ERODE SENGUNTHAR ENGINEERING COLLEGE

(An Autonomous Institution, Affiliated to Anna University)

PERUNDURAI, ERODE - 638 057

UG Curriculum and Syllabus

B.E – COMPUTER SCIENCE AND DESIGN

Choice Based Credit System (CBCS)

REGULATION 2019

ERODE SENGUNTHAR ENGINEERING COLLEGE

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.E. COMPUTER SCIENCE AND DESIGN

REGULATION – 2019
CHOICE BASED CREDIT SYSTEM
I TO VIII SEMESTERS CURRICULUM
(Total credits to be earned is 164 credits)

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

SEMESTER 1   **Total Credits : 21.5**

Code No	Course	L	T	P	C	Maximum Marks			Category
						CA	ES	Tot.	
THEORY									
19BS101	Calculus and its Applications	3	1	0	4	40	60	100	BS
19BS103	Engineering Chemistry	3	0	0	3	40	60	100	BS
19HS101	Communicative English	3	0	0	3	40	60	100	HS
19ES101	C Programming	3	0	0	3	40	60	100	ES
19TPS01	Soft Skills - I	1	0	2	1.5	40	60	100	EEC
19BS102	Engineering Physics	2	0	2	3	40	60	100	BS
PRACTICALS									
19ES102	Chemistry Laboratory	0	0	4	2	60	40	100	ES
19ES103	C Programming Laboratory	0	0	4	2	60	40	100	ES

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SEMESTER - II

Total Credits : 21.5

Code No	Course	L	T	P	C	Maximum Marks			Category
						CA	ES	Tot.	
19BS210	Applied Linear Algebra	3	1	0	4	40	60	100	BS
19BS204	Physics for Information Science	3	0	0	3	40	60	100	BS
19MC201	Environmental Science and Engineering	3	0	0	0	40	60	100	MC
	Language Elective	3	0	0	3	40	60	100	HS
19ES201	Digital Principles and System Design	3	0	0	3	40	60	100	ES
19CD201	Data Structures	3	0	0	3	40	60	100	PC
19TPS02	Soft Skills -II	1	0	2	1.5	40	60	100	EEC
PRACTICALS									
19ES202	Digital Electronics Laboratory	0	0	4	2	60	40	100	ES
19CD202	Data Structure Laboratory	0	0	4	2	60	40	100	PC

SEMESTER - III

Total Credits: 20

Code No	Course	L	T	P	C	Maximum Marks			Category
						CA	ES	Tot.	
THEORY									
19BS305	Discrete Mathematics	3	1	0	4	40	60	100	BS
19CD301	Design and Analysis of Algorithms	3	0	0	3	40	60	100	PC
19CD302	Computer Architecture Design	3	0	0	3	40	60	100	PC
19CD303	Object Oriented Programming	3	0	0	3	40	60	100	PC
19ES301	Basics of Electricaland Electronics Engineering	3	0	0	3	40	60	100	ES
19TPS03	Quantitative Aptitude and Logical Reasoning - I	2	0	0	0	40	60	100	EEC
19MC301	Indian Constitution	2	0	0	0	40	60	100	MC
PRACTICALS									
19CD305	Design and Analysis of Algorithms Laboratory	0	0	4	2	60	40	100	PC
19CD306	Object Oriented Programing Laboratory	0	0	4	2	60	40	100	PC

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SEMESTER - IV

Total Credits : 23

Code No	Course	L	T	P	C	Maximum Marks			Category
						CA	ES	Tot.	
THEORY									
19BS406	Statistical Methods for Data Analysis	3	1	0	4	40	60	100	BS
19CD401	Computer Networks	3	0	0	3	40	60	100	PC
19CD402	Design of Operating Systems	3	0	0	3	40	60	100	PC
19CD403	Microprocessor and Micro controller Design	3	0	0	3	40	60	100	ES
19CD404	Data Base Design	3	0	0	3	40	60	100	PC
	Universal Human Values 2 : Understanding Harmony	3	0	0	3	40	60	100	HS
19TPS04	Quantitative Aptitude and Logical Reasoning - II	2	0	0	0	40	60	100	EEC
PRACTICALS									
19CD405	Microprocessor and Microcontroller and Interfacing Laboratory	0	0	4	2	60	40	100	ES
19CD406	Database Design Laboratory	0	0	4	2	60	40	100	PC

SEMESTER - V

Total Credits : 22

Code No	Course	L	T	P	C	Maximum Marks			Category
						CA	ES	Tot.	
19CD501	Web Design Technology	3	0	0	3	40	60	100	PC
19CD502	Embedded System Design	3	0	0	3	40	60	100	PC
	Open Elective I	3	0	0	3	40	60	100	OE
19CD503	Object Oriented Analysis and Design	3	0	0	3	40	60	100	PC
19CD504	Mobile Computing	3	0	0	3	40	60	100	PC
	Professional Elective I	3	0	0	3	40	60	100	PE
19TPS05	Quantitative Aptitude and Logical Reasoning - III	2	0	0	0	40	60	100	EEC
PRACTICALS									
19CD504	Web Design Laboratory	0	0	4	2	60	40	100	PC
19CD505	Embedded System Design Laboratory	0	0	4	2	60	40	100	PC

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SEMESTER - VI

Total Credits : 23

| Code No | Course | L | T | P | C | Maximum Marks | | | Category |
						CA	ES	Tot.	
19CD601	Cryptography and Network Security	3	0	0	3	40	60	100	PC
19CD602	Compiler Design	3	0	0	3	40	60	100	PC
19CD603	User Interface Design	3	0	0	3	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
19CD604	Cloud Architect Design	3	0	0	3	40	60	100	PC
19TPS06	Quantitative Aptitude and Logical Reasoning - IV	2	0	0	0	40	60	100	EEC
PRACTICALS									
19CD605	Cloud Computing Laboratory	0	0	4	2	60	40	100	PC
19CD606	User Interface Design Laboratory	0	0	2	1	60	40	100	PC
19CD607	Security Laboratory	0	0	4	2	60	40	100	PC

SEMESTER – VII

Total Credits : 22

| Code No | Course | L | T | P | C | Maximum Marks | | | Category |
						CA	ES	Tot.	
19CD701	Data Analytics	3	0	0	3	40	60	100	PC
19CD702	Machine Learning	3	0	0	3	40	60	100	PC
	Professional Elective III	3	0	0	3	40	60	100	PE
	Professional Elective IV	3	0	0	3	40	60	100	PE
19CD703	Design Patterns	3	0	0	3	40	60	100	PC
	Open Elective III	3	0	0	3	40	60	100	OE
PRACTICALS									
19CD704	Data Analytics and Machine Learning Laboratory	0	0	4	2	60	40	100	PC
19CD705	Design Patterns Laboratory	0	0	4	2	60	40	100	PC

SEMESTER : VIII

Credits :12

| Code No | Course | L | T | P | C | Maximum Marks | | | Category |
						CA	ES	Tot.	
	Professional Elective V	3	0	0	3	40	60	100	PE
	Professional Elective VI	3	0	0	3	40	60	100	PE
19CS801	Project 1 Phase II	0	0	12	6	60	40	100	EEC

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MANDANTORY COURSES

Code No	Course	L	T	P	C	Maximum Marks			Category
						CA	ES	Tot.	
19MC201	Environmental Science and Engineering	3	0	0	0	40	60	100	MC
19MC301	Indian Constitution	2	0	0	0	40	60	100	MC

LANGUAGE ELECTIVES

Code No	Course	L	T	P	C	Maximum Marks			Category
						CA	ES	Tot.	
19HX201	English for Engineers	3	0	0	3	40	60	100	HS
19HX202	Hindi	3	0	0	3	40	60	100	HS
19HX203	Japanese	3	0	0	3	40	60	100	HS
19HX204	French	3	0	0	3	40	60	100	HS

