Edition, Wiley India Private Limited, New Delhi 2015						
2.	C. Ray Wylie and C. Louis Barrett, Advanced Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd, 2003						
3.	J. A. Brown and R. V. Churchill, Complex Variables and Applications , Sixth Edition, McGraw Hill, New Delhi, 1996						
4.	Peter V.O. Neil, Advanced Engineering Mathematics, Eighth Edition , Cengage Learning India Private Limited, 2018						
5.	Glyn James, Advanced Engineering Mathematics, Third Edition, Wiley India, 2007						



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Department	INFORMATION TECHNOLOGY				R 2019	Semester II	BS
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19BS204	PHYSICS FOR INFORMATION SCIENCE	3	0	0	3	45	100

Course Objective (s): The purpose of learning this course is

- To understand the essential principles of Physics of semiconductor device and Electron transport properties.
- Become proficient in magnetic
- Become proficient in super conducting
- Understand the optical properties of materials
- Know the applications of Nanomaterials in computer

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

- Acquire knowledge on basics of semiconductor physics and its applications in various devices,
- Get knowledge on magnetic properties of materials and their applications
- Gain knowledge on super conducting materials and quantum computing
- Have the necessary understanding on the functioning of optical materials for optoelectronics,
- Understand the basics of nanomaterials and carbon nanotubes.

Unit I	SEMICONDUCTOR PHYSICS	9
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Introduction- types of semiconductors - Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Hall effect theory (n-type and p-type semiconductors) and its experiment- Applications- FET, MOSFET and Silicon control rectifier (qualitative treatment only).

Unit II	MAGNETIC PROPERTIES OF MATERIALS	9
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Magnetism in materials – magnetic field and induction – magnetization - magnetic permeability and susceptibility–types of magnetic materials – microscopic classification of magnetic materials - Ferromagnetism: origin and exchange interaction- Domain Theory, Hysteresis, soft and hard magnetic materials-Ferrites-applications-magnetic recording and readout-storage of magnetic data-Tapes, Floppy disc and magnetic disk drives and GMR

Unit III	SUPER CONDUCTING MATERIALS	9
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Introduction-super conducting phenomena-Properties of super conductors-Meissner effect-isotope effect- Type I & Type II super conductor, High TC super conductor-Applications of super conductor-Magnetic levitation and SQUIDS- super conducting computing-quantum computing (qualitative concepts)

Unit IV	OPTICAL MATERIALS	9
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Classification of optical materials – carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators and Semiconductors (concepts only)–Excitons–Traps– Luminescence - Fluorescence and phosphorescence - LCD, Optical storage device-CD ROM-DVD ROM- Blu ray-DVDRAM

Unit V	NANOELECTRONIC DEVICES	9
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Introduction – Nanomaterials-Synthesis-physical vapour deposition-quantum confinement – quantum dot- Applications of nanomaterials- 3D printers-magnetic semiconductors– spintronics - Nanobots-Single electron transistor-DNA computing- Carbon nanotubes: preparation-Chemical Vapour Deposition technique- Properties and applications

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TEXT BOOK(S):	
1.	Jaspri Singh, —Semiconductor Devices: Basic PrinciplesII, Wiley 2012.
2.	Kasap, S.O. —Principles of Electronic Materials and DevicesII, McGraw-Hill Education, 2007.
3	Kittel, C. —Introduction to Solid State PhysicsII. Wiley, 2005.
REFERENCE(S):	
1.	Garcia, N. & Damask, A. —Physics for Computer Science Students. Springer-Verlag, 2012.
2.	Hanson, G.W. —Fundamentals of Nanoelectronics. Pearson Education, 2009
3.	Rogers, B., Adams, J. &Pennathur, S. —Nanotechnology: Understanding Small Systems. CRC Press, 2014



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Department	INFORMATION TECHNOLOGY					R 2019	Semester II	MC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19MC201	ENVIRONMENTAL SCIENCE AND ENGINEERING	3	0	0	0	45	100	
<p>Course Objective (s): The purpose of learning this course is to</p> <ul style="list-style-type: none"> • Study the nature and facts about environment. • Finding and implementing scientific, technological and economic solutions to environmental problems. • Know the types of natural resources and the individual role in conserving the resources. • Apply the knowledge to various social issues by understanding the environmental legislation laws. • Study the integrated themes and biodiversity, natural resources, pollution control and waste management. 								
<p>Course Outcomes: At the end of this course, learners will be able to:</p> <ul style="list-style-type: none"> • Extend their knowledge in maintaining ecological balance and make use of their knowledge in the preservation of biodiversity. • Outline the role of human being in maintaining a clean environment and useful environment for the future generations. • Explain the constituents of environment, precious resources in the environment and conservation of natural resources. • Find the role of government and Non-Government organization and explain the various rain water harvesting techniques. • Develop their awareness about population growth, Family planning programme and HIV/AIDS and extend their knowledge in role of information technology in environment & human health. 								
Unit I	ECOSYSTEMS AND BIODIVERSITY							10
<p>Environment: Scope – importance - need for public awareness - Concepts of an ecosystem - Structure and function of an ecosystem - Producers, consumers and decomposers - Food chains- food webs - types of ecosystem - structure and functions of forest ecosystem and river ecosystem – Biodiversity - value of biodiversity - consumptive use-productive use - social - ethical - aesthetic values - Hotspots of biodiversity - Threats to biodiversity - Habitat loss - poaching of wildlife and man wildlife conflicts. Conservation of biodiversity - In-situ and Ex-situ conservation.</p>								
Unit II	ENVIRONMENTAL POLLUTION							8
<p>Pollution: Causes - effects and control measures of Air pollution - Water pollution - Soil pollution and Noise pollution - Solid waste management - Causes - effects - control measures of urban and industrial wastes - Role of an individual in prevention of pollution - Disaster managements - Floods - cyclone-landslides.</p>								
Unit III	NATURAL RESOURCES							9
<p>Forest resource - Use-over exploitation - deforestation - Water resource - use-over utilization of surface and ground water - conflicts over water - Mineral resource - use-exploitation-environmental effects of extracting and using mineral resource - Food resources - world food problems changes caused by agriculture - Effects of modern agriculture - fertilizer- pesticide problems - Energy resource - Renewable energy sources - solar energy - wind energy. Land resources - land degradation - soil erosion - Role of an individual in conservation of natural resources.</p>								
Unit IV	SOCIAL ISSUES AND THE ENVIRONMENT							9
<p>Sustainable & Unsustainable development - Water conservation - rain water harvesting (roof top method) - climate change - global warming - acid rain - ozone layer depletion - Environment protection act - Air (Prevention and control of pollution) Act - Water (prevention and control of pollution) Act - Green Chemistry – 12 Principles of Green chemistry – Application of Green chemistry.</p>								
Unit V	HUMAN POPULATION AND THE ENVIRONMENT							9

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Population growth - variation among nations - Population explosion & its consequences – Family, child, women welfare programmes - Human rights - HIV/AIDS – Human health and environment - Role of information technology in environment and human health.

TEXT BOOK(S):

1. Anubha Kaushik and C.P. Kaushik, Environmental Science and Engineering, New Age International Publishers, New Delhi(2015)
2. Dr. A.Ravikrishan, Environmental 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 Sciencell, Second Edition, Pearson Education, New Delhi (2012).
2. Santosh Kumar Garg, Rajeshwari garg, smf Ranjni Garg —Ecological and EnvironmentalStudiesll 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.

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Department	INFORMATION TECHNOLOGY					R 2019	Semester II	HS
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19HX201	ENGLISH FOR ENGINEERS	3	0	0	3	45	100	
Course Objective (s):								
<ul style="list-style-type: none"> To acquire the usage of grammar in English language. To develop listening skills which will enable to listen lectures and comprehend different types of texts. To enhance the reading skill to comprehend technical writings. To improve writing skills to express thoughts freely. To develop speaking skills to speak fluently in real contexts. 								
Course Outcomes: At the end of this course, learners will be able to:								
<ul style="list-style-type: none"> Improve their language usage in LSRW skills. Develop listening skills to understand sentence stress and intonations. Acquire the ability to understand different written texts. Enhance the writing skills to express the ideas of the learners. Communicate fluently in pair / team. 								
Unit I	LANGUAGE FOCUS						9	
Voice (Active & Passive) - Reported speech - Conditionals - Collocations - Discourse markers - One word substitution - Phrasal verbs - Error identification								
Unit II	LISTENING						9	
Listening for specific information – Identifying sentence stress - Rhythm - Intonation								
Unit III	READING						9	
Reading graphs and charts - Skimming and scanning texts – Identifying topic sentences - Understanding the structure of a text								
Unit IV	WRITING						9	
Job Application, Letter and Resume - Recommendations - Report writing (accident and survey) - Writing review (book and movie) - Transcoding (interpreting charts & diagrams)								
Unit V	SPEAKING						9	
Collaborative task - Turn taking (initiating and responding appropriately) - Negotiating - Exchanging - Language Functions: suggesting - comparing and contrasting -Expressing - finding out facts, attitudes and opinions								
TEXT BOOK(S):								
1.	Communicative English by KN Shoba ,Lourdes JoavaniRayen Published by Cambridge university Revised Edition 2018							
REFERENCE(S):								
1	Jeremy Comfort, Pamela Rogerson, Trish Stott, and Derek Utley, Speaking Effectively and Developing Speaking Skills for Business English, Cambridge: Cambridge University Press, 2002.							
2	Eric H. Glendinning and Beverly Holmstrom, Study Reading: A Course In Reading for Academic Purposes. United Kingdom: Cambridge University Press, 2004.							
3	Murphy, Raymond. English Grammar in Use – A Self-Study Reference and Practice Book For Intermediate learners Of English .Ived. United Kingdom: Cambridge University Press. 2012.							
4	Seely, John. Oxford Guide to Effective Writing and Speaking. Indian ed. New Delhi: Oxford University Press. 2005.							

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Department	INFORMATION TECHNOLOGY				R 2019	Semester II	HS
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P			
19HX202	HINDI	3	0	0	3	45	100
Course Objective (s): The purpose of learning this course is to <ul style="list-style-type: none"> • Help students to acquire the basics of Hindi • Understand the Nouns • Understand Pronouns and tenses • Understand the different vocabulary • Speak in Hindi 							
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> • Use Hindi alphabet • Use Nouns in speaking and writing • Communicate effectively with Improved fluency in Hindi • Clarity on the basic sounds of the Hindi language • Use Proper vocabulary 							
Unit I	HINDI ALPHABET						9
Genders (Masculine & Feminine Nouns ending in a ,e,i,o, u,)- Masculine & Feminine - Reading Exercises. Introduction - Vowels - Consonants - Plosives - Fricatives - Nasal sounds - Vowel Signs - Chandra Bindu & Visarg -Table of Alphabet-Vocabulary.							
Unit II	NOUNS IN HINDI						9
Genders (Masculine & Feminine Nouns ending in a ,e,i,o, u,)- Masculine & Feminine - Reading Exercises.							
Unit III	PRONOUNS AND TENSES						9
Categories of Pronouns - Personal Pronouns - Second person (you & honorific) - Definite & Indefinite pronouns - Relative pronouns - Present tense - Past tense - Future tense - Assertive & Negative Sentences - Interrogative Sentences.							
Unit IV	CLASSIFIED VOCABULARY						9
Parts of body - Relatives - Spices- Eatables- Fruit & Vegetables - Clothes - Directions-Seasons - Professions.							
Unit V	SPEAKING						9
Model Sentences - Speaking practice for various occasions.							
TEXT BOOK(S):							
1.	Elementary Hindi: Learn to Communicate in Everyday Situations by Richard Delacy Tuttle Publication 2013						
2	Colloquial Hindi: The Complete Course for Beginners by Tej K. Bhatia						
REFERENCE(S):							
1	B. R. Kishore, Self Hindi Teacher for Non-Hindi Speaking People, Vee Kumar Publications (P) Ltd., New Delhi, 2009						
2	Syed, Prayojan Mulak Hindi, Rahamathullah Vani Prakasan, New Delhi, 2002.						
3	Ramdev, Vyakaran Pradeep, Saraswathi Prakasan, Varanasi, 2004.						

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Department	INFORMATION TECHNOLOGY					R 2019	Semester II	HS
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19HX203	JAPANESE	3	0	0	3	45	100	
Course Objective (s): The purpose of learning this course is to <ul style="list-style-type: none"> To help students acquire the basics of Japanese language To teach them how to converse in Japanese in various occasions To teach the students the Japanese cultural facets and social etiquette 								
Course Outcomes: At the end of this course, learners will be able to communicate effectively with: <ul style="list-style-type: none"> Improved fluency in Japanese Clarity on the basic sounds of the Japanese language Proper vocabulary 								
Unit I	Introduction						9	
Introduction to Japanese - Japanese script - Pronunciation of Japanese (Hiragana) - Long vowels - Pronunciation of in, tsu, ga - Letters combined with ya, yu, yo - Daily Greetings and Expressions Numerals. N1 wa N2 des - N1 wa N2 jaarimasen - S ka - N1 mo - N1 no N2 - .san - Kanji - Technical Japanese Vocabulary (25 Numbers) - Phonetic and semantic resemblances between Tamil and Japanese								
Unit II	Vocabulary & Grammar 語彙と文法						9	
Introduction - Kore - Sore - are - Kono N1 - Sono N1 - ano N1 - so des - so jaarimasen - S1 ka - S2 ka - N1 no N1 - so des ka ' koko - soko - asoko - kochira - sochira - achira - N1 wa N2 (Place) des - dhoko - N1 no N2 - Kanji-10 - ima - ji - fun des - Introduction of verb - V mas - V masen - V mashitha - V masendeshitha - N1 (Time) ne V - N1 kara N2 des - N1 tho N2 / S ne Kanji-10 - Technical Japanese Vocabulary (25 Numbers) - Dictionary Usage.								
Unit III	Noun & Types 名詞とタイプ						9	
N1 (Place) ye ikimas - ki mas - kayerimasu - Dhoko ye moikimasen - ikimasendeshitha - N1 (vehicle) de ikimasu - kimasu - kayerimasu - N1 (Personal or Animal) tho V ithsu - S yo. - N1 wo V (Transitive) - N1 woshimus - Naniwoshimasuka - Nan & Nani - N1 (Place) de V - V masenka - V masho - Oo. Kanji-10 , N1 (tool - means) de V - Word / Sentence wa go nan des ka - N1 (Person) ne agemus - N1 (Person) ne moraimus - mo V shimashitha - , Kanji-10 - Japanese Typewriting using JWPCE Software, Technical Japanese Vocabulary (25 Numbers)								
Unit IV	Vocabulary & Grammar 語彙と文法						9	
Introduction to Adjectives - N1 wanaadjdes. N1 waiadjdes - naadjna N1 - iadjji N1 - Tho themo - amari - N1 wadho des ka - N1 wadhonna N2 des ka - S1 ka S2 - dhore - N1 gaarimasu - wakarimasu - N1 gasukimasu - N1 gakiraimasu - jozu des - hetha des - dhonna N1 - Usages of yoku - dhaithai - thakusan - sukoshi - amari - zenzen - S1 kara S2 - dhoshithe, N1 gaarimasu - imasu N1 (Place) ne N2 gaarimasu - iimasu - N1 wa N2 (Place) nearimasu - iimasu - N1 (Person, Place, or Thing) no N2 (Position) - N1 ya N2, Kanji-10 - Japanese Dictionary usage using JWPCE Software, Technical Japanese Vocabulary (25 Numbers)								
Unit V	Root Word & Vocabulary 語彙と語彙						9	
Saying Numbers , Counter Suffixes , Usages of Quantifiers - Interrogatives - Dhonokurai - gurai - Quantifier - (Period) ne - .kai V - Quantifier dhake / N1 dhake Kanji - Past tense of Noun sentences and na Adjective sentences - Past tense of ii - adj sentences - N1 wa N2 yoriadj des - N1 tho N2 tho Dhochiragaadj des ka and its answering method - N1 [no naka] de {nani/dhoko/dhare/ithsu} ga ichiban adj des ka - answering - N1 gahoshi des - V1 mas form dhake mas - N1 (Place) ye V masu form ne ikimasu/kimasu/kayerimasu - N1 ne V/N1 wo V - Dhokoka - Nanika - gojumo - Technical Japanese Vocabulary (25 Numbers)								

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Department	INFORMATION TECHNOLOGY					R 2019	Semester II	HS
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19HX204	FRENCH	3	0	0	3	45	100	
Course Objective (s): The purpose of learning this course is to								
<ul style="list-style-type: none"> To help students acquire the basics of French language To teach them how to converse in French in various occasions 								
Course Outcomes: At the end of this course, learners will be able to:								
<ul style="list-style-type: none"> The students will become familiar with the basics of French language and start conversing in French. 								
Unit I	Alphabet Français							6
Alphabet Français (alphabets) - Les Accents Français (the accents in French) - aigu - grave - circonflexe - tréma - cédille - écrire son nom dans le français (spelling) - nom (name in French) - Les noms de jours de la semaine (Days of the week)								
Unit II	Numbers, month & year (Nombre, mois et année)							6
Les noms de mois de l'année (Months) - Numéro 1 à 100 (Numbers 1 to 100) GRAMMAIRE : Conjugaison								
Unit III	Language Skills & Grammar (Compétences linguistiques et grammaire)							10
Moyens de transport (Transport) - Noms de Professions (Professions) - Noms d'endroits communs (Places) - Nationalités (Nationalities) ÉCOUTER : (Listening) Écouter I - alphabet associé à des prénoms français - Écouter et répondre PARLER (Speaking) Présentation - même / Présentez - Vous (Introducing oneself) LIRE : Lire les phrases simples								
Unit IV	Grammar (et grammaire)							12
Pronoms (Pronouns) - Noms communs masculins et de femme (Common masculine and feminine nouns) - Verbes communs (Common verbs) ÉCOUTER : écouter et crier les pronoms - Observer les dessins et écouter les dialogues LIRE : Lire les profils d'utilisateurs d'interlingua (alter ego) PARLER : Parler de sa ville - Parler de sa profession								
Unit V	Speaking & Writing (Parler et écrire)							11
Narration de son nom et l'endroit où on vit - Son âge et date de naissance - Numéro de téléphone et adresse - Narration du temps - La France en Europe PARLER : Conversation entre deux amis - Jouer la scène ÉCOUTER : Écouter les conversations (CD alter ego) ÉCRIRE : Écrire une carte postale								
TEXT BOOK(S):								
1.	Le Bon Usage by M. Grevisse Publisher- Duculot 14 edition (25 January 2001)							
2.	Advanced French by Monique L'Huillier, Cambridge University Press, 2013							
REFERENCE(S):								
1	Alter ego+ Niveau a1							
2	Grammaire Progressive du Français							
3	Collins Easy Learning French Verbs & Practice							
4	Français Linguaphone							
5	Français l. Harrisonburg: The Rosetta Stone: Fairfield Language Technologies							

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Department	INFORMATION TECHNOLOGY					R 2019	Semester II	ES
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ES202	ADVANCED C PROGRAMMING	3	0	0	3	45	100	
Course Objective (s):								
The purpose of learning this course is								
<ul style="list-style-type: none"> To develop C Programs using basic programming constructs To develop C programs using arrays and strings To develop applications in C using functions, pointers and structures To do input/output and file handling in C To use Interrupts in C Programming 								
Course Outcomes:								
At the end of this course, learners will be able to								
<ul style="list-style-type: none"> Develop C applications using Arrays and Strings. Develop C applications using Function and Pointers. Develop application using structure and union. Design a C application using Sequential and Random-access file Develop program using Interrupts & bit level operations 								
Unit I	CONSTRUCTS OF C							9
Lexical elements – Operators - data types – I/O statements – format specifications – control statements – decision making and looping.								
Unit II	ARRAYS & FUNCTIONS							9
Array handling in C – declaration – single dimensional arrays, two – dimensional arrays, multidimensional arrays, sorting and searching on single and two dimensional arrays. Array order reversal, array counting or histogramming, finding the maximum number in a set, removal of duplicates from an ordered array, partition an array, finding the kth-smallest element strings: Character array – string handling functions – manipulation on strings. Prototype – declaration - arguments (formal and actual) – return types – types of functions difference between built-in and user-defined functions.								
Unit III	POINTERS & STRUCTURES							9
Introduction to Pointers – Pointer Arithmetic – Pointer and Arrays – Returning Pointers. Declarations - nested structures- array of structures - structure to functions - unions- difference between structure and union – Command Line arguments								
Unit IV	FILES AND HANDLING SIGNALS AND PROCESSES							9
File Introduction – File Modes – Reading and Writing Files – File related functions – Reading and Writing Binary Files – Random Access Files. What is process & Threads? Types of process and threads Use of fork, vfork? Daemon process, Signals and how to handle all signals. Use of return and exit statements								
Unit V	INTERRUPT PROGRAMMING							9
Working with INT86 interrupts: Accessing Primary, Secondary Storage, Accessing Printers, Keyboards, Mouse and Monitors.								
TEXT BOOK(S)								
1.	Brian W Kernighan, The C programming language, Second Edition Pearson Education Asia, 2005							
2.	E.Balagurusamy, C Programming in ANSI C, Eighth Edition, Tata Mcgraw Hill, 2019							
3.	Yaswant Kanitkar, Let Us C, 16 th Edition, BPB Publication, 2015							
4.	Paul Deitel and Harvey Deitel, —C How to Program, Seventh edition, Pearson Publication 2015							



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REFERENCE(S)

1.	Pradip Dey, Manas Ghosh, —Fundamentals of Computing and Programming in C, Second Edition, Oxford University Press,2013.
2.	Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 2017.
3.	Ivor Horton, Instant C Programming, Wrox Press, 1995



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Department	INFORMATION TECHNOLOGY					R 2019	Semester II	ES
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ES203	FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	0	3	45	100	
Course Objective (s): The purpose of learning this course is to <ul style="list-style-type: none"> To know about the Electric circuit laws, single and three phase circuits and wiring To understand the Function of electrical machines. To explain the fundamentals of semiconductor and applications. To explain the principles of digital electronics To understand the various measuring instruments 								
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Apply the concept of electric circuit laws to analyze the electric circuits. Analyze the working principles of electrical machines. Understand the concepts of various electronic devices. Design the logic gates, Half and Full ladder. Choose appropriate instruments for electrical measurement for a specific application 								
Unit I	ELECTRICAL CIRCUITS						9	
Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase Balanced Circuits.								
Unit II	ELECTRICAL MECHANICS						9	
Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, single phase induction Motor								
Unit III	SEMICONDUCTOR DEVICES AND APPLICATIONS						9	
Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics								
Unit IV	DIGITAL ELECTRONICS						9	
Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip – Flops – Registers and Counters – A/D and D/A Conversion (single concepts)								
Unit V	MEASUREMENTS & INSTRUMENTATION						9	
Introduction to transducers - Classification of Transducers: Resistive, Inductive, Capacitive, Thermoelectric, piezoelectric, photoelectric, Hall effect and Mechanical - , Classification of instruments - Types of indicating Instruments – Oscilloscopes – three phase power measurements – instrument transformers (CT and PT)								

TEXT BOOK(S):	
1.	D P Kothari and I.J Nagarath, "Electrical Machines "Basic Electrical and Electronics Engineering", McGraw Hill Education(India) Private Limited, Third Reprint ,2016
2.	Thereja .B.L., "Fundamentals of Electrical Engineering and Electronics", S. Chand & Co. Ltd., 2008
3.	Leonard S Bobrow, "Foundations of Electrical Engineering", Oxford University Press, 2013
REFERENCE(S):	
1.	Del Toro, "Electrical Engineering Fundamentals", Pearson Education, New Delhi, 2007
2.	Allan S Moris, "Measurement and Instrumentation Principles", Elsevier, First Indian Edition, 2006
3.	Rajendra Prasad, "Fundamentals of Electrical Engineering", Prentice Hall of India, 2006



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Department	INFORMATION TECHNOLOGY				R 2019	Semester II	EEC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P			
19TPS02	SOFT SKILLS - II	1	0	1	1.5	30	100
Course Objective (s): The purpose of learning this course is <ul style="list-style-type: none"> To train the Students on Group Discussion Do's and Don'ts. To coach the students on Interview Skills. To develop Presentation Skills. To develop Business Etiquette. To teach importance of Ethics and Values. 							
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Participate Group Discussion with Confidence by knowing the tips and Tricks. Attend the interview with positive attitude by having Mock Interviews. Present them very well by enhancing their Presentation Skills. Behave very well in official gathering and Meeting by knowing Etiquette. Have good ethics and values in their Personal and Professional Life. 							
UNIT 1	GROUP DISCUSSION						6
GD skills – Understanding the objective and skills tested in a GD – General types of GDs – Roles in a GD – Do's & Don'ts – Mock GD & Feedback.							
UNIT 2	INTERVIEW SKILLS						6
Interview handling Skills – Self preparation checklist – Grooming tips: do's & don'ts – mock interview & feedback.							
UNIT 3	PRESENTATION SKILLS						6
Presentation Skills – Stages involved in an effective presentation – selection of topic, content, aids – Engaging the audience – Time management – Mock Presentations & Feedback.							
UNIT 4	Business Etiquette						6
Grooming etiquette – Telephone & E-mail etiquette – Dining etiquette – do's & Don'ts in a formal setting – how to impress.							
UNIT 5	Ethics						6
Ethics – Importance of Ethics and Values – Choices and Dilemmas faced – Discussions from news headlines.							
REFERENCES: <ol style="list-style-type: none"> The Seven Habits of Highly Effective People - Stephen R. Covey. All the books in the "Chicken Soup for the Soul" series. Man's search for meaning – Viktor Frankl The greatest miracle in the world – Og Mandino Goal - Eliyahu Goldratt. Working with Emotional Intelligence - David Goleman. Excel in English – Sundra Samuel, Samuel Publications Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillan India Ltd., Delhi. Essentials of Effective Communication, Ludlow and Panthon; Prentice Hall of India. Effective Presentation Skills (A Fifty-Minute Series Book) by Steve Mandel "Strategic interviewing" by Richard Camp, Mary E. Vielhaber and Jack L. Simonetti – Published by Wiley India Pvt. Ltd "Effective Group Discussion: Theory and Practice" by Gloria J. Galanes, Katherine Adams, John K. Brillhart 							



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Department	INFORMATION TECHNOLOGY					R 2019	Semester II	ES
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ES221	ENGINEERING DRAWING LABORATORY	0	0	4	2	60	100	

Course Objective (s): The purpose of learning this course is to

- To provide hands on training for fabrication of components using carpentry, sheet metal and welding equipment /tools.
- To gain the skills for making fitting joints and household pipe line connections using suitable tools.
- To develop the skills for preparing the green sand mould and to make simple household electrical connection
- To provide hands on training for dismantling and assembling of petrol engines, gear box and pumps.
- To develop the skills for making wood/sheet metal models using suitable tools

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

- Fabricate simple components using carpentry, sheet metal and welding equipment/tools
- Make fitting joints and household pipe line connections using suitable tools.
- Prepare green sand mould and make simple household electrical connections using suitable tools
- Dismantle and assemble petrol engines, gear box and pumps.
- Make simple models using wood and sheet metal.

List of Experiments

1. Forming of simple object in sheet metal using suitable tools (Example: Dust Pan / Soap Box)
2. Fabrication of a simple component using thin and thick plates. (Example: Book rack)
3. Making a simple component using carpentry power tools. (Example: Pen stand/Tool box/ Letter box.
4. Prepare a "V" (or) Half round (or) Square joint from the given mild Steel flat.
5. Construct a household pipe line connections using pipes, Tee joint, Four way joint, elbow, union, bend, Gate way and Taps (or) Construct a pipe connections of house application centrifugal pump using pipes, bend, gate valve, flanges and foot valve.
6. Prepare a green sand mould using solid pattern/split pattern.
7. Construct a domestic electrical wire connections using indicator, one way switch with calling bell, two way switch with lamp, one way switch with fan regulator and one way switch with socket.
8. Dismantling and assembly of Centrifugal Monoblock / Gear Pump / Gearbox.
9. Dismantling and assembly of two stroke and four stroke petrol engine.
10. Mini Project (Fabrication of Small Components).



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Department	INFORMATION TECHNOLOGY				R 2019	Semester II	ES
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ES214	ADVANCED C PROGRAMMING LABORATORY	0	0	4	2	60	100

Course Objective (s):

The purpose of learning this course is

- To develop C Programs using basic programming constructs
- To develop C programs using arrays and strings
- To develop applications in C using functions, pointers and structures
- To do input/output and file handling in C
- To handle signals and Process and access peripherals

Course Outcomes:

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

- Write a C Program using basic programming constructs.
- Develop C applications using Function and Pointers.
- Develop application using structure and union.
- Design a C application using Sequential and Random access file
- Develop a C program to interact with device

List of Experiments

1. Programs using only I/O Functions
2. Programs to study operators and datatypes
3. Programs based on control Structures
4. Programs using For and While loops
5. Programs using single dimensional arrays
6. Programs using multi Dimensional arrays
7. Programs on Sorting and searching using arrays
8. Programs based on string Manipulations
9. Programs based on User defined function programs
10. Programs using Functions with parameters
11. Program using storage classes
12. Programs to introduce pointers
13. Programs using structures
14. Programs using array of structures
15. Program to send and receive signals
16. Program to handle process
17. Program to display device details

TEXT BOOK(S)

- 1, Brian W Kernighan, The C programming language, second edition pearson Education Asia, 2005
- 2, E. Balagurusamy, C Programming, Second Edition, Tata Mcgraw Hill, 2009
- 3, Yaswant Kanitkar, Let Us C, 16th Edition, BPB Publication, 2015

REFERENCE(S)

1. Paul Deitel and Harvey Deitel, —C How to Program, Seventh edition, Pearson Publication.
2. Pradip Dey, Manas Ghosh, —Fundamentals of Computing and Programming in C, First Edition, Oxford University Press, 2009.
3. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.
4. Ivor Horton, Instant C Programming, Wrox Press, 1995


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Department	INFORMATION TECHNOLOGY					R 2019	Semester III	BS
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19BS305	DISCRETE MATHEMATICS	3	1	0	4	60	100	
Course Objective (s): The purpose of learning this course is to <ul style="list-style-type: none"> • Understand the notion of mathematical thinking, mathematical proofs and be able to apply them in problem solving. • Understand and use the terms Cardinality, finite, countably infinite and uncountably infinite, and determine which of these characteristics is associated with a given set. • Develop enough confidence to identify and model mathematical patterns in real world and offer appropriate solutions, using the skills learned in their interactive and supporting environment 								
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> • Formulate short proofs using the following methods: direct proof, indirect proof and proof by contradiction. • Use logical notation to define and reason about fundamental mathematical concepts such as sets, relations, functions and integers. • Demonstrate the ability to solve problems using counting techniques and combinatorics in the context of discrete probability. • Recognize properties of graphs and its applications • Solve Boolean functions and minimize circuits using gates. 								
Unit I	LOGIC AND PROOFS							12
Propositional Logic – Applications of Propositional logic-Propositional equivalences – Predicates and Quantifiers – Nested Quantifiers – Rules of inference – Introduction to proofs								
Unit II	COUNTING							12
The basics of counting – The pigeonhole principle – Permutations and combinations – Generating functions – Principle of Inclusion and Exclusion								
Unit III	RELATIONS							12
Relations and their properties – n-ary Relations and their Applications- Representing relations – Closures of relations-Equivalence relations- partial orderings.								
Unit IV	GRAPHS							12
Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths – shortest path problems – planar graphs – graph coloring.								
Unit V	BOOLEAN ALGEBRA							12
Boolean functions- representing Boolean functions – logic gates-minimization of circuits.								
REFERENCE(S):								
1.	Kennath H Rosan, "Discrete Mathematics and Its Applications" Seventh Edition, Tata McGraw Hill, 2012.							
2.	Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Fifth Edition, Pearson Education Asia, New Delhi, 2007.							
3.	Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, "Discrete Mathematical Structures", sixth edition, Pearson Education Pvt Ltd., New Delhi, 2010.							
4.	Koshy, "Discrete Mathematics with Applications", Elsevier Publications, 2008.							

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Department	INFORMATION TECHNOLOGY				R2019	Semester III	PC
Course Code	Course Name	Hours/Week			Credit	Total hours	Maximum Marks
		L	T	P	C		
19IT301	DATA STRUCTURES AND ALGORITHMS	3	0	0	3	45	100
Course Objective (s): The purpose of learning this course is to <ul style="list-style-type: none"> To learn about the basic operations of ADT and analyze the asymptotic notations To familiarize with linked lists and its operations To study about stack and queue operations To learn about tree data structures To study about graph and its algorithms 							
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Apply the fundamental knowledge of various Data structures for designing, implementing and evaluating time complexity for real time problems. Write programs to implement linked List to problems solutions Implement stack and queue operations for various applications Relate the knowledge of tree data structures implementations Apply the concept of graphs in real world problems. 							
Unit I	INTRODUCTION						9
Introduction to Data Structures – Abstract Data Types (ADT) – Array as ADT Representations - Algorithm Analysis - Asymptotic notations – Mathematical Analysis for Recurrence Relations- Recurrences for Fibonacci Series and Factorial – Searching: Sequential (linear) search and Binary Search							
Unit II	LINKED LIST						9
Linked List: Representation – Singly Linked List - Doubly Linked List - Circular Linked List – All Operations (insertion, deletion, display, updation)							
Unit III	STACK & QUEUE						9
Stack ADT representations – Operations - Polish notations – Application of Stack : Checking of Balanced Paranthesis, Conversion of infix to postfix, Evaluation of Postfix Expressions–Circular Queue – Dequeue – Priority Queue-Application of Queues: Addition of two polynomials							
Unit IV	TREES						9
Binary Trees: representation – Tree Traversal algorithm- Expression Trees - Binary Search Tree – search – insertion – deletion – Find Min & Max- AVL Trees – search – insertion – deletion – Splay Trees							
Unit V	GRAPHS						9
Introduction – Terminology – Graph Representation-Operations on Graphs - Traversing : Breadth first search- Depth first search – Topological sort - Shortest-path algorithms (Dijkstra Algorithm) - Minimum spanning tree – Prim's and Kruskal's algorithms							
TEXT BOOK(S) 1. Reema Thareja, "Data Structures Using C", Second Edition, Oxford University Press, 2011 2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 1997							
REFERENCE(S) 1. Stephen G. Kochan, "Programming in C", 3rd edition, Pearson Education. 2. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education, 1983 3. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Second Edition, University Press, 2008							



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Department	INFORMATION TECHNOLOGY					R 2019	Semester III	ES
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ES302	DIGITAL ELECTRONICS	3	0	0	3	45	100	
Course Objective (s):								
The purpose of learning this course is								
<ul style="list-style-type: none"> • To design digital circuits using simplified Boolean functions • To analyze and design combinational circuits • To analyze and design synchronous and asynchronous sequential circuits • To understand Programmable Logic Devices • To write HDL code for combinational and sequential circuits 								
Course Outcomes:								
At the end of this course, learners will be able to								
<ul style="list-style-type: none"> • Simplify Boolean functions using KMap • Design and Analyze Combinational and Sequential Circuits • Implement designs using Programmable Logic Devices • Write HDL code for combinational and Sequential Circuits • Design Register, Counter and Memory 								
Unit I	BOOLEAN ALGEBRA AND LOGIC GATES						9	
Digital Systems, Binary Numbers, Number Conversions-Octal and Hexadecimal Numbers; Complements, Signed Binary Numbers, Introduction to Boolean Algebra and Logic Gates – Boolean functions - Canonical and Standard Forms-Digital Logic gates – Digital Integrated Circuits-Introduction, Special Characteristics, Different Logic Families								
Unit II	GATE LEVEL MINIMIZATION						9	
Introduction, The Map Method, Four Variable Map, Five Variable Map, Product of Sums Simplification, Don't Care Conditions, NAND and NOR implementation, Exclusive –OR Function,								
Unit III	COMBINATIONAL LOGIC						9	
Combinational circuits- Analysis and Design Procedure- Binary Adder- Subtractor- Decimal Adder – Binary Multiplier – Magnitude Comparator – Decoders- Encoders- Multiplexers-								
Unit IV	SYNCHRONOUS AND ASYNCHRONOUS SEQUENTIAL LOGIC						9	
Sequential circuits- Latches – Flip flops – Analysis of Clocked Sequential Circuits – State Reduction and Assignment- Design Procedure. Asynchronous Circuits- Analysis Procedure- Circuits with Latches – Reduction of State Flow Tables – Race Free State Assignment – Hazards- Design Example.								
Unit V	REGISTERS, COUNTERS AND MEMORY						9	
Registers, Shift Registers, Ripple Counters, Synchronous Counters, Random access memory, Memory Decoding, Error Detection and correction, Read only Memory, Programmable Logic Array, Programmable Array Logic								
TEXT BOOK(S)								
1.	Malvino, Paul Albert , Leach, Donald P, Gautam Saha: Digital Principles And Applications, TMH 8th Edition, 2014.							
2.	Morris Mano and Michael D. Ciletti, "Digital Design", 6 th Edition, Pearson Education, 2018							
REFERENCE(S)								
1.	.Bartee, Thomas C: Digital Computer Fundamentals, 4th Edition, TMH.2016.							
2.	Floyd, Thomas L: Digital Computer Fundamentals, 11th Edition, Pearson International. 2017.							


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Department	INFORMATION TECHNOLOGY					R 2019	Semester III	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19CS302	COMPUTER ARCHITECTURE	3	0	0	3	45	100	
Course Objective (s):								
The purpose of learning this course is								
<ul style="list-style-type: none"> To understand the basic structure and operation of a digital computer. To understand the operation of the arithmetic unit. To know in detail the different types of control and the concept of pipelining. To know the hierarchical memory system including cache memory and virtual memory. To know the different ways of communicating with I/O devices and standard I/O interfaces. 								
Course Outcomes:								
At the end of this course, learners will be able to								
<ul style="list-style-type: none"> Design of a pipelined CPU and cache hierarchy. Analyse and evaluate CPU and memory hierarchy performance. Design the trade-offs in modern CPU including issues affecting superscalar and dynamically scheduled architectures. Design hardware of multiprocessors including cache coherence and synchronization. Design a complex simulation tool to study various micro architectural features. 								
Unit I	BASIC STRUCTURE OF COMPUTERS							9
Functional units - Basic operational concepts - Bus structures - Performance and metrics - Instructions and instruction sequencing - Hardware - Software Interface - Instruction set architecture - Addressing modes – RISC - CISC								
Unit II	ARITHMETIC OPERATIONS							9
Arithmetic Operations - Addition and subtraction of signed numbers - Design of fast adders - Multiplication of positive numbers - Signed operand multiplication and fast multiplication - Integer division - Floating point and fixed point operations								
Unit III	BASIC PROCESSING UNIT AND PIPELINING							9
Fundamental concepts - Execution of a complete instruction - Multiple bus organization - Hardwired control - Micro programmed control - Pipelining : Basic concepts - Data hazards - Instruction hazards - Data path and control considerations - Performance considerations - Exception handling - ILP – Hardware and Software approaches.								
Unit IV	MEMORY SYSTEM							9
Basic concepts - Semiconductor RAM - ROM - Speed - Size and cost - Cache memories - Improving cache performance - Virtual memory - Memory management requirements - Associative memories - Secondary storage devices								
Unit V	I/O ORGANIZATION							9
Accessing I/O devices - Programmed Input/output Interrupts - Direct Memory Access - Buses - Interface circuits - Standard I/O Interfaces (PCI, SCSI, and USB), IOP - CPU Communication.								
TEXT BOOK(S)								
1.	William Stallings, —Computer Organization and Architecture – Designing for Performance, 10th Edition, Pearson Education, 2016.							
2.	John P. Hayes, —Computer Architecture and Organization, 3rd Edition, Tata McGraw Hill, 2017.							
REFERENCE(S)								
1.	Carl Hamacher, Zvonko Vranesic and Safwat Zaky, —Computer Organization and Embedded Systems, 6th Edition, Tata McGraw Hill, 2017							
2.	David A. Patterson and John L. Hennessy, —Computer Organization and Design: The Hardware/Software interface, 3rd Edition, Elsevier, 2005.							
3.	V.P. Heuring, H.F. Jordan, —Computer Systems Design and Architecture, 2nd Edition, Pearson Education, 2008.							


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Department	INFORMATION TECHNOLOGY				R 2019	Semester III	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19IT304	DATABASE MANAGEMENT SYSTEM	3	0	0	3	45	100
Course Objective (s): The purpose of learning this course isto							
<ul style="list-style-type: none"> • Understand the fundamentals of DBMSArchitecture. • Learn data modeling using the entity-relationship and developing databasedesigns. • Understand the use of Structured Query Language (SQL) and learn SQLsyntax. • Apply normalization techniques to normalize thedatabase • Understand the needs of database processing and learn techniques for controlling the consequences of concurrent dataaccess. 							
Course Outcomes: At the end of this course, learners will be able to							
<ul style="list-style-type: none"> • Describe the fundamental elements of relational database managementsystems • Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL. • Design ER-models to represent simple database applicationscenarios • Compare and contrast various transaction processing and concurrency control techniques and recoveryprocedures • Familiar with basic database storage structures and accesstechniques 							
Unit I	INTRODUCTION						9
History and motivation for database systems; components of database systems; DBMS functions; database architecture and data independence.							
Unit II	DATA MODELING						9
Data modeling; conceptual models; object -oriented model; relational data model.; Database query languages: Overview of database languages; SQL; query optimization; 4th-generation environments; embedding nonprocedural queries in a procedural language; introduction to Object Query Language.							
Unit III	RELATIONAL DATABASES						9
Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping; Mapping conceptual schema to a relational schema; entity and referential integrity; relational algebra and relational calculus; Relational database design: Database design; functional dependency; normal forms; multi valued dependency; join dependency; representation theory.							
Unit IV	TRANSACTION PROCESSING						9
Transactions; failure and recovery; concurrency control							
Unit V	PHYSICAL DATABASE DESIGN						9
Storage and file structure; indexed files; hashed files; b -trees; files with dense index; files with variable length records; database efficiency and tuning. NoSQL-MongoDB-Introduction to Data Mining and Data Warehousing							
TEXT BOOK(S)							
1.	A. Silberschatz, H. F. Korth & S. Sudershan, Database system concepts, McGraw Hill, 6th Edition 2010.						
2.	C. J. Date, An introduction to database systems, Addison Wesley, 8th Edition, 2003.						
REFERENCE(S)							
1.	R. Elmasri & S. B. Navathe, Fundamentals of database systems, Addison Wesley, 6th Edition, 2011.						
2.	H. Garcia et al., Database system implementation, Prentice Hall, 2000						



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Department	INFORMATION TECHNOLOGY				R 2019	Semester III	EEC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19TPS03	QUANTITATIVE APTITUDE AND LOGICAL REASONING - I	2	0	0	0	30	100
Course Objective (s): <ul style="list-style-type: none"> To crack aptitude assessment by using speed math concepts. To solve problems using fast track method by learning simplification and numbers. To learn the basic of ratio and proportion and mixture concepts. To calculate different ways of solving problems on average and ages. To learn the logical skills by analyzing the objects. 							
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Solve the question with speed and accuracy. Crack the quantitative aptitude questions by using simplification and numbers system. Solve most of the aptitude topics by knowing ratio and proportion topics with allegation. Solve the problems on average and ages by using logical way of approach. Develop their logical thinking. 							
UNIT 1	SPEED MATHS AND NUMBER SYSTEMS						6
SPEED MATHS: Square and square roots – Square for numbers from 31 to 50. Finding squares of numbers between 81 to 100. Cubes and cubes roots. NUMBER SYSTEMS: Numbers and types of Numbers – Properties of Numbers – Face value and place value - Divisibility rules – Concept on unit digit and remainder theorem.							
UNIT 2	SIMPLIFICATIONS & PROBLEMS ON NUMBERS						6
SIMPLIFICATIONS: BODMAS rule – Application of algebraic formulae – Simplification of decimal fraction & mixed fraction – Continued fraction and its simplification – Recurring decimals. PROBLEMS ON NUMBERS: Set of numbers – Assume the unknown numbers and form equations							
UNIT 3	RATIO & PROPORTION , ALLIGATIONS & MIXTURE						6
.RATIO AND PROPORTION: Ratio between two or more persons – Miscellaneous problems. ALLIGATIONS ANS MIXTURES: Definition – Allegation rule – Mean value (or cost price) of the mixture – Six golden rules to solve problems on mixture – Removal among the quantities more than two.							
UNIT 4	AVERAGES & PROBLEM ON AGES						6
AVERAGES: Average from total – Total from the average – Miscellaneous problems. PROBLEMS ON AGES: Ages - Persons in Past - Present - Future. Miscellaneous problem.							
UNIT 5	ANALOGY & MIRROR & WATER IMAGES						6
ANALOGY: Study and topic relationship – Worker and tool relationship – Tool and action relationship – Work and working place – Worker and product – Product and raw materials – Instrument and measurement – Quantity and unit – Animals and young ones – Male and female. MIRROR IMAGES AND WATER IMAGES: Letter inverted – Object inverted.							
REFERENCES: <ol style="list-style-type: none"> Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-Hill Publishing Company Ltd, 2012 Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012. R.V.Praveen, "Quantitative Aptitude and Reasoning" Third Edition, PHI Learning, 2016. Dr.R S Aggarwal, Quantitative Aptitude, Revised and Enlarged Edition, S.Chand Publishing Company Ltd, 2017. Arun Sharma "How to Prepare for Quantitative Aptitude" Eight Edition, McGraw Hill Education, 2018. "Reasoning and Aptitude" for GATE and ESE Prelims, Made Easy Publication, 2020. 							



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Department	INFORMATION TECHNOLOGY					R 2019	Semester III	MC
Course Code	Course Name	Hours /Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19MC301	INDIAN CONSTITUTION	2	0	0	0	30	100	
<p>Course Objective (s): The purpose of learning this course is</p> <ul style="list-style-type: none"> To Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indiannationalism. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the IndianConstitution. 								
<p>Course Outcomes: At the end of this course, learners will be able to:</p> <ul style="list-style-type: none"> Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indianpolitics. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution inIndia. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the IndianConstitution. Discuss the passage of the Hindu Code Bill of1956. 								
Unit I	HISTORY OF MAKING OF INDIAN CONSTITUTION						5	
History of Indian Constitution - Drafting Committee, (Composition & Working)								
Unit II	PHILOSOPHY OF THE INDIAN CONSTITUTION						5	
Preamble - Salient Features								
Unit III	CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES						5	
Fundamental Rights - Right to Equality - Right to Freedom - Right against Exploitation -Right to Freedom of Religion - Cultural and Educational Rights - Right to Constitutional Remedies - Directive Principles of State Policy - Fundamental Duties.								
Unit IV	ORGANS OF GOVERNANCE						5	
Parliament - Composition - Qualifications and Disqualifications - Powers and Functions Executive - President - Governor - Council of Ministers - Judiciary, Appointment and Transfer of Judges, Qualifications - Powers and Functions.								
Unit V	LOCAL ADMINISTRATION						5	
District's Administration head: Role and Importance, - Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation - Pachayati raj: Introduction, PRI: ZilaPachayat - Elected officials and their roles, CEO ZilaPachayat: Position and role- Block level: Organizational Hierarchy (Different departments) -Village level: Role of Elected and Appointed officials - Importance of grass root democracy.								
Unit VI	ELECTION COMMISSION						5	
Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women								
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.								



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Department	INFORMATION TECHNOLOGY					R 2019	Semester III	ES
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ES308	DIGITAL ELECTRONICS LABORATORY	0	0	4	2	60	100	

Course Objective (s):

The purpose of learning this course is to

- Familiarize students with digital ICs,
- Understand the building blocks of digital circuits
- Set up Adder and Subtractor circuits
- Provide students the opportunity to set up Combinational Circuits
- Provide students the opportunity to set up sequential Circuits

Course Outcomes:

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

- Study and Test Logic Gates
- Implement Logic Circuits
- Design and Implement Adder and Subtractor
- Design and Implement Combinational Circuits
- Design and Implement Sequential Logic Circuit

List of Experiments

Study of Logic Gates.

- Logic gates using discrete components.
- Verification of truth table for AND, OR, NOT, NAND, NOR and XOR gates.
- Realization of NAND and NOR gates

Implementation of Logic Circuits.

- Verification of Boolean laws.
- Verification of DeMorgan's law

Adder and Subtractor

- Implementation of Half-Adder and Full-Adder
- Implementation of Half-Subtractor and Full Subtractor

Combinational Circuit Design

- Design of Decoder and Encoder
- Design of Code Converter.
- Design of multiplexers and demultiplexers.

Sequential Circuit Design

- Implementation of Shift registers, Serial Transfer.
- Ring Counter, 4-bit Binary Counter, BCD Counter.

TEXT BOOK(S)

- Malvino, Paul Albert, Leach, Donald P, Gautam Saha: Digital Principles And Applications, TMH 8th Edition, 2014.
- Morris Mano and Michael D. Ciletti, "Digital Design", 6th Edition, Pearson Education, 2018

REFERENCE(S)

- Bartee, Thomas C: Digital Computer Fundamentals, 4th Edition, TMH. 2016.
- Floyd, Thomas L: Digital Computer Fundamentals, 11th Edition, Pearson International. 2017.



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Department	INFORMATION TECHNOLOGY				R 2019	Semester III	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19IT305	DBMS LABORATORY	0	0	4	2	60	100

Course Objective (s):

The purpose of learning this course is

- To learn the fundamentals of data models to conceptualize and depict a database system using ERdiagram.
- To understand the relational database implantation using SQL with effective relational database design concepts
- To know the fundamental concepts of transaction processing- concurrency control techniques and recoveryprocedure.
- Tounderstandtheinternalstoragestructuresusingdifferentfileandindexingtechniqueswhich will help in physical DB design along with Query optimization techniques.

Course Outcomes:

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

- Use the Relational model, ERdiagrams.
- Familiarize to use SQL commands to manage thedatabase
- Use constraints in databasedesign
- Apply proceduralextensions
- Apply concurrency control and recovery mechanisms for practicalproblems.
- Design effective Databases for enterpriseapplications

List of Experiments

- 1 Conceptual Database design usingE-RDIAGRAM.
- 2 Implementation of SQL commands DDL, DML, DCL and TCL
- 3 Queries to demonstrate implementation of IntegrityConstraints
- 4 Practice of In builtfunctions
- 5 Implementation of Join operation and Nested Queries, Practicing set operators in SQL queries
- 6 Implementation of virtual tables using Views
- 7 Practice of Procedural extensions(Procedure, Function, Cursors, Triggers)
- 8 Application Development using front end tools
 - a. Inventory ControlSystem
 - b. Railway ReservationSystem
 - c. Bank ManagementSystem
 - d. Payroll ProcessingSystem
 - e. Hotel ManagementSystem
 - f. Project Management System
 - g. Student InformationSystem
- 9 Study ofMongoDB



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TEXT BOOK(S)	
1.	A. Silberschatz, H. F. Korth & S. Sudershan, Database system concepts, McGraw Hill, 6th Edition 2010.
2.	C. J. Date, An introduction to database systems, Addison Wesley, 8th Edition, 2003.
REFERENCE(S)	
1.	R. Elmasri & S. B. Navathe, Fundamentals of database systems, Addison Wesley, 6th Edition, 2011.
2.	H. Garcia et al., Database system implementation, Prentice Hall, 2000



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Department	INFORMATION TECHNOLOGY	R 2019			Semester III			PC
Course Code	Course Name	Hours / Week			Credits	Total Hours	Maximum Marks	
		L	T	P	C			
19IT306	DATA STRUCTURES & ALGORITHMS LABORATORY	0	0	4	2	60	100	
Course Objective (s): The purpose of learning this course is to <ul style="list-style-type: none"> To implement linear and non-linear datastructures To demonstrate the various sortingtechniques To understand the different operations of searchtrees To implement graph traversalalgorithms To get familiarized to sorting and searchingalgorithms 								
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Write routines to demonstrate linear and non-linear data structureoperations Suggest appropriate linear / non-linear data structure operations for solving a givenproblem Appropriately use the Tree ADT operations for a givenproblem Suggest functions to implement graphical concepts for real lifescenarios. Demonstrate searching and sortingalgorithms. 								
List of Experiments <ol style="list-style-type: none"> Implementation of SearchingAlgorithms Implementation of sorting algorithms Implementation of ArrayADT Implementation of Stack ADT using Arrays and Linkedlist Implementation of Queue ADT using Arrays and Linkedlist Implementation of Doubly EndedQueue Applications of Stack andQueue Implementation of Singly and Doubly Linked Lists Implementation of TreeTraversals Implementation of Binary SearchTree Implementation of AVLTrees Implementation of GraphTraversals Implementation of Minimum SpanningTree 								
TEXT BOOK(S) <ol style="list-style-type: none"> Reema Thareja, "Data Structures Using C", Second Edition , Oxford University Press, 2011 Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education, 1983. 								
REFERENCE(S) <ol style="list-style-type: none"> Stephen G. Kochan, "Programming in C", 3rd edition, Pearson Education. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 1997. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Second Edition, University Press, 2008 								



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Department	INFORMATION TECHNOLOGY					R 2019	Semester IV	BS
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19BS401	PROBABILITY AND STATISTICS	3	1	0	4	60	100	
Course Objective (s): The purpose of learning this course is to <ul style="list-style-type: none"> Understand the basic concepts of probability and the distributions with characteristics Understand the basic concepts of random variables Understand the basic concepts of hypothetical testing of samples from a population Summarize and apply the methodologies for the data analysis using statistical notions. Develop enough confidence to identify and model mathematical patterns in real world and offer appropriate solutions, using the skills learned in their interactive and supporting environment. 								
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Demonstrate and apply the basic probability axioms and concepts in their core areas. Apply the concepts of probability distributions in an appropriate place of science and Engineering.. Apply basic statistical inference techniques, including confidence intervals, hypothesis testing to science/engineering problems. Design an experiment for an appropriate situation using ANOVA technique. Correlate and predict the valid outcome of a real time problem 								
Unit I	PROBABILITY AND RANDOM VARIABLE						12	
Probability - Axioms of probability - Conditional probability - Total probability - Baye's theorem- Random variable - Probability mass function - Probability density function - Properties – Moment generating functions.								
Unit II	PROBABILITY DISTRIBUTIONS						12	
Moment generating functions of probability distributions- Concept and applications of standard probability distributions: Binomial- Poisson- Uniform -Exponential –Normal- Weibull distributions.								
Unit III	TESTING OF HYPOTHESIS						12	
Sampling distributions – Estimation of parameters – Statistical hypothesis – Large sample test based on Normal distribution for single mean and difference of means -Tests based on t, Chisquare and F distributions for mean, variance and proportion – Contingency table (test for independent) – Goodness of fit.								
Unit IV	DESIGN OF EXPERIMENTS						12	
One way and Two way classifications – Completely randomized design – Randomized block design – Latin square design								
Unit V	CORRELATION AND REGRESSION						12	
Correlation –Multiple correlation-Regression-Multiple regression-Linear fit-Quadratic fit								
REFERENCE(S):								
1.	Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 9th Edition, 2015.							
2.	Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 9th Edition, 2011.							
3.	Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 4 th Edition, Elsevier, 2009.							
4.	Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum"s Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 2009.							

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Department	INFORMATION TECHNOLOGY					R 2019	Semester IV	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19IT401	OBJECT ORIENTED PROGRAMMING	3	0	0	3	45	100	
Course Objective (s):								
The purpose of learning this course isto								
<ul style="list-style-type: none"> Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methodsetc. Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handlingmechanisms. Understand the principles of inheritance, packages and interfaces. Understand the basics of Exception Handling &Multithreading Know how to handleevents 								
Course Outcomes:								
At the end of this course, learners will be able to:								
<ul style="list-style-type: none"> Write Java application programs using OOP principles and proper program structuring Demonstrate the concepts of Packages and inheritance Write Java programs to implement error handling techniques using exception handling Develop application using multithreading Write a event based javaprogram 								
Unit I	INTRODUCTION TO JAVA						9	
Basics of Java programming, Byte Code, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays – One and Multidimensional								
Unit II	OBJECT AND CLASSES						9	
Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, StringBuffer, File, this reference, static in java								
Unit III	INHERITANCE AND PACKAGES						9	
Inheritance in java, Super and sub class, Type of inheritance, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Inheriting interface, Package in java, Util package								
Unit IV	THREADS AND EXCEPTION HANDLING						9	
Thread - Thread life cycle and methods, Thread Creation Methods, Multi threading - Thread synchronization, Exception handling with try-catch-finally – Nested try-catch – User defined Exception								
Unit V	GUI PROGRAMMING						9	
Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: FlowLayout, BorderLayout, GridLayout, GUI components like Buttons, CheckBoxes, RadioButtons, Labels, Text Fields, Text Areas, Lists, Scroll Bars, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing.								
TEXT BOOK(S)								
1.	The Complete Reference, Java (11th Edition), Herbert Schild, TMH							
2.	Core Java Volume-I Fundamentals, Eight Edition, Horstmann & Cornell, Pearson Education							
REFERENCE(S)								
1.	E. Balagurusamy, Java Programming with premier, second edition, Tata Mcgraw Hill, 2016..							
2.	KEN ARNOLD, Java Programming Language, Addison Wesley, 2000							
3.	John R Hubbard, Programming with Java, Tata Mcgraw Hill, 1998							


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Department	INFORMATION TECHNOLOGY				R 2019	Semester IV	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19CS402	SOFTWARE ENGINEERING	3	0	0	3	45	100

Course Objective (s):

The purpose of learning this course is

- To know the fundamentals of project management activities.
- To design software using models.
- To gather knowledge on various software testing, maintenance methods
- To develop an efficient software system through good group cohesiveness.
- To verify the quality of software products

Course Outcomes:

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

- Analyze a problem, identify and define the computing requirements appropriate to its solution.
- Design, implement and evaluate a system / computer based system process, component or program to meet desired needs
- Apply design and development principles in the construction of software systems.
- Apply testing methods for the software products
- improve the product by checking the quality of the software products

Unit I | FUNDAMENTALS OF SE AND REQUIREMENT ENGINEERING | 9

Software Engineering Fundamentals; Software processes: Software life-cycle and process models; Process assessment models; Overview of Project Management activities; Software requirements and specifications: Requirements elicitation; Requirements analysis modeling techniques; Functional and nonfunctional requirements; User requirements, System requirements, requirement validation and software requirement specification document. Prototyping - Basic concepts of formal specification techniques

Unit II | SOFTWARE DESIGN | 9

Fundamental design concepts and principles; Design characteristics; System Models - Context, Behavioral, Data and, Object models, Architectural design- System structuring, Control models; Structured design; Object-oriented analysis and design; User interface design; Design for reuse; Design patterns;

Unit III | SOFTWARE VALIDATION AND MAINTENANCE | 9

Software validation: Validation planning; Testing fundamentals, including test plan creation and test case generation; Black-box and white-box testing techniques; Unit, integration, validation, and system testing; Object-oriented testing; Inspections. Software evolution: Software maintenance; Characteristics of maintainable software; Reengineering; Legacy systems; Software reuse.

Unit IV | SOFTWARE PROJECT MANAGEMENT | 9

Team management – Team processes, Team organization and decision -making, Roles and responsibilities in a software team, Role identification and assignment, Project tracking, Team problem resolution; Project planning and scheduling; Software measurement and estimation techniques; Risk analysis and management; Software quality assurance; Software configuration management;.

Unit V | SOFTWARE QUALITY PROCESS IMPROVEMENT | 9

Overview of Quality management and Process Improvement; Overview of SEI -CMM, ISO 9000, CMMI, PCMM, TQM and Six Sigma; overview of CASE tools. Software tools and environments: Programming environments; Project management tools; Requirements analysis and design modeling tools; testing tools; Configuration management tools;

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TEXT BOOK(S)	
1.	R. S. Pressman, Software Engineering, a practitioner's approach, McGraw Hill, 7th Edition, 2010.
2.	Ian Sommerville, "Software Engineering", 9th Edition, Addison- Wesley, 2011
REFERENCE(S)	
1.	Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 2010.
2.	Kelkar S.A., "Software Engineering", Prentice Hall of India Pvt Ltd, 2007.
3.	Stephen R. Schach, "Software Engineering", Tata McGraw-Hill Publishing Company Limited, 2007.