PROFESSIONAL ELECTIVES

Code No	Course	L	T	P	C	Maximum Marks			Category
						CA	ES	Tot.	
19CDPE01	Advanced Operating System Design and Security	3	0	0	3	40	60	100	PE
19CDPE02	Distributed Systems	3	0	0	3	40	60	100	PE
19CDPE03	Soft Computing	3	0	0	3	40	60	100	PE
19CDPE04	Multimedia Design	3	0	0	3	40	60	100	PE
19CDPE05	Mobile Ad Hoc networks	3	0	0	3	40	60	100	PE
19CDPE06	Wireless Sensor Networks	3	0	0	3	40	60	100	PE
19CDPE07	Computer Vision	3	0	0	3	40	60	100	PE
19CDPE08	Business Intelligence	3	0	0	3	40	60	100	PE
19CDPE09	Data Visualization	3	0	0	3	40	60	100	PE
19CDPE10	Quantum Computing	3	0	0	3	40	60	100	PE
19CDPE11	Block chain and Crypto currency	3	0	0	3	40	60	100	PE
19CDPE12	Image Processing	3	0	0	3	40	60	100	PE
19CDPE13	Natural Language Processing	3	0	0	3	40	60	100	PE
19CDPE14	Virtual Reality & Augmented Reality	3	0	0	3	40	60	100	PE
19CDPE15	Software Project Management	3	0	0	3	40	60	100	PE

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19CDPE16	Advanced Databases	3	0	0	3	40	60	100	PE
19CDPE19	Parallel Computing	3	0	0	3	40	60	100	PE
19CDPE20	Optimization Techniques	3	0	0	3	40	60	100	PE
19CDPE21	Advanced Algorithms	3	0	0	3	40	60	100	PE
19CDPE22	Graphics and Multimedia Systems	3	0	0	3	40	60	100	PE
19CDPE23	Advanced Computer Architecture	3	0	0	3	40	60	100	PE
19CDPE24	Data warehousing and Data Mining	3	0	0	3	40	60	100	PE
19CDPE25	Image Processing	3	0	0	3	40	60	100	PE
19CDPE26	GPU Programming	3	0	0	3	40	60	100	PE
19CDPE27	Game Programming	3	0	0	3	40	60	100	PE
19CDPE28	VLSI Design	3	0	0	3	40	60	100	PE
19CDPE29	Software Product Design	3	0	0	3	40	60	100	PE

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	16.36	15%	20%
2	ES	5	5	3	5	-	-	-	-	18	10.90	10%	15%
3	HS	3	3	-	3	-	-	-	-	9	5.45	5%	10%
4	PC	-	5	13	11	16	17	13	-	75	45.45	40%	45%
5	PE	-	-	-	-	3	3	6	6	18	10.90	10%	15%
6	OE	-	-	-	-	3	3	3	-	9	5.45	5%	10%
7	EEC	1.5	1.5	-	-	-	-	-	6	9	5.45	5%	10%
	Total	21.5	21.5	20	23	22	23	22	12	165	100	90%	125%

BS- Basic Science ES-Engineering Science HS-Humanities and Social Science
PE- Professional Elective OE- Open Elective PC- Professional Core
MC – Mandatory course CA – Continuous Assessment
ES- End semester Examination EEC-Employability Enhancement Course
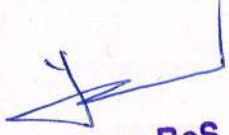
Total Number of Credits of Program Core : 75
No. of Credits related to Design : 48
% of Credits in Core related to Design : 64%

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Department	B.E. COMPUTER SCIENCE AND DESIGN				R 2021	Semester I	BS

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
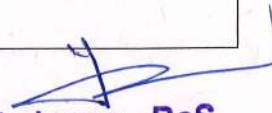
Course Objective (s): The purpose of learning this course is to
- Interpret the introductory concepts of Limit and continuity
- Interpret the introductory concepts of calculus, this will enable them to model and analyze physical phenomena involving continuous change of variables
- Find eigen values and 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

Repesentation of a function-Limit of a function-Continuty-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	B.E. COMPUTER SCIENCE AND DESIGN					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	

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

Course Outcomes: At the end of this course, learners will be able :
- 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 – wave particle 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 conductions 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 Physics‖. Oxford University Press, 2015
2.	Gaur, R.K. & Gupta, S.L. —Engineering Physics‖. Dhanpat Rai Publishers, 2012
3	Pandey, B.K. & Chaturvedi, S. —Engineering Physics‖. Cengage Learning India, 2012

REFERENCE(S):

1.	Halliday, D., Resnick, R. & Walker, J. —Principles of Physics‖. Wiley, 2015
2	Serway, R.A. & Jewett, J.W. —Physics for Scientists and Engineers‖. 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)

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

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Department	B.E. COMPUTER SCIENCE AND DESIGN				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

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

Course Outcomes: At the end of this course, learners will be able to:
- 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, causticembrittlememt) – Internal conditioning (carbonate, phosphate, sodium aluminate and calgon) .External treatment – Demineralization process – Reverse Osmosis.

Unit II	ELECTROCHEMISTRYAND 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	ENERGYSOURCES	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	FUELSANDCOMBUSTION	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-Trophs 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", DhanpatRai 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.	GowarikerV.R, Viswanatha.N.V, JayadevSreedhar-"Polymer Science", Publishing company New Age International Publishers, New Delhi,2015.
4.	Ozin G. A. and Arsenault A. C., "Nanochemistry: A Chemical Approach to Nanomaterials", RSC Publishing, 2017.
5.	Ashima Srivastava and Janhavi N N., "Concepts of Engineering Chemistry", ACME Learning Private Limited., New Delhi., 2015.

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Department	B.E. COMPUTER SCIENCE AND DESIGN					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):
- 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:
- 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	B.E. COMPUTER SCIENCE AND DESIGN					R 2019	Semester I	ES
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ES101	C PROGRAMMING	3	0	0	3	45	100	

Course Objective (s): The purpose of learning this course is to
- Know the basics of C programming
- Understand Control statements and Arrays in C
- Develop C program using function and Pointers
- Apply Structure
- Handle files

Course Outcomes: At the end of this course, learners will be able to:
- Write simple C Programs
- Write program using arrays and Strings
- Develop application using Functions and Pointer
- Write program using Structure
- Perform Read and Write Operations on Files

Unit I	INTRODUCTION TO C	9

Introduction to programming paradigms – Structure of C program – C programming: Data Types – Storage classes – Constants – Enumeration Constants – Keywords – Operators: Precedence and Associativity – Expressions – Input/Output statements, Assignment statements – Decision making statements – Switch statement – Looping statements – Pre-processor directives – Compilation process

Unit II	ARRAYS AND STRINGS	9

Introduction to Arrays: Declaration, Initialization – One dimensional array – Example Program: Computing Mean, Median and Mode – Two dimensional arrays – Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) – String operations: length, compare, concatenate, copy – Selection sort, linear and binary search.

Unit III	FUNCTION AND POINTERS	9

Introduction to functions: Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion – Example Program: Computation of Sine series, Scientific calculator using built-in functions, Binary Search using recursive functions – Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Example Program: Sorting of names – Parameter passing: Pass by value, Pass by reference – Example Program: Swapping of two numbers and changing the value of a variable using pass by reference

Unit IV	STRUCTURES	9

Structure – Nested structures – Pointer and Structures – Array of structures – Example Program using structures and pointers – Self referential structures – Dynamic memory allocation – Singly linked list – typedef.

Unit V	FILE PROCESSING	9

Files – Types of file processing: Sequential access, Random access – Sequential access file – Example Program: Finding average of numbers stored in sequential access file – Random access file – Example Program: Transaction processing using random access files – Command line arguments

TEXT BOOK(S)

1,	Kernighan B. W. and Ritchie DM, "C Programming Language (ANSI C)", Prentice Hall, 2013
2,	Deitel H. M. and Deitel P. J., "C How to Program", Prentice Hall, 2012.

REFERENCE(S)

1.	Herbert Schildt, "C The Complete Reference", Tata McGraw Hill, 2010
2.	Gottfried Byron, "Programming With C", Tata McGraw Hill, 2011

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Department	B.E. COMPUTER SCIENCE AND DESIGN					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	2	2	45	100

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

- 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:

- 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.

PRACTICAL : 15 Hours

REFERENCES:
1. The Seven Habits of Highly Effective People - Stephen R. Covey.
2. All the books in the "Chicken Soup for the Soul" series.
3. Man's search for meaning – Viktor Frankl
4. The greatest miracle in the world – Og Mandino
5. Goal - Eliyahu Goldratt.
6. Working with Emotional Intelligence - David Goleman.
7. Excel in English – Sundra Samuel, Samuel Publications
8. Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillan India Ltd., Delhi
9. Essentials of Effective Communication, Ludlow and Panthon; Prentice Hall of India.
10. Effective Presentation Skills (A Fifty-Minute Series Book) by Steve Mandel
11. "Strategic interviewing" by Richaurd Camp, Mary E. Vielhaber and Jack L. Simonetti – Published by Wiley India Pvt. Ltd
12. "Effective Group Discussion: Theory and Practice" by Gloria J. Galanes, Katherine Adams , John K. Brilhart

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Department	B.E. COMPUTER SCIENCE AND DESIGN					R 2019	Semester I	BS
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19BS106	CHEMISTRY LABORATORY	0	0	4	2	60	100	

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	B.E. COMPUTER SCIENCE AND DESIGN					R 2019	Semester II	ES
Course Code	**Course Name**	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ES103	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 data types

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

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Department	B.E. COMPUTER SCIENCE AND DESIGN				R 2019	Semester	II
Course Code	Course Name	Hours/Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19BS201	APPLIED LINEAR ALGEBRA	3	1	0	4	60	100

Course Objective (s): The purpose of learning this course is to
- Introduce the system of linear equations and solve numerically.
- Understand the concepts of vector space
- Understand linear transformations and diagonalization.
- Apply the concept of inner product spaces in orthogonalization.
- Apply eigen values and eigen vectors in real life

Course Outcomes: At the end of this course, learners will be able to:
- Explain the fundamental concepts of system of linear equations and their solutions
- Explain advanced algebra and their role in modern Mathematics and applied contexts.
- Demonstrate accurate and efficient use of advanced algebraic techniques
- Demonstrate their mastery by solving non - trivial problems related to the concepts and by proving simple theorems about the statements proven by the text.
- Understand the applications of eigen values and eigen vectors

Unit I	SYSTEM OF LINEAR EQUATIONS	12

Direct method: Gauss elimination method – Gauss-Jordan method - Iterative methods: Gauss-Seidel method – LU decomposition method – Cholesky decomposition method - Relaxation Method.

Unit II	VECTOR SPACES	

Vector spaces and subspaces – Linear independence and dependence – Basis and Dimension - Null spaces, column spaces – Dimension Theorem.

Unit III	LINEAR TRANSFORMATION	12

Similarity transformation – Diagonalization – Orthogonal space- matrix of linear transformation-Geometry of linear transformation-kernal-range- Nullity.

Unit IV	INNER PRODUCT SPACE	12

Inner product – Length and orthogonality – Orthogonal sets – Orthogonal projections – Inner product spaces – The Cauchy Schwarz Inequality - The Gram Schmidt Orthogonalization process - Applications of inner product spaces.

Unit V	APPLICATION OF EIGENVALUES AND EIGENVECTORS	12

Generalised eigen vectors-Power method – Jacobi method for symmetric matrix – Quadric surface.

REFERENCE(S):
1.	Strang, G., ―Linear Algebra and its applications, Thomson (Brooks/Cole), New Delhi, 2005
2.	Friedberg, A.H., Insel, A.J. and Spence, L., ―Linear Algebral, Prentice - Hall of India, New Delhi, 2004.
3.	Bernard Kolman, David R. Hill, ―Introductory Linear Algebral, Pearson Education, New Delhi, First Reprint 2009.
4.	Howard Anton, Elementary Linear Algebra Applications , Wiley India Pvt. Ltd., Bangalore, 9th Edition, 2008.
5.	Steven Chapra , Numerical Methods for Engineers , Tata McGraw Hill seventh Edition, 2015.

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Department	B.E. COMPUTER SCIENCE AND DESIGN					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

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

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

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

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 - Flourescence and phosphorescence - LCD, Optical storage device-CD ROM-DVD ROM-Blu ray-DVD RAM

Unit V	NANOELECTRONIC DEVICES	9

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.	Jasprit Singh, —Semiconductor Devices: Basic Principlesǁ, Wiley 2012.
2.	Kasap, S.O. —Principles of Electronic Materials and Devicesǁ, McGraw-Hill Education, 2007.
3	Kittel, C. —Introduction to Solid State Physicsǁ. 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	B.E. COMPUTER SCIENCE AND DESIGN					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

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

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

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.

Unit II	ENVIRONMENTAL POLLUTION	8

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.

Unit III	NATURAL RESOURCES	9

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.

Unit IV	SOCIAL ISSUES AND THE ENVIRONMENT	9

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.

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, Envrionmental Science and Engineering., Sri Krishna Hitech Publishing co. Pvt. Ltd., Chennai,12th Edition (2016)

REFERENCE(S):

1.	Masters, Gilbert M, ―Introduction to Environmental Engineering and Sciencell, Second Edition, Pearson Education, New Delhi (2012).
2.	Santosh Kumar Garg, Rajesh warigarg, smf RanjniGarg ―Ecological and Environmental Studiesll 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	B.E. COMPUTER SCIENCE AND DESIGN					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):
- 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:
- 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	B.E. COMPUTER SCIENCE AND DESIGN					R 2019	Semester II	HS
Course Code	**Course Name**	**Hours / Week**			**Credit**	**Total Hours**	**Maximum Marks**	
		L	T	P	C			
19HX202	HINDI	3	0	0	3	45	100	

Course Objective (s): The purpose of learning this course is to
- Help students to acquire the basics of Hindi
- Understand the Nouns
- Understand Pronouns and tenses
- Understand the different vocabulary
- Speak in Hind

Course Outcomes: At the end of this course, learners will be able to:
- Use Hindi alphabet
- Use Nouns in speaking and wrting
- 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):
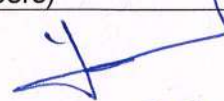
1.	Elementary Hindi: Learn to Communicate in Everyday Situations by Richard Delacy Tuttle Publication 2013
2	Colloquial Hindi: The Complete Course for Beginners by Tej K. Bhatia

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, RahamathullahVani Prakasan, New Delhi, 2002.
3	Ramdev, Vyakaran Pradeep, Saraswathi Prakasan, Varanasi, 2004.