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Department	NAME OF THE DEPARTMENT					R 2019	Semester IV	HS
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19HS402	UNIVERSAL HUMAN VALUES 2 : UNDERSTANDING HARMONY	2	1	0	3	60	100	
<p>Course Objective (s): The purpose of learning this course is to</p> <ul style="list-style-type: none"> To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature 								
<p>Salient Features of the Course: The salient features this course is to</p> <ul style="list-style-type: none"> It presents a universal approach to value education by developing the right understanding of reality (i.e. a worldview of the reality "as it is") through the process of self-exploration. The whole course is presented in the form of a dialogue whereby a set of proposals about various aspects of the reality are presented and the students are encouraged to self-explore the proposals by verifying them on the basis of their natural acceptance within oneself and validate experientially in living. The prime focus throughout the course is toward affecting a qualitative transformation in the life of the student rather than just a transfer of information. While introducing the holistic worldview and its implications, a critical appraisal of the prevailing notions is also made to enable the students discern the difference on their own right. 								
<p>Course Methodology: The methodology of this course is :</p> <ul style="list-style-type: none"> To explorational and thus universally adaptable. It involves a systematic and rational study of the human being vis-à-vis the rest of existence. The course is in the form of 28 lectures (discussions) and 14 practice sessions. It is free from any dogma or value prescriptions. It is a process of self-investigation and self-exploration, and not of giving sermons. Whatever is found as truth or reality is stated as a proposal and the students are facilitated to verify it in their own right, based on their Natural Acceptance and subsequent Experiential Validation – the whole existence is the lab and every activity is a source of reflection. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student in every activity, leading to continuous self evolution. This self-exploration also enables them to critically evaluate their pre-conditionings and present beliefs. 								
<p>Module 1 – Introduction to Value Education</p> <p>Lectures - Understanding Value Education - Self-exploration as the Process for Value Education - Continuous Happiness and Prosperity – the Basic Human Aspirations - Right Understanding, Relationship and Physical Facility - Happiness and Prosperity – Current Scenario - Method to Fulfill the Basic Human Aspirations</p> <p>Tutorials [Practice Session] - Sharing about Oneself - Exploring Human Consciousness - Exploring Natural Acceptance</p>							<p>6+3</p>	

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Module 2 – Harmony in the Human Being 6+3	
Lectures - Understanding Human being as the Co-existence of the Self and the Body - Distinguishing between the Needs of the Self and the Body – The Body as an Instrument of the Self - Understanding Harmony in the Self - Harmony of the Self with the Body - Programme to ensure self-regulation and Health	
Tutorials [Practice Session] - Exploring the difference of Needs of Self and Body - Exploring Sources of Imagination in the Self - Exploring Harmony of Self with the Body	
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	
Tutorials [Practice Session] - Exploring the Feeling of Trust - Exploring the Feeling of Respect - Exploring Systems to fulfil Human Goal	
Module 4 – Harmony in the Nature/Existence 4+2	
Lectures - Understanding Harmony in the Nature - Interconnectedness, self-regulation and Mutual Fulfilment 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 style="list-style-type: none"> • Students are expected to become more aware of themselves, and their surroundings (family, society, nature) • Students would become more responsible in life, and in handling problems with sustainable solutions. • Students become sensitive to their commitment towards what they have understood (human values, human relationship and human society). • Students would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction. • Students would have better critical ability . 	
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
2.	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
REFERENCE BOOK(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 Swaraj or Indian Home Rule - by Mohandas K. Gandhi


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SUGGESTED ASSESSMENT:

This is a compulsory credit course. The assessment is to provide a fair state of development of the student, so participation in classroom discussions, self-assessment, peer assessment etc. will be used in evaluation. **Example:**

Assessment by faculty mentor: 10 marks

Self-assessment: 10 marks & *Assessment by peers:* 10 marks

Socially relevant project/Group Activities/Assignments: 20 marks

Semester End Examination: 50 marks

The overall pass percentage is 40%. In case the student fails, he/she must repeat the course



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Department	INFORMATION TECHNOLOGY					R 2019	Semester IV	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19CS404	OPERATING SYSTEMS	3	0	0	3	45	100	
Course Objective (s): The purpose of learning this course is to <ul style="list-style-type: none"> Understand the basic concepts of operating system. Familiarise the OS services that assist system users Expose several aspects of OS design including: process, deadlocks and Filesystems. Learn CPU scheduling and Process synchronization, Learn the memory management, Secondary Management and File System Implementation. 								
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Understand the basic functionalities of OS and Process Implement CPU Scheduling and Process Synchronization Implement IPC & Deadlock Simulate disk scheduling and Memory management techniques. Identify File and Disk Storage Management with respect to different Storage Management 								
Unit I	INTRODUCTION TO OS AND PROCESS						9	
Overview of operating systems-Functionalities, characteristics and types of OS Hardware concepts -CPU states, I/O channels- Memory hierarchy microprogramming –Process concepts - operations on processes – process states -Concurrent processes – process control block -Process context Threads Concepts								
Unit II	CPU SCHEDULING AND SYNCHRONIZATION						9	
Job and processor scheduling – scheduling algorithms –Process hierarchies Problems of concurrent processes – critical sections – mutual exclusion – synchronization – Process cooperation, producer and consumer processes – Critical section problem Semaphores – init, wait, signal operations - Use of semaphores to implement mutex, process synchronization – Critical reg.								
Unit III	IPC AND DEADLOCK						9	
Inter process Communication (IPC) - Message Passing– Direct and Indirect Communication Deadlock: System model – Deadlock characteristics – Methods for handling deadlocks – Deadlock prevention Deadlock avoidance - Deadlock detection - Deadlock recovery.								
Unit IV	MEMORY MANAGEMENT						9	
Memory Management: Background - Swapping -Contiguous memory allocation – Paging - Segmentation - Segmentation with paging Virtual Memory: Background - Demand paging Process creation Page replacement -Allocation of frames –Thrashing								
Unit V	FILE AND SECONDARY STORAGE MANAGEMENT						9	
Secondary Storage Management – disk components - Disk scheduling – swap-space management File organization – blocking and buffering – file descriptor - Directory structure UNIX file structure Protection and Security - Access rights – access matrix								



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TEXT BOOK(S)	
1.	Abraham Silberschatz, Peter B.Galvin, Greg Gagne, Operating System Concepts. Ninth edition. Addison-Wesley(2015)
2.	William Stallings, "Operating Systems-Internals and Design Principles", Sixth Edition, Pearson Prentice Hall(2009).
REFERENCE(S)	
1.	Harvey M.Deitel, Paul J. Deitel, David R. Choffnes, "Operating systems", Third edition, Pearson Prentice Hall(2007).
2.	Andrew S. Tanenbaum, Albert S. Woodhull "Operating systems: design And implementation", Third Edition, Pearson Prentice Hall (2006)



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Department	INFORMATION TECHNOLOGY				R 2019	Semester IV	ECEC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P			
19TPS04	QUANTITATIVE APTITUDE AND LOGICAL REASONING - II	2	0	0	0	30	100
Course Objective (s):							
<ul style="list-style-type: none"> To learn the basic of partnership and chain rule in simplified way. To solve problems using fast track method by learning profit and loss with percentage. To teach the angle of elevation and depression. To know the relationship, direction concepts in easy way. To know about coding and decoding through logical way. 							
Course Outcomes: At the end of this course, learners will be able to:							
<ul style="list-style-type: none"> 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 issues and factors. Enhance the logical way of thinking by solving problems codes and rankings concepts. 							
UNIT 1	PARTNERSHIP & CHAIN RULE						6
PARTNERSHIP: Ratio of division of gains: Simple Partnership – Compound Partnership - Working and sleeping partners. CHAIN RULE: Definition – Direct proportion and Indirect proportion.							
UNIT 2	PROFIT & LOSS, PERCENTAGE						6
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 3	HEIGHT AND DISTANCE						6
HEIGHT AND DISTANCES: Line of sight – Angle of elevation – Angle of depression.							
UNIT 4	BLOOD RELATIONSHIP & DIRECTION SENSE TEST						6
BLOOD RELATIONSHIP: Analysis the gender relationship – Relationship diagram - Family tree. DIRECTION SENSE TEST: Distance between the starting and ending points - Sense the direction correctly.							
UNIT 5	LOGICAL SEQUENCE OF WORD, CODING AND DECODING, NUMBER RANKING & TIME SEQUENCE TEST						6
LOGICAL SEQUENCE OF WORDS: Sequence of occurrence of events – Sequence of objects in a class or 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.							
REFERENCES:							
<ol style="list-style-type: none"> Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-Hill Publishing Company Ltd, 2012 Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012. R.V.Praveen, "Quantitative Aptitude and Reasoning" Third Edition, PHI Learning, 2016. Dr. R S Aggarwal, Quantitative Aptitude, Revised and Enlarged Edition, S.Chand Publishing Company Ltd, 2017. Arun Sharma "How to Prepare for Quantitative Aptitude" Eight Edition, McGraw Hill Education, 2018 "Reasoning and Aptitude" for GATE and ESE Prelims, Made Easy Publication, 2020. 							



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Department	INFORMATION TECHNOLOGY				R 2019	Semester IV	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19IT403	OPERATING SYSTEM LABORATORY	0	0	4	2	60	100
Course Objective (s): The purpose of learning this course is <ul style="list-style-type: none"> • Understand the basics of OperatingSystem • To write shell scriptprogram • To understand the Scheduling, Page replacementalgorithms • To understand the various memory managementSchemes • To understand filemanagement • To understand the basic configuration ofLinux 							
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> • Install and configureOS • Write shellscripts • Implement CPU scheduling and Pagereplacements • Configuring Kernels &Virtualization • Develop Mini project to demonstrate basic OSfunctionalities 							
List of Experiments <ol style="list-style-type: none"> 1. Install and Configure Operating System (Linux andWindows) 2. Unix commands and shellprogramming 3. Inter-process Communication usingpipes 4. Simulation of CPU Schedulingalgorithms 5. Implementation of page replacementAlgorithms 6. Simulation of memory managementSchemes 7. Implementation of filemethods 8. Virtualization 9. KernelConfiguration 10. Mini Project : Develop Linux like OS with 10 Linux commandsdemonstration 							
TEXT BOOK(S)							
1.	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, 9 th Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2012.						
2.	Andrew S. Tanenbaum, Modern Operating System, Prentice Hall of India Pvt. Ltd, 2015.						
REFERENCE(S)							
1.	Richard Petersen, The Linux Complete Reference, Sixth Edition, Mcgraw Hill 2017						
2.	Richard Blum and Christine Bresnahan , Linux Command Line and Shell Scripting Bible, 3 rd Edition Wiley, 2015						



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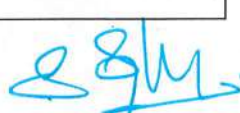
Department	INFORMATION TECHNOLOGY				R 2019	Semester IV	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19IT404	OBJECT ORIENTED PROGRAMMING LABORATORY	0	0	4	2	60	100
Course Objective (s): The purpose of learning this course is to <ul style="list-style-type: none"> Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms. Understand the principles of inheritance, packages and interfaces. Understand the basics of Exception Handling & Multithreading Know how to handle events 							
Course Outcomes: At the end of this course, learners will be able <ul style="list-style-type: none"> To write program using object classes Apply inheritance and Interface to write program Able to handle I/O with exception handling Develop multi threaded program To develop GUI with event handling 							
List of Experiments <ol style="list-style-type: none"> Programs using class and methods Program using Inner class and static Program to demonstrate file handling Program using single and multi level inheritance Inheritance via Interface and Abstract class Programs on Package implementations Applications using Generic collections Program using IO Streaming Create user defined exception Develop application to demonstrate multithreading Program using Applet Program to demonstrate event handling using AWT/Swing Program to demonstrate Layout Managers 							
TEXT BOOK(S)							
1.	Herbert Schildt, Java: The Complete Reference, 11th Edition, McGraw Hill Education, 2014						
2.	Cay S Horstmann, Gary Cornell, Core Java Volume - I Fundamentals, 9th Edition, Prentice Hall, 2013.						
REFERENCE(S)							
1.	Bert Bates, Kathy Sierra, Head First Java, 2nd Edition, OReilly Media, 2005.						
2.	Kathy Sierra, Bert Bates, OCA/OCP Java SE 7 Programmer I and II Study Guide, First edition, McGraw Hill Education, 2014.						



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Department	INFORMATION TECHNOLOGY					R 2019	Semester IV	EEC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19HS401	LANGUAGE SKILLS	0	0	2	0	30	100	
Course Objective (s): The purpose of learning this course is <ul style="list-style-type: none"> To involve the students in effective listening activities. To improve the oral communication skills in proper manner. To focus the effective reading of general and technical text. To enhance and comprehend the written text. To integrate LSRW skills. 								
Course Outcomes: At the end of this course, learners will be able to <ul style="list-style-type: none"> Understand the technical talks. Communicate to his peer group properly. Comprehend the general and technical text. Write the reports and job application in clear manner. Integrate LSRW skills. 								
Unit I	LISTENING							6
Listening and its importance –Listening strategies - Listen to a process information - give information, as part of a simple explanation - Being an active listener: giving verbal and non-verbal feedback - taking lecture notes								
Unit II	SPEAKING							6
Give personal information - ask for personal information - express ability - ask for clarification - pronunciation basics - pronunciation practice - conversation starters: Pep talk - stressing syllables and speaking clearly - summarizing academic readings and lectures								
Unit III	READING							6
Strategies for effective reading - Read and recognize different types of texts - Predicting content using photos and title - Read for details - Use of graphic organizers to review and aid comprehension - Understanding pronoun reference and use of connectors in a passage- speed reading techniques								
Unit IV	WRITING							6
Plan before writing - Develop a paragraph: topic sentence, supporting sentences, concluding sentence –Write a descriptive paragraph – Write a paragraph with reasons and examples - Write an opinion paragraph – E-mail writing - Types of essays- descriptive-narrative- issue-based-argumentative-analytical								
Unit V	INTEGRATION OF LSRW							6
Task based Instruction : watching a video –Listing, Sorting, ordering, comparing and analyzing the ideas – Reading a newspaper and creating topic based videos								
TEXT BOOK(S):								
1	Gramer F. Margot and Colin S. Ward Reading and Writing (Level 3) Oxford University Press: Oxford, 2011							
2	Brooks, Margret. Skills for Success. Listening and Speaking. Level 4 Oxford University Press, Oxford: 2011							
3	Richards, C. Jack. & David Bholke. Speak Now Level 3. Oxford University Press, Oxford: 2010							
REFERENCE(S):								
1.	Davis, Jason and Rhonda Liss. Effective Academic Writing (Level 3) Oxford University Press: Oxford, 2006.							
2.	E. Suresh Kumar and et al. Enriching Speaking and Writing Skills. Second Edition. Orient Black swan							
3.	Anderson, Kenneth et al. Study Speaking: A Course in Spoken English for Academic Purposes. United Kingdom: Cambridge University Press 1992.							


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Department	INFORMATION TECHNOLOGY				R 2019	Semester V	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19IT501	COMPUTER COMMUNICATION NETWORKS	3	0	0	3	45	100

Course Objective (s):

The purpose of learning this course is

- To study the concepts of data communications and functions of different layers of ISO/OSI reference architecture
- To understand the error detection and correction methods and types of LAN
- To study the concepts of sub netting and routing mechanisms.
- To understand the different types of protocols and network components.
- To study the application protocols and network security

Course Outcomes:

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

- Identify the protocols and services of Data link layer.
- Identify the protocols and functions associated with the transport layer services.
- Describe the layering architecture of computer networks and distinguish between the OSI reference model and TCP/IP protocol suite.
- Distinguish the basic network configurations and standards associated with each network.
- Construct a network model and determine the routing of packets using different routing algorithms.

Unit I	NETWORK MODELS	9
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Data Communications: Components, Representations, Data Flow, Networks: Physical Structures, Network Types: LAN, WAN, Switching, Internet. Protocol Layering: Scenarios, Principles, Logical Connections, TCP/IP Protocol Suite: Layered Architecture, Layers in TCP/IP suite, Description of layers, Encapsulation and Decapsulation, Addressing, Multiplexing and Demultiplexing, The OSI Model: OSI Versus TCP/IP

Unit II	DATA LINK LAYER & MAC	9
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Introduction: Nodes and Links, Services, Categories' of link, Sublayers, Link Layer addressing: Types of addresses, ARP. Data Link Control (DLC) services: Framing, Flow and Error Control, Data Link Layer Protocols: Simple Protocol, Stop and Wait protocol, Piggybacking. L1, L2. Random Access: ALOHA, CSMA, CSMA/CD, CSMA/CA. Controlled Access: Reservation, Polling, Token Passing.

Unit III	WIRED AND WIRELESS LAN	9
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Ethernet Protocol: IEEE802, Ethernet Evolution, Standard Ethernet: Characteristics, Addressing, Access Method, Efficiency, Implementation, Fast Ethernet: Access Method, Physical Layer, Gigabit Ethernet: MAC Sublayer, Physical Layer, 10 Gigabit Ethernet. L1, L2. Introduction: Architectural Comparison, Characteristics, IEEE 802.11: Architecture, MAC Sublayer, Addressing Mechanism, Physical Layer, Bluetooth: Architecture, Layers. Hubs, Switches, Membership, Configuration, Communication between Switches and Routers, Advantages.

Unit IV	NETWORK LAYER	9
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Introduction, Network Layer services: Packetizing, Routing and Forwarding, Other services, Packet Switching: Datagram Approach, Virtual Circuit Approach, IPV4 Addresses: Address Space, Classful Addressing, Classless Addressing, DHCP, Network Address Resolution, Forwarding of IP Packets: Based on destination Address and Label. L1, L2. Internet Protocol (IP): Datagram Format, Fragmentation, Options, Security of IPv4 Datagrams, ICMPv4: Messages, Debugging Tools, Mobile IP: Addressing, Agents, Three Phases, Inefficiency in Mobile IP.

Unit V	ROUTING AND TRANSPORT LAYER	9
Introduction, Routing Algorithms: Distance Vector Routing, Link State Routing, Path vector routing, Unicast Routing Protocol: Internet Structure, Routing Information Protocol, Open Shortest Path First, Border Gateway Protocol Version 4. L1, L2, L3. Introduction: Transport Layer Services, Connectionless and Connection oriented Protocols, Transport Layer Protocols: Simple protocol, Stop and wait protocol, Go-Back-N Protocol, Selective repeat protocol, User Datagram Protocol: User Datagram, UDP Services, UDP Applications, Transmission Control Protocol: TCP Services, TCP Features, Segment, Connection, State Transition diagram, Windows in TCP, Flow control, Error control, TCP congestion control. L1, L2		
TEXT BOOK(S)		
1.	Data Communications and Networking , Forouzan, 5th Edition, McGraw Hill, 2016 ISBN: 1-25-906475-3	
REFERENCE(S)		
1.	Computer Networks, James J Kurose, Keith W Ross, Pearson Education, 2013, ISBN: 0-273-76896-4	
2.	Introduction to Data Communication and Networking, Wayarles Tomasi, Pearson Education, 2007, ISBN:0130138282	



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Department	INFORMATION TECHNOLOGY					R 2019	Semester V	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19IT502	INTERNET PROGRAMMING	3	0	0	3	45	100	
Course Objective (s): The purpose of learning this course is to <ul style="list-style-type: none"> • Understand the basics of WWW and Webdesign • Learn HTML and CSSa • Learn javascripts • Understand PHP&MySQL • Learn to send and receive data usingXML&AJAX 								
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> • Understand the concepts of WWW including browser and HTTPprotocol. • Create webpages using the HTML andCSS • Use the JavaScript for client sidevalidation. • Develop dynamic pages using PHP &MySQL • Develop the modern Web applications using the XML andAJAX 								
Unit I	Introduction to WWW & WEB DESIGN						6	
WWW, Internet and IETF, W3C, HTTP Protocol: Request and Response, Web application architecture: Web browser and Web servers, Responsive web Design : Web design issues including Browser, Bandwidth and Cache, Display resolution, Look and Feel of the Website, Page Layout andlinking, User centric design, Sitemap, Planning and publishing website, Designing effective navigation								
Unit II	HTML & CSS						9	
HTML History, Structure of HTML Document – formatting tags and fonts, color, hyperlink, lists, tables, images, forms, Inclusion of Audio and Video, Meta tags, Character entities, frames and frame sets, Browser architecture and Website structure. Overview and features of HTML5. Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS								
Unit III	CLIENT SIDE PROGRAMMING						9	
Client side scripting advantages- Introduction to JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: Java script and objects, JavaScript own objects, the DOM and web browser environments, Manipulation using DOM, forms and validations, DHTML- Event handling in java script.								
Unit IV	PHP PROGRAMMING						12	
PHP : Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, Session Tracking and Cookies								

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Unit V	XML AND AJAX	9
Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Using XML with application. Transforming XML using XSL and XSLT. AJAX Architecture- Dynamic web page Creation using AJAX.		
TEXT BOOK(S)		
1.	Steven Holzner, PHP Complete Reference, Mcgraw Hill, 2014	
2.	Internet and World Wide Web How to program,P.J.Deitel&H.M.Deitel,Pearson,2017	
REFERENCE(S)		
1.	Developing Web Applications in PHP and AJAX, Harwani, McGraw Hill, 2017	
2.	Web Technology: Theory and Practice by M. Srinivasan Publisher: Pearson India,2017.	
3	Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India, 2014	

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Department	INFORMATION TECHNOLOGY				R 2019	Semester V	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19IT503	FORMAL LANGUAGES AND AUTOMATA THEORY	3	0	0	3	45	100
Course Objective (s): The purpose of learning this course is <ul style="list-style-type: none"> To have an understanding of Computational languages. To have a knowledge of regular languages and context free languages and its properties. To know the relation between regular language, context free language and corresponding recognizers. To study the concept of Turing machines. 							
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Understand the concepts of Finite Automata, Regular and Context free Languages Design the Context free grammar and Push down automata for a context free Language Apply the pumping lemma properties to Regular and Context Free Languages Design the Turing machine for a Language. Understand the various classes of problems 							
Unit I	AUTOMATA						9
Strings, Alphabet, Language, Operations, Finite State Machine, definitions, finite automation model, acceptance of strings and languages, on deterministic finite automation, deterministic finite automation, equivalence between NFA and DFA, Conversion of NFA into DFA, minimization of FSM, equivalence between two FSM's, Moore and Malay machines							
Unit II	REGULAR EXPRESSIONS						9
Regular sets, regular expressions, identity rules, manipulation of regular expressions, equivalence between RE and FA, inter conversion, Pumping lemma, Closure properties of regular sets (proofs not required), regular grammars, right linear and left linear grammars equivalence between regular linear grammar and FA, inter conversion between RE and RG.							
Unit III	CONTEXT FREE GRAMMARS						9
Context free Grammars, Derivation trees, Left Most Derivations, Right Most Derivations, Ambiguity in Context-Free Grammars, Specifications of Context Free Grammars, Normal Forms, Chomsky Normal Form (CNF), Greibach Normal Form (GNF), Pushdown automata (PDA) – Languages of a PDA - Equivalence of PDA's and CFG's.							
Unit IV	TURING MACHINE						9
Definitions and Examples- Computing Partial Functions with Turing Machines – Combining Turing Machines-Variations of Turing Machines with Multitape TMs-Nondeterministic Turing Machines-Universal Turing Machines-Models of Computations, Counter machine and the Church, Turing Thesis.							

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Unit V	CLASSES OF PROBLEMS	9
Chomsky hierarchy of languages, linear bounded automats and context sensitive language, Introduction to DCFL and DPDA,LR(O) Grammar, decidability of problems, Universal Turing Machine, undecidability of post's correspondence problem. Turing reducibility, definition of P and NP problems, NP complete and NP hard.		
TEXT BOOK(S)		
1.	J.E.Hopcroft, R.Motwani and J.D Ullman, —Introduction to Automata Theory, Languages and Computations, 3rd Edition, Pearson Education, 2011	
2.	J.Martin, —Introduction to Languages and the Theory of Computation, 3rd Edition, TMH, 2007.	
REFERENCE(S)		
3.	H.R.Lewis and C.H.Papadimitriou, —Elements of the theory of Computation, 2 nd Edition, Pearson Education/PHI, 2003	
4.	Micheal Sipser, —Theory and Computation, 7th Edition, Thomson Course Technology, 2008	

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Department	INFORMATION TECHNOLOGY				R 2019	Semester V	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19IT504	INTERNET PROGRAMMING LABORATORY	0	0	4	2	60	100

Course Objective (s): The purpose of learning this course is to

- Understand various Scripts like HTML, XML and JavaScript
- Study the various rich internet applications using Ajax
- Learn the server side programming using PHP
- Publishing content on the World Wide Web.
- Expose to the basic tools and applications used in Web publishing.

Course Outcomes:

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

- Build dynamic web pages using JavaScript (Client side programming).
- Build interactive web applications using HTML, DHTML and CSS
- Design dynamic web pages using AJAX, PHP and XML
- Implement the web authoring tools with the database design for web development
- Create XML documents and Schemas.

List of Experiments

1. Programs in java using servlets
2. Write programs in Java to create three-tier applications using JSP and Databases
 - i) for conducting on-line examination.
 - ii) For displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
3. Write programs in Java using Servlets:
 - i) To invoke servlets from HTML forms
 - ii) To invoke servlets from Applets
4. Create a web page with the following using HTML
 - i) To embed an image map in a webpage
 - ii) To fix the hotspots
 - iii) Show all the related information when the hot spots are clicked.
5. Create a web page with all types of Cascading stylesheets
6. Client Side Scripts for Validating Web Form Controls using DHTML
7. Write programs in Java to create applets incorporating the following features:
 Create a color palette with matrix of buttons Set background and foreground of the control text area by selecting a color from color palette. In order to select Foreground or background use check box control as radio buttons To set background images



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8. Programs using XML – Schema–XSLT/XSL
9. Programs usingAJAX
10. Consider a case where we have two web Services- an airline service and a travel agent and the travel agent is searching for an airline. Implement this scenario using Web Services andDatabase.

TEXT BOOK(S)

1.	HTML 5, Black Book, dreamtech Press, 2017
2.	InternetandWorldWideWebHowtoprogram,P.J.Deitel&H.M.Deitel,Pearson, 2017
3.	Developing Web Applications in PHP and AJAX, Harwani, McGraw Hill 2015

REFERENCE(S)

1.	Web Technology: Theory and Practice by M. Srinivasan Publisher: Pearson India, 2016
2.	Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India, 2017



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Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P			
19TPS05	QUANTITATIVE APTITUDE AND LOGICAL REASONING - III	2	0	0	0	30	100
Course Objective (s): <ul style="list-style-type: none"> To design to help people make sense of numerical data. To calculate the calendars and series in simplified way. To understand the concept of the interest amount in SI and CI. To know the procedure to deal with a situation and sufficient to determine the answer. To teach seating arrangements in rows or in small groups. 							
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken to solve Aptitude Questions. Solve the question based on calendar, odd man out and series by using shortcut methods. Calculate the interest by using shortcut methods instead of traditional methods. Induce their critical thinking by solving the syllogism and course of action. Analyze the conditions and do interpretation. 							
UNIT 1 DATA INTERPRETATION & CLOCKS							6
DATA INTERPRETATION: Tabulation – Bar graphs – Pie charts – Line graphs. CLOCKS: Definition – important points – Angular difference between two hands at different timings- Incorrect clock.							
UNIT 2 CALENDARS, ODDMAN OUT & SERIES							6
CALENDARS: Odd days – Leap year – Ordinary year – Counting of odd days – Day of the week. ODDMAN OUT & SERIES: Odd man out – Power series – Number series-Sequence of real numbers.							
UNIT 3 SIMPLE & COMPOUND INTEREST							6
SIMPLE INTEREST: Principal – Rate of interest – Number of years – Using formulae and shortcuts methods. COMPOUND INTEREST: Compounded Annually – Compounded Half-Yearly – Compounded Quarterly – Compounded annually – Rates are different for different years.							
UNIT 4 STATEMENT & COURSE OF ACTION, SYLLOGISM							6
STATEMENT AND COURSE OF ACTION: Courses of action - Decision taken - Improvement, Follow-up or further action in regard to the given statement. SYLLOGISM/ LOGICAL VENN DIAGRAMS: Relationship between the two things or not - Classification of propositions – Immediate deductive inference – Immediate deductive inference.							
UNIT 5 SEATING ARRANGEMENTS & DATA SUFFICIENCY							6
SEATING ARRANGEMENTS: Persons seating in the circular – Rectangular – Square. DATA SUFFICIENCY: Reasoning ability using a set of directions.							
REFERENCES: <ol style="list-style-type: none"> Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-Hill Publishing Company Ltd, 2012 Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012. R.V.Praveen, "Quantitative Aptitude and Reasoning" Third Edition, PHI Learning, 2016. Dr. R S Aggarwal, Quantitative Aptitude, Revised and Enlarged Edition, S.Chand Publishing Company Ltd, 2017. Arun Sharma "How to Prepare for Quantitative Aptitude" Eight Edition, McGraw Hill Education, 2018. "Reasoning and Aptitude" for GATE and ESE Prelims, Made Easy Publication, 2020. 							


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Department	INFORMATION TECHNOLOGY					R 2019	Semester V	EEC
Course Code	Course Name	Hours/ Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19HS504	PROFESSIONAL SKILLS FOR SOFTWARE ENGINEER	0	0	2	0	30	100	
Course Objective (s): <ul style="list-style-type: none"> To develop students' communicative competence in English with Listening skills. To improve their ability to communicate effectively in interviews. To enable the learners to fine-tune their comprehending level of different texts. To prepare the error-free documents. To strengthen their thinking level and update their knowledge for career growth. 								
Course Outcomes: At the end of this course, learners will be able to <ul style="list-style-type: none"> Develop listening skills to comprehend general / technical talks. Make effective presentations in group/pair and attend job interviews Understand various concepts by reading different texts. Enhance the writing skills to express the ideas of the learners. Strengthen their soft skills. 								
Unit I	LISTENING						6	
Formal and Informal conversation - Practicing Group discussion & Presenting Ideas, Listening interviews conversations, News, documentaries - Listening to Seminars, discussions from TV/ Radio/ Podcast								
Unit II	PUBLIC SPEAKING						6	
Introduction to Group Discussion – Guidelines to GD – GD Best Practices - Participating in group discussions - Understanding group dynamics - Different types of Interview format - answering questions - offering information - Mock interviews – Improving Body language (paralinguistic features) - Articulation of sounds - Intonation - Making effective presentations								
Unit III	ACADEMIC READING						6	
Reading different genres ranging from daily newspapers, technical articles, magazines and short stories - Predicting the content - Gap filling exercises - Sequencing the sentences								
Unit IV	WRITING SKILLS						6	
Writing Job applications - Resume preparation - E-mail content writing – Technical Content Presentation in web - Letters(formal & informal) - Memos - Reports - Interpreting the visual texts – Common Errors in English - Preparation of Essays								
Unit V	IT CAREER SKILLS						6	
Introduction to Employability and IT Career Skills - developing a long term career plan - making career changes - Time Management during interview and work - General awareness of Current Affairs - Managing changes - Stress management - Leadership traits - Team work - Intercultural communication - Creative and Critical thinking								
TEXT BOOK(S):								
1	E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015							
REFERENCE(S):								
1	Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015.							
2	Interact English Lab Manual for Undergraduate Students, Orient Blackswan: Hyderabad, 2016.							
3	Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014							
4	S. Hariharan et al. Soft Skills. MJP Publishers: Chennai, 2010							


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Department	INFORMATION TECHNOLOGY				R 2019	Semester V	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P			
19IT505	COMPUTER NETWORKING LABORATORY	0	0	4	2	60	100
Course Objective (s): The purpose of learning this course is to <ul style="list-style-type: none"> • Know the basic switch setup • Understand LAN and Router setup • Learn the configuration of Network and Ethernet address • Learn configuration of DHCP, Port and ACL • Understand the RIP Connectivity 							
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> • Understand basic network topology • Set up switches & Set up LAN and Router • Configure Network and Ethernet address • Configure DHCP, Port, RIP and ACL • Get Cisco CCNA Certification 							
List of Experiments <ol style="list-style-type: none"> 1. Network topology – study experiment 2. Types of Cables – study experiment 3. Basic switch setup & Configuring switch interfaces 4. VLAN and VTP configuration 5. Basic router setup 6. Prepare the Network, perform all the necessary basic configurations for your device. 7. Configure and Activate Serial and Ethernet Addresses and assign appropriate addresses to the device interfaces. 8. Configure the DHCP configurations 9. Configure the Port Security for the ports connected to the switches 10. Configure the access-list in routers 11. Check the Connectivity to all the devices inside your LAN 12. Configure RIP Routing on the Router and verify the Configurations & Connectivity 							
TEXT BOOK(S)							
1.	Computer Networks, James J Kurose, Keith W Ross, Pearson Education, 2013, ISBN: 0-273-76896-4						
2.	Computer Networks, Andrew S Tanenbaum, Pearson Education, Fifth Edition						



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Department	INFORMATION TECHNOLOGY					R 2019	Semester IV	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19IT506	COMMUNICATION ENGINEERING	3	0	0	3	45	100	
<p>Course Objective (s):</p> <p>The purpose of learning this course is</p> <ul style="list-style-type: none"> • Understand the basic concepts of communication and its types • Understand the concepts of pulse modulation • Learn the basics of Digital Modulation • Gain knowledge on various mobile communication technologies and their performances • Understand the process of satellite and optical fiber communication 								
<p>Course Outcomes:</p> <p>At the end of this course, learners will be able to:</p> <ul style="list-style-type: none"> • Identify different communication systems, their working principles and applications • Understand the pulse modulation techniques • Analyze the performance of various digital modulation techniques • Understand the basic concepts of Mobile communication technologies • Analyze spread spectrum modulation 								
Unit I	ANALOG COMMUNICATION							9
Elements of Communication systems - Basic principles of AM, FM and PM - Spectra – Power consideration - Receiver characteristics and detection of AM, FM and PM Systems performance.								
Unit II	PULSE MODULATION							9
Sampling process - Pulse Amplitude modulation - Pulse width modulation - Pulse position modulation Bandwidth Noise trade off - Quantization process - Pulse Code Modulation - Noise considerations in PCM systems - Time Division Multiplexing.								
Unit III	DIGITAL MODULATION							9
Introduction to pass band data transmission - Pass band transmission model - Coherent binary modulation techniques: BPSK, QPSK - Coherent Quadrature modulation techniques: QAM - Noncoherent binary modulation: BFSK, DPSK - performance of digital modulation systems based on probability of error, band width.								
Unit IV	MOBILE COMMUNICATION TECHNOLOGIES							9
Wireless Communication - Multiple access techniques in Mobile communication - TDMA, FDMA, CDMA, W-CDMA, OFDMA, GSM technologies - RAKE receiver for wireless communication using CDMA.								
Unit V	SPREAD SPECTRUM MODULATION							9
Pseudo noise Sequences - A Notion of spread spectrum - Direct sequence spread spectrum - signal space dimensionality and processing gain - Probability of error - Frequency hopping spread spectrum.								
TEXT BOOK(S)								
1.	Simon Haykin, Communication systems, John Wiley and Sons, 2013.							
2.	John Proakis, Massoud Salehi, Digital Communication, 5th Edition, McGraw-Hill, 2014.							
3.	Taub and Schilling, Principles of Communication systems, Tata McGraw Hill Publication, 2013.							
REFERENCE(S)								
1.	K Sam Shanmugam, Digital and Analog Communication Systems, John Wiley, 2008.							
2.	A B Carlson, Communication Systems, McGraw-Hill, 2009							

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Course Code	Course Name	Hours/Week			Credit C	Total Hours	Maximum Marks
		L	T	P			
19IT601	MACHINELEARNING	3	0	0	3	45	100
Course Objective(s):							
The purpose of learning this course is to							
<ul style="list-style-type: none"> • Introduce applications of machine learning and case studies • Provide an insight to different supervised learning techniques, merits and demerits • Enable the students to understand Graphical models and their applicability to real world problems • To explore discovering clusters in the given data • To study and evaluate dimensionality reduction for the given data 							
Course Outcomes:							
At the end of this course, learners will be able							
<ul style="list-style-type: none"> • Explore the acquired knowledge on recalling the applications of machine learning • Understand the concepts behind different types of learning and their appropriateness • Choose and apply appropriate learning technique for a given real world problem. • Analyze the observations for a given set of data. • Evaluate the effectiveness of different learning techniques for different kinds of data and applications 							
Unit I	INTRODUCTION TOMACHINELEARNING						9
What and Why?, Designing a learning system, Issues. Examples of Machine Learning Applications, Overview: Supervised Learning, Learning Associations, Classification, Regression, Unsupervised learning And Reinforcement Learning.							
Unit II	SUPERVISEDLEARNING						9
Generative Vs Discriminative Learning, Gaussian Mixture Models, Decision Tree Learning, Neural Networks, Support Vector Machines, Instance Based Learning, Ensemble Learning.							
Unit III	GRAPHICALMODELS						9
Bayesian Learning ,Markov Random Fields, Hidden Markov Model, Conditional Random Fields.							
Unit IV	REGRESSION						9
LinearRegression,LogisticRegression,OtherTypesofRegression,Overfitting,ModelSelection.							
Unit V	UNSUPERVISEDLEARNING						9
Discovering Clusters, Discovering Latent Factors, Discovering Graph Structure							
TEXTBOOK(S)							
1.	Ethem Alpaydin,— Introduction to Machine Learning3e (Adaptive Computation and Machine Learning Series)II, Third Edition,MIT Press,2014.						
2.	KevinP. Murphy, Machine Learning A Probabilistic Perspective,MIT Press,2012.						
REFERENCE(S)							
1.	Christopher Bishop.Pattern Recognition and MachineLearning.,Springer,2006.						
2.	Jason Bell,—Machine learning—Hands on for Developers and Technical Professionals II, First Edition,Wiley,2014						
3.	Stephen Marsland, —Machine Learning — An Algorithmic Perspectivell, SecondEdition,ChapmanandHall/CRCMachineLearningandPatternRecognitionSeries,2014.						