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Department	B.E. COMPUTER SCIENCE AND DESIGN					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
- 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:
- 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 - N1mo - 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 - ikimasendheshitha - 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 - N1wanaadj des. N1 wa ii adj des - naadjna N1 - ii adj ii N1 - Thothemo - 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 - imasuN1(Place) ne N2 gaarimasu - iimasu - N1 wa N2(Place) ne arimasu - 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 thoDhochiragaadj 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	B.E. COMPUTER SCIENCE AND DESIGN					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
- 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:
- 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 - trémacédille - écrire son nom dans le français (spellingone -sname 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) - Nomsd'endroitscommuns (Places) - Nationalités (Nationalities) ECOUTER : (Listening) Écouter I - alphabet associéà des prénomsfrançais - Écouter et répondre PARLER (Speaking)Présntation - même /Présentez - Vous (Introducingoneself)LIRE :Lireles phrases simples

Unit IV	**Grammar (et grammaire)**	12

Pronoms (Pronouns) - Nomscommunsmasculins et de femme (Common masculine and Femininenouns) - Verbescommuns (Common verbs)COUTER :couter et crier les prnoms - Observer les dessins et couter les dialogues LIRE : Lire les profilsd'utilisateursd'interlingua (alter ego)PARLER :Parler de saville - Parler de sa profession

Unit V	**Speaking & Writing (Parler et écrire)**	11

Narration de son nom et l'endroitoù on vit - Son âge et date de naissance - Numéro de téléphoneet'dresse-Narration du temps - La France en Europe PARLER :Conversation entre deuxamis - Jouer la scène ÉCOUTER :Ecouter les conversations (CD alter ego)ÉCRIRE :Écrireune 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	FrançaisLinguaphone
5	Françaisl.Harrisonburg: The Rosetta Stone: Fairfield Language Technologies

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Department	B.E. COMPUTER SCIENCE AND DESIGN					R 2019	Semester II	ES

Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ES201	DIGITAL PRINCIPLES AND SYSTEM DESIGN	3	0	0	3	45	100	

Course Objective (s):

The purpose of learning this course is

- 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

- 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", 6th 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	B.E. COMPUTER SCIENCE AND DESIGN				R 2019	Semester II	PC
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19MCS201	DATA STRUCTURES	3	0	0	3	45	100

Course Objective (s):

The purpose of learning this course is to
- To learn about the implementation of list using arrays and linked list
- To design and implement stack and queue
- To study and implement the nonlinear tree data structures.
- To study and implement the nonlinear graph data structures.
- To learn basic sorting ,searching algorithms and hashing techniques

Course Outcomes:

At the end of this course, learners will be able to:
- Apply the fundamental knowledge of various Data structures for designing and implementing real time problems using linked list.
- Write programs to implement stack and queue.
- Apply the concepts of trees in real world problems.
- Apply the concepts of graphs in real world applications.
- Implement basic sorting, searching algorithms and hashing techniques.

Unit I	INTRODUCTION	4

Data Management concepts, Data types – primitive and non-primitive, Performance Analysis and Measurement (Time and space analysis of algorithms-Average, best and worst case analysis), Types of Data Structures- Linear & Non Linear Data Structures

Unit II	LINEAR DATA STRUCTURE	13

Array: Representation of arrays, Applications of arrays, sparse matrix and its representation Stack: Stack-Definitions & Concepts, Operations On Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, Tower of Hanoi Queue: Representation Of Queue, Operations On Queue, Circular Queue, Priority Queue, Array representation of Priority Queue, Double Ended Queue, Applications of Queue Linked List: Singly Linked List, Doubly Linked list, Circular linked list ,Linked implementation of Stack, Linked implementation of Queue, Applications of linked list

Unit III	NON LINER DATA STRUCTURE	13

Tree-Definitions and Concepts, Representation of binary tree, Binary tree traversal (Inorder, postorder, preorder), Threaded binary tree, Binary search trees, Conversion of General Trees To Binary Trees, Applications Of Trees Some balanced tree mechanism, eg. AVL trees, 2-3 trees, Height Balanced, Weight Balance, Graph-Matrix Representation Of Graphs, Elementary Graph operations,(Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree)

Unit IV	HASHING AND FILE STRUCTURES	6

Hashing: The symbol table, Hashing Functions, Collision Resolution Techniques, File Structure: Concepts of fields, records and files, Sequential, Indexed and Relative/Random File Organization, Indexing structure for index files, hashing for direct files, Multi-Key file organization and access methods

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Unit V	SORTING AND SEARCHING	6

Sorting – Bubble Sort, Selection Sort, Quick Sort, Merge Sort Searching – Sequential Search and Binary Search

TEXT BOOK(S)

1.	Reema Thareja, "Data Structures Using C", Second Edition , Oxford University Press, 2014
2.	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2002

REFERENCE(S)

1.	Stephen G. Kochan, "Programming in C", 4th Edition, Pearson Education, 2015
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	B.E. COMPUTER SCIENCE AND DESIGN					R 2019	Semester II	EEC
Course	**Course Name**	Hours/ Week			Credit	Total Hours	Maximum	
Code		L	T	P	C		Marks	
19TPS02	**SOFT SKILLS - II**	1	0	2	2	45	100	

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

- 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:

- 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.

PRACTICAL : 15 Hours

REFERENCES:
1. The Seven Habits of Highly Effective People - Stephen R. Covey.
2. All the books in the "Chicken Soup for the Soul" series.
3. Man's search for meaning – Viktor Frankl
4. The greatest miracle in the world – Og Mandino
5. Goal - Eliyahu Goldratt.
6. Working with Emotional Intelligence - David Goleman.
7. Excel in English – Sundra Samuel, Samuel Publications
8. Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillan India Ltd., Delhi.
9. Essentials of Effective Communication, Ludlow and Panthon; Prentice Hall of India.
10. Effective Presentation Skills (A Fifty-Minute Series Book) by Steve Mandel
11. "Strategic interviewing" by Richaurd Camp, Mary E. Vielhaber and Jack L. Simonetti – Published by Wiley India Pvt. Ltd
12. "Effective Group Discussion: Theory and Practice" by Gloria J. Galanes, Katherine Adams , John K. Brilhart

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Department	B.E. COMPUTER SCIENCE AND DESIGN					R 2019	Semester II	ES

Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19ES202	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 an 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.
a. Logic gates using discrete Components.
b. Verification of truth table for AND, OR, NOT, NAND, NOR and XOR gates.
c. Realization of NAND and NOR gates
Implementation of Logic Circuits.
d. Verification of Boolean laws.
e. Verification of DeMorgan's law
Adder and Subtractor
f. Implementation of Half-Adder and Full-Adder
g. Implementation of Half-Subtractor and FullSubtractor
Combinational Circuit Design
h. Design of Decoder and Encoder
i. Design of Code Converter.
j. Design of multiplexers and demultiplexers.
Sequential Circuit Design
k. Implementation of Shift registers, Serial Transfer.
l. Ring Counter , 4-bit Binary Counter , BCD Counter.

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", 6th 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	B.E. COMPUTER SCIENCE AND DESIGN				R 2019	Semester II	PC

Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19CD202	DATA STRUCTURES LABORATORY	0	0	4	2	60	100

Course Objective (s):
The purpose of learning this course is to
- Familiarize students in the implementation of searching algorithms
- Understand sorting algorithms
- Familiarize linear data structures.
- Know non linear data structures.
- Understand graph algorithms

Course Outcomes:
At the end of this course, learners will be able to:
- Implement searching algorithms and sorting algorithms
- Implement Linear data structures -list
- Implement Stack and Queue
- Implement on Binary Trees
- Implement Graph Algorithms

List of Experiments
1. Implementation of Searching Algorithms
2. Implementation of sorting algorithms
3. Implementation of LIST ADT using Array and Linked Representation
4. Implementation of Queue ADT
5. Implementation of Singly, Doubly and Circularly Linked Lists
6. Implementation of Stack ADT using Arrays and Linked list
7. Implementation of Binary Trees
8. Implementation of Graph Algorithms

TEXT BOOK(S)

1.	Reema Thareja, "Data Structures Using C", Second Edition , Oxford University Press, 2014
2.	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2002

REFERENCE(S)

1.	Stephen G. Kochan, "Programming in C", 4th Edition, Pearson Education, 2015
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	B.E. COMPUTER SCIENCE AND DESIGN				R 2019	Semester	III

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
- Understand the notion of mathematical thinking and be able to apply them in problem solving.
- Understand the notion of 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
- Work and apply Boolean in logical circuits

Course Outcomes: At the end of this course, learners will be able to:
- 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	B.E. COMPUTER SCIENCE AND DESIGN					R 2019	Semester	III
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19CT301	DESIGN AND ANALYSIS OF ALGORITHMS	3	0	0	3	45	100	

Course Objective (s):

The purpose of learning this course is
- To provide a mathematical foundation for analyzing and proving the efficiency of an algorithm.
- To focus on the design of algorithms in various domains of computer engineering.
- To provide familiarity with main thrusts of work in algorithms sufficient to give some context for formulating and seeking known solutions to an algorithmic problem.

Course Outcomes:

At the end of this course, learners will be able to
- Ability to use mathematical tools to analyze and derive the running time of algorithms and prove the correctness.
- Explain and apply the major algorithm design paradigms.
- Explain the major graph algorithms and their analyses.
- Explain the major String Matching algorithms and their analysis.
- Explain the major Computational Geometry algorithms and their analysis.

Unit I	ALGORITHM DEVELOPMENT	9

Stages of algorithm development for solving a problem: Describing the problem, Identifying a suitable technique, Design of an algorithm, Proof of Correctness of the algorithm - Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties – Mathematical analysis for Recursive and Non-recursive algorithms.

Unit II	BRUTE FORCE, DIVIDE AND CONQUER, DECREASE AND CONQUER TECHNIQUE	9

Brute force techniques – Travelling Salesman Problem, Divide and Conquer - Finding a maximum and minimum in a given array -Matrix multiplication: Strassen's algorithm, Merge sort - Quick sort - Binary search, Decrease and Conquer- Insertion sort, Topological sort.

Unit III	DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE	9

Dynamic programming – Principle of optimality - Coin changing problem, Computing a Binomial Coefficient – Floyd's algorithm – Multi stage graph - Optimal Binary Search Trees – Knapsack Problem and Memory functions. Greedy Technique – Container loading problem - Prim's algorithm and Kruskal's Algorithm – 0/1 Knapsack problem, Optimal Merge pattern - Huffman Trees.

Unit IV	BACKTRACKING, BRANCH AND BOUND	9

n - Queens Problem - Hamiltonian Circuit Problem - Subset Sum Problem. Branch and Bound Technique: Assignment Problem - Knapsack Problem - Travelling Salesman

Unit V	SOLVABILITY	9

Lower Bound Arguments - Decision Trees - P, NP and NP-Complete Problems, Problem. Approximation Algorithms: Vertex-cover problem - Travelling Salesman Problem

TEXT BOOK(S)

1.	Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Pearson Publications, 3rd Edition, 2012

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2.	Alfred V Aho, Design And Analysis Of Computer Algorithms, Addison Wesely, 2001

REFERENCE(S)

1.	Thomas H. Cormen, Charles E. Leiserson, R.L. Rivest, "Introduction to Algorithms", Prentice Hall of India Publications, 3rd Edition, 2009
2.	Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms," 2nd Edition, Galgotia Publications, 2008.
3.	Sara Baase and Allen Van Gelder, "Computer Algorithms: Introduction to Design and Analysis", Pearson Publications, 3rd Edition, 2008.

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Department	B.E. COMPUTER SCIENCE AND DESIGN				R 2019	Semester	III

Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19CT302	COMPUTER ARCHITECTURE DESIGN	3	0	0	3	45	100

Course Objective (s):

The purpose of learning this course is
- To make students understand the basic structure and operation of digital computer.
- To understand the hardware-software interface.
- To familiarize the students with arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations.
- To expose the students to the concept of pipelining.
- To familiarize the students with hierarchical memory system including cache memories and virtual memory.

Course Outcomes:

At the end of this course, learners will be able to
- Design arithmetic and logic unit.
- Design and anlayse pipelined control units
- Evaluate performance of memory systems.
- Understand parallel processing architectures.
- Understand the various memory systems and I/O communication.

Unit I	INTRODUCTION AND OVERVIEW OF COMPUTER ARCHITECTURE	9

Introduction to computer systems - Overview of Organization and Architecture –Functional components of a computer -Registers and register files-Interconnection of components- Organization of the von Neumann machine and Harvard architecture-Performance of processor. Instructions – operations and operands – represeting instructions – Logical operations – control operations – Addressing and addressing modes.

Unit II	DATA REPRESENTATION AND COMPUTER ARITHMETIC	9

Fixed point representation of numbers-algorithms for arithmetic operations: multiplication (Booths, Modified Booths) - division (restoring and non-restoring) - Floating point representation with IEEE standards and algorithms for common arithmetic operations- Representation of non- numeric data (character codes).

Unit III	PROCESSOR AND CONTROL UNIT, PARALLELISM	9

A Basic MIPS implementation – Building a Datapath – Control Implementation Scheme – Pipelining – Pipelined datapath and control – Handling Data Hazards & Control Hazards – Exceptions. Parallel processing challenges – Flynn's classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures - Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors.

Unit IV	MEMORY SYSTEM ORGANIZATION AND ARCHITECTURE	9

Memory systems hierarchy-Main memory organization-Types of Main memory-memory interleaving and its characteristics and performance- Cache memories: address mapping-line size-replacement and policies- coherence- Virtual memory systems- TLB- Reliability of memory systems- error detecting and error correcting systems.
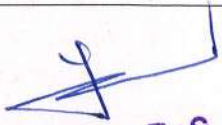
Unit V	INTERFACING AND COMMUNICATION	9

I/O fundamentals: handshaking, buffering-I/O techniques: programmed I/O, interrupt-driven I/O, DMA- Interrupt structures: vectored and prioritized-interrupt overhead- Buses: Synchronous and asynchronous- Arbitration.

TEXT BOOK(S)

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1.	David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.
2.	Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.

REFERENCE(S)

1.	W. Stallings, Computer organization and architecture, Prentice-Hall, 8th edition, 2013
2.	John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill, 2012.
3.	John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.

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Department	B.E. COMPUTER SCIENCE AND DESIGN				R 2019	Semester	III

Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19CT303	OBJECT ORIENTED PROGRAMMING	3	0	0	3	45	100

Course Objective (s):

The purpose of learning this course is
- To get a clear understanding of object-oriented concepts
- To understand the basics of C++, objects and classes, Inheritance, Polymorphism
- To understand the basics of I/O and file management, and advance topics including templates, exceptions and Standard Template Library

Course Outcomes:

At the end of this course, learners will be able to
- Student should be able to analyze and design a computer program based on Object Oriented Principles.
- Students will be able to solve a real world problems based on Object Oriented Principles.
- Gain the basic knowledge on Object Oriented concepts
- Ability to develop applications using Object Oriented Programming Concepts
- Ability to implement features of object oriented programming to solve real world problems

Unit I	INTRODUCTION	9

Introduction: Traditional Versus Object Orientation Approach – Benefits and applications of OOP– Characteristics of Object Oriented Programming Languages: Objects – Classes – Data encapsulation – Data hiding–Inheritance – Polymorphism –Overloading– Dynamic Binding – Message Passing – Extensibility.

Unit II	C++ PROGRAMMING BASICS	9

Overview–C++ Data Types–Basics of object and class in C++ – Program structure– Member Functions and Member Variable – Techniques for Creating and Initializing Objects – Initializing and Cleaning Objects – Data Hiding – Namespace– Identifiers– Variables – Constants– Operators– Typecasting– Control structures– Loops and Decisions –Constructors and their types – Destructor – Access specifiers: Private Public and Protected members.