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Department	INFORMATION TECHNOLOGY					R2019	Semester VI	PC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19IT602	WIRELESS SENSOR NETWORKS	3	0	1	4	45	100	
Course Objective(s):								
The purpose of learning this course is								
<ul style="list-style-type: none"> To understand the state of the art in wireless sensor network - architectures and applications To study the functions of different wireless architectures To learn the various aspects of MAC protocols To know the concept of infrastructure establishment To gain knowledge about various tools and platform in the networks 								
Course Outcomes:								
At the end of this course, learners will be able								
<ul style="list-style-type: none"> To examine the various wireless sensor networking strategies. To evaluate the different types of architecture used in sensor networks. To analyze the technical issues related to networking of sensors To synthesize knowledge to control the sensor network. To design and build a wireless sensor network using simulators 								
Unit I	INTRODUCTION OF WIRELESS SENSOR NETWORKS						9	
Introduction - Background of WSN Technology - Sensor Network Standards - RF Technologies for WSN - Difference between mobile adhoc and sensor networks - Applications of sensor networks - Challenges for Wireless Sensor Networks.								
Unit II	ARCHITECTURES						9	
Single Node Architecture - Hardware Components - Energy Consumption of Sensor Nodes - Operating systems and Execution Environments - Network Architecture - Sensor Network Scenarios - Optimization Goals and Figures of Merit - Gateway Concepts.								
Unit III	NETWORKING SENSORS						9	
Physical Layer and Transceiver Design Considerations - MAC Protocols for Wireless Sensor Networks - Low Duty Cycle Protocols and Wakeup Concepts - SMAC - Standards, Topologies & Protocols - IEEE 802.15.4 - Address & Name Management – Assignment of MAC Addresses - Routing Protocols - Energy Efficient Routing - Geographic Routing.								
Unit IV	INFRASTRUCTURE ESTABLISHMENT AND POWER CONTROL						9	
Topology Control - Clustering - Time Synchronization - Localization and Positioning - Sensor Tasking and Control - Power Consumption in Sensor Nodes – Power Control at different protocol Layers - Physical Layer Power Conservation Mechanisms – Higher Layer Power Conservation Mechanisms.								
Unit V	SENSOR NETWORK PLATFORMS AND TOOLS						9	
Operating Systems for Wireless Sensor Networks - Sensor Node Hardware – Hardware Platforms for WSNs: Mica2 -MicaZ -Btnode - and Sun SPOT – WSN Simulation Platform - Node Level Simulators : NS2 - TOSSIM - Middleware Architecture for WSN –Open Issues in software Technologies								
TEXT BOOK								
1. Holger Karl & Andreas Willig - "Protocols And Architectures for Wireless Sensor Networks" - John Wiley - 2005.								
2. KavehPahlavan - Prashant Krishnamurthy - "Principles of Wireless Networks: A unified approach" - Prentice Hall - 2002.								
REFERENCE BOOKS								
1. 1. KazemSohraby - Daniel Minoli - &TaiebZnati - "Wireless Sensor Networks -Technology - Protocols - And Applications" - John Wiley - 2007								
2. Anna Hac - "Wireless Sensor Network Designs" - John Wiley - 2003.								



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Department	INFORMATION TECHNOLOGY				R2019	Semester VI	EEC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19IT603	BIGDATA AND ANALYTICS	2	0	2	3	60	100
Course Objective(s):							
The purpose of learning this course is to							
<ul style="list-style-type: none"> • Introduce big data technology landscape • Understand Hadoop and its ecosystem • Work with NoSQL data bases such as Mongo DB and Cassandra • Understand pig and Hive • Understand the basics of enterprise reporting using open source tools. 							
Course Outcomes:							
At the end of this course, learners will be able to:							
<ul style="list-style-type: none"> • Understand the basics of Big Data & Understand the Hadoop ecosystem • Write Map Reduce Program • Install and use NoSQL databases • Write Pig Scripts and Hive Query to access NoSQL data • Generate report using Open Source Tools 							
Unit I	INTRODUCTION TO BIG DATA						3
Classification of Digital Data, Introduction to Big Data Characteristics of Data, Evolution of Big Data, Definition of Big Data, Introduction to Big Data Analytics - What is Big Data Analytics, Classification, Challenges, Terminologies Used in Big Data Environment							
Unit II	THE BIG DATA TECHNOLOGY LANDSCAPE						4
NoSQL-Types of NoSQL Databases - Why NoSQL? - Advantages of NoSQL, SQL versus NoSQL, NewSQL, Hadoop- Features of Hadoop, Key Advantages of Hadoop, Overview of Hadoop Ecosystems, Hadoop Distributions, Hadoop versus SQL, Integrated Hadoop Systems Offered by Leading Market Vendors, Cloud based Hadoop solutions							
Unit III	HADOOP						9
RDBMS Versus Hadoop, Distributed Computing Challenges, Hadoop Overview, Hadoop Distributed File System, Processing Data with Hadoop, Managing Resources and Application with Hadoop YARN, Hadoop Ecosystem							
Unit IV	NOSQL-MONGODB AND CASSANDRA						9
MongoDB-Terms used in RDBMS and MongoDB, Data Types in MongoDB, CRUD(Create, Read, Update and Delete)-Cassandra-Features of Cassandra, CQL Data Types, CQLSH, Key Spaces, CRUD, Collections, Using a Counter, Time To Live(TTL), Alter table data, Import and Export, System Tables.							
Unit V	HIVE, PIG, REPORTING TOOL						9
e - Hive Architecture, Data Types, File Format, Hive Query Language, RCFILE Implementation, SERDE, UDF Pig - Anatomy of Pig, Pig on Hadoop, Pig Philosophy, Use Case for Pig: ETL Processing, Pig Latin Overview, Data Types, Running Pig, Execution Modes of Pig, HDFS Commands, Relational Operators, EvalFunction, Complex Data Type, PiggyBank, UDF (User Defined Function), Parameter Substitution, Diagnostic Operator Jasper Report - Introduction to Jasper Reports, Jasper soft Studio, Connecting to MongoDB NoSQL database, Connecting to Cassandra NoSQL Databases							



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HANDSON(26Hours)

A project that allows the students to apply Technical, Behavioral, Process concepts learnt in the elective course by:

- Executing near real-life project (with large data)
- Working in teams(project teams will ideally comprise of 4 members)
- Experiencing expectations from different roles

There will be 1 project(at the end of the course)

Project 1: Data in disparate data sources such as Excel, text file, databases etc. will be provided to the students. They will be expected to extract, cleanse, integrate and load it into the data-warehouse.

Project 2: Design reports according to given business scenarios. The data for these reports is to be pulled from the data-warehouse built-in the earlier project.

TEXTBOOK(S)

- | | |
|----|---|
| 1. | Big Data and Analytics–Seema Acharya and Subhashini C–Wiley India |
| 2. | Big Data for Dummies–Judith Hurwitz, Alan Nugent, Fern Halper, Marcia Kaufman |
| 3. | Hadoop: The Definitive Guide by Tom White |

REFERENCE(S)

- | | |
|----|--|
| 1. | Hadoop in action–Chuck Lam. |
| 2. | Hadoop for Dummies – Dirk Deroos, Paul C. Zikopoulos, Roman B. Melnyk, Bruce Brown |



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Department	INFORMATION TECHNOLOGY				R2019	Semester VI	PC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19CS604	CLOUD COMPUTING	3	0	0	3	45	100
Course Objective(s):							
The purpose of learning this course is to							
<ul style="list-style-type: none"> Understand the concept of Cloud Computing. Know about the Cloud Services. Gain knowledge on the various issues in Cloud Computing. Be familiar with the lead Players in Cloud. Appreciate the emergence of cloud as the next generation computing paradigm and web based communication. 							
Course Outcomes:							
At the end of this course, learners will be able to:							
<ul style="list-style-type: none"> Articulate the main concepts, key technologies, strengths and limitations of Cloud Computing. Learn the key and enabling technologies that help in the development of cloud. Develop the ability to understand and use the architecture of compute and storage cloud. Understand Service and delivery models. Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud. 							
Unit I	UNDERSTANDING CLOUD COMPUTING						9
Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services							
Unit II	DEVELOPING CLOUD SERVICES						9
Web-Based Application – Pros and Cons of Cloud Service Development Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds							
Unit III	CLOUD COMPUTING FOR EVERYONE						9
Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation.							
Unit IV	USING CLOUD SERVICES						9
Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling, Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing – Collaborating on Databases – Storing and Sharing Files							
Unit V	ADVANCED WAY TO COLLABORATE ONLINE						9
Collaborating via Web – Based Communication Tools – Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Group Ware – Collaborating via Blogs and Wikis							
TEXTBOOK(S)							
1.	Michael Miller, Cloud Computing, 9 th Edition Pearson Education, 2014.						
2.	Anthony T. Velte, Cloud Computing, 12 th Edition, Tata Mcgraw Hill, 2013.						
REFERENCE(S)							


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1.	Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing,
2.	Applications and Data Centers in the Cloud with SLAs, Emereo Pvt Limited, July 2008



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Department	INFORMATION TECHNOLOGY					R2019	Semester VI	PC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19IT604	CLOUD COMPUTING LABORATORY	0	0	4	2	60	100	
Course Objective(s): The purpose of learning this course is to <ul style="list-style-type: none"> Learn how to install Virtual Box Develop Web Applications in Cloud Learn Configurations of Cloudsim Learn the design and development process involved in creating a cloud based application Learn to implement and use parallel programming using Hadoop 								
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Configure various virtualization tools such as Virtual Box, VMware workstation. Design and deploy a web application in a PaaS environment. Learn how to simulate a cloud environment to implement news schedulers. Install and use a generic cloud environment that can be used as a private cloud. Manipulate large datasets in a parallel environment 								
List of Experiments <ol style="list-style-type: none"> Install Virtualbox/VMware Workstation with different flavours of Linux or Windows OS on top of windows Install a Compiler in the Virtual Machine created using Virtualbox and executes simple programs Install Google App Engine. Create helloworld app and other simple web applications using Python/Java. Use GAE launcher to launch the Web Applications. Simulate a cloud scenario using Cloud Sim and run a scheduling algorithm that is not present in CloudSim. Find a procedure to transfer the files from one Virtual Machine to another Virtual Machine. Find a procedure to launch Virtual Machine using trystack (Online OpenStack Demo Version) Install Hadoop Single node Cluster and run simple applications like word count 								
TEXTBOOK(S)								
1.	Cloud Infrastructure and Services Participant Guide Volume 1 & 2 (EMC Education Services, Oct 2011)							
REFERENCE(S)								
1	S.R. Smoot and N.K. Tan, "Private Cloud Computing: Consolidation, Virtualization and Service - Oriented Infrastructure" (Elsevier, 2012, ISBN: 978-0-12-384919-9) Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "Mastering in Cloud", MHI, 2013							



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Department	INFORMATION TECHNOLOGY					R2019	Semester VI	EEC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19TP601	QUANTITATIVE APTITUDE, LOGICAL REASONING, VERBAL ABILITY-V& RECRUITMENT PROCESS	2	0	0	0	30	100	
Course Objective(s): The purpose of learning this course is to								
<ul style="list-style-type: none"> To calculate the work capacity by chocolate based method. To find the ratio in which two or more ingredients at the given price. To work with time, speed and distance by relative speed concepts. To determine how various phenomena are related. To get a most suitable candidate available for the job. 								
Course Outcomes: At the end of this course, learners will be able to:								
<ul style="list-style-type: none"> Understand the concepts of Times and Work and Pipes and Cistern and Correlating the Concepts of both. Crack allegations and mixture problem by using shortcut methods. Know the concepts of Time, Speed and Distance and concepts of Boats and Streams. Analyze the cause and effect of problems by using critical thinking. Know the importance and do's and don'ts of Group Discussion and Crack Interviews by knowing its tricks and tips through and lingit. 								
UNIT 1	TIME & WORK, PIPE & CISTERNS						6	
TIME AND WORK: Introduction–Basic concepts–Leaving and joining–Alternative days–in between days the works starting and ending. PIPES AND CISTERNS: Introduction–Basic concepts–Capacity of the total liters–Water flow in the tank.								
UNIT 2	ALLIGATIONS & MIXTURE						6	
ALLIGATIONS AND MIXTURES: Definition–Allegation rule–Mean value (or cost price) of the mixture –Six golden rules to solve problems on mixture–Removal among the quantities more than two.								
UNIT 3	TIME & DISTANCE, TRAINS, BOATS AND STREAMS						6	
TIME AND DISTANCE: Definition – Average speed – Distance covered is same – Distance covered is different–Stop page time per hour for a train–Time taken with two different modes of transport–Time and distance between two moving bodies. PROBLEMS ON TRAINS: Basic concepts–Basic formulae–Different types of Objects–Two trains crossing each other in both directions–Shortcuts. BOATS AND STREAMS: Introduction–Speed of man (Boat and Streams) – Moving same and opposite Directions–important formulae.								
UNIT 4	STATEMENT & ARGUMENTS, CAUSE & EFFECT, ASSERTION & REASON						6	
STATEMENT AND ARGUMENTS: Arguments strong with respect to the statement. CAUSE AND EFFECT: Cause and effect relationship between the two statements. ASSERTION AND REASON: Assertion (A) and Reason (R)–Both (A) and (R) are individually true and (R)–(A) is true but (R) is false–(A) is false but (R) is true.								
UNIT 5	COMMUNICATION SKILLS & RECRUITMENT PROCESS						6	



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COMMUNICATION SKILLS: Verbal Communication Skills–Non-Verbal Communication Skills–SelfIntro–Presentation Skills–Public Speaking.

RECRUITMENT PROCESS: CV Making– Industry Expectations–Company Pattern Discussion–Group Discussion–Interview Handling.

REFERENCES:

1. Murphy, Raymond .English in Use- A Self- Study Reference and Practice Book for Intermediate Learners of English.IV. United Kingdom: Cambridge University Press.2012.
2. Lewis, Norman. Word Power Made Easy. New York: PocketBooks.1991.
3. Baron's The Official Guide for New GMAT Review 2015. NewJersey: John Wiley & Sons, Inc.
4. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-Hill Publishing Company Ltd, 2012
5. Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.
6. The CV Book: Your Definitive Guide to Writing the Perfect CV Book by James Innes
7. Group Discussion and Interview Skills Paper Back – Sep 2015 by Priyadarshi Patnaik(Author)



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Department	INFORMATION TECHNOLOGY				R2019	SemesterVI	EEC
Course Code	Course Name	Hours/Week			Credit	TotalH ours	Maximum Marks
19IT605	COMPREHENSIVEREVIEW-I	L	T	P	C	30	-
Course Objective(s): The purposeoflearningthis courses <ul style="list-style-type: none"> ToencouragethestudentstocomprehendtheknowledgeacquiredfromthefirstSemesterto6thSemesterofB.T ech. DegreeCourse throughperiodic exercise. 							
Course Outcomes: At theendofthis course, learners willbeableto: <ul style="list-style-type: none"> Review,prepareandpresenttechnologicaldevelopments 							
METHODOFEVALUATION: <ul style="list-style-type: none"> The students will be assessed100% internally through weekly test with objective type questions onallthesubject relatedtopics. 							



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Department	INFORMATION TECHNOLOGY				R2019	Semester VI	EEC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19IT606	MINIPROJECT	0	0	2	1	30	100

Course Objective(s):

The purpose of learning this course is to

- Develop knowledge to formulate a real world problem and project's goals.
- Identify the various tasks of the project to determine standard procedures.
- Identify and learn new tools, algorithms and techniques.
- Understand the various procedures for validation of the product and analysis of the cost effectiveness.
- Understand the guideline to prepare report for oral demonstrations.

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 system/application and analysis of the cost effectiveness.
- Prepare report and present the oral demonstrations.

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Department		INFORMATION TECHNOLOGY				R2019	SemesterVII	PC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19IT701	CRYPTOGRAPHYANDNETWORK SECURITY	3	0	1	4	45	100	
Course Objective(s):								
The purpose of learning this course is								
<ul style="list-style-type: none"> • To know the methods of conventional encryption techniques. • To understand the concepts of Symmetric Key Cryptography. • To acquire the methods of Asymmetric Key Cryptography. • To understand authentication and Hash Functions. • To know the current trends in network security tools and applications. 								
Course Outcomes:								
At the end of this course, learners will be able								
<ul style="list-style-type: none"> • To design and conduct experiments to analyze and interpret data using conventional techniques. • To use Cryptography in different fields of Engineering and Mathematics. • To implement Public key Cryptography algorithms for an application. • To apply Hash algorithms and authentication protocols for an application. • To use the best solution for a security threat. 								
Unit I	INTRODUCTION TO CRYPTOGRAPHY						9	
Security trends - Need for Security at Multiple levels, Security Policies - Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography- Algorithm Implementations using C								
Unit II	SYMMETRIC CRYPTOGRAPHY						9	
MATHEMATICS OF SYMMETRIC KEY CRYPTOGRAPHY: Algebraic structures - Modular arithmetic- Euclid's algorithm- Congruence and matrices - Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS: Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard - Key distribution- Algorithm Implementations using Cryptool								
Unit III	ASYMMETRIC CRYPTOGRAPHY						9	
MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: Primes – Primality Testing – Factorization – Euler's totient function, Fermat's and Euler's Theorem - Chinese Remainder Theorem – Exponentiation and logarithm - ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange - ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography- Algorithm Implementations using C								
Unit IV	MESSAGE AUTHENTICATION AND INTEGRITY						9	
Authentication requirement – MAC – MD5 –SHA –Digital signature and authentication protocols – DSS- Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications - Kerberos, X.509- Algorithm Implementations using Cryptool								
Unit V	NETWORK SECURITY PRACTICES						9	
Electronic Mail security – PGP, S/MIME – IP security – Web Security - System Security: Intruders – Malicious software – viruses – Firewalls – Applications using Snort, Ettercap, Metasploit								



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TEXTBOOK(S)	
1.	William Stallings, Cryptography and Network Security: Principles and Practice , 8 th Edition, PHI, 2017.
REFERENCE(S)	
1.	C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd,2011
2.	Behrouz A. Foruzan, Cryptography and Network Security, Tata McGraw Hill 2015.
3.	Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: Private Communication in a PUBLIC World, Prentice Hall, ISBN 0-13-046019-2,2016.



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Department	INFORMATION TECHNOLOGY	R2019	SemesterVII	ES
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Department	INFORMATION TECHNOLOGY	Hours/Week			Credit	R2019	SemesterVI	PC
Course Code	Course Name				C	Total Hours	Maximum Marks	
		L	T	P				
19IT702	INTERNETOF THINGS	3	0	0	3	45	100	

Course Objective(s):

The purpose of learning this course is

- To understand what Internet of Things is.
- To identify the various elements of an IoT System
- To understand the various means of communication from Node/Gateway to CloudPlatforms
- To understand Cloud Computing & its relevance inIoT
- To identify types of data analytics and data visualization tools
- To make students aware of security concerns and challenges while implementing IoT solutions.

Course Outcomes:

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

- Describe components of IoT Architecture and platforms of IoT ecosystem
- Describe and choose Sensors and Actuators
- Describe and implement edge network
- Describe Big Data Analytics, transform data and draw meaningful conclusions
- Identify the DIY (Do it yourself) open source electronics platforms for building IoT prototypes

Unit I	Introduction to IoT	9
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What is IoT?, Genesis of IoT, IoT and Digitization, IoT Impact,Convergence of IT and IoT, IoT Challenges,IoT Network Architecture and Design,Drivers Behind New Network Architectures,Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.

UNIT-II IoT PROTOCOLS & Smart Objects	10
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Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards –Protocols – IEEE 802.15.4–BACNet Protocol– Modbus – KNX – Zigbee– Network layer – APS layer – Security.

Smart Objects: The Things in IoT,Sensors,Actuators, and Smart Objects,Sensor Networks,Connecting Smart Objects

Unit III	CommunicationandConnectivityTechnologies	6
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IoT Access Technologies.Cloud Computing in IoT – IoT Communication Model–Cloud Connectivity

Unit IV	DataAnalyticsandIoTPlatforms	10
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Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big DataAnalytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A BriefHistory of OT Security, Common Challenges in OT Security, How IT and OT Security Practices andSystems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application ofSecurityinanOperationalEnvironment

Unit V	ConcernsandFutureTrends	9
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Different Players of IoT - Security Concerns and Challenges - Future Trends – Standards. Strategyfor Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-CaseExamples.



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Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P			
19IT704	IOT LABORATORY	0	0	4	2	60	100

Course Objective(s):

The purpose of learning this course is

- To implement LED operations
- To implement IOT sensors in motion devices
- To implement IOT for Alarm Systems
- To implement IOT for Music Systems
- To implement IOT for Security Systems

Course Outcomes:

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

- Develop Sensors for LED Operations
- Develop Sensors for Motion Devices
- Develop Sensors for Alarm Systems
- Develop Sensors for Music Systems
- Develop Sensors for Security Systems

List of Experiments

Programs could be implemented using Arduino/Raspberry Pi/Tinkercad/etc.

1. LED ON/OFF Pattern
2. Push Button Control with LED Pattern
3. Push Button Counter
4. Temperature and Humidity Sensor Interface
5. Fire Alarm
6. Remote Controlled AC Fan Regulator
7. Motion Detection
8. Playing Music
9. Controlling and Monitoring a Traffic Light Controller
10. Password Security Lock System

TEXTBOOK(S)

1.	Hersent, David Boswarthick, Omar Elloumi, The Internet of Things: Key Applications And Protocols, Wiley Publications, Oliver, 2012
2.	Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 2013
3.	Dieter Uckelmann, Mark Harrison, Florian Michahelles, Architecting the Internet of Things, Springer Publications, 2011
4.	Marco Schwatz, Internet of Things with Arduino Cookbook, Pack Publications, 2016.

REFERENCE(S)

1.	Internet of Things and Data Analytics, Wiley Publications, 2016.
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Department	INFORMATION TECHNOLOGY				R 2019	Semester V	PE
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP01	WEB APPLICATION DEVELOPMENT USING C# AND .NET	3	0	0	3	45	100

Course Objective(s):

The purpose of learning this course is to

- Understand the foundations of CLR execution.
- Learn the technologies of the .NET framework.
- Know the object oriented aspects of C#.
- Be aware of application development in .NET.
- Learn web based applications on .NET (ASP.NET).

Course Outcomes:

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

- List the major elements of the .NET framework and explain how C# fits into the .NET platform.
- Understand Object based concept of C#
- Debug, compile, and run a simple application.
- Analyze the basic structure of a C# application and web based development of C#
- Discuss CLR and security in .NET.

Unit I	INTRODUCTION TO C#	9
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Introducing C#, Understanding .NET, overview of C#, Literals, Variables, Data Types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Methods, implicit and explicit casting, Constant, Arrays, Array Class, Array List, String, String Builder, Structure, Enumerations, boxing and unboxing

Unit II	OBJECT ORIENTED PROGRAMMING IN C#	9
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Class, Objects, Constructors and its types, inheritance, properties, indexers, index overloading, polymorphism, sealed class and methods, interface, abstract class, abstract and interface, operator overloading, delegates, events, errors and exception, Threading

Unit III	APPLICATION DEVELOPMENT & CONNECTING WITH DATABASE	9
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Building windows application, Creating our own window forms with events and controls, menu creation, inheriting window forms, SDI and MDI application, Dialog Box (Modal and Modeless), accessing data with ADO.NET, DataSet, typed dataset, Data Adapter, updating database using stored procedures, SQL Server with ADO.NET, handling exceptions, validating controls, windows application configuration

Unit IV	WEB BASED DEVELOPMENT ON .NET	9
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Programming web application with web forms, ASP.NET introduction, working with XML and .NET, Creating Virtual Directory and Web Application, session management techniques, web.config, web services, passing datasets, returning datasets from web services, handling transaction, handling exceptions, returning exceptions from SQL Server.

Unit V	CLR AND .NET FRAME WORK	9
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Assemblies, Versioning, Attributes, reflection, viewing meta data, type discovery, reflection on type, marshalling, remoting, security in .NET

TEXTBOOK(S)

1. Herbert Schildt, "The Complete Reference: C# 4.0", Tata McGraw Hill, 2012.


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2.	ChristianNageletal."ProfessionalC#2012with.NET4.5",WileyIndia,2012
REFERENCE(S)	
1.	AndrewTroelsen,"ProC#2010andthe.NET4Platform,Fifthedition,APress,2010.
2.	Ian Griffiths, Matthew Adams, Jesse Liberty, "Programming C# 4.0", Sixth Edition,O'Reilly,2010

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Department	INFORMATIONTECHNOLOGY					R 2019	Semester V	PE
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ITP02	WEB DEVELOPMENT USING JAVA PROGRAMMING	3	0	0	3	45	100	
Course Objective(s): The purpose of learning this course is to <ul style="list-style-type: none"> Understand the basic concepts of core principles of the Java Language Gain knowledge to develops and alone applications. Discuss basic principles of HTML, JavaScript and XML Gain knowledge to develop dynamic Web applications like Servlet Introduce tools, technologies and framework Hibernate and Spring 								
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Develop the application based on the java concepts Solve the real world problems using concepts like swings, JDBC Analyze and design web-based information systems to meet certain business needs using HTML5, CSS, JavaScript Design and Develop interactive, client-side, server-side executable web Explore the features of various platforms and frameworks like hibernate, Spring, struts used in web applications development 								
Unit I	JAVAFUNDAMENTALS						9	
Overview of Java - Java modifiers-Wrapper classes-Argument passing in class & object Returning a value- Objects as arguments-Returning objects- Passing an array-constructors – this keyword- Inheritance- Use of super in calling parent class constructor-java.lang.Object and its methods – Passing arguments in super():super(int), super(String) - super(String, String)-Packages-User defined exception-Collections-Swings-EventHandling-JDBC-JDBC Drivers-JDBCconfiguration(connection)-Statement-CallableStatement-preparedstatements-Scrollableandupdatableresultsets-Queryexecution								
Unit II	BASICWEBDEVELOPMENTTECHNOLOGIES						9	
HTMLcommon tags-List-Tables-Images-Forms-Frames-HTML5-Formdesign-CSS-Introductionto Java Scripts-storing data (data types) - Objects- Properties-Events-Decision making-Looping Functions- Array-Conversions-ProcessingHTMLformsandvalidationusingJavaScript-XMLDTD,								
Unit III	SERVLET& JSP						12	
Overview of servlet- Servlet configuration- Servlet Architecture- Servlet life cycle-Servlet Request and Response-Generic Servlet, Http Servlet- web.xml and its need-Servlet configuration- Session Tracking-servlet.Introduction toJSP-Problem with servlet-Life cycle of JSP-scripting Elements(Expression tag, Scriptlets tag and declarations tag)-JSP Directive Elements-page directive-JSP objects-Action Elements								
Unit IV	EJB						6	
EJB-Overview-CreatingEJB-StatelessandStatefulbean-Callbacks-MessageDrivenBean-Annotations-Callbacks								
Unit V	JAVAFRAMEWORKS						9	


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Hibernate Introduction- features- Architecture- Mapping and Configuration Files in Hibernate – Hibernate O/R Mappings–Hibernate Query Language-Simple Examples using hibernate-Spring Introduction-Architecture-IOC container- Dependency Injection Bean — Getting started with Spring MVC framework-Simple examples using Spring-STRUTS–Introduction,Struts frame work core components–Installing and Setting up struts–Getting started with struts.

TEXTBOOK(S)

1.	Herbert Schildt, "Java The Complete Reference", 8th Edition, McGraw-Hill Osborne Media, 2015
2.	Paul Deitel, "Internet & World Wide Web: How to Program", Prentice Hall, 5 th Edition, 2011.
3.	Gavin King, Christian Bauer, "Java Persistence with Hibernate", Dream tech press, Kogent Learning Solutions Inc. 2008
4.	Craig Walls, "Spring in Action", Manning, Dream tech press, 2014

REFERENCE(S)

1.	Cay S. Horstmann and Gary Cornell, "Core Java™, Volume I—Fundamentals" 9 th Edition, Prentice Hall, 2012
2.	Robert W. Sebesta, "Programming the World Wide Web", Addison-Wesley, 7 th Edition, 2012.
3.	Uttam K. Roy, "Web Technologies", Oxford University Press, 1 st Edition, 2011


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Department	INFORMATION TECHNOLOGY					R2019	Semester V	PE
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ITP03	OPEN SOURCE SYSTEMS	3	0	0	3	45	100	
Course Objective(s):								
<ul style="list-style-type: none"> • Impart knowledge on Open Source System and its benefits in application development • Learn different open source Database • Know how to configure Open Source servers • Learn the basics of Firewall and CVS • Understand the basics of Open Source Server Side Technologies 								
Course Outcomes:								
At the end of this course, learners will be able to:								
<ul style="list-style-type: none"> • Understand basics of Open Source Software • Use MySQL database • Configure Open Source Servers • Understand firewall rules, Build Systems and CVS • Configure web application using Open Source Server Side Technologies 								
Unit I	INTRODUCTION TO OPEN SOURCE OPERATING SYSTEMS						9	
Introduction to Open Sources - Need of Open Sources -Advantages of Open Sources Application of Open Sources - Sources LINUX Introduction General Overview Kernel Mode and User Mode Process -Advanced Concepts-Scheduling-Personalities-Cloning-Signals-Development with Linux.								
Unit II	OPEN SOURCES DATABASE						9	
MySQL:Introduction-Setting up account-Starting, Terminating and Writing your Own SQL programs-Record Selection Technology- Working with Strings-Date and Time-sorting Query Results-Generating Summary-Working with Metadata-Using Sequences- MySQL and Web.								
Unit III	CONFIGURING SERVERS						9	
Setting up email servers-- using postfix (SMTP services), courier (IMAP & POP3 services), squirrel mail(web mail services) Setting up file services -- using samba (file and authentication services for windowsnetworks),usingNFS(fileservicesforgnu/Linux/Unixnetworks);Setting up proxy services--using squid (http / ftp / https proxy services) ;Setting up printer services -using CUPS (print spooler),foomatic (printerdatabase).								
Unit IV	FIREWALL, BUILD SYSTEM, CVS						9	
Setting up a Firewall-Using Net Filter and IP tables; Using the GNU Compiler Collection— GNU Compiler Tools;the C Preprocessor (CPP), the C Compiler(gcc) and the C++compiler (g++), assembler(gas); Understanding Build Systems—constructing make files and using make,using auto conf and autogen to automatically generate make files tailored for different development environments;Using source code versioning and management tools -- using CVS to manage source code revisions,patch & diff.								
Unit V	SERVER TECHNOLOGIES						9	
WebServer: Apache Server-Working with Web Server-Configuring and Using Apache Web Services-MDA-Introduction to MDA-Geneses of MDA-MDA Applications								

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TEXTBOOK(S)	
1.	N. B. Venkateshwarlu (Ed); Introduction to Linux: Installation and Programming, B, S Publishers; 2005
2.	Peter Wainwright, Professional Apache. Wrox Press, New Delhi, 2010
3.	M. N. RAO, Fundamentals of Open Source Software, PHI Learning Private Limited, 2015
REFERENCE(S)	
1.	H.S. Lahman Model-Based Development: Applications 1st edition Pearson, Education Inc, 2011
2.	Stephen J. Mellor, Marc Balces, "Executable UMS: A foundation for MDA", Addison, 2002.