Unit III	FUNCTIONS	9

C++ Functions: Simple functions- Arguments passed by value and by reference- Overloading of functions – Constructor Overloading-Inline functions - Passing and returning of objects- friend function - Friend Classes -Static Functions - Operator Overloading: Overloading Unary Operators Overloading Binary Operators - Data Conversion: Conversions Between Objects and Basic Types - Conversions Between Objects of Different Classes.

Unit IV	INHERITANCE	9

Inheritance: Concept of Inheritance –Types of Inheritance: Single –Multiple – Multilevel – Hierarchical – Hybrid – Virtual Functions: Normal Member Functions Accessed with Pointers – Virtual Member Functions Accessed with Pointers – Abstract Classes and Pure Virtual Functions – Virtual Destructors –Virtual Base Classes – THIS Pointer.

Unit V	I/O AND FILE MANAGEMENT	9

I/O and File Management, Templates, Exceptions and STL: C++ streams –C++ streams classes – Unformatted I/O Operations –Formatted console I/O Operations –Managing output with manipulators – File stream classes – Opening and Closing a Files –Finding end of file –File opening modes –File pointers and manipulators –Sequential input and Output operations –Exception Handling Fundamentals–try –catch –throw –multiple catch –Catching All Exceptions –Restricting Exceptions –

Rethrowing an Exception –Implementing user defined exceptions –Overview and Use of Standard Template Library.

TEXT BOOK(S)

1.	Robert Lafore, "Object -Oriented Programming in C++", Sams Publication, Fourth Edition, 2002.
2.	Balagurusamy.E, "Object Oriented Programming with C++", Tata McGraw-Hill Publication, 2008.

REFERENCE(S)

1.	Herbert Schildt, "The Compete Reference C++", Tata McGraw-Hill Publication, Third Edition, Fourth Edition, 1998.
2.	Safee Vohra, "Object Oriented Programming with C++", Bookrent.in Publication, First Edition, 2015.
3.	M. T. Guru, D. S. Nagendraswamy, H. S.Manjunatha, K. S. Somashekara, "Object Oriented Programming with C++", PHI Publication, Second Edition, 2012.

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Department	COMPUTER SCIENCE AND ENGINEERING					R 2019	Semester	II
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19ES301	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	0	3	45	100	

Course Objective (s): The purpose of learning this course is to
- 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:
1. Apply the concept of electric circuit laws to analyze the electric circuits.
2. Analyze the working principles of electrical machines.
3. Understand the concepts of various electronic devices.
4. Design the logic gates, Half and Full adder.
5. 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", Oxfo rd University Press, 2013

REFERENCE(S):

1.	Del Toro, "Electrical Engineering Fundamentals", Pearson Education, New Delhi, 2007
2.	Allan S Moris, "Measurement and Instrumentation Principles", Elseveir, First Indian Edition, 2006
3.	Rajendra Prasad, "Fundamentals of Electrical Engineering", Prentice Hall of India, 2006

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Department	B.E. COMPUTER SCIENCE AND DESIGN					R 2019	Semester III	EEC
Course Code	Course Name	Hours/ Week			Credit	Total Hours	Maximum	
		L	T	P	C		Marks	
19TPS03	QUANTITATIVE APTITUDE AND LOGICAL REASONING - I	2	0	0	0	30	100	

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

- Crack aptitude assessment by using speed math concepts.
- Solve problems using fast track method by learning simplification and numbers.
- Learn the basic of ratio and proportion and mixture concepts.
- Calculate different ways of solving problems on average and ages.
- Learn the logical skills by analyzing the objects.

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

- 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.

TOTAL : 30 HOURS

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REFERENCES:

1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-Hill Publishing Company Ltd, 2012

2. Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.

3. R.V.Praveen,"Quantitative Aptitude and Reasoning"Third Edition, PHI Learning ,2016.

4. Dr.R S Aggarwal, Quantitative Aptitude, Revised and Enlarged Edition, S.Chand Publishing Company Ltd, 2017.

5. Arun Sharma "How to Prepare for Quantitative Aptitude"Eight Edition, McGraw Hill Education,2018.

6. "Reasoning and Aptitude" for GATE and ESE Prelims, Made Easy Publication,2020.

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Department	B.E. COMPUTER SCIENCE AND DESIGN				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	-	30	100	

Course Objective (s): The purpose of learning this course is
- 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 Indian nationalism.
- 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 Indian Constitution.

Course Outcomes: At the end of this course, learners will be able to:
- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- 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 Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

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. 3. 4

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	B.E. COMPUTER SCIENCE AND DESIGN					R 2019	Semester	III
Course Code	**Course Name**	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19CT305	**DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY**	0	0	4	2	60	100	

Course Objective (s):

The purpose of learning this course is

- To provide a mathematical foundation for analyzing and proving the efficiency of an algorithm.
- To focus on the design of algorithms in various domains of computer engineering.
- To provide familiarity with main thrusts of work in algorithms sufficient to give some context for formulating and seeking known solutions to an algorithmic problem.

Course Outcomes:

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

- Ability to use mathematical tools to analyze and derive the running time of algorithms and prove the correctness.
- Explain and apply the major algorithm design paradigms.
- Explain the major graph algorithms and their analyses.
- Explain the major String Matching algorithms and their analysis.
- Explain the major Computational Geometry algorithms and their analysis.

List of Experiments

1. Sort a given set of n integer elements using Quick Sort method and compute its time complexity. Run the program for varied values of n> 5000 and record the time taken to sort. Plot a graph of the time taken versus non graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using Java how the divide and- conquer method works along with its time complexity analysis: worst case, average case and best case

2. Sort a given set of n integer elements using Merge Sort method and compute its time complexity. Run the program for varied values of n> 5000, and record the time taken to sort. Plot a graph of the time taken versus non graph sheet. The elements can be read from a file or can be generated using random number generator. Demonstrate using Java how the divide and- conquer method works along with its time complexity analysis: worst case, average case and best case.

3. Implement in Java, the 0/1 Knapsack problem using (a) Dynamic Programming method (b) Greedy method.

4. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm. Write the program in Java.

5. Find Minimum Cost Spanning Tree of a given connected undirected graph using Kruskal's algorithm. Use Union-Find algorithms in your program.

6. Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.

7. Write Java programs to (a) Implement All-Pairs Shortest Paths problem using Floyd's algorithm. (b) Implement Travelling Sales Person problem using Dynamic programming.

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8. .Design and implement in Java to find a subset of a given set S = {Sl, S2,.....,Sn} of n positive integers whose SUM is equal to a given positive integer d. For example, if S ={1, 2, 5, 6, 8} and d= 9, there are two solutions {1,2,6}and {1,8}. Display a suitable message, if the given problem instance doesn't have a solution.

9. Design and implement in Java to find all Hamiltonian Cycles in a connected undirected Graph G of n vertices using backtracking principle.

10. Write a Java program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero. B. Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer for every 1 second; second thread computes the square of the number and prints; third thread will print the value of cube of the number

TEXT BOOK(S)

1.	Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Pearson Publications, 3rd Edition, 2012
2.	Alfred V Aho, Design And Analysis Of Computer Algorithms, Addison Wesely, 2001

REFERENCE(S)

1.	Thomas H. Cormen, Charles E. Leiserson, R.L. Rivest, "Introduction to Algorithms", Prentice Hall of India Publications, 3rd Edition, 2009
2.	Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms," 2nd Edition, Galgotia Publications, 2008.
3.	Sara Baase and Allen Van Gelder, "Computer Algorithms: Introduction to Design and Analysis", Pearson Publications, 3rd Edition, 2008.

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Department	B.E. COMPUTER SCIENCE AND DESIGN					R 2019	Semester	III
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19CT306	OBJECT ORIENTED PROGRAMMING LABORATORY	0	0	4	2	60	100	

Course Objective (s):

The purpose of learning this course is
- To get a clear understanding of object-oriented concepts
- To understand the basics of C++, objects and classes, Inheritance, Polymorphism
- To understand the basics of I/O and file management, and advance topics including templates, exceptions and Standard Template Library

Course Outcomes:

At the end of this course, learners will be able to
- Student should be able to analyze and design a computer program based on Object Oriented Principles.
- Students will be able to solve a real world problems based on Object Oriented Principles.
- Gain the basic knowledge on Object Oriented concepts
- Ability to develop applications using Object Oriented Programming Concepts
- Ability to implement features of object oriented programming to solve real world problems

List of Experiments

1. Write a program for multiplication of two matrices using OOP.

2. Create a class Student which has data members as name, branch, roll no, age ,sex ,marks in five subjects.

3. Display the name of the student and his percentage who has more than 70%.Use array of objects.

4. Write a program to enter any number and find its factorial using constructor.

5. Write a program to perform addition of two complex numbers using constructor overloading. The first constructor which takes no argument is used to create objects which are not initialized, second which takes one argument is used to initialize real and imag parts to equal values and third which takes two argument is used to initialized real and imag to two different values.

6. Write a program to find the greatest of two given numbers in two different classes using friend function.

7. Implement a class string containing the following functions:

8. Overload + operator to carry out the concatenation of strings.

9. Overload = operator to carry out string copy.

10. Overload <= operator to carry out the comparison of strings.

11. Function to display the length of a string.

12. Function tolower( ) to convert upper case letters to lower case.

13. Function toupper( ) to convert lower case letters to upper case.
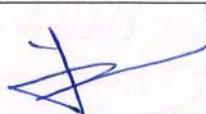
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14. Create a class called LIST with two pure virtual function store() and retrieve().To store a value call store and to retrieve call retrieve function. Derive two classes stack and queue from it and override store and retrieve.

15. Create a base class called SHAPE. Use this class to store two double type values. Derive two specific classes called TRIANGLE and RECTANGLE from the base class. Add to the base class, a member function getdata to initialize base class data members and another member function display to compute and display the area of figures. Make display a virtual function and redefine this function in the derived classes to suit their requirements. Using these three classes design a program that will accept driven of a TRINGLE or RECTANGLE interactively and display the area.

16. Write a program to define the function template for calculating the square of given numbers with different data types.

17. Write a program to demonstrate the use of special functions, constructor and destructor in the class template. The program is used to find the bigger of two entered numbers.

18. Write a program to perform the deletion of white spaces such as horizontal tab, vertical tab, space, line feed, new line and carriage return from a text file and store the contents of the file without the white spaces on another file.

19. Write a program to read the class object of student info such as name, age, sex, height and weight from the keyboard and to store them on a specified file using read() and write() functions. Again, the same file is opened for reading and displaying the contents of the file on the screen.

20. Write a program to raise an exception if any attempt is made to refer to an element whose index is beyond the array size.

21. . Write a program to read a set of lines from the keyboard and to store it on a specified file.

TEXT BOOK(S)

| 1. | Robert Lafore, "Object -Oriented Programming in C++", Sams Publication, Fourth Edition, 2002. |
| 2. | Balagurusamy.E, "Object Oriented Programming with C++", Tata McGraw-Hill Publication, 2008. |

REFERENCE(S)

1.	Herbert Schildt, "The Compete Reference C++", Tata McGraw-Hill Publication, Third Edition, Fourth Edition, 1998.
2.	Safee Vohra, "Object Oriented Programming with C++", Bookrent.in Publication, First Edition, 2015.
3.	M. T. Guru, D. S. Nagendraswamy, H. S.Manjunatha, K. S. Somashekara, "Object Oriented Programming with C++", PHI Publication, Second Edition, 2012.

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Programme	B.E. COMPUTER SCIENCE AND DESIGN				R 2019	Semester IV
Course Code	Course Name	Hours / Week			Total Hours	Maximum Marks
		L	T	P	C		
19BS406	STATISTICAL METHODS FOR DATA ANALYSIS	3	1	0	4	60	100

Course Objective(s): The purpose of learning this course is to
- Demonstrate the knowledge of the Statistics, probability.
- Choose and apply an appropriate statistical analysis or modeling methods to solve problems.
- Expose the applications of statistics in machine learning for prediction.
- Able to analyse data and predict quality control.
- Analyze the contribution of dependent and independent variables in various data analysis techniques.

Course Outcomes: Upon completion of the course, students will be able to:
- Know about the entire base of data and its analysis
- Understand about sampling distributions and estimations.
- Understand about the use of hypothesis test results in data analytics.
- Realize the use of non-parametric tests when quick or preliminary data analysis is needed.
- Study about the time series analysis which is helpful to evaluate current achievements in data mining.

UNIT I	INTRODUCTION	12

Statistics – Definition -Types of variables – Organizing data - Descriptive Measures-Measures of central tendency-mean-median-mode. Deviation - standard- Quartile. Basic definitions and rules for probability, Conditional probability, Independence of events, Baye's theorem, Probability distributions: Normal distributions.

UNIT II	SAMPLING DISTRIBUTION AND ESTIMATION	12

Introduction to sampling distributions, sampling distribution of the mean. Weak law of large numbers-Central limit theorem-chebyshev 's inequality .Estimation: Point and Interval estimates for Population parameters of large sample and small samples, Determining the sample size,

UNIT III	TESTING OF HYPOTHESIS - PARAMETRIC TESTS	12

Hypothesis testing: one sample and two sample tests for means and proportions of large samples (z-test), one sample and two sample tests for means of small samples (t-test), F-test for two sample standard deviations. One way and two way classifications - Completely randomized design – Randomized block design-Latin square design

UNIT IV	NON-PARAMETRIC TESTS AND QUALITY CONTROL	12

Chi-square test for goodness of fit and independence of attributes. Sign test for paired data. Rank sum test. Kolmogorov-Smirnov – Test for goodness of fit- Quality improvement and statistics–Statistical quality control - statistical process control –control charts– design of control charts –analysis of patterns on control charts - X bar chart, R chart and S chart. Process and product control – attribute charts – p, np and C charts – control charts -performance.

UNIT V	CORRELATION, REGRESSION AND TIME SERIES ANALYSIS	12

Correlation analysis, Rank correlation and Estimation of regression line. Time series analysis: Variations in time series, Trend analysis, Cyclical variations, Seasonal variations and Irregular variations.

TEXT BOOKS:

1.	Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2012.
2.	Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia , 8th Edition, 2007.
3	Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 3rd Edition, Elsevier, 2004.
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, 2004.

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Department	B.E. COMPUTER SCIENCE AND DESIGN					R 2019	Semester	IV
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19CD401	COMPUTER 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:

- Understand the fundamentals of data communications and functions of layered architecture.
- Practice the error detection and correction methods and understand the different network technologies
- Analyse the requirements for a given organizational structure and select the most appropriate networking architecture and routing technologies
- Understand the transport layer principles and reliable data transfer
- Understand the application layer protocols and also the use of cryptography and network security

Unit I	DATA COMMUNICATIONS AND PHYSICAL LAYER	9

Introduction, history and development of computer networks, networks topologies, ISO/OSI model and protocols. Different types of transmission media, errors in transmission: attenuation, noise. Repeaters. Encoding (NRZ, NRZI, Manchester, 4B/5B). MAC Layer: Aloha, TDMA, CDMA, CSMA/CD, CSMA/CA.