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Department	INFORMATION TECHNOLOGY					R 2019	Semester V	PE
Course Code	Course Name	Hours /Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ITP04	COMPILER DESIGN PRINCIPLES	3	0	0	3	45	100	
Course Objective(s):								
The purpose of learning this course is								
<ul style="list-style-type: none"> To understand, design and implement a lexical analyzer and parser. To design DFA & NFA with different conversion techniques. To implement code generation schemes. To perform optimization of codes and gain knowledge about runtime environments. To understand Lex and YACC tools. 								
Course Outcomes:								
At the end of this course, learners will be able to:								
<ul style="list-style-type: none"> Design a lexical analyzer to identify the tokens in a program Construct a parser through the application of grammar. Understand intermediate code generation and symbol table organization techniques Design a compiler for a small language with code generation. Analyze various code optimization techniques 								
Unit I	INTRODUCTION TO COMPILER AND LEXICAL ANALYSIS							9
Introduction to programming language translators, classification of programming languages, overview of various programming language translators, Compiler Vs Interpreter, cross compiler, bootstrap arrangement, logical phases of compiler, pass Vs phase-cousins of compilers, Lexical Analysis phase: - Design issues, patterns, lexemes, Tokens-attributes-specification of tokens, Regular expressions- Overview of automata, Thompson construction NFA-DFA-minimized DFA-lexical errors-Lex								
Unit II	SYNTAX ANALYSIS							9
Role of parser- Formal definition of grammars; BNF and EBNF -Parse Tree- Ambiguity- Elimination of ambiguity-Topdown parsing: Recursive-Descent parsing, Non-recursive predictive parsing; LL(1) grammars, Bottom-Up parsing:- Shift-Reduce parsers, Operating precedence parsing: design of operator precedence table, parsing-LR parsers:- Construction of SLR parse tables and parsing, CLR parsing- LALR parsing-Syntax errors-YACC								
Unit III	SEMANTIC ANALYSIS							9
Syntax Directed Translations: Syntax-directed definitions, Translation Schemes, construction of syntax trees, DAG'S-bottom-up evaluation of s-attributed definitions, l-attributed definitions; Runtime environments: Source language issues, storage organization, storage-allocation strategies, symbol tables: local and global symbol table structures and management. Type checking Systems: Data type asset of values with set of operations; data types; type checking models; semantic models of user-defined types; parametric polymorphism; subtype polymorphism; type-checking algorithms.								



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Unit IV	INTERMEDIATE CODE & CODE OPTIMIZATION	9
Intermediate languages, Three Address code: declarations, assignment statements, addressing array elements, Boolean expressions, case statements, back patching. Code optimization: The principle source of optimization, optimization of basic blocks, Loop optimizations		
Unit V	CODE GENERATION & OTHER TRANSLATION ISSUES	9
Issues in the design of a code generator, the target machine, Reducing the memory access times by exploiting addressing modes-peephole optimizations, basic blocks, DAG's-Iterative vs. recursive interpretation; Elements of Assembly language- assemblers-Passes of an assembler-Macros- design of macroprocessors-passes of a macroprocessor		
TEXTBOOK(S)		
1.	A. V. Aho et al, Compilers: Principles, techniques, & tools, Second Edition, Pearson Education, 2007	
2.	K.D. Cooper and L. Torczon, Engineering a Compiler, Morgan Kaufmann, 2004	
REFERENCE(S)		
3.	Steven S. Muchnick "Advanced Compiler Design Implementation" Elsevier Science India.	
4.	D.M. Dhamdhere "Systems Programming and Operating Systems" Tata McGraw-Hill Pub.	


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Department	INFORMATION TECHNOLOGY					R 2019	Semester V	PE
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ITP05	DATA WAREHOUSING AND DATAMINING	3	0	0	3	45	100	
Course Objective(s): The purpose of learning this course is to <ul style="list-style-type: none"> • Understand basics of dataware house • Learn datamining and association mining • Understand classification and prediction • Know cluster analysis technique Cloud Computing • Familiarize graph and multimedia mining 								
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> • Understand the basics of data warehouse • Apply association rule mining • Apply classification and prediction techniques • Analyze data using cluster techniques • Apply graph and multimedia mining 								
Unit I	INTRODUCTION TO DATA WAREHOUSE						9	
Introduction-a Multidimensional Data model-Datacube Technology-Data Warehouse Architecture-Types of OLAP servers-Data warehouse implementation-Data warehousing to Data Mining								
Unit II	INTRODUCTION TO DATAMINING AND ASSOCIATION MINING						9	
Data mining — functionalities - Major issues - Data cleaning - Data integration and Transformation – Data reduction-Discretization and concept hierarchy generation-Efficient and scalable frequent item set mining methods-Mining various kinds of association rules-Association Mining to Correlation Analysis-Constraint based Association Mining								
Unit III	CLASSIFICATION AND PREDICTION						9	
Introduction-Issues-Classification by decision tree induction-Bayesian classification-Rule based Classification. Classification by backpropagation-Other classification methods- Prediction-Accuracy and Error Measures-Evaluating the accuracy								
Unit IV	CLUSTER ANALYSIS						9	
Cluster analysis-Types of data-Partitioning methods-Hierarchical methods-Density based methods-Grid based methods – Model based Clustering methods – Clustering High dimensional data-Constraint based cluster analysis-outlier analysis-Datamining Applications-Datamining system products-Additional Themes on datamining.								
Unit V	GRAPH MINING AND MULTIMEDIA MINING						9	
Graph mining- Multi relational data mining-Multidimensional analysis and descriptive mining of complex data objects. Spatial data mining-Multimedia data mining-Text mining- Mining the world wide web-Datamining applications								



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TEXTBOOK(S)	
1.	Jiewei Han, Micheline Kamber, "Data mining concepts and techniques", Morgan Kaufmann Pub,2006
2.	William H.Inmon,"Buildingthedatawarehouse",WileyDreamtech(p)Ltd.,IVEdition, 2005.
REFERENCE(S)	
1.	Ian H.Witten,Eibe Frank," DataMining: PracticalM/c Learning tools and techniques withJava implementation",ThirdEdition,MorganKaufman,2000
2.	K.P.Soman,ShyamDiwakar,V.Ajay,"Insight into DataMining, theory and practice",PHI Learning Private Limited,2010.
3.	Ronen Feldman, James Sangee, "The Text Mining Handbook: Advanced Approaches in analyzing unstructured data",Cambridge University Press,2007



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Department	INFORMATIONTECHNOLOGY					R 2019	Semester V	PE
Course Code	Course Name	Hours /Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ITP06	COMPUTER GRAPHICS AND MULTIMEDIA SYSTEMS	3	0	0	3	45	100	
Course Objective(s): The purpose of learning this course is <ul style="list-style-type: none"> To understand the basic output primitives To understand the three dimensional concepts To know basics of Multimedia System To understand the design of Multimedia Systems To develop a multimedia application 								
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Understand the basic output primitives Apply three dimensional concepts Design multimedia system Understand the various multimedial technologies Understand the Applications of Multimedia System 								
Unit I	OUTPUTPRIMITIVES						9	
Introduction-Line-Curve And Ellipse Drawing Algorithms–Attributes–Two-Dimensional Geometric Transformations–Two-Dimensional Clipping and Viewing								
Unit II	THREE-DIMENSIONALCONCEPTS						9	
Three-Dimensional Object Representations–Three-Dimensional Geometric and Modeling Transformations–Three-Dimensional Viewing–Color Models–Animation.								
Unit III	MULTIMEDIA SYSTEMS DESIGN						9	
An Introduction – Multimedia Elements – Multimedia Applications – Multimedia Systems Architecture –Evolving Technologies for Multimedia – Defining Objects for Multimedia Systems – Multimedia Data Interface Standards–Need For Data Compression–Multimedia Databases.Compression and Decompression:Types of Compression –Binary Image Compression Schemes–Color,Gray Scale and Still–VideoImage Compression–Audio Compression–Fractal Compression								
Unit IV	MULTIMEDIA INPUT/OUTPUT TECHNOLOGIES						9	
Key Technology Issues – Pen Input – Video and Image Display Systems – Print Output Technologies–Image Scanners–Digital Voice and Audio–Digital Camera–Video Images and Animation–Full-Motion Video.Storage and Retrieval Technologies:Magnetic Media Technology–Optical Media–Hierarchical Storage Management–Cache Management for Storage Systems								



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Unit V	MULTIMEDIA APPLICATION DESIGN	9
Multimedia Application Classes–Types Of Multimedia Systems–Virtual Reality Design–Components of Multimedia Systems–Organizing Multimedia Databases–Application Workflow Design Issues–Distributed Application Design Issues.		
TEXTBOOK(S)		
1.	Donald Hearn and M.Pauline Baker, "Computer Graphics C Version", Pearson Education, 2003.	
2.	Prabhat K Andleigh and Kiran Thakrar, "Multimedia Systems and Design", PHI, 2003. ISBN: 81-203-2177-4	
3.	Pakhira, "Computer Graphics, Multimedia and Animation", 2 nd Edition, PHI 2010	
4.	Tay Vaughan, "Multimedia Making it work, Fourth Edition", Tata McGraw-Hill. ISBN: 0-07-463953-6.	
REFERENCE(S)		
1.	Ze-Nain Li, Mark S. Drew, "Fundamentals of Multimedia", PHI. ISBN: 81-203-2817-5.	
2.	John F. Koegel Buford, "Multimedia Systems", Third Edition, 2000. ISBN: 8177588273	
3.	Judith Jeffcoate, "Multimedia in practice technology and Applications", PHI, 1998	
4.	Foley, Vandam, Feiner, Huges, "Computer Graphics: Principles & Practice", Pearson Education, second edition 2003.	

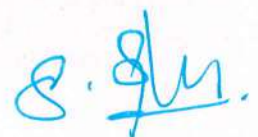


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Department	INFORMATION TECHNOLOGY				R 2019	Semester V	PE
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP07	DISTRIBUTED SYSTEMS	3	0	0	3	45	100
Course Objective (s):							
The purpose of learning this course is to							
<ul style="list-style-type: none"> Understand the basics of networking and the protocols used in distributed environment. Know about operating systems and sequential program design Design and develop fault tolerant and efficient distributed algorithms Evaluate the impact of memory on parallel/distributed algorithm formulations and validate their performance. Gain knowledge of how to design and implement distributed algorithms 							
Course Outcomes:							
At the end of this course, learners will be able to:							
<ul style="list-style-type: none"> Analyse various issues in the design and implementation of distributed computing systems Categorize the various system models, communication between Client and Server Identify the advantages and challenges in designing distributed algorithms for different primitives like mutual exclusion, deadlock detection Apply the knowledge of deadlock methods and its algorithms Understand the significance of distributed file system with real-time applications 							
Unit I	INTRODUCTION						7
Distributed Computing Models, Software Concepts, Hardware Concepts, The Client Server model, Issues in design of a distributed Operating System.							
Unit II	COMMUNICATION						9
Introduction to Message Passing, Advantages and features of message passing, Message format, Message Buffering, Remote Procedure Call, Extended RPC Models, Remote Object Invocation, Message Oriented Communication.							
Unit III	PROCESSES, SYNCHRONIZATION AND DISTRIBUTED DEADLOCK						11
Threads, code migration, clock synchronization, logical clocks, global state, Election algorithms, mutual exclusion, Distributed transaction. Distributed Deadlock Detection System model, Resources Vs. Communication Deadlocks, Deadlock Prevention, avoidance, Detection and Resolution, Centralized deadlock detection, distributed deadlock detection, path pushing and edge chasing algorithm							
Unit IV	DISTRIBUTED SHARED MEMORY						9
Distributed Shared Memory Introduction, General architecture of distributed shared memory, Design and implementation, Issues of DSM, Granularity, structure of shared memory space, consistency models, thrashing, advantages of DSM							
Unit V	DISTRIBUTED FILE SYSTEM						9
Distributed File System Introduction, Desirable features of good distributed file system, file models, file accessing, sharing, caching methods, file replication, fault tolerance, Case Study: CORBA (CORBA, RMI and Services)							
TEXTBOOK(S)							
1.	Andrew Tanenbaum, Maarten Van Steen, "Distributed System- Principals Paradigm", Maarten van Steen Publication, 2016						
2.	Singhal and Shivratri, "Advanced Concept in Operating Systems", McGraw Hill, 2015						

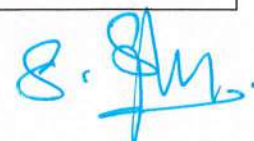

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REFERENCE(S)	
1.	Sunita Mahajan, Seema Shah, "Distributed Computing", Oxford, 2 nd edition, 2013
2.	Pradeep K. Sinha "Distributed Operating Systems", Prentice Hall of India Private, 2012
3.	George Coulouris, Tim Kindberg, Jean Dollimore, Distributed Systems: Concepts and Design, Academic Internet Publishers, 2006



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Department	INFORMATIONTECHNOLOGY					R2019	SemesterVI	PE
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ITP08	GRAPH THEORY	3	0	0	3	45	100	
Course Objective(s):								
The purpose of learning this course is								
<ul style="list-style-type: none"> To understand the basics of graph data structure To familiarize Tree and its properties To understand the Representation of graph To know the various Graph Problems To learn Directed graph and its applications 								
Course Outcomes:								
At the end of this course, learners will be able to:								
<ul style="list-style-type: none"> Understand graph fundamentals Apply tree principles to solve problems Represent Graph Apply Graph to Solve Problems Analyze the properties of Directed Graph 								
Unit I	INTRODUCTION						9	
Definitions, importance, isomorphism, walk, paths, circuits, connected, disconnected graphs, operation on graphs, Euler and Hamiltonian graphs								
Unit II	TREES						9	
Properties, distance and centers, trees, spanning trees, fundamental circuits, minimal spanning tree, Cutsets Properties, fundamental circuits and cut sets, connectivity, separability, network flows, 1-2 isomorphism, Planar and dual graphs, Combinatorial representation, planar graphs, Kuratowski's graphs, detection of planarity, dual graphs								
Unit III	MATRIX REPRESENTATION OF GRAPHS						9	
Incidence matrix, circuit matrix, cut set matrix, fundamental matrices, relationships amongst matrices, path matrix, and adjacency matrix								
Unit IV	COLORING, COVERING AND PARTITIONING						9	
Chromatic Number, Chromatic Partitioning, Matching, Covering, Four Color Problem								
Unit V	DIRECTED GRAPHS						9	
Different types, Directed Paths and Connectedness, Euler Di-graphs, Trees-matrix representation, tournament. Graph theoretic algorithms, Computer Representation of graphs— input & output, algorithms for connectedness, spanning tree, fundamental circuits, cut vertices, directed circuits and Shortest Paths								
TEXTBOOK(S)								
1.	Narasimha Deo, Graph Theory with Application To Engineering And Computer Science, Prentice Hall India, 2010							
2.	Tulasiraman and M.N.S. Swamy, Graph, Networks and Algorithms, John Wiley, 1992							
REFERENCE(S)								
1.	F. Harary, Graph Theory, Addison Wesley/Narosa, 2013							
2.	E.M. Reingold, J. Nievergelt, N. Deo, Combinatorial Algorithms: Theory and Practice, Prentice Hall, N.J. 1977							




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Department	INFORMATIONTECHNOLOGY					R2019	SemesterVI	PE
Course Code	Course Name	Hours /Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ITP09	HUMAN COMPUTER INTERACTION	3	0	0	3	45	100	
Course Objective(s): The purpose of learning this course is <ul style="list-style-type: none"> To learn the foundations of Human Computer Interaction. To understand the GUI concepts To become familiar with the design technologies for individuals and persons with disabilities. To be aware of screening in HCI. To learn the software tools used in user interface. 								
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Understand fundamentals of HCI Design effective HCI for graphical user interface. Design effective dialog for HCI. Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Websites. Develop meaningful user interface using software tools 								
Unit I	INTRODUCTION						9	
Introduction:Importance of User Interface–Definition, importance of good design.Benefits of good design.A brief history of Screen design								
Unit II	GRAPHICALUSERINTERFACE						9	
The Graphical User Interface—popularity of graphics,the concept to direct manipulation,graphical system, Characteristics, Web user–Interface popularity,characteristics- Principles of User Interface								
Unit III	DESIGNOFGUI						9	
Design process–HumanInteraction with Computers,Importance of human characteristics human consideration,Human Interaction Speeds,understanding business junctions								
Unit IV	CORE METHOLOGIES OF HCI						9	
Screen Designing:Design goals–Screen Planning and Purpose,Organizing Screen Elements, Ordering of Screen Data and Content – Screen Navigation and Flow – Visually pleasing composition – amount of information–Focus and Emphasis–PresentationInformation Simply and Meaningfully– Information Retrievalon Web–Statistical Graphics–Technological Consideration in Interface Design								
Unit V	SOFTWARETOOLS						9	
Windows–New and Navigation schemes selection of window, selection of devices based and screenbased controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors. Software tools – Specification methods, interface – Building Tools. Interaction Devices–KeyboardandFunctionKeys–Pointing Devices–Speech Recognition Digitization and Generation–Image and Video Displays–Drivers								
TEXTBOOK(S)								
1.	The Essential Guide to User Interface ",Wilber to Galitz,Wiley Dream Tech,Third Edition,2007							
2.	Designing the User Interface,Fifth Edition Ben Shneidermann,Pearson Education Asia,2010							


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REFERENCE(S)	
1.	Human-Computer Interaction, Alan Dix, Janet Finckay, Greg Goryd, Abowd, Russell Beaulieu, Pearson, Third Edition, PrenticeHall(2004).
2.	Interaction Design: Beyond Human-Computer Interaction, 5th Edition, 2019, Sharps. Wiley Dream Tech
3.	User Interface Design: A Software Engineering Perspective, Soren Lauesen, Pearson Education, 2004.



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Department	INFORMATION TECHNOLOGY				R2019	Semester VI	PE
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP10	BIOINFORMATICS	3	0	0	3	45	100
Course Objective(s): The purpose of learning this course to <ul style="list-style-type: none"> • Provide an introduction to what bioinformatics is and why it is important • Understand the purpose and categories of Bio informatics technologies. • Understand the Neural Network concepts in Bioinformatics. • Provide an overview of the application areas of bio informatics • Study about the Microarray Analysis. 							
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> • Understand the concepts of genomics, proteomics and Datamining in Bioinformatics • Evaluate bio informatics algorithms such as dynamic programming, Hidden Markov Models and Monte Carlo • Design various bio informatics tools for pattern matching and visualization • Understanding of the intersection of life and information sciences • Apply Microarray Analysis for Gene classification and genome expression 							
Unit I	INTRODUCTION						9
Need for Bio Informatics technologies-Overview of Bioinformatics Technologies-Structural Bio Informatics-Data Format and Processing – Secondary Resources and Applications-Role of Structural Bio Informatics.							
Unit II	DATA WAREHOUSING AND DATAMINING IN BIOINFORMATICS						9
Bio informatics data-Data Warehousing Architecture-Data Quality-Biomedical DataAnalysis–DNA DataAnalysis-Protein DataAnalysis-Neural Network Architecture-Neural Network Applications inBio Informatics							
Unit III	MODELING FOR BIO INFORMATICS						9
Hidden Markov Modeling for Biological Data Analysis-Sequence Identification-Sequence Classification-Multiple Alignment Generation-Comparative Modeling-Protein Modeling–Genomic Modeling-Probabilistic Modeling-Bayesian Networks-Boolean Networks- Molecular Modeling							
Unit IV	PATTERN MATCHING AND VISUALIZATION						9
Gene Regulation - Motif Recognition - Motif Detection - Strategies for Motif Detection - Visualization-FractalAnalysis-DNA Walk Models-One Dimension-Two Dimension-Higher Dimension – Game Representation of BiologicalSequences							
Unit V	MICRO ARRAY ANALYSIS						9
Microarray Technology for Genome Expression Study-Image Analysis for Data Extraction-Preprocessing-Segmentation- Gridding- Spot Extraction-Normalization, Filtering-Cluster Analysis-Gene Network Analysis-Compared Evaluation of Scientific Data Management Systems–Cost Matrix-Evaluation Model-Benchmark							
TEXT BOOK(S)							
1.	Arthur M.Lesk,Introduction to Bioinformatics, 4 th Edition Oxford University Press,2014.						
2.	Gautam B.Singh,Fundamentals of Bioinformatics and Computational Biology : Methods and Exercises in Matlab,Springer,2014						
REFERENCE(S)							
1.	Yi-Ping Phoebe Chen, Bio Informatics Technologies,Springer Verlag, 2010						
2.	M.Abhilash,Introduction to Bioinformatics and Microarray Technology,CBS Publishers & Distributors, 2010						


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Department	INFORMATION TECHNOLOGY				R2019	Semester VI	PE
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP11	INFORMATION STORAGE MANAGEMENT	3	0	0	3	45	100
Course Objective(s): The purpose of learning this course is to <ul style="list-style-type: none"> Understand data creation, the amount of data being created, the value of data to a business, challenges in data storage and data management Evaluate storage architectures and key data center elements in classic, virtualized and cloud environments Describe storage networking technologies such as FCSAN, IP-SAN, FCoE, NAS and object-based and unified storage Understand and articulate business continuity solutions—back up and replications, along with archive for managing fixed content Understand solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities 							
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Understand the concept of data storage in distributed environment in data centre, challenges in data storage and management technologies Evaluate storage architectures and understand logical and physical components of a storage infrastructure Identify different storage virtualization technologies and their benefits Understand and articulate business continuity solutions including, backup technologies Define information security and storage security domains 							
Unit I	INTRODUCTION						9
Data, Information, Evolution of storage architecture, Data center infrastructure, Information life cycle. Overview: Virtualization - Cloud, Data center environment: Application - Desktop — Memory virtualization-Connectivity-Disk drive interface-Storage media-Flash drives, RAID: Implementation-Methods-Levels, Intelligent Storage system							
Unit II	EVOLUTION						9
Introduction to DAS and SCSI, SAN: Evolution-Components-Connectivity options-Ports-FC architecture-Zoning – FC topologies, SAN based virtualization: Block level - VSAN, IP SAN: iSCSI-FCIP components-FCIP topology and frame structure, FCOE: Components–Benefits							
Unit III	NETWORK STORAGE						9
NAS: Benefits–Components-Implementations-File Sharing Protocols-I/O Operations-Factors affecting NAS performance-File level Virtualization, Object based Storage: Operation Benefits-Fixed Content and archives-Archive types, CAS: Architecture-Operations–Use Cases, Unified Storage							
Unit IV	INFORMATION AVAILABILITY						9
Introduction: Information availability - BC terminology — Planning lifecycle - Business impact analysis - Technology solutions, Backup and restore: Purposes -Methods -Architecture - Operations - SCB - Topologies- Targets-Deduplication, Local Replication: Terminology-Data consistency-Technologies-Restore and restart considerations, Remote replication: Modes-Technologies-Advanced replication technologies.							



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Unit V	SECURING THE STORAGE INFRASTRUCTURE	9
Securing the storage infrastructure:Security terminology–Security framework–Risk triad-Security domains-Implementations-Managing the storage infrastructure:Monitoring-Activities-Challenges-Solutions Data Warehousing with OracleBI		
TEXT BOOK(S)		
1.	Robert Spalding, "Storage Networks:The Complete Reference", Tata McGraw Hill, New Delhi, 2006.	
2.	Somasundaram G, Alok Shrivastava, "ISM—Storing, Managing and Protecting Digital Information", EMC Education Services, Wiley India, New Delhi, 2012.	
REFERENCE(S)		
1.	Gerald J Kowalski, Mark T May bury, "Information Storage and Retrieval Systems:Theory and Implementation", B S Publications, New Delhi, 2009.	
2.	Marc Farley Os borne, "Building Storage Networks", Tata McGraw Hill, New Delhi, 2001	
3.	Meeta Gupta, "Storage Area Network Fundamentals", Pearson Education, New Delhi, 2002.	

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Department	INFORMATION TECHNOLOGY					R2019	Semester IV	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ITP12	OBJECT ORIENTED ANALYSIS AND DESIGN	3	0	0	3	45	100	
Course Objective (s): The purpose of learning this course is to								
<ul style="list-style-type: none"> Understanding object basics, classes and objects, Inheritance How software objects are altered to build software systems that are more robust. Gaining competence in OOAD and understand the issues and options in reuse. 								
Course Outcomes: At the end of this course, learners will be able to:								
<ul style="list-style-type: none"> Learn about Object relationship. Analyze UML and Unified process Learn Object oriented analysis understand the basic of objects and classes and extract and refine classes, identify use 								
Unit I	INTRODUCTION						9	
Object-Oriented Programming Languages and the object-oriented model, Object-oriented analysis, design, and implementation, Objects and Classes, Messages and Interfaces, Inheritance and Polymorphism. Unified Methodology: Types of models: Unified Modeling Language (UML) views and basic features, Object-oriented design methodologies, the rational unified process, Object-oriented CASE tools								
Unit II	OBJECT ORIENTED ANALYSIS						9	
Extracting entity classes - Initial dynamic model - Extracting control classes- refining use cases - incrementing the class diagram - Initial dynamic model - MSG Foundation case study revising the entity classes- Extracting - USE case realization - MSG Foundation case study incrementing the class diagram - more on use cases - risk analysis								
Unit III	DESIGN WORKFLOW						9	
Design workflow - format of the attributes - allocation of operations - Osbert Oglesby case study - Workflows of the unified process - Phases of the unified process - class diagrams - Use case diagrams - Interaction diagrams - state charts - package diagrams - Deployment diagrams.								
Unit IV	CLASSES AND CLASS MODELS IN UML						9	
Class models and diagrams, Attributes and operations, Association and whole-part relationships, Aggregation and composition, Roles, navigability, and constraints, Generalization and inheritance relationships, Dependency, Qualified and derived associations, Association classes, Properties, tagged values, and Stereotypes, Abstract classes and Parameterized classes.								
Unit V	TEST AUTOMATION						9	
Quality issues - Non execution based testing - execution based testing - cost benefit analysis - risk analysis - Improving the process - Metrics - CPM/PERT - Choice of programming language - Reuse case studies - Portability - planning and estimating duration and cost - testing the project management								
TEXTBOOK(S)								
1.	Bennett, S., "Schuam's Outline of UML". New York: McGraw-Hill, 2004.							
2.	Grady Booch- Object Oriented Analysis and design - Addison Wesley, 2007							
REFERENCE(S)								
1.	Rum Baugh, J, Blaha. M. Premerlani, W, Eddy F and Loesen W, "Object Oriented Modeling							
2.	Coad P, Yourdon E., "Object Oriented Analysis", Second Edition, Yourdon Press, 1991							

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Department	INFORMATION TECHNOLOGY					R2019	SemesterVI	PE
Course Code	Course Name	Hours /Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ITP13	SERVICEORIENTEDARCHITECTURE	3	0	0	3	45	100	
Course Objective(s): The purpose of learning this course is to <ul style="list-style-type: none"> • Learn XML fundamentals. • Be exposed to build applications based onXML. • Understand the key principles behind SOA. • Be familiar with the web services technology elements for realizing SOA. • Learn the various web service standards. 								
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> • Design,develop and test Web Services • Build applications based on XML. • Learn standards related to Web Services. • Evaluate emerging and proposed standards for the main components of Web Services architectures • Build SOA-based applications for intra-enterprise and inter-enterprise applications. 								
Unit I	INTRODUCTION TO XML						9	
XML Document Structure–Well Formed and Valid Documents–Name spaces–DTD–XML Schema–X-Files								
Unit II	BUILDING XML-BASED APPLICATIONS						9	
Parsing XML–using DOM, SAX–XMLTransformation and XSL–XSL Formatting–Modeling Databases in XML.								
Unit III	SERVICE ORIENTED ARCHITECTURE						9	
Characteristics of SOA,Comparing SOA with Client-Server and Distributed Architectures–Benefits of SOA –Principles of Service Orientation–Service Layers.								
Unit IV	WEB SERVICES						9	
Service Descriptions–WSDL–Messaging with SOAP–Service Discovery–UDDI–Message Exchange Patterns–Orchestration–Choreography–WS Transactions.								
Unit V	BUILDING SOA-BASED APPLICATIONS						9	
Service Oriented Analysis and Design–Service Modeling–Design Standards and Guidelines–Composition–WS-BPEL–WS-Coordination–WS-Policy–WS-Security–SOA support in J2EE								
TEXTBOOK(S)								
1.	Ron Schmelzer et al.“XMLandWebServices”,Pearson Education,2002.							
2.	Thomas Erl, “Service Oriented Architecture: Concepts, Technology, and Design”,Pearson Education, 2016.							


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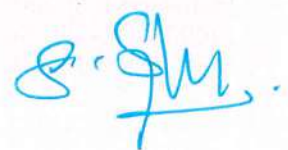
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Department	INFORMATION TECHNOLOGY				R2019	Semester V	PE
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P			
19ITP14	WEB SERVICES PROGRAMMING AND XML	3	0	0	3	45	100
<p>Course Objective(s): The purpose of learning this course is to</p> <ul style="list-style-type: none"> • Be able to understand and write well-formed XML documents • Be able to write the schema for the given XML documents in both DTD and XML Schema languages • Learn the XML Technologies and modeling databases in XML • Provide an overview of Service Oriented Architecture and the importance of Web services • Be able to create, deploy and call Web Services 							
<p>Course Outcomes:</p> <p>At the end of this course, learners will be able to</p> <ul style="list-style-type: none"> • Understand Web Services and its Infrastructure • Impart knowledge in XML technologies to build robust XML applications • Familiarize with concepts of SOA, standards and technologies for building the Web Services • Use the approaches for providing security for XML documents and the messages exchanged among Web Services • Deploying and Publishing Web Service 							
Unit I	XML TECHNOLOGY						9
XML – benefits – Advantages of XML over HTML, EDI, Databases – XML based Standards – Structuring with Schemas – DTD – XML Schemas – XML processing – DOM – SAX – Presentation Technologies – XSL – XFORMS – XHTML – Transformation – XSLT – XLINK – XPATH – XQuery.							
Unit II	ARCHITECTURE OF WEB SERVICES						9
Business Motivations for Web Services – B2B – B2C – Technical Motivations – limitations of Corba and Dcom – Service-Oriented Architecture (SOA) – Architecting Web Services – Implementation View – Web Services Technology Stack – Logical View – Composition of Web Services – Deployment View – From Application server to peer to peer – Process View – Life in the run time.							
Unit III	WEB SERVICES BUILDING BLOCKS						9
Transport Protocols for Web Services – Messaging with Web Services – Protocols – SOAP – Describing Web Services – WSDL – Anatomy of WSDL – Manipulating WSDL – Web Service Policy – Discovering Web Services – UDDI – Anatomy of UDDI – Web Service Inspection – Ad-Hoc Discovery – Securing Web Services							
Unit IV	IMPLEMENTING XML IN E - BUSINESS						9
B2B – B2C Applications – Different types of B2B Interaction – Components of E-Business XML Systems – eb XML – Rosetta Net – Applied XML in vertical industry – Web Services for Mobile Devices							
Unit V	XML CONTENT MANAGEMENT AND SECURITY						9
Semantic Web – Role of Meta data in Web Content-Resource Description Framework – RDF Schema – Architecture of Semantic Web – Content Management Workflow – XLANG – WSFL – Securing Web Services							



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TEXTBOOK(S)	
1.	Ron Schmelzer et al. "XML and WebServices", Pearson Education, 2002.
2.	Keith Ballinger, ".NET Web Services Architecture and Implementation", Pearson Education, 2003.
REFERENCE(S)	
1.	David Chappell, "Understanding .NET A Tutorial and Analysis", Addison Wesley, 2002.
2.	Kennard Scibner and Mark C. Stiver, " Understanding SOAP", SAMS publishing 2000.
3.	Alexander Nakhimovsky and Tom Myers, "XML Programming : Web Applications and Web Services with JSP and ASP", A press, 2002.



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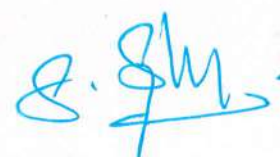
Department	INFORMATIONTECHNOLOGY					R2019	SemesterVII	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ITP15	SOFTWARE TESTING	3	0	0	3	45	100	
Course Objective (s): The purpose of learning this course is to								
<ul style="list-style-type: none"> To learn the criteria for test cases. To learn the design of test cases. To understand test management and test automation techniques To apply test metrics and measurements. 								
Course Outcomes: At the end of this course, learners will be able to:								
<ul style="list-style-type: none"> Develop Quality plans and use SQA components in project life cycle. Analyze the product Quality. Judge the use of infrastructure components and use configuration items for Quality control Use various testing methods and verify Assess Quality standards of various software products 								
Unit I	INTRODUCTION						9	
Testing as an Engineering Activity – Testing as a Process – Testing Maturity Model - Testing axioms – Basic definitions – Software Testing Principles – The Tester's Role in a Software Development Organization – Origins of Defects – Cost of defects – Defect Classes – The Defect Repository and Test Design – Defect Examples – Developer / Tester Support of Developing a								
Unit II	TEST CASE DESIGN						9	
Test case Design Strategies – Using Black Box Approach to Test Case Design –Boundary Value Analysis – Equivalence Class Partitioning – State based testing – Cause-effect graphing – Compatibility testing – user documentation testing – domain testing – Random Testing – Requirements based testing –Using White Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing –Control Flow Graphs –Additional White Box Testing Approaches - Evaluating Test Adequacy Criteria.								
Unit III	LEVELS OF TESTING						9	
Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination System Testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Ad-hoc testing – Alpha, Beta Tests – Testing OO systems – Site testing								
Unit IV	TEST AMANAGEMENT						9	
Testing services – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process – Reporting Test Results –Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group – The structure of Testing Group – The Technical Training Program.								
Unit V	TEST AUTOMATION						9	
Software test automation – skill needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation – Test metrics and measurements – Software testing tools								

TEXTBOOK(S)	
1.	Daniel Galin, "Software Quality Assurance – from Theory to Implementation" Pearson Education, First Edition, 2014.
2.	Yogesh Singh, "Software Testing", Cambridge University Press, 2012
REFERENCE(S)	
1.	Aditya Mathur, "Foundations of Software Testing", Pearson Education, 2011.
2.	Ron Patton, "Software Testing" , Second Edition, Pearson Education, Second Edition, 2007
3.	Srinivasan Desikan, Gopaldaswamy Ramesh, "Software Testing – Principles and Practices", Pearson Education, 2009.
4.	Alan C Gillies, "Software Quality Theory and Management", Cengage Learning, Second Edition, 2003



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Department	INFORMATION TECHNOLOGY				R2019	Semester VII	PC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP16	HIGH PERFORMANCE COMPUTING	3	0	1	4	45	100
Course Objective(s):							
The purpose of learning this course is							
<ul style="list-style-type: none"> Introduce students the design, analysis, and implementation, of high performance computational science and engineering applications. Illustrate on advanced computer architectures, parallel algorithms, parallel languages, and performance-oriented computing. 							
Course Outcomes:							
At the end of this course, learners will be able							
<ul style="list-style-type: none"> Illustrate the key factors affecting performance of CSE applications. Illustrate mapping of applications to high-performance computing systems. Apply hardware/software co-design for achieving performance on real-world applications. 							
Unit I	INTRODUCTION: COMPUTATIONAL SCIENCE AND ENGINEERING						9
Computational Science and Engineering Applications; characteristics and requirements, Review of Computational Complexity, Performance: metrics and measurements, Granularity and Partitioning, Locality: temporal/spatial/stream/kernel, Basic methods for parallel programming, Real-world case studies (drawn from multiscale, multi-discipline applications)							
Unit II	HIGH-END COMPUTER SYSTEMS						9
Memory Hierarchies, Multi-core Processors: Homogeneous and Heterogeneous, Shared-memory Symmetric Multiprocessors, Vector Computers, Distributed Memory Computers, Supercomputers and Petascale Systems, Application Accelerators / Reconfigurable Computing, Novel computers: Stream, multithreaded, and purpose							
Unit III	PARALLEL ALGORITHMS						9
Parallel models: ideal and real frameworks, Basic Techniques: Balanced Trees, Pointer Jumping, Divide and Conquer, Partitioning, Regular Algorithms: Matrix operations and Linear Algebra, Irregular Algorithms: Lists, Trees, Graphs, Randomization: Parallel Pseudo-Random Number Generators, Sorting, Monte Carlo techniques							
Unit IV	PARALLEL PROGRAMMING						9
Revealing concurrency in applications, Task and Functional Parallelism, Task Scheduling, Synchronization Methods, Parallel Primitives (collective operations), SPMD Programming (threads, OpenMP, MPI), I/O and File Systems, Parallel Matlabs (Parallel Matlab, Star-P, Matlab MPI), Partitioning Global Address Space (PGAS) languages (UPC, Titanium, Global Arrays)							
Unit V	ACHIEVING PERFORMANCE						9
Measuring performance, Identifying performance bottlenecks, Restructuring applications for deep memory hierarchies, Partitioning applications for heterogeneous resources, using existing libraries, tools, and frameworks							



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TEXTBOOK(S)	
1.	Introduction to Parallel Computing, AnanthGrama, Anshul Gupta, George Karypis, and Vipin Kumar, 2nd edition, Addison-Welsey, 2003.
2.	Petascale Computing: Algorithms and Applications, David A. Bader (Ed.), Chapman & Hall/CRC Computational Science Series, 2007.
REFERENCE(S)	
1.	Grama, A. Gupta, G. Karypis, V. Kumar, An Introduction to Parallel Computing, Design and Analysis of Algorithms: 2/e, Addison-Wesley, 2003.
2.	G.E. Karniadakis, R.M. Kirby II, Parallel Scientific Computing in C++ and MPI: A Seamless Approach to Parallel Algorithms and their Implementation, Cambridge University Press,2003.
3.	Wilkinson and M. Allen, Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers, 2/E, Prentice Hall, 2005.
4.	. M.J. Quinn, Parallel Programming in C with MPI and OpenMP, McGraw-Hill, 2004.



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Department	INFORMATIONTECHNOLOGY				R2019	SemesterVII	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP17	GREEN COMPUTING	3	0	0	3	45	100
Course Objective (s):							
The purpose of learning this course is to							
<ul style="list-style-type: none"> • learn the fundamentals of Green Computing. • analyse the Green Computing Grid Framework. • understand the issues related with Green compliance. • study and develop various case studies. 							
Course Outcomes:							
At the end of this course, learners will be able to:							
<ul style="list-style-type: none"> • Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment. • Enhance the skill in energy saving practices in their use of hardware. • Evaluate technology tools that can reduce paper waste and carbon footprint by the stakeholders. • Understand the ways to minimize equipment disposal requirements 							
Unit I	FUNDAMENTALS						9
Green IT Fundamentals: Introduction-Business, IT, and the Environment – Applying IT for enhancing Environmental sustainability, Green IT Standards and Eco-Labeling of IT, Enterprise Green IT strategy-Green Data center							
Unit II	GREEN DEVICES AND MODELING						9
Green Devices-Introduction, Life Cycle of a device or hardware, Reuse, Recycle and Dispose. – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.							
Unit III	GRID SOFTWARE AND ENTERPRISE						9
Green Software: Introduction, Energy-saving software techniques, Evaluating and Measuring software Impact to platform power. Enterprise:Introduction, Enterprise Greening, Information systems in Greening Enterprises, Green Issues-Virtualization of IT systems – Materials recycling – Best ways for Green PC – Green Grid framework.							
Unit IV	GREEN IT						9
Introduction, Implementation of Green IT, Information Assurance, Communication and Social media-Socio-cultural aspects of Green IT –Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future.							
Unit V	CASE STUDIES						9
A seven-step approach to creating green IT strategy, Research and Development Directions-Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.							

TEXTBOOK(S)	
1.	BhuvanUnhelkar, ?Green IT Strategies and Applications-Using Environmental Intelligence, CRC Press, June 2014.
2.	Woody Leonhard, Katherine Murray, ?Green Home computing for dummies, August 2012
REFERENCE(S)	
1.	John Lamb, The Greening of IT, Pearson Education, 2009.
2.	Jason Harris, ?Green Computing and Green IT- Best Practices on regulations & industry, Lulu.com, 2008
3.	Carl speshocky, ? Empowering Green Initiatives with IT, John Wiley & Sons, 2010.
4.	Wu Chun Feng (editor), ?Green computing: Large Scale energy efficiency, CRC Press

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Department	INFORMATION TECHNOLOGY				R2019	Semester VII	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P			
19ITP18	DIGITAL SIGNAL PROCESSING	3	0	0	100	45	100
Course Objective (s):							
The purpose of learning this course is to							
<ul style="list-style-type: none"> To provide background and fundamental material for the analysis and processing of digital signals. To familiarize the relationships between filtering and frequency techniques To study the fundamentals of Image restoration To study the designs and structures of image color processing techniques 							
Course Outcomes:							
At the end of this course, learners will be able to:							
CO1: Memorize the different types of signals and systems							
CO2: Understand the significance of various digital filter structure							
CO3: Know to image restoration techniques							
CO4: Apply the knowledge of image color processing techniques in the real time applications							
CO5: Understand the various segmentation techniques							
Unit I	INTENSITY TRANSFORMATIONS AND SPATIAL FILTERING						9
Digital Image Fundamentals -Basic Relationship between Pixels - Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system-Simple image formation model, image sampling and quantization, basic relationships between pixels							
Unit II	FILTERING IN FREQUENCY DOMAIN						9
Basics of Filtering in the Frequency Domain - Image Smoothing using Frequency Domain Filters - Image Sharpening using Frequency Domain Filters - Selective Filtering							
Unit III							9
Model of the Image Degradation/Restoration Process - Noise Models - Restoration using Spatial Filtering - Noise Reduction by Frequency Domain Filtering – Inverse Filtering - Wiener Filtering – Constrained Least Mean Square Filtering - Geometric Mean Filter							
Unit IV							9
Image Compression: Fundamentals, Basics of Full-Color Image Processing – Color Transformations – Smoothing and Sharpening, image compression models, error-free compression, Morphological Image Processing: Preliminaries, dilation, erosion, open and closing, hit or miss transformation, basic morphologic algorithms							
Unit V							9
Fundamentals - Point, Line, and Edge Detection - Thresholding - Region-Based Segmentation							
TEXTBOOK(S)							
1.	R.C. Gonzalez and R.E. Woods, "Digital Image Processing", Fourth edition, Prentice Hall, 2018.						
REFERENCE(S)							
1.	William K Pratt, "Digital Image Processing", John Willey, 2001						
2.	A.K. Jain, "Fundamentals of Digital Image Processing", PHI, New Delhi, 2003						
3.	Milan Sonka, et.al, "Image Processing, Analysis and Machine Vision", Fourth edition, PWS Publishing, 2013.						



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Department	INFORMATION TECHNOLOGY					R2019	Semester VII	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ITP19	INFORMATION RETRIEVAL	3	0	0	3	45	100	
Course Objective (s): The purpose of learning this course is to <ul style="list-style-type: none"> To understand the importance and need of information retrieval system To learn to evaluate information retrieval systems To learn about text similarity measure and Vector model To be exposed to Link Analysis. To Understanding about search engine 								
Course Outcomes: At the end of this course, learners will be able to: CO1 : Apply information retrieval models CO2 : Performance evaluation metric for IR CO3 : Apply document text mining techniques and Vector model CO4 : Use Link Analysis CO5 : Design web search engine								
Unit I	INTRODUCTION						9	
Definition - Objectives - Relationship to DBMS - Information versus Data Retrieval – The Software Architecture of the IR System – Digital Libraries and Data Warehouses - Information Retrieval System Capabilities - Search - Browse -Miscellaneous.								
Unit II	INDEX CONSTRUCTION						9	
Indexing Process - Automatic Indexing - Information Extraction - Stemming Algorithms - Inverted File Structures - Blocked sort-based indexing - Distributed indexing - Dynamic indexing - Statistical properties of terms in IR - Dictionary compression								
Unit III	VECTOR SPACE MODEL AND EVALUATION						9	
Term frequency and weighting - Vector space model - Queries as vectors - Computing vector scores - IR system evaluation - Standard text collections - Evaluation of unranked and ranked retrieval sets								
Unit IV	USER SEARCH TECHNIQUES						9	
Search Statements and Binding - Similarity Measures and Ranking - Relevance Feedback - Selective Dissemination of Information Search - Weighted Searches of Boolean Systems - Searching the Internet and Hypertext - information Visualization Technologies.								
Unit V	WEB SEARCH						9	
Web characteristics - Search user experience - Index size and estimation - Near-duplicates and shingling - Web crawler features and architecture - URL frontier - Link analysis - Web as a graph - PageRank algorithm - Hubs and authorities								


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TEXTBOOK(S)	
1.	Manning C, Raghavan P, Schutze H , "Introduction to Information Retrieval", Cambridge University Press, New Delhi, 2008
2.	Ricardo Baeza-Yates, Berthier Ribeiro-Neto , "Modern Information Retrieval: The Concepts and Technology behind Search", Addison Wesley, USA, 2011.
REFERENCE(S)	
1.	Bruce Croft W, Metzler D, StrohmanT , "Search Engines: Information Retrieval in Practice", Addison Wesley, USA, 2009.
2.	Gerald 'K , "Information Retrieval Architecture and Algorithms", Springer, Heidelberg, 2013.
3.	Stefan Büttcher, Charles L. A. Clarke, Gordon V. Cormack , "Information Retrieval: Implementing and Evaluating Search Engines", MIT Press, Cambridge, USA, 2016.
4.	Hang Li , "Learning to Rank for Information Retrieval and Natural Language Processing", 2nd Edition, Morgan & Claypool Publishers, USA, 2014.



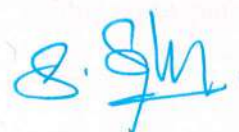
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Department	INFORMATION TECHNOLOGY					R2019	Semester VII	PE
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ITP20	MULTICORE AND COMPUTING COMMUNICATION SYSTEMS	3	0	0	3	45	100	
Course Objective(s):								
The purpose of learning this course is to								
<ul style="list-style-type: none"> To understand the need for multi-core processors, and their architecture. To understand the challenges in parallel and multi-threaded programming. To learn about the various parallel programming paradigms, To develop multicore programs and design parallel solutions. 								
Course Outcomes:								
At the end of this course, learners will be able to:								
<ul style="list-style-type: none"> Describe multicore architectures and identify their characteristics and challenges. Identify the issues in programming Parallel Processors. Write programs using OpenMP and MPI. Design parallel programming solutions to common problems. Compare and contrast programming for serial processors and programming for parallel processors. 								
Unit I	INTRODUCTION TO MULTI CORE						9	
Single core to Multi-core architectures – SIMD and MIMD systems – Interconnection networks – Symmetric and Distributed Shared Memory Architectures – Cache coherence – Performance Issues – Parallel program design.								
Unit II	PARALLEL PROGRAM CHALLENGES						9	
Performance – Scalability – Synchronization and data sharing – Data races – Synchronization primitives (mutexes, locks, semaphores, barriers) – deadlocks and livelocks – communication between threads (condition variables, signals, message queues and pipes).								
Unit III	OpenMP PROGRAMMING						9	
OpenMP Execution Model – Memory Model – OpenMP Directives – Work-sharing Constructs – Library functions – Handling Data and Functional Parallelism – Handling Thread Loops and Overheads - Performance Considerations.								
Unit IV	MPI PROGRAMMING						9	
MPI program execution – MPI constructs – libraries – Data Decomposition- MPI send and receive – Point-to-point and Collective communication – MPI derived datatypes – Performance evaluation								
Unit V	MULTITHREADED PROGRAM DEVELOPMENT						9	
Case studies - n-Body solvers – Tree Search – OpenMP and MPI implementations and comparison – Performance Tuning								

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TEXTBOOK(S)	
1.	Peter S. Pacheco, —An Introduction to Parallel Programming, Morgan-Kauffman/Elsevier, 2011.
2.	Darryl Gove, —Multicore Application Programming for Windows, Linux, and Oracle Solaris, Pearson, 2011 (unit 2)
REFERENCE(S)	
1.	Michael J Quinn, —Parallel programming in C with MPI and OpenMP, Tata McGraw Hill, 2014.
2.	Victor Alessandrini, Shared Memory Application Programming, 1 st Edition, Concepts and Strategies in Multicore Application Programming, Morgan Kaufmann, 2015.
3.	Yan Solihin, Fundamentals of Parallel Multicore Architecture, CRC Press, 2015.
4.	Shameem Akhter and Jason Roberts, "Multi-core Programming", Intel Press, 2010.



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Department	INFORMATION TECHNOLOGY				R2019	Semester IV	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP21	ARTIFICIAL INTELLIGENCE	3	0	0	3	45	100
Course Objective (s): The purpose of learning this course is to							
<ul style="list-style-type: none"> To gain a characteristic perspective of AI and its foundations. To become familiar with basic principles of AI towards problem solving using various search algorithms To learn to represent knowledge in solving AI problems, inference and perception, To know the overview of machine learning algorithms both supervised and unsupervised and introduction to learning. 							
Course Outcomes: At the end of this course, learners will be able to:							
CO1: Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.							
CO2: Apply basic principles of AI in solutions that require problem solving.							
CO3: Provide the appropriate and a fundamental understanding to solve AI problems							
CO4: Learn how to analyze the complexity of a given problem and come with suitable optimizations.							
CO5: Learn to design applications for NLP that make use of AI							
Unit I	FUNDAMENTALS OF AI						9
Artificial Intelligence: Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Non AI and AI techniques, Applications of Artificial Intelligence, Structure of Agents, Intelligent Agents, Structure of Intelligent Agents -Rationality-Nature of Environments- Example							
Unit II	PROBLEM SOLVING AGENTS						9
Searching for solutions: Uninformed search - BFS, DFS, Uniform cost search, Iterative deepening search - Informed Search - Greedy Best First search, A* search, AO* search - Games - Optimal decisions in Games, alpha - beta pruning							
Unit III	KNOWLEDGE AND REASONING						9
Propositional logic, Theory of First order logic, Inference in First order logic, Forward & Backward chaining, Resolution - Probabilistic Reasoning: Representing knowledge in uncertain domain - Bayesian Networks - Hidden Markov Models (HMM)							
Unit IV	PLANNING AND LEARNING						9
Algorithms for Planning as state space search - Planning Graphs - Learning: Forms of learning - supervised learning, unsupervised learning, reinforcement learning - Reinforcement learning task - Q							
Unit V	APPLICATIONS						9
Principles of Natural Language Processing - Rule Based Systems Architecture - AI application to robotics - Current trends in Intelligent Systems							
TEXTBOOK(S)							
1.	Stuart J Russell and Peter Norvig , "Artificial Intelligence – A Modern Approach", 3rd Edition, Prentice Hall of India/ Pearson Education, New Delhi, 2018.						
2.	Elaine Rich, Kevin Knight and Shivashankar B Nair , "Artificial Intelligence", 3rd Edition, Tata McGraw Hill Publishing Company, New Delhi, 2017.						

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REFERENCE(S)	
1.	George F Luger, "Artificial Intelligence: Structures and Strategies for Complex Problem Solving", 5th Edition, Pearson Education, New Delhi, 2017.
2.	Nils J Nilsson, "Principles of Artificial Intelligence", Narosa Publishing House, New Delhi, 2002.
3.	Patrick Henry Winston, "Artificial Intelligence", 3rd Edition, Pearson Education, New Delhi, 2013.
4.	Husain, Amir. The sentient machine: The coming age of Artificial Intelligence. Simon and Schuster, 2017.
5.	Kaplan, Jerry. Artificial intelligence: What everyone needs to know. Oxford University Press, 2016.



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Department	INFORMATION TECHNOLOGY				R2019	SemesterVII	PE
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP22	R PROGRAMMING	3	0	0	3	45	100

Course Objective(s):

The purpose of learning this course is

- To understand the basics in R programming in terms of constructs , control statements, string functions
- To learn to apply R programming for Text processing
- To understand the use of R Big Data analytics
- To able to appreciate and apply the R programming from a statistical perspective

Course Outcomes:

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

- Create artful graphs to visualize complex data sets and functions
- Write more efficient code using parallel R and vectorization
- Interface R with C/C++ and Python for increased speed or functionality
- Find new packages for text analysis, image manipulation
- Perform statistical analysis of the same

Unit I | INTRODUCING TO R

9

R Data Structures – Help functions in R – Vectors – Scalars – Declarations – recycling – Common Vector operations – Using all and any – Vectorized operations – NA and NULL values – Filtering – Vectorised if-then-else – Vector Equality – Vector Element names

Unit II | MATRICES, ARRAYS AND LISTS

9

Creating matrices – Matrix operations – Applying Functions to Matrix Rows and Columns – Adding and deleting rows and columns – Vector/Matrix Distinction – Avoiding Dimension Reduction – Higher Dimensional arrays – lists – Creating lists – General list operations – Accessing list components and Values – applying functions to lists – recursive lists

Unit III | DATA FRAMES

9

Creating Data Frames – Matrix-like operations in frames – Merging DataFrames – Applying functions to Data frames – Factors and Tables – factors and levels – Common functions used with factors – Working with tables - Other factors and table related functions - Control statements – Arithmetic and Boolean operators and values – Default values for arguments - Returning Boolean values – functions are objects – Environment and Scope issues – Writing Upstairs - Recursion – Replacement functions – Tools for composing function code – Math and Simulations in R

Unit IV | OOP

9

S3 Classes – S4 Classes – Managing your objects – Input/Output – accessing Keyboard and Monitor – reading and writing files – accessing the internet – String Manipulation – Graphics – Creating Graphs – Customizing Graphs – Saving graphs to files – Creating three-dimensional plots


Unit V | INTERFACING

9

Interfacing R to other languages – Parallel R – Basic Statistics – Linear Model – Generalized Linear models – Non-linear models – Time Series and Auto-correlation – Clustering

TEXTBOOK(S)

1. Norman Matloff, "The Art of R Programming : A Tour of Statistical Software Design", No Starch Press, 2011
2. Jared P. Lander, "R for Everyone : Advanced Analytics and Graphics", Addison-Wesley Data & Analytics Series, 2013.


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REFERENCE(S)	
1.	Mark Gardener, "Beginning R-The Statistical Programming Language", Wiley, 2013
2.	Robert Knell, "Introductory R: A Beginner's Guide to Data Visualization, Statistical Analysis and Programming in R", Amazon Digital South Asia Services Inc, 2013.



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Department	INFORMATION TECHNOLOGY				R2019	SemesterVII	PE
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP23	BLOCK CHAIN TECHNOLOGY	3	0	0	3	45	100
Course Objective(s):							
The purpose of learning this course is to							
<ul style="list-style-type: none"> • learn the basic models of Block Chain. • study the functions and challenges in crypto currency domain. • Design, build, and deploy smart contracts using bitcoin and Ethereum. • Have a knowledge on various Consensus Algorithms. • Explore the significance of a hyperledger 							
Course Outcomes:							
At the end of this course, learners will be able to:							
<ul style="list-style-type: none"> • understand emerging abstract models for Block Chain Technology. • experiment with cryptocurrency trading and crypto exchanges • Develop smart contracts using Bit Coin and Ethereum. • Secure distributed ledgers through consensus. • build the Hyperledger architecture and the consensus mechanism applied in the hyperledger. 							
Unit I	INTRODUCTION TO BLOCK CHAIN						9
What is Block Chain? Blockchain Technology Mechanisms & Networks, Blockchain Origins, Objective of Blockchain, Blockchain Challenges, Transactions And Blocks, P2P Systems, Keys As Identity, Digital Signatures, Hashing, and public key cryptosystems, private vs. public Blockchain. Merkle Tree, Life of Block Chain Mechanisms.							
Unit II	CRYPTOCURRENCY						9
History, A basic crypto currency, Creation of coin, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin Payments and double spending, FORTH – the precursor for Bitcoin scripting, Bitcoin Scripts , Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay, Consensus introduction, Distributed consensus in open environments-Consensus in a Bitcoin network							
Unit III	BITCOIN & ETHERUM						9
Bitcoin: history- Bitcoin- usage, storage, selling, transactions, working- Invalid Transactions Parameters that invalidate the transactions- Scripting language in Bitcoin- Applications of Bitcoin script- Nodes and network of Bitcoin- Bitcoin ecosystem Ethereum: Ethereum network, EVM, Transaction fee, Mist Browser, Ether, Gas, Solidity, Smart contracts, Truffle-Design and issue Crypto currency, Mining, DApps, DAO							
Unit IV	DISTRIBUTED CONSENSUS						9
Bitcoin Consensus, Proof of Work (PoW)- HashcashPoW , Bitcoin PoW, Attacks on PoW , monopoly problem- Proof of Stake- Proof of Burn - Proof of Elapsed Time - Bitcoin Miner, Mining Difficulty, Mining Pool-Permissioned model and use cases, Design issues for Permissioned Blockchains, Execute contracts- Consensus models for permissioned blockchain-Distributed consensus in closed environment-Paxos							
Unit V	HYPERLEDGER						9
Hyperledger Architecture- Consensus- Consensus & its interaction with architectural layers Application programming interface- Application model -Hyperledger frameworks- Hyperledger Fabric -Various ways to create Hyperledger Fabric Blockchain network- Creating and Deploying a business network on Hyperledger Composer Playground- Testing the business network definition- Transferring the commodity between the participants							
TEXTBOOK(S)							

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2023 - 2024
2023 - 2024

1.	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.
2.	Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and Cryptocurrency, IEEE Symposium on security and Privacy, 2015
REFERENCE(S)	
1.	Mastering Bitcoin: Unlocking Digital Cryptocurrencies, by Andreas M Antonopoulos 2018
2.	DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger,"Yellow paper.2014
3.	Antonopoulos, Mastering Bitcoin: Programming the Open Block Chain,O Reilly, 2017
4.	https://www.coursera.org/learn/ibm-blockchain-essentials-for-developers
5.	https://museblockchain.com/



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Department	INFORMATION TECHNOLOGY				R2019	SemesterVII	PC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP24	EMBEDDED SYSTEM	3	0	1	4	45	100
Course Objective(s):							
The purpose of learning this course is							
<ul style="list-style-type: none"> • To understand the concepts of embedded system design and analysis. • To become familiar with the embedded hardware. • To be exposed to the basic concepts of embedded programming • To learn the real time operating systems. • To design an embedded system and to develop programs using C. 							
Course Outcomes:							
At the end of this course, learners will be able							
<ul style="list-style-type: none"> • To analyse and design embedded systems concept. • To understand embedded system hardware. • Outline the concepts of embedded systems. • Explain the basic concepts of real time operating system design. • Illustrate the code for constructing a system. 							
Unit I	INTRODUCTION TO EMBEDDED COMPUTING						9
Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Instruction sets preliminaries - Design methodologies- Design flows – Requirement Analysis – Specifications-System analysis and architecture design – Quality Assurance techniques -Designing with computing platforms – consumer electronics architecture – platform-level performance analysis.							
Unit II	REVIEW OF EMBEDDED HARDWARE						9
Terminology – Gates – Timing diagram – Memory – Microprocessor buses – Direct memory access – Interrupts – Built interrupts – Interrupts basis – Shared data problems – Interrupt latency - Embedded system evolution trends – Round-Robin – Round Robin with interrupt function – Rescheduling architecture – algorithm.							
Unit III	EMBEDDED PROGRAMMING						9
Components for embedded programs- Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.							
Unit IV	REAL TIME OPERATING SYSTEM						9
Task and Task states – Task and data – Semaphore and shared data operating system services – Message queues timing functions – Events – Memory management – Interrupt routines in an RTOS environment – Basic design using RTOS.							
Unit V	EMBEDDED C PROGRAMMING						9
Introduction-Creating hardware delays' using Timer 0 and Timer 1-Reading switches-Adding Structure to the code-Generating a minimum and maximum delay-Example: Creating a portable hardware delay- Timeout mechanisms-Creating loop timeouts-Testing loop timeouts- hardware timeouts-Testing a hardware timeout							

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TEXT BOOK(S):

1. Marilyn Wolf, —Computers as Components - Principles of Embedded Computing System Design, Third Edition —Morgan Kaufmann Publisher (An imprint from Elsevier), 2012.
2. Frank Vahid and Tony Gwargie, "Embedded System Design", John Wiley & sons, 2002.

REFERENCE (S):

1. Steve Heath, "Embedded System Design", Elsevier, Second Edition, 2004.



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Department	INFORMATION TECHNOLOGY				R2019	Semester VII	PC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P			
19ITP25	VIDEO ANALYTICS	3	0	1	4	45	100
Course Objective(s):							
The purpose of learning this course is							
<ul style="list-style-type: none"> To understand the need for video Analytics To understand the basic configuration of video analytics To understand the functional blocks of a video analytic system To get exposed to the various applications of video analytics 							
Course Outcomes:							
At the end of this course, learners will be able							
<ul style="list-style-type: none"> Design video analytic algorithms for security applications Design video analytic algorithms for business intelligence Design custom made video analytics system for the given target application 							
Unit I	INTRODUCTION TO VIDEO ANALYTIC COMPONENTS						9
Need for Video Analytics-Overview of video Analytics- Foreground extraction- Feature extraction-classifier - Preprocessing- edge detection- smoothing- Feature space-PCA-FLD-SIFT features							
Unit II	FOREGROUND EXTRACTION MODELS						9
Background estimation- Averaging- Gaussian Mixture Model- Optical Flow based- Image Segmentation- Region growing- Region splitting-Morphological operations- erosion-Dilation-Tracking in a multiple camera environment							
Unit III	CLASSIFIERS						9
Neural networks (back propagation) - Deep learning networks- Fuzzy Classifier- Bayesian classifier- HMM based classifier							
Unit IV	VIDEO ANALYTICS FOR SECURITY						9
Abandoned object detection- human behavioral analysis -human action recognition- perimeter security- crowd analysis and prediction of crowd congestion							
Unit V	ANALYSIS OF BUSINESS INTELLIGENCE & TRAFFIC MONITORING AND ASSISTANCE						9
Customer behavior analysis - people counting- Traffic rule violation detection- traffic congestion identification for route planning- driver assistance- lane change warning							
TEXT BOOK							
1. Graeme A. Jones (Editor), Nikos Paragios (Editor), Carlo S. Regazzoni (Editor) Video-Based Surveillance Systems: Computer Vision and Distributed Processing , Kluwer academic publisher, 2001.							
2. Nilanjan Dey (Editor), Amira Ashour (Editor) and Suvojit Acharjee (Editor), Applied Video Processing in Surveillance and Monitoring Systems (IGI global) 2016							
REFERENCE BOOKS							
1 Zhihao Chen (Author), Ye Yang (Author), Jingyu Xue (Author), Liping Ye (Author), Feng Guo (Author), The Next Generation of Video Surveillance and Video Analytics: The Unified Intelligent Video Analytics Suite, CreateSpace Independent Publishing Platform, 2014							
2 Caifeng Shan (Editor), Fatih Porikli (Editor), Tao Xiang (Editor), Shaogang Gong (Editor) Video Analytics for Business Intelligence, Springer, 2012							



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Department	INFORMATION TECHNOLOGY					R2019	Semester VII	PC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ITP26	EMBEDDED SECURITY	3	0	1	4	45	100	
Course Objective(s):								
The purpose of learning this course is to								
<ul style="list-style-type: none"> Understand concepts, issues, principles, and mechanisms in embedded systems security such as embedded security trends, software vulnerabilities, physical attacks and security policies; To provide a clear understanding on the basic concepts, Building Blocks of Embedded System To teach the fundamentals of Embedded processor Modeling , Bus Communication in processors, Input/output interfacing Obtain hands-on skills in securing practical embedded systems; Learn recent research advances in embedded systems security and prepare for graduate research in embedded systems security. 								
Course Outcomes:								
At the end of this course, learners will be able ,								
<ul style="list-style-type: none"> explore basic security systems to Embedded Systems apply cryptographic techniques to Embedded Systems analyze and implement the memory management mapping techniques develop certain applications for specific case studies explore research topics in security based Embedded Systems 								
Unit I	INTRODUCTION TO EMBEDDED SECURITY							9
Introduction to Embedded Security: Goals - Security in the product Life cycle - Attack and Threat Classifications- Practical Design Solutions - Embracing Embedded Systems Security: Introduction to embedded systems - Embedded system trends - Software Security: Buffer overflow exploits - Mitigation of buffer overflow attacks - Return-to-libc attack. Hardware Security: Hardware trojans - Intellectual property (IP) piracy and integrated circuit (IC) overbuilding - Side-channel analysis - Smart Home Security and Privacy: Vulnerability analysis - Countermeasures								
Unit II	EMBEDDED CRYPTOGRAPHY							9
Embedded Cryptography: Secret key cryptography - public key cryptography - hash functions - authentication techniques - etc. - Key management for embedded systems - Data Protection Protocols for Embedded Systems: Data-in-motion protocols: IP-based network security - Data-at-rest protocols								
Unit III	INTRODUCTION TO EMBEDDED SYSTEMS							9
Introduction to Embedded Systems –Structural units in Embedded processor, selection of processor & memory devices- DMA, Memory management methods- memory mapping, cache replacement concept, Timer and Counting devices, Watchdog Timer, Real Time Clock.								
Unit IV	EMBEDDED SYSTEM APPLICATION DEVELOPMENT							9
Objectives, different Phases & Modeling of the Embedded product Development Life Cycle (EDLC), Case studies on Smart card- Adaptive Cruise control in a Car -Mobile Phone software for key inputs. Design , Development of embedded Products like : Smart card -Adaptive Cruise control in a Car - Mobile Phone -Automated Robonoid								
Unit V	OTHER EMERGING RESEARCH TOPICS							9
Implantable medical device security - Security and privacy vulnerabilities of in-car wireless systems - RFID security - GPS spoofing and countermeasures - Wireless electronic warfare: jamming and anti-jamming techniques - Smart phone security								

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TEXT BOOK(S):

1. Peckol, "Embedded system Design", John Wiley & Sons, Second Edition, 2019.
2. Lyla B Das," Embedded Systems-An Integrated Approach", First Edition, Pearson, 2013.
3. Shibu. K.V, "Introduction to Embedded Systems", 2e, Mc graw Hill, 2017.