Unit II	DATA LINK LAYER	9

Error detection (Parity, CRC, Hamming code), Sliding Window, Stop and Wait protocols, LAN: Design, specifications of popular technologies, switching, Ethernet, Gigabit Ethernet, Token Ring, Token Bus, Bluetooth, Wi-Fi, Wi-Max, FDDI, PPP, bridging and SDN.

Unit III	NETWORK LAYER	9

Internet Protocol, IPv6, ARP, DHCP, ICMP, Distance vector routing, Link state routing, Classless Inter-domain routing, RIP, OSPF, BGP, Subnetting, , Network Address Translation

Unit IV	TRANSPORT LAYER	9

UDP, TCP, Connection establishment and termination, sliding window revisited, flow and congestion control, timers, retransmission, TCP extensions, Design issues in protocols at different layers, Socket Programming

Unit V	APPLICATION LAYER	9

DNS, E-Mail -SMTP, MIME, POP3, IMAP, FTP, HTTP, WWW, symmetric and asymmetric key cryptography, Sharing of symmetric keys – Diffie-Hellman key Exchange, Public Key Infrastructure, Public Key Authentication Protocols, Firewalls.

TEXT BOOK(S)	
1.	AS Tanenbaum, DJ Wetherall, "Computer Networks", 5th Edition, Prentice-Hall, 2010.
2.	Behrouz A. Forouzan, "Data communication and Networking", 4th Edition, Tata McGrawHill, 2007

REFERENCE(S)	
1.	Peterson & Davie, "Computer Networks, A Systems Approach", 3rd Edition, Harcourt, 2013
2.	William Stallings, "Data and Computer Communications", 8th Edition, PHI, 2006

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Department	B.E. COMPUTER SCIENCE AND DESIGN					R 2019	Semester	IV
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19CD402	DESIGN OF OPERATING SYSTEMS	3	0	0	3	45	100	

Course Objective (s):

The purpose of learning this course is
- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes

Course Outcomes:

At the end of this course, learners will be able to
- Developing low-level operating system code.
- Understanding the performance and design trade-offs in complex software systems
- Understanding and be capable of developing OS code inside a variety of OS environments, including monolithic, microkernels, and virtual machines, including device drivers.
- Developing benchmarks and use of profiling tools to evaluate the performance of operating systems and application stacks.
- Understanding and of evaluating research published in the field of operating systems at a level commensurate with their experience

Unit I	INTRODUCTION TO OPERATING SYSTEMS	9

Introduction to system software: Assemblers-Loaders-Linkers-Compilers, Definition of Operating systems-Computer system organization- Computer-system Architecture- Operating system structure-Operating system operations. System Structures: Operating system services-User and Operating-system Interface-System calls-Types of system calls-System programs

Unit II	PROCESS MANAGEMENT	9

Process of OS: Process concept-Process scheduling-Operations on processes- Interprocess communication-Examples of IPC systems, Multithreaded programming: Overview-Multicore programming-Multithreading models-Threading issues, Process scheduling-Basic concepts-Scheduling criteria-Scheduling Algorithms, Synchronization: The critical section problem-Peterson's solution-Synchronization hardware- Mutex locks-Semaphores-Classic problems of synchronization-Monitors

Unit III	DEADLOCKS AND MEMORY MANAGEMENT	9

Deadlocks: System model-Deadlock characterization-Methods for handling deadlocks-Deadlock prevention-Deadlock avoidance-Deadlock detection-Recovery from deadlock, Memory Management strategies:-Swapping-Contiguous memory allocation-Segmentation-Paging-Structure of the Page table, Virtual Memory Management: Background Demand paging-Copy-on-write-Page replacement-Allocation of frames-Thrashing

Unit IV	FILE MANAGEMENT	9

File systems: File concept-Access methods-Directory and Disk structure-File-system mounting-File sharing Protection Implementing file systems: File-system structure- File-system implementation-Directory implementation-Allocation methods-Free-space management. Mass storage structure: Overview of mass-storage structure-Disk structure- Disk attachment-Disk scheduling-Disk management-Swap-space management.

Unit V	MULTI-PROCESSOR BASED AND VIRTUALIZATION CONCEPTS	9

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Virtual machines; supporting multiple operating systems simultaneously on a single hardware platform; running one 8 15 operating system on top of another. Reducing the software engineering effort of developing operating systems for new hardware architectures. True or pure virtualization. Para virtualization; optimizing performance of virtualization system; hypervisor call interface.

TEXT BOOK(S)

1.	Silberschatz, Galvin, and Gagne, "Operating System Concepts",Wiley India Pvt Ltd, 9th Edition 2013.
2.	William Stallings, "Operating Systems – internals and design principles", Prentice Hall, 7th Edition, 2011.

REFERENCE(S)

1.	Ramaz Elmasri, A. Gil Carrick, David Levine, —Operating Systems – A Spiral Approachǁ, Tata McGraw Hill Edition, 2010.
2.	Achyut S.Godbole, Atul Kahate, - "Operating Systems", McGraw Hill Education, 2016
3.	D M Dhamdhere, "Operating Systems: A Concept-Based Approach", Second Edition, Tata McGraw-Hill Education, 2007.

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Dept. of CSE - ESEC

Department	B.E. COMPUTER SCIENCE AND DESIGN				R 2019	Semester	IV

Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19CT404	MICROPROCESSOR AND MICROCONTROLLER DESIGN	3	0	0	3	45	100

Course Objective (s):

The purpose of learning this course is

- Students will gain knowledge on architecture, accessing data and instruction from memory for processing.
- Ability to do programs with instruction set and control the external devices through I/O interface
- Generate a system model for real world problems with data acquisition, processing and decision making with aid of micro controllers and advanced processors.

Course Outcomes:

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

- Recall the basics of processor, its ways of addressing data for operation by instruction set.
- Execute basic and advanced assembly language programs.
- Learn the ways to interface I/O devices with processor for task sharing.
- Recall the basics of co-processor and its ways to handle float values by its instruction set.
- Recognize the functionality of micro controller, latest version processors and its applications.
- Acquire design thinking capability, ability to design a component with realistic constraints, to solve real world engineering problems and analyze the results

Unit I	8051 MICROCONTROLLER	9

Architecture of 8051 - Special Function Registers - I/O Pins, Ports and Circuits - Instruction Set - Addressing Modes - Assembly language Programming.

Unit II	ON-CHIP PERIPHERALS	9

I/O Port Programming - Timer Registers -Timer Modes - Overflow Flags - Clocking Sources -Timer/ Counter Interrupts - Timer Programming - Baud Rate Generation - Serial Port Register -Modes of Operation - Serial Port Programming- Interrupt Organization - Processing Interrupts - Interrupt Programming.

Unit III	PERIPHERAL DEVICES	9

Programmable Peripheral Interface (8255) - Keyboard / Display Controller (8279) - Programmable Interrupt Controller (8259) - Case Studies: Traffic Light Control - Interfacing Keyboard, Seven Segment and LCD display - Multiple Interrupt requests.

Unit IV	INTERFACING MEMORY AND I/O DEVICES WITH 8051	9

Microcontroller Specification - External Memory Interface - Interfacing with MAX232 chip for RS232C Communication - ADC and DAC Interface - Interfacing Relay and Sensors - RTC Interfacing.

Unit V	DESIGN OF MICROCONTROLLER BASED SYSTEM	9

Voltage, Current and Frequency Measurement - DC Motor Control - Stepper Motor control - Case Studies: Arduino Board Overview - Arduino IDE - Temperature Control.

TEXT BOOK(S)

1	Krishna Kant, "Microprocessor and Microcontroller Architecture, Programming and System Design using 8085, 8086, 8051, 8096", Prentice Hall of India, 2nd