REFERENCE(S):

1. Raj Kamal, 'Embedded System-Architecture, Programming, Design', Mc Graw Hill, 2013.
2. C.R.Sarma, "Embedded Systems Engineering", University Press (India) Pvt. Ltd, 2013.
3. Tammy Noergaard, "Embedded Systems Architecture", Second Edition, Elsevier, 2012.
4. Han-Way Huang, "Embedded system Design Using C8051", First Edition, Cengage Learning, 2009.
5. Rajib Mall "Real-Time systems Theory and Practice" Pearson Education, 2006.



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Department	INFORMATION TECHNOLOGY				R2019	Semester VII	PC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP27	ROBOTICS	3	0	1	4	45	100
Course Objective(s): The purpose of learning this course is <ul style="list-style-type: none"> To understand the functions of the basic components of a Robot. To study the use of various types of End of Effectors and Sensors To impart knowledge in Robot Kinematics and Programming To learn Robot safety issues and economics. 							
Course Outcomes: At the end of this course, learners will be able <ul style="list-style-type: none"> apply the basic engineering knowledge for the design of robotics. impart knowledge on Drive Systems and Effectors implement sensors and image recognition techniques in Robo development develop simple programs for robotics apply safety measures for Robotics 							
Unit I	FUNDAMENTALS OF ROBOTS						6
Robot - Definition - Robot Anatomy - Co ordinate Systems, Work Envelope Types and Classification- Specifications-Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load- Robot Parts and their Functions-Need for Robots-Different Applications.							
Unit II	ROBOT DRIVE SYSTEMS AND END EFFECTORS						9
Pneumatic Drives-Hydraulic Drives-Mechanical Drives-Electrical Drives-D.C. Servo Motors, Stepper Motors, A.C. Servo Motors-Salient Features, Applications and Comparison of all these Drives, End Effectors-Grippers-Mechanical Grippers, Pneumatic and Hydraulic- Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingere and Three Fingere Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.							
Unit III	SENSORS AND MACHINE VISION						12
Requirements of a sensor, Principles and Applications of the following types of sensors- Position sensors - Piezo Electric Sensor, LVDT, Resolvers, Optical Encoders, pneumatic Position Sensors, Range Sensors Triangulations Principles, Structured, Lighting Approach, Time of Flight, Range Finders, Laser Range Meters, Touch Sensors ,binary Sensors., Analog Sensors, Wrist Sensors, Compliance Sensors, Slip Sensors, Camera, Frame Grabber, Sensing and Digitizing Image Data- Signal Conversion, Image Storage, Lighting Techniques, Image Processing and Analysis-Data Reduction, Segmentation, Feature Extraction, Object Recognition, Other Algorithms, Applications- Inspection, Identification, Visual Serving and Navigation.							
Unit IV	ROBOT KINEMATICS AND ROBOT PROGRAMMING						13



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Department	INFORMATION TECHNOLOGY				R 2019	Semester VII	PE
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P			
19ITP28	INFORMATION AND CODING THEORY	3	0	0	3	45	100
Course Objective (s): The purpose of learning this course is to <ul style="list-style-type: none"> To introduce information theory, the fundamentals of error control coding techniques and their applications, and basic cryptography. To provide a complementary U/G physical layer communications course to ECE4601 and ECE4606. This class will first introduce the basic concepts of information theory, leading to the channel capacity theorem. Afterwards, the course will consider error control coding techniques and applications. Finally, the basic concepts of cryptography will be introduced. 							
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Comprehend probability and statistics in Information Theory. Evaluate the performance of source coding algorithms such as Huffman, Arithmetic and dictionary techniques. Analyze BER performance with block codes Analyze BER performance with convolution codes in AWGN. Evaluate the performance of the communication system with Iterative decoding in AWGN for Turbo codes and LDPC codes. 							
Unit I	INFORMATION THEORY						10
Entropy, relative entropy and mutual information, channel capacity, Gaussian channel, Binary Symmetric Channel (BSC), Network information theory							
Unit II	SOURCE CODING						5
Lossless data compression, entropy coding, Huffman coding, Arithmetic coding, Shannon fano codes, Dictionary techniques, LZ77 and LZW techniques.							
Unit III	CHANNEL CODING						10
Channel capacity, Block codes, linear block codes, Hamming weight, Hamming bound, Maximum Likelihood (ML) detection, syndrome decoding, BCH and RS codes, Reed-Muller codes, soft-decision decoding algorithm and Network coding, Tradeoff between power and bandwidth.							
Unit IV	CONVOLUTION CODES						10
Viterbi decoding, state diagrams, Trellis diagram, catastrophic encoders, soft-decision decoding, Product codes, Trellis coded modulation.							
Unit V	ITERATIVE DECODING						10
Turbo codes, constituent encoder, Interleaver, Soft information, Low-Density Parity Check (LDPC) codes, MAP algorithms.							
TEXT BOOK(S):							
1.	T. M. Cover and J. A. Thomas, Elements of Information Theory, John Wiley, Second Edition, 2006.						
2.	S. Lin, D. J. Costello, Error Control Coding, Pearson Education, Second Edition, 2004.						
REFERENCE(S):							
1.	T. K. Moon, Error Correction Coding: Mathematical Methods and Algorithms, John Wiley, First Edition, 2005.						
2.	Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann, Fourth Edition, 2012.						



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Forward Kinematics, Inverse Kinematics and Difference; Forward Kinematics and Reverse Kinematics of manipulators with Two, Three Degrees of Freedom (in 2 Dimension), Four Degrees of freedom (in 3 Dimension) Jacobians, Velocity and Forces-Manipulator Dynamics, Trajectory Generator, Manipulator Mechanism Design-Derivations and problems. Lead through Programming, Robot programming Languages-VAL Programming-Motion Commands, Sensor Commands, End Effector commands and simple Programs.

Unit V	IMPLEMENTATION AND ROBOT ECONOMICS	5
RGV, AGV; Implementation of Robots in Industries-Variou Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.		
TEXT BOOK(S):		
1. Klaffer R.D., Chmielewski T.A and Negin M., "Robotic Engineering - An Integrated Approach", Prentice Hall, 2009.		
2. Groover M.P., "Industrial Robotics -Technology Programming and Applications", Second Edition, McGraw Hill, 2017.		
REFERENCE(S):		
1. Craig J.J., "Introduction to Robotics Mechanics and Control", Pearson Education, 2008.		
2. Deb S.R., "Robotics Technology and Flexible Automation" Tata McGraw Hill Book Co., 2005.		
3. Koren Y., "Robotics for Engineers", Mc Graw Hill Book Co., 1992.		
4. Janakiraman P.A., "Robotics and Image Processing", Tata McGraw Hill, 1995		
5. Rajput R.K., "Robotics and Industrial Automation", S.Chand and Company, Second Edition, 2008.		



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Department	INFORMATION TECHNOLOGY				R 2019	Semester VIII	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP29	SOFTWARE PROJECT AND QUALITY MANAGEMENT	3	0	0	3	45	100

Course Objectives:

The purpose of learning this course is

- To understand the Software Project Planning and Evaluation techniques.
- To plan and manage projects at each stage of the software development life cycle
- To manage software projects and control software deliverables
- To learn about the activity planning and risk management principles.
- to measure software quality and how to use measurements to improve the software development process.

Course Outcomes:

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

- Understand Project Management principles while developing software.
- Gain knowledge about the basic project management concepts, framework and the process models.
- Obtain adequate knowledge about software process models and software effort estimation techniques.
- Understand the project reporting structure, project progress and tracking mechanisms in project management.
- Estimate the risks involved in various project activities
- Analyze SQM process and evaluate the quality of a software product

Unit I	PROJECT EVALUATION AND PROJECT PLANNING	9
Introduction to Software Project Management – Software Projects – ways of categorizing software projects – problems with software projects – Project Life Cycle – Overview of Project Management activities; Software requirements and specifications – Stakeholders – Project Team – Step Wise:		
Unit II	PROJECT LIFE CYCLE AND EFFORT ESTIMATION	9
Software process and Process Models – Choice of Process models - mental delivery – Rapid Application development – Agile methods – Extreme Programming – SCRUM – Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points - COCOMO II A Parametric Productivity Model - Staffing Pattern.		
Unit III	SOFTWARE VALIDATION AND MAINTENANCE	9
Software validation: Validation planning; Testing fundamentals, including test plan creation and test case generation; Black-box and white-box testing techniques; Unit, integration, validation, and system testing; Object-oriented testing; Inspections. Software evolution: Software maintenance; Characteristics of maintainable software; Reengineering; Legacy systems; Software reuse.		
Unit IV	ACTIVITY PLANNING AND RISK MANAGEMENT	9

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Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical path (CRM) method – identifying critical activities – crashing and fast tracking – PERT technique – Monte Carlo simulation – Resource Allocation – Cost schedules.

Unit V	INFORMATION RETRIEVAL AND LEXICAL RESOURCES	9
Information Retrieval: Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – valuation Lexical Resources: World Net-Frame Net-Stemmers-POS Tagger- Research Corpora.		



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Department	INFORMATION TECHNOLOGY				R2019	SemesterVIII	PE
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP30	QUANTUM COMPUTING	3	0	0	3	45	100
Course Objective(s):							
The purpose of learning this course is to							
<ul style="list-style-type: none"> introduce the fundamentals of quantum computing understand the quantum computing paradigm study the principles of Various typical Quantum Algorithms understand the quantum error and its correction. 							
Course Outcomes:							
At the end of this course, learners will be able to:							
<ul style="list-style-type: none"> apply and formalize the basic concepts of Quantum Computing understand the fundamental differences between conventional computing and quantum computing. understand how quantum parallelism is used in the simplest quantum algorithms such as Deutsch, period finding and quantum Fourier transform . apply elementary operations to develop more sophisticated applications of quantum computing. Analyze and simulate the Quantum Computing methodologies with Error Correction Strategies 							
Unit I	BASIC CONCEPTS TO QUANTUM COMPUTING						9
Overview of traditional computing – Church-Turing thesis – circuit model of computation – reversible computation – quantum physics – quantum physics and computation – Dirac notation and Hilbert Spaces – dual vectors – operators – the spectral theorem – functions of operators – tensor products – Schmidt decomposition theorem							
Unit II	QUBITS AND QUANTUM MODEL OF COMPUTATION						9
State of a quantum system – time evolution of a closed system – composite systems – measurement – mixed states and general quantum operations – quantum circuit model – quantum gates – universal sets of quantum gates – unitary transformations – quantum circuits							
Unit III	QUANTUM ALGORITHMS – I						9
Superdense coding – quantum teleportation – applications of teleportation – probabilistic versus quantum algorithms – phase kick-back – the Deutsch algorithm – the Deutsch-Jozsa algorithm – Simon's algorithm – Quantum phase estimation and quantum Fourier Transform – eigenvalue estimation							
Unit IV	QUANTUM ALGORITHMS – II						9
Order-finding problem – eigenvalue estimation approach to order finding – Shor's algorithm for order finding – finding discrete logarithms – hidden subgroups – Grover's quantum search algorithm – amplitude amplification – quantum amplitude estimation – quantum counting – searching without knowing the success probability							
Unit V	QUANTUM COMPUTATIONAL COMPLEXITY AND ERRORCORRECTION						9
Computational complexity – black-box model – lower bounds for searching – generalblack-box lower bounds – polynomial method – block sensitivity – adversary methods –classical error correction – classical three-bit code – fault tolerance – quantum errorcorrection – three- and nine-qubit quantum codes – fault-tolerant quantum computation							



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2019 - 2020

TEXTBOOK(S)	
1.	P. Kaye, R. Laflamme, and M. Mosca, "An introduction to Quantum Computing", Oxford University Press, 2006.
REFERENCE(S)	
1.	V. Sahni, "Quantum Computing", Tata McGraw-Hill Publishing Company, 2007.



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Department	INFORMATION TECHNOLOGY				R 2019	SEMESTER VIII	PE
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP31	NATURAL LANGUAGE PROCESSING	3	0	0	3	45	100

Course Objective(s):

The purpose of learning this course is to

- learn the fundamentals of natural language processing
- understand the semantic analysis of speech and parsing
- understand the role of semantics of sentences and pragmatics
- be exposed to the machine translation principles
- apply the NLP techniques to IR applications.

Course Outcomes:

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

- tag a given text with basic Language features
- To design an innovative application using NLP components
- To implement a rule based system to tackle morphology/syntax of a language
- Generate the natural language and do machine translation.
- Apply information retrieval techniques.


Unit I	INTRODUCTION	9
Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM - Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance		
Unit II	WORD LEVEL AND SYNTACTIC LEVEL ANALYSIS	9
Word Level Analysis: Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction -Words and Word classes -Part-of Speech Tagging. Part of Speech Tagging: Rule Based, Stochastic Part-of Speech Tagging – Transformation Based Tagging -Syntactic Analysis: Context-free Grammar-Constituency- Parsing-Probabilistic Parsing.		
Unit III	CONTEXT FREE GRAMMARS	9
Parsing with Context Free Grammars – Top down Parser – Problems with Basic Top Down Parser – Finite State Parsing Methods - Representing Meaning: Computational Desiderata for Representations – Meaning Structure of Language – First Order Predicate Calculus- Semantic Analysis: Syntax driven Semantic Analysis – Attached for a Fragment of English- Integrating Semantic Analysis into the Earley Parser, Robust Semantic Analysis		
Unit IV	MACHINE TRANSLATION	9
Dialogue and Machine Translation - Dialogue Acts – Automatic, Plan inferential, Cue based Interpretation of Dialogue Acts – Dialogue Structure and coherences – Dialogue Managers - Language Similarities and differences – The Transfer Metaphor – The Interlingua Idea- Direct Translation – Using Statistical Techniques – Usability and System Development		
UNIT V	INFORMATION RETRIEVAL AND LEXICAL RESOURCES	9
Information Retrieval: Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – valuation Lexical Resources: World Net-Frame Net-Stemmers-POS Tagger- Research Corpora.		

TEXTBOOK(S)

1.	Allen, James. Natural Language Understanding. The Benjamin/Cummings Publishing Company, Inc., Redwood City, Second Edition, 1995.
2.	Daniel Jurafsky, James H. Martin Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, 2014.

REFERENCE(S)

1.	C. Manning and H. Schütze , "Foundations of Statistical Natural Language Processing ", Massachusetts Institute of Technology, 2003.
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Course Code	Course Name	Hours/Week			Credit C	Total Hours	Maximum Marks
		L	T	P			
19ITP32	SOFT COMPUTING	3	0	0	3	45	100
Course Objective(s): The purpose of learning this course is to <ul style="list-style-type: none"> understand Soft Computing concepts, technologies, and applications. study about Fuzzy Logic, Various fuzzy systems and their functions. study Neural Networks, architecture, functions and various algorithms involved. know Genetic algorithms, its applications and advances. have exposure on tools for solving soft computing problems. 							
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> learn about soft computing techniques and their applications apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems. analyze various neural network architectures apply genetic algorithms to combinatorial optimization problems. use various tools to solve soft computing problems. 							
Unit I	INTRODUCTION TO SOFT COMPUTING						9
Introduction to Soft Computing-Soft Computing Vs Soft Computing-Variou Components of Soft Computing-From Conventional AI to Computational Intelligence- Applications of Soft Computing							
Unit II	FUZZY LOGIC						9
Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making-Applications of Fuzzy Logic.							
Unit III	AI & NEURAL NETWORKS						9
Ai: Biological neurons and its Working-Simulation of biological neurons to problem solving-Different ANNs architectures-Training techniques for ANNs. Machine Learning Using Neural Network: Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks							
Unit IV	GENETIC ALGORITHM						9
Fundamental, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator ,Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.							
Unit V	Matlab/Python Lib						9
Introduction to Matlab/Python, Arrays and array operations, Functions and Files, Study of neural network toolbox and fuzzy logic toolbox, Simple implementation of Artificial Neural Network and Fuzzy Logic							

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TEXTBOOK(S)	
1.	S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications, 2nd Edition, 2011.
2.	S, Rajasekaran & G.A. VijayalakshmiPai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications, PHI Publication, 1st Edition, 2009.
REFERENCE(S)	
1.	E. Goldberg, Genetic Algorithms: Search and Optimization, Thirteen Edition, 1989.
2.	Rich E, Knight K, Artificial Intelligence, TMH, 3rd Edition, 2012.
3.	Martin T Hagen, Neural Network Design, Nelson Candad, 2nd Edition, 2008.



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Department	INFORMATION TECHNOLOGY			R 2019	Semester VIII	PE	
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP33	DEEP LEARNING	3	0	0	3	45	100
Course Objective(s):							
The purpose of learning this course is to							
<ul style="list-style-type: none"> • study the fundamentals of Deep Learning • study about various techniques in Feed Forward Networks • know about RNN and CNN. • study Neural Networks, architecture, functions and various algorithms involved. • exposure on recent trends and applications in deep learning. 							
Course Outcomes:							
At the end of this course, learners will be able to:							
<ul style="list-style-type: none"> • apply the fundamentals of Deep Learning • use various techniques of FFN to solve soft computing problems. • Apply RNN and CNN to real world scenarios • Identify the applications of deep learning in research activities 							
Unit I	INTRODUCTION TO DEEP LEARNING						9
Biological Neuron, Idea of computational units, McCulloch–Pitts unit and Thresholding logic, Linear Perceptron, Perceptron Learning Algorithm, Linear separability. Convergence theorem for Perceptron Learning Algorithm.							
Unit II	FEEDFORWARD NETWORKS						9
Multilayer Perceptron, Gradient Descent, Backpropagation, Empirical Risk Minimization, regularization, autoencoders.							
Unit III	RNN & CNN						9
Back propagation through time, Long Short Term Memory, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs. LeNet, AlexNet.							
Unit IV	DEEP NEURAL NETWORKS						9
Difficulty of training deep neural networks, Greedy layerwise training. Newer optimization methods for neural networks (Adagrad, adadelta, rmsprop, adam, NAG). Saddle point problem in neural networks, Regularization methods (dropout, drop connect, batch normalization).							
Unit V	RECENT TRENDS AND APPLICATIONS						9
Variational Autoencoders, Generative Adversarial Networks, Multi-task Deep Learning, Multi-view Deep Learning. Vision, NLP, Speech							

TEXTBOOK(S)

1. Deep Learning, Ian Goodfellow and Yoshua Bengio and Aaron Courville, MIT Press, 2016.

REFERENCE(S)

1. Neural Networks: A Systematic Introduction, Raúl Rojas, 1996
2. Pattern Recognition and Machine Learning, Christopher Bishop, 2007



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Department	INFORMATION TECHNOLOGY				R2019	SemesterVII	PC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP34	Mobile and Pervasive Computing	3	0	1	4	45	100
Course Objective(s): The purpose of learning this course is							
<ul style="list-style-type: none"> To understand the basic concepts of mobile computing. To understand the wireless network. To be familiar with the network layer protocols and routing. To know the basis of transport and application layer protocols. To apply the pervasive concepts in mobile environment 							
Course Outcomes: At the end of this course, learners will be able							
<ul style="list-style-type: none"> Understanding of Basic architecture and concepts. Able to use different wireless network. Able to use different routing Technology. Explain the functionality of Transport and Application layers To apply the pervasive concepts in mobile environment 							
UNIT I	MOBILE NETWORKS						9
Cellular Wireless Networks: GSM – Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security –GPRS.DECT – TETRA – UMTS – IMT							
UNIT II	WIRELESS NETWORKS						9
Wireless LANs and PANs – IEEE 802.11 Standard – Architecture – Services –Network – HiperLAN – Blue Tooth- Wi-Fi – WiMAX							
UNIT III	Mobile IP AND ROUTING						9
Mobile IP protocols -WAP push architecture-WML scripts and applications. Data networks – SMS – GPRS – EDGE – Hybrid Wireless100 Networks – ATM – Wireless ATM.DHCP – AdHoc– Proactive and Reactive Routing Protocols – Multicast Routing.							
UNIT IV	TRANSPORT AND APPLICATION LAYERS						9
Mobile TCP– WAP – Architecture – WWW Programming Model– WDP – WTLS – WTP – WSP – WAE – WTA Architecture – WML – WML Scripts.							
UNIT V	PERVASIVE COMPUTING						9
Technology Trend Overview - Pervasive Computing: Concepts - Challenges - Middleware - Context Awareness - Resource Management - Human–Computer Interaction - Pervasive Transaction Processing - Infrastructure and Devices - Wireless Networks - Middleware for Pervasive Computing Systems - Resource Management - User Tracking- Context Management -Service Management - Data Management - Security Management.							
TEXT BOOK(S):							
1. Jochen Schiller, "Mobile Communications", PHI, Second Edition, 2009.							
2. Jochen Burkhart, Pervasive Computing: Technology and Architecture of Mobile Internet Applications, Addison-Wesley Professional; 14 th Edition, 2007.							


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REFERENCE(S)

1. Frank Adelstein, Sandeep KS Gupta, Golden Richard, Fundamentals of Mobile and Pervasive Computing, McGraw-Hill, 2005
2. Debashis Saha, Networking Infrastructure for Pervasive Computing: Enabling Technologies, Kluwer Academic Publisher, Springer; First edition, 2002
3. Alan Colman, Jun Han, and Muhammad AshadKabir, Pervasive Social Computing Socially-Aware Pervasive Systems and Mobile Applications, Springer, 2016.



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Department	INFORMATION TECHNOLOGY				R2019	Semester VIII	PC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP35	Data Visualization Techniques	3	0	1	4	45	100
Course Objective(s):							
The purpose of learning this course is							
<ul style="list-style-type: none"> To introduce visual perception and core skills for visual analysis. To understand visualization for time-series, ranking and deviation analysis. To understand visualization for distribution analysis, Coorelation and Multivariate analysis To understand issues and best practices in information dashboard design. To understand the graphical dashboard design techniques 							
Course Outcomes:							
At the end of this course, learners will be able							
<ul style="list-style-type: none"> Explain principles of visual perception Apply core skills for visual analysis Apply visualization techniques for various data analysis tasks Design information dashboard 							
UNIT I	CORE SKILLS FOR VISUAL ANALYSIS						9
Information visualization – effective data analysis – traits of meaningful data – visual perception – making abstract data visible – building blocks of information visualization – analytical interaction – analytical navigation – optimal quantitative scales – reference lines and regions – trellises and crosstabs – multiple concurrent views – focus and context – details on demand – over-plotting reduction – analytical patterns – pattern examples.							
UNIT II	TIME-SERIES, RANKING, AND DEVIATION ANALYSIS						9
. Time-series analysis – time-series patterns – time-series displays – time-series best practices – part-to-whole and ranking patterns – part-to-whole and ranking displays – best practices – deviation analysis – deviation analysis displays – deviation analysis best practices.							
UNIT III	DISTRIBUTION, CORRELATION, AND MULTIVARIATE ANALYSIS						9
Distribution analysis – describing distributions – distribution patterns – distribution displays – distribution analysis best practices – correlation analysis – describing correlations – correlation patterns – correlation displays – correlation analysis techniques and best practices – multivariate analysis – multivariate patterns – multivariate displays – multivariate analysis techniques and best practices.							
UNIT IV	INFORMATION DASHBOARD DESIGN						9
Information dashboard – Introduction– dashboard design issues and assessment of needs – Considerations for designing dashboard-visual perception – Achieving eloquence.							
Unit V	Graphical DASHBOARD DESIGN						9
Advantages of Graphics Library of Graphs – Designing Bullet Graphs – Designing Sparklines – Dashboard Display Media –Critical Design Practices – Putting it all together- Unveiling the dashboard.							
TEXT BOOK(S)							
1. Ben Fry, "Visualizing data: Exploring and explaining data with the processing environment", O'Reilly, 2008.							
2. Edward R. Tufte, "The visual display of quantitative information", Second Edition, Graphics Press, 2001.							



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REFERENCE(S)


1. Evan Stubbs, "The value of business analytics: Identifying the path to profitability", Wiley, 2011.

2. Nathan Yau, "Data Points: Visualization that means something", Wiley, 2013.

3. Stephen Few, "Information dashboard design: Displaying data for at-a-glance monitoring", second edition, Analytics Press, 2013.


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Department	INFORMATION TECHNOLOGY				R2019	Semester VIII	PC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P			
19ITP36	ETHICAL HACKING	3	0	1	4	45	100
Course Objective(s):							
The purpose of learning this course is							
<ul style="list-style-type: none"> To introduce the methodologies and framework of ethical hacking for enhancing the security. To understand Business Perspective. To know about Information Security Models. Analyze different type of attack. 							
Course Outcomes:							
At the end of this course, learners will be able							
<ul style="list-style-type: none"> Understand the basic of an ethical hack Gain the knowledge of interpreting the results of a controlled attack Understand the role of politics, inherent and imposed limitations and metrics for planning of a test Comprehend the dangers associated with penetration testing To analyze Vulnerability and Enumeration 							
UNIT I	INTRODUCTION TO ETHICAL HACKING						9
Ethical Hacking: Introduction - Networking & Basics - TCP/IP Protocol stack - IP addressing and routing- Foot Printing - Google Hacking – Scanning - Windows Hacking - Linux Hacking - Trojans & Backdoors - Virus & Worms - Proxy& Packet Filtering - Denial of Service – Sniffer - Social Engineering							
UNIT II	BUSINESS PERSPECTIVE						9
Business Objectives - Security Policy - Previous Test Results – BusinessChallengesPlanning for a Controlled Attack: Inherent Limitations - Imposed Limitations - timing is Everything - Attack Type - Source Point - Required Knowledge - Multi-Phased Attacks - Teaming and Attack structure - Engagement Planner - The Right Security Consultant - The Tester – Logistics – Intermediates - LawEnforcement.							
UNIT III	HACKS AND SECURITY						9
Physical Security – Steganography – Cryptography - Wireless Hacking - Firewall & Honeypots - IDS & IPS – Vulnerability - Penetration Testing - Session Hijacking - Hacking Web Servers - SQL Injection - Cross Site Scripting - Exploit Writing - Buffer Overflow – Reverse Engineering - Email Hacking - Incident Handling & Response - Bluetooth Hacking – Mobile Phone Hacking							
UNIT IV	PREPARING FOR A HACK						9
Preparing for a Hack: Technical Preparation - Managing the EngagementReconnaissance: Social Engineering - Physical Security - Internet Reconnaissance.							
UNIT V	ENUMERATION						9
Enumeration: Enumeration Techniques - Soft Objective - Looking Around or Attack - Elements of Enumeration. Preparing for the Next Phase Exploitation: Intuitive Testing – Evasion - Threads and Groups - Operating Systems - Password Crackers – RootKits – applications – Wardialing – Network - Services and Areas of Concern							
TEXT BOOK							
1. Hands On Ethical Hacking and Network Defense – By Michael T. Simpson, Kent Backman, James Corley, Third Edition, 2016.							
2. Official Certified Ethical Hacker Review Guide – By Steven DeFino, Barry Kaufman, Nick Valenteen, First Edition, 2009.							
REFERENCE(S)							
1. The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy (Syngress Basics Series), 1 st Edition, 2011.							


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Department	INFORMATION TECHNOLOGY				R2019	SemesterVIII	PC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P			
19ITP37	E-COMMERCE	3	0	1	4	45	100
Course Objective(s): The purpose of learning this course is							
<ul style="list-style-type: none"> • Discuss fundamentals of e-commerce, types and applications. • Evaluate the role of the major types of information systems in a business environment and their relationship to each other • Assess the impact of the Internet and Internet technology on business electronic commerce and electronic business • Identify the major management challenges for building and using information systems and learn how to find appropriate solutions to those challenges. • Learn strategies for e-commerce, Mobile Commerce, Wireless Application Protocol, WAP technology and Mobile Information devices. 							
Course Outcomes: At the end of this course, learners will be able							
<ul style="list-style-type: none"> • Understand the basic concepts and technologies used in the field of management information systems, Understand the processes of developing and implementing information systems • Be aware of the ethical, social, and security issues of information systems and • Develop an understanding of how various information systems work together to accomplish the information objectives of an organization • Understand the role of information systems in organizations, the strategic management processes, and the implications for the management and learn about the importance of managing organizational change associated with information systems implementation 							
UNIT I	INTRODUCTION						9
Definition of Electronic Commerce, E-Commerce: technology and prospects, incentives for engaging in electronic commerce, needs of E-Commerce, advantages and disadvantages, framework, Impact of E-commerce on business, E-Commerce Models.							
UNIT II	NETWORK INFRASTRUCTURE FOR E- COMMERCE						9
Internet and Intranet based E-commerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, FRAME RELAY). Mobile Commerce: Introduction, Wireless Application Protocol, WAP technology, Mobile Information device.							
UNIT III	WEB SECURITY						9
Security Issues on web, Importance of Firewall, components of Firewall, Transaction security, Emerging client server, Security Threats, Network Security, Factors to consider in Firewall design, Limitation of Firewalls.							
UNIT IV	ENCRYPTION						9
Encryption techniques, Symmetric Encryption: Keys and data encryption standard, Triple encryption, Secret key encryption; Asymmetric encryption: public and private pair key encryption, Digital Signatures, Virtual Private Network.							
UNIT V	ELECTRONIC PAYMENTS						9
Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking.EDI Application in business, E- Commerce Law, Forms of Agreement, Govt. policies and Agenda.							
TEXT BOOK							
1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison Wesley 2002.							
REFERENCE(S)							
1. Pete Lohsin , John Vacca "Electronic Commerce", New Age International, Fourth Edition,							
2. Laudon, "E-Commerce: Business, Technology, Society", Pearson Education, Tenth Edition,2014.							


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Department	INFORMATION TECHNOLOGY				R2019	Semester VIII	PC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP38	COMPUTER VISION	3	0	0	3	60	100
Course Objective(s):							
The purpose of learning this course is							
<ul style="list-style-type: none"> To study the basics of Computer Vision To know about the fundamentals of image formation To study the major ideas in Appearance based methods To study the techniques/filters used in 2D images To understand the concepts in 3D geometrical methods 							
Course Outcomes:							
At the end of this course, learners will be able to:							
<ul style="list-style-type: none"> Recognize and describe both the theoretical and practical aspects of computing with images. Describe the foundation of image formation and image analysis Become familiar with the major technical approaches involved in computer vision Build computer vision applications 							
Unit I	COMPUTER VISION OVERVIEW						9
Introduction to Computer Vision - History - Image Information - Geometric Primitives and Transformations - Photometric Image Information - The Digital Camera - Image Processing - Point Operators - Linear Filtering - Neighborhood Operators							
Unit II	IMAGE TRANSFORMATION AND FEATURE DETECTION						9
Fourier Transforms - Pyramids and Wavelets - Global Optimization - Feature Detection and Matching - Points and Patches - Edges - Lines - Patterns to Features - Features Scaling - Evaluation and Selection of Features							
Unit III	APPEARANCE-BASED METHODS						9
Statistical Linear Models: PCA, ICA, FLD - Non-negative Matrix Factorization, Sparse Matrix Factorization- Statistical Tensor Models: Multilinear PCA, Multilinear ICA- Person and Activity Recognition							
Unit IV	2D SHAPE MODELS						9
Physically Based Models: Mass-Spring Systems- Active Contours (Snakes) - energy minimization, regularization Statistical Shape Models- Active Shape Models- Active Appearance Models- Kalman Filters- Particle Filters, Condensation & Mean Shift							
Unit V	ESTIMATION OF 3D GEOMETRY						9
Camera calibration, Epipolar Geometry- Stereo, Multi-View Geometry- Shape from Shading- Structure from Motion, Optical Flow- Surface Reconstruction - energy minimization, regularization							
TEXTBOOK(S)							
1.	Richard Szeliski, <i>Computer Vision: Algorithms and Applications</i> ,						
2.	David Forsyth and Jean Ponce, <i>Computer Vision: A Modern Approach (Second Edition)</i> David Forsyth and Jean Ponce						
REFERENCES(S)							
1.	Robot Vision, B.K.P.Horn						



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Department	INFORMATION TECHNOLOGY			R2019	Semester VIII	PC	
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP39	CYBER FORENSICS	3	0	0	3	60	100
Course Objective(s):							
The purpose of learning this course is							
<ul style="list-style-type: none"> To Understand the basics of computer forensics To Apply a number of different computer forensic tools to a given scenario To Analyze and validate forensics data To Identify the vulnerabilities in a given network infrastructure To Implement real-world hacking techniques to test system security 							
Course Outcomes:							
At the end of this course, learners will be able to:							
<ul style="list-style-type: none"> Understand the basics of computer forensics Apply a number of different computer forensic tools to a given scenario Analyze and validate forensics data Identify the vulnerabilities in a given network infrastructure Implement real-world hacking techniques to test system security 							
Unit I	INTRODUCTION TO COMPUTER FORENSICS						9
Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques – Incident and incident response methodology – Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. – Forensics Technology and Systems – Understanding Computer Investigation – Data Acquisition.							
Unit II	EVIDENCE COLLECTION AND FORENSICS TOOLS						9
Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools- -Duplication and Preservation of Digital Evidence							
Unit III	ANALYSIS AND VALIDATION						9
Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensic - Tactics of Terrorist and Rogues – Tactics of Private Companies							
Unit IV	FORENSICS TOOLS AND TECHNOLOGY						9
Types of Computer Forensics Tools and Technology -Tools and Types of Military Computer Forensics Technology -Tools and Types of Law Enforcement Computer Forensic Technology - Tools and Types of Business Computer Forensic Technology							
Unit V	ETHICAL HACKING IN WEB						9
Introduction to Ethical Hacking – Foot printing and Reconnaissance – Scanning Networks – Enumeration – System Hacking – Malware Threats – Sniffing - Social Engineering – Denial of Service – Session Hijacking – Hacking Web servers – Hacking Web Applications – SQL Injection – Hacking Wireless Networks – Hacking Mobile Platforms - Processing Evidence and Report Preparation – Future Issues.							
TEXTBOOK(S)							
1.	Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Stuart, —Computer Forensics and Investigations, Cengage Learning, India Edition, 2016.						
2.	CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, 2015						



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REFERENCE(S)

1. John R.Vacca, —Computer Forensics, Cengage Learning, 2015.
2. Marjie T.Britz, —Computer Forensics and Cyber Crime: An Introduction, 3rd Edition, Prentice Hall, 2013.
3. AnkitFadia Ethical Hacking Second Edition, Macmillan India Ltd, 2006
4. Majid Yar, "Cybercrime and Society", SAGE Publications Ltd, Hardcover, 2nd Edition, 2013

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Department	INFORMATION TECHNOLOGY				R2019	Semester VIII	PC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP40	INFORMATION SECURITY	3	0	1	4	45	100
Course Objective(s):							
The purpose of learning this course is							
<ul style="list-style-type: none"> To understand the basics of Information Security To know the legal, ethical and professional issues in Information Security To know the aspects of risk management To become aware of various standards in this area To know the Physical and Logical Design 							
Course Outcomes:							
At the end of this course, learners will be able							
<ul style="list-style-type: none"> Discuss the basics of information security Illustrate the legal, ethical and professional issues in information security Demonstrate the aspects of risk management. Become aware of various standards in the Information Security System Design and implementation of Security Techniques. 							
UNIT I	Introduction to Information Security						9
History – CNSS Security Model – Components – Security in the System life Cycle – Security Professionals and the organization – CommUnit les of Interest. Information Security: Threat and Attacks – Compromises to Intellectual Property – Deviations in Quality of Service- Espionage – Force of Nature – Human Error – Information Extortion – Sabotage – Software Attacks – Technical Hardware failures – Technical Software failures							
UNIT II	Issues in Information Security						9
Law and Ethics in Information Security – Relevant U.S. Laws – International Laws and Legal Bodies – Ethics and Information Security – Codes of Ethics at Professional Organizations – Key U.S. Federal Agencies – Planning for Security – Information Security Policy, Standards, and Practices – The Information Security Blueprint –Security Education, Training, and Awareness Program							
UNIT III	Risk Management						9
Risk Identification: Planning and Organizing the Process – Identifying, Inventorying and Categorizing Assets – Classifying and Prioritizing Threats – Specifying Asset Vulnerabilities; Risk Assessment : Planning and Organizing Risk Assessment – Determining the Loss Frequency – Calculating Risk – Assessing Risk Acceptability – The FAIR Approach to Risk Assessment – Risk Control – Quantitative Versus Qualitative Risk Management Practices – Recommended Risk Control Practices.							
UNIT IV	Security Technology						9
Firewalls and VPNs – Access Control Mechanisms – Biometrics – Access Control Architecture Models; Firewalls: processing Modes – architecture – Selecting the Right Firewalls – Configuring and Managing Firewalls – Content Filters – Protecting Remote Connections – Intrusion Detection and Prevention Systems – Honeypots, Honeynets, and Padded Cell Systems – Scanning and Analysis Tools							



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UNIT V	Design	9
<p>Logical Design: Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS, VISA International Security Model, Design of Security Architecture, Planning for Continuity. Physical Design : Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel.</p>		
TEXT BOOK		
<p>2. Michael E. Whitman and Herbert J. Mattord, "Principles of Information Security", 5 Edition, Cengage Learning, India, 2015</p>		
REFERENCE (S)		
<p>1. Charles P. Pfleeger and Shari Lawrence Pfleeger, "Security in Computing", 5 Edition, Prentice Hall, 2018.</p>		
<p>2. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management Vol 6", 6 Edition, CRC Press, 2012</p>		

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Department	INFORMATION TECHNOLOGY				R 2019	Semester VIII	PC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P			
19ITP41	FUNDAMENTALS OF NANO SCIENCE	3	0	0	3	60	100
Course Objective(s):							
The purpose of learning this course is							
<ul style="list-style-type: none"> To understand the basics of Nano technology To identify the various methods of preparation mechanism To understand the working of various devices for preparation and patterning To understand the different preparation environment and their safety issues To characterize various environmental techniques for proper characterization 							
Course Outcomes:							
At the end of this course, learners will be able to:							
<ul style="list-style-type: none"> Describe components and properties of Nano particles Describe and choose various preparation mechanisms for nano technology components Learn about various Nano scale devices Describe the different safety issues during Nano preparation in specific environment Characterize the different techniques for Nano particle preparation and implementation 							
Unit I	INTRODUCTION TO NANO SCIENCE						9
Background to nanoscience and nanotechnology - scientific revolutions – nano sized effects - Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nano structured materials- nano particles- quantum dots, nano wires-ultra-thin films-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).							
Unit II	GENERAL METHODS OF PREPARATION						9
Bottom-up Synthesis-Top-down Approach: Co-Precipitation, Ultra sonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer= Epitaxy, MOMBE.							
Unit III	PATTERNING AND LITHOGRAPHY FOR NANOSCALE DEVICES						9
Introduction to optical/UV electron beam and X-ray Lithography systems and processes, Wet etching, dry (Plasma /reactive ion) etching, Etch resists-dip pen lithography							
Unit IV	PREPARATION ENVIRONMENTS						9
Clean rooms: specifications and design, air and water purity, requirements for particular processes, Vibration free environments: Services and facilities required. Working practices, sample cleaning, Chemical purification, chemical and biological contamination, Safety issues, flammable and toxic hazards, biohazards							
Unit V	CHARACTERISATION TECHNIQUES AND RECENT NANO MATERIALS						9
X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA - Recent special nano materials - Carbon based nano materials – CNT- graphene							
TEXTBOOK(S)							
1.	A.S. Edelstein and R.C. Cammearata, eds., "Nano Materials: Synthesis, Properties and Applications", Institute of Physics Publishing, Bristol and Philadelphia,2002.						

2.	N John Dinardo, "Nano Scale Characterization of Surfaces & Interfaces", 2nd Edition, Weinheim Cambridge, Wiley-VCH, 2000
REFERENCE(S)	
1.	G Timp (Editor), "Nanotechnology", AIP press/Springer, 2012.
2.	Akhlesh Lakhtakia (Editor), "The Hand Book of Nano Technology, Nanometer Structure, Theory, Modeling and Simulations". Prentice-Hall of India (P) Ltd, New Delhi, 2007.



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Department	INFORMATION TECHNOLOGY				R2019	Semester VIII	PC
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITP42	MEDICAL IMAGE PROCESSING	3	0	0	3	60	100
Course Objective(s):							
The purpose of learning this course is							
<ul style="list-style-type: none"> • Know the medical imaging modalities • Identify the diagnostic tasks for which images are needed • Study the typical distortions associated with each modality • Analyze basic image compression algorithms for monochrome images • Study the various schemes associated with medical image analysis 							
Course Outcomes:							
At the end of this course, learners will be able to:							
<ul style="list-style-type: none"> • Classify imaging systems according to different criteria • Describe the operations of various fundamental classes of image processing • Create an enhanced image based on spatial and frequency domain operations • Formulate a image degraded model for images affected by various types of noise • Elaborate the morphological operators and techniques used for image segmentation • Analyse and classify the schemes associated with medical image analysis 							
Unit I	INTRODUCTION						9
Introduction: Objects and images – Digital image processing system. Imaging Systems: Human Visual Pathway – Photographic film – Other Sensors – Digitizing an image – Quality of a digital image – Color images. Medical images obtained with Ionizing and Non Ionizing Radiations: Medical imaging modalities – Images from x-rays – Images from γ -rays – Doses and risk – Ultrasound imaging – Magnetic resonance imaging – Picture Archiving and Communication Systems (PACS)							
Unit II	IMAGE ENHANCEMENT AND RESTORATION						9
Fundamentals of digital image processing: Gray level histogram – Histogram transformations. Image Enhancement in Spatial & Frequency Domain: Algebraic operations – Logical operations – Geometric operations – Convolution based operations – Fourier domain – Fourier Transform – Sampling – Cross Correlation and auto correlation – Frequency Domain filters. Image Restoration: Image degradation – Noise – Noise reduction filters – Blurring – Geometric degradations							
Unit III	MORPHOLOGICAL IMAGE PROCESSING						9
Mathematical morphology – Morphological operators. Image Segmentation: Segmentation – Thresholding – Region-based methods – Other methods. Feature Recognition and Classification: Object recognition and classification – Connected components 162labeling– Features – Statistical classification.							
Unit IV	IMAGE COMPRESSION FOR MONOCHROME IMAGES						9
Run length Coding – Interpolation Coding – Wavelet Coding – JPEG Baseline Image Coding Standard							
Unit V	MEDICAL APPLICATIONS						9
Computer-aided diagnosis in mammography – Tumor imaging and treatment – Angiography – Bone strength and osteoporosis – Tortuosity							



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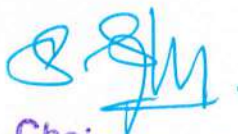
TEXTBOOK(S)	
1.	Geoff Dougherty. <i>Digital Image Processing for Medical Applications</i> , Cambridge University Press, 2010

REFERENCE(S)	
1.	Rafael C. Gonzalez & Richard E. Woods, <i>Digital Image Processing</i> , Pearson Education, Fourth Edition, 2017.
2.	William K. Pratt, <i>Introduction to Digital Image Processing</i> , CRC Press, Fourth Edition, 2014.
1.	https://nptel.ac.in/courses/108105091/


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OPEN ELECTIVE OFFERED BY IT TO OTHER DEPARTMENTS

Code No	Course	Objectives & Outcomes			L	T	P	C	Maximum Marks			Category
		PEO	PO	PSO					CA	ES	Tot.	
PROFESSIONALELECTIVE III												
19ITO01	C Programming				3	0	0	3	40	60	100	OE
19ITO02	Basic Java Programming				3	0	0	3	40	60	100	OE
19ITO03	Artificial Intelligence				3	0	0	3	40	60	100	OE
19ITO04	Data Analytics				3	0	0	3	40	60	100	OE
19ITO05	Front End Web Design				3	0	0	3	40	60	100	OE
19ITO06	Mobile Application Development				3	0	0	3	40	60	100	OE
19ITO07	Cloud Computing				3	0	0	3	40	60	100	OE
19ITO08	Multimedia and Animation											OE


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Department	INFORMATION TECHNOLOGY				R 2019	Semester	OE
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITO01	C PROGRAMMING	3	0	0	3	45	100

Course Objective (s):

The purpose of learning this course is

- To know how to write, compile and debug programs in C language
- To develop C Programs using basic programming constructs
- Identify the difference between call by value and call by reference
- Use pointers to understand the dynamics of memory
- To do input/output and file handling in C

Course Outcomes:

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

- Use different data types in a computer program
- Design programs involving decision structures and loops.
- Develop C applications using Arrays and Strings.
- Develop C applications using Function and Pointers.
- Develop application using structure and union.
- Design a C application using Sequential and Random-access file

Unit I C STATEMENTS

9

Overview of C Language: History- Features-how to install C - Structure of C Programs-Compilation & linking process. Token, Identifiers, Variables, Constants, Data Types , Control string, Delimiters, Operators, Expressions - Precedence and Associativity, Expression Evaluation, Type conversions, Managing input and output operation.

Unit II C CONTROL STATEMENTS

9

Control Statements and its types- Selection Statements(making decisions) – if and switch statements, Repetition statements (loops)-while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Simple C Program examples.

Unit III ARRAYS AND STRINGS

9

Arrays– Basic concepts, one-dimensional arrays, two – dimensional arrays, multidimensional arrays, C programming examples: sorting and searching, Matrix operations. Strings:Characterarray–stringhandlingfunctions–manipulation onstrings, build in string functions. Enumerated data type.

Unit IV FUNCTION & POINTERS

9

Introduction to functions: Function definition, function call, Function prototype, Parameter passing methods, Recursion, Built-in math functions, Storage classes-auto, register, static, extern, scope rules, arrays to functions, Scientific calculator using built-in functions, Binary Search using recursive functions . Pointer: Introduction, features, pointer variable, null pointer, pointer to pointer, pointer expression. Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers.

Unit V STRUCUTRE AND FILE

9

Union, comparison between Union and Structure - Structure - Nested structures - Pointer and Structures - Array of structures - Self referential structures – typedef - Dynamic memory allocation. File Introduction – File Modes – Reading and Writing Files – File related functions – Reading and Writing Binary Files – RA Files.

TEXT BOOK(S)

1. The C Programming Language by Brian Kernighan and Dennis Ritchie 2nd edition.
2. E.Balagurusamy, C Programming in ANSI C, Eighth Edition, Tata Mcgraw Hill, 2019
3. Yaswant Kanitkar, Let Us C, 16th Edition, BPB Publication, 2015
4. Paul Deitel and Harvey Deitel, —C How to Program, Seventh edition, Pearson Publication 2015

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Department	INFORMATIONTECHNOLOGY				R2019	Semester	OE
Course	Course Name	Hours/ Week			Credit	Total Hours	Maximum Marks
Code		L	T	P	C		
19ITO02	BASIC JAVA PROGRAMMING	3	0	0	3	45	100

Course Objective(s):

The purpose of learning this course is to

- Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
- Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc.
- Understand the principles of inheritance, packages and interfaces.
- Know how to handle events
- Understand the basics of JDBC connectivity

Course Outcomes:


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

- Know the basic structure of java
- Write Java application programs using OOP principles and proper program structuring
- Demonstrate the concepts of Packages and inheritance
- Write an event based Java program
- Develop interactive Java programs using database

Unit I	INTRODUCTION TO JAVA	9
Object Oriented Programming : Introduction, History, Characteristics of Java : Abstraction – objects and classes - Encapsulation- Inheritance -Polymorphism- Benefits of OOP– Creating and Executing a Java program- The Java Environment - Java Source File -Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -Comments, Data Types, Variables, Operators, JavaDoc comments.		
Unit II	CONTROL STRUCTURES & ARRAYS	9
Control Flow: Decision making and branching – simple if-else statement- nested if-else- if-else if ladder-switch. Looping: while – do..while - for loop – break – continue. Arrays: one dimensional array- two dimensional array – String- String Methods- String Buffer Class.		
Unit III	OBJECT AND CLASSES	9
Class and Objects : Defining a class- Methods- Visibility- Creating Object- Accessing class member- constructor and its types – method overloading – Static members – Nesting of Methods – this keyword- command line input – vectors-wrapper classes		
Unit IV	INHERITANCE AND PACKAGES	9
Inheritance in java, Super and sub class, Type of inheritance, Visibility Control ,Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Inheriting interface, Package in java, Util package		
Unit V	GUI PROGRAMMING & CONNECTIVITY	9
AWT basis Event handling in Java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout and Border Layout. GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Lists, Scroll Bars, Menus, Dialog Box. Applet and its life cycle, Introduction to Swing. JDBC: Introduction, drivers, DB connectivity steps, Connectivity with Oracle.		

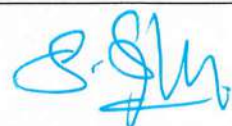
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TEXTBOOK(S)	
1.	The Complete Reference, Java(11thEdition), Herbert Schild, TMH
2.	Core Java Volume-I Fundamentals, Eight Edition, Horstmann & Cornell, Pearson Education
REFERENCE(S)	
1.	E. Balagurusamy, Java Programming with premier, second edition, Tata Mcgraw Hill, 2016.
2.	Ken Arnold, Java Programming Language, Addison Wesley, 2000
3.	John R Hubbard, Programming with Java, Tata Mcgraw Hill, 1998


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Department	INFORMATION TECHNOLOGY				R 2019	Semester	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P			
19ITO03	ARTIFICIAL INTELLIGENCE	3	0	0	3	45	100
Course Objective (s): The purpose of learning this course is							
<ul style="list-style-type: none"> To know the overview of artificial intelligence principles and approaches. To know the basic understanding of the building blocks of AI in terms of intelligent agents To develop the representation using Prolog Programming language To know the search strategies in AI To analyze the applications of fuzzy logic and neural network for various applications 							
Course Outcomes:							
<ul style="list-style-type: none"> At the end of this course, learners will be able to: Acquire a fundamental understanding of the principles of artificial intelligence and its foundations Understand the basics of Intelligence agents Develop the application using Prolog programming Gain knowledge about the Search strategies Obtain adequate knowledge to develop the AI applications 							
Unit I	Introduction to Artificial Intelligence						9
Introduction, Brief History, Intelligent Systems, Categorization of Intelligent Systems, Components of AI Program, Foundations of AI, Sub-areas of AI, Applications, Development of AI Languages, Current Trends in AI, Future of AI.							
Unit II	Intelligent Agents						9
Rational Agents, Mapping from Sequences to Actions, Properties of Environments, Structure of Intelligent Agents, Types of Agents: Simple Reflex Agents, Goal Based Agents, Utility Based Agents.							
Unit III	Prolog Programming language						9
Introduction, Prolog Program, Control Strategy of Prolog, Programming Techniques in Prolog, List Manipulation in Prolog, System Predicate, Cut, Effect of Rule and Goal Orders, Structuring of Data in Prolog, Recursive Data Types in Prolog, System-Defined Predicates..							
Unit IV	Search Strategies						9
Uninformed Search Strategies: Breadth-First Search, Uniform Cost Search, Depth-First Search, Analysis of Search Methods Informed Search Strategies: Heuristic Functions, Best-First Search, Greedy Search, A* Algorithm							
Unit V	Case Studies						9
Application of fuzzy logic and neural networks to Measurement- Control- Adaptive Neural Controllers – Signal Processing and Image Processing							
TEXT BOOK(S)							



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1	Artificial Intelligence – A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI, Pearson Education.
2	Prolog Programming for Artificial Intelligence. Ivan Bratka- Third Edition – Pearson Education.
REFERENCE(S)	
1.	Artificial Intelligence – Structures and Strategies for Complex Problem Solving , George F Luger, Addison Wesley, Fifth Edition
2.	Artificial Intelligence, 3rd Edition, Patrick Henry Winston., Pearson Edition
3.	Fuzzy logic & Neural Networks/ Chennakesava R. Alavala/ New Age International, 2008



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Department	INFORMATION TECHNOLOGY				R 2019	Semester	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ITO04	DATA ANALYTICS	3	0	0	3	45	100
Course Objective (s): The purpose of learning this course is <ul style="list-style-type: none"> To know the pattern in data. To know the basic to interpret of data To develop the analytic algorithm To know the handle large applications To analyze the applications of support systems 							
Course Outcomes: At the end of this course, learners will be able to: <ul style="list-style-type: none"> Find a meaningful pattern in data Graphically interpret data Implement the analytic algorithms Handle large scale analytics projects from various domains Develop intelligent decision support systems 							
Unit I	Data Definitions and Analysis Techniques						9
Elements, Variables, and Data categorization, Levels of Measurement, Data management and indexing, Introduction to statistical learning and R-Programming							
Unit II	Descriptive Statistics						9
Measures of central tendency-Measures of location of dispersions-Practice and analysis with R							
Unit III	Basic Analysis Techniques						9
Basic analysis techniques-Statistical hypothesis generation and testing-Chi-Square test-t-Test-Analysis of variance-Correlation analysis-Maximum likelihood test-Practice and analysis with R							
Unit IV	Data analysis techniques						9
Regression analysis-Classification techniques-Clustering-Association rules analysis-Practice and analysis with R							
Unit V	Case Studies						9
Understanding business scenarios-Feature engineering and visualization-Scalable and parallel computing with Hadoop and Map-Reduce-Sensitivity Analysis							
TEXT BOOK(S)							
1.	Probability & Statistics for Engineers & Scientists (9 th Edn.), Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye, Prentice Hall Inc.						
2.	Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015. References.						
REFERENCE(S)							
1.	Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.						
2.	An Introduction to Statistical Learning: with Applications in R, G James, D. Witten, T Hastie, and R. Tibshirani, Springer, 2013						

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Department	INFORMATION TECHNOLOGY					R 2019	Semester	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19IT005	FRONT END WEB DESIGN	3	0	0	3	45	100	

Course Objective (s):

The purpose of learning this course is

- To demonstrate the use of singular, plural and paired tags in HTML.
- To demonstrate tables, forms and frames in HTML.
- To demonstrate the use of css, single style sheet, multiple style sheet and css selectors.
- To understand the syntax for javascript, operators, functions, events and error
- To handle advanced javascript concept

Course Outcomes:

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

- Describe the principles and tools that are used to develop Web applications
- Discuss the enhanced techniques used by web professionals for creating dynamic web pages
- Use functions and events for user input and validation
- Examine advanced technologies to make web pages responsive and more interactive
- Assess dynamic websites using HTML5, CSS3, and advanced Javascript

Unit I	Overview of HTML, CSS and JavaScript	9
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Fundamentals of HTML, Creating Style Sheet, CSS Box Model- Border properties, Padding properties, Margin properties, Introduction to JavaScript, Working with Web Forms and validating user input, JavaScript functions and events, JavaScript Timing Events, JavaScript Image Slideshow, Recursive function in JavaScript, Error handling in JavaScript.

Unit II	Document Object Model in JavaScript	9
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Document Object Model, Programming HTML DOM with JavaScript, Assigning event handlers in JavaScript using DOM object property, addEventListener and removeEventListener in JavaScript, Event bubbling in JavaScript, Image gallery with thumbnails in JavaScript.

Unit III	Working with jQuery and JSON	9
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Basics of jQuery, jQuery Events, Benefits of using CDN, jQuery Selectors, jQuery input vs :input, jQuery DOM manipulation methods, jQuery Elements, Working with JSON Objects, JSON Arrays, Nested JSON object, Conversion of JSON object to string, Conversion of string to JSON object.

Unit IV	Working with AngularJS	9
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Program to understand angular modules, controllers, AngularJS Directives. • Program to demonstrate event handling, filters and sorting data in angularjs.

Unit V	Introduction to Web Publishing or Hosting	9
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Creating the Web Site-Saving the site-Working on the web site- Creating web site structure-Creating Titles for web pages-Themes-Publishing web site

TEXT BOOK(S)

1.	HTML 5 BLACK BOOK by DT Editorial Services, DREAMTECH PRESS
2.	Beginning CSS: Cascading Style Sheets for Web Design, Ian Pouncey, Richard York, Wiley India

REFERENCE(S)

1.	AngularJS in action by Lukas Ruebbelke, Dreamtech press
2.	Web Technologies: HTML, Javascript, Kogent Learning, Wiley India



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Department	INFORMATION TECHNOLOGY				R2019	Semester	OE
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19IT006	MOBILE APPLICATION DEVELOPMENT	3	0	0	3	45	100
Course Objective(s):							
The purpose of learning this course is to							
<ul style="list-style-type: none"> Gain knowledge about basic Android Understand the design and interface To facilitate students to understand android SDK To help students to gain a basic understanding of Android application development To inculcate working knowledge of Android Studio development tool 							
Course Outcomes:							
At the end of this course, learners will be able to:							
<ul style="list-style-type: none"> Identify various concepts of mobile programming that make it unique from programming for other platforms, Critique mobile applications on their design pros and cons, Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces, Develop mobile applications for the Android operating system that use basic and advanced phone features Deploy applications to the Android marketplace for distribution. 							
Unit I	INTRODUCTION TO ANDROID						9
Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building your First Android application, Understanding Anatomy of Android Application, Android Manifest file							
Unit II	DESIGN						9
Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.							
Unit III	INTERFACE						9
Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.							
Unit IV	ANDROID APPLICATIONS						9
Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources							
Unit V	ANDROID APIS						9
Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.							
TEXTBOOK(S)							
1.	Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)						
REFERENCE(S)							
1.	Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd						
2.	Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd						
3.	Android Application Development All in one for Dummies by Barry Burd, Edition: I						


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Department	INFORMATION TECHNOLOGY				R 2019	Semester	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P			
19ITO07	CLOUD COMPUTING	3	0	0	3	45	100
Course Objective (s):							
The purpose of learning this course is							
<ul style="list-style-type: none"> • Understand the concept of cloud computing. • Know about the cloud services. • Gain knowledge on the various issues in cloud computing. • Be familiar with the lead players in cloud. • Appreciate the emergence of cloud as the next generation computing paradigm and web based communication. 							
Course Outcomes:							
At the end of this course, learners will be able to:							
<ul style="list-style-type: none"> • Articulate the main concepts ,key technologies, strengths and limitations of cloud computing. • Learn the key and enabling technologies that help in the development of cloud. • Develop the ability to understand and use the architecture of compute and storage cloud • Understand Service and delivery models. • Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud 							
Unit I	UNDERSTANDING CLOUD COMPUTING						9
Cloud Computing–History of Cloud Computing–Cloud Architecture–Cloud Storage–Why Cloud Computing Matters– Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services							
Unit II	DEVELOPING CLOUD SERVICES						9
Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On- Demand Computing – Discovering Cloud Services Development Services and Tools –Amazon Ec2 – Google App Engine –IBM Clouds							
Unit III	CLOUD COMPUTING FOR EVERYONE						9
Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists– Collaborating Contact Lists–Cloud Computing for the Community–Collaborating on Group Projects and Events – Cloud Computing for the Corporation.							
Unit IV	USING CLOUD SERVICES						9
Collaborating on Calendars, Schedules and Task Management–Exploring Online Scheduling, Applications–Exploring Online Planning and Task Management–Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management –Collaborating on Word Processing - Collaborating on Databases – Storing and Sharing Files							
Unit V	CLOUD IT MODEL						9
Analysis of Case Studies when deciding to adopt cloud computing architecture. How to decide if the cloud is right for your requirements. Cloud based service, applications and development platform deployment so as to improve the total cost of ownership							
TEXT BOOK(S)							
1.	Michael Miller, Cloud Computing, 9th Edition Pearson Education, 2014						


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2.	Anthony T.Velte, Cloud Computing, 12th Edition, Tata Mcgraw Hill, 2013
REFERENCE(S)	
1.	Gautam Shroff, "Enterprise Cloud Computing Technology Architecture Applications", Cambridge University Press; 1 edition, [ISBN: 978-0521137355],2010.
2.	Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach" McGraw-Hill Osborne Media; 1 edition [ISBN: 0071626948], 2009.

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Department	INFORMATION TECHNOLOGY				R2019	Semester	OE
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19IT008	MULTIMEDIA AND ANIMATION	3	0	0	3	45	100
Course Objective(s):							
The purpose of learning this course is to							
<ul style="list-style-type: none"> Students will be able to understand the relevance and underlining infrastructure of multimedia system. The purpose of the course for the students is to apply contemporary theories of multimedia learning to the development of multimedia products. Understand informational media (audio/ visual materials, web based materials, games and simulations etc) applied with multimedia techniques. Acquire knowledge about multimedia software tools. 							
Course Outcomes:							
At the end of this course, learners will be able to:							
<ul style="list-style-type: none"> Analyze instructional and informational media Understand the architecture and design Know about multimedia software tools Apply contemporary theories of multimedia learning to the development of multimedia products Understand the design and development process of multimedia projects. 							
Unit I	INTRODUCTION						9
Definition of multimedia, Multimedia Basics, Where to use Multimedia, Multimedia Elements -Multimedia Applications, Virtual Reality, Delivering Multimedia.							
Unit II	MULTIMEDIA SYSTEMS ARCHITECTURE						9
Multimedia Workstation Architecture, High resolution Graphic displays, Multimedia Architecture Based on interface bus, Network architecture for Multimedia systems.							
Unit III	EVOLVING TECHNOLOGIES FOR MULTIMEDIA SYSTEMS						9
Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.							
Unit IV	DEFINING OBJECTS FOR MULTIMEDIA SYSTEM						9
Text, Images, Audio and Voice, Full Motion and Live Video, Multimedia Data Interface Standards, File formats for multimedia systems, Video processing standards.							
Unit V	MULTIMEDIA SOFTWARE						9
Overview of Multimedia Software Tools, Open Source Replacements, Multimedia OS, Multimedia Authoring, Some Useful Editing and Authoring Tools, VRML, OpenGL, Windows and Open Source API 2.							
TEXTBOOK(S)							
1.	Computer Graphics Multimedia and Animation, Malay K. Pakhira PHI second edition						
REFERENCE(S)							
1.	Principles of Multimedia, Ranjan Parekh TMGH, New Delhi						
2.	Multimedia Systems John F. Koegel Buford Pearson Education						
3.	Multimedia Technology & Applications, David Hillman Galgotia Publications Pvt Ltd.						



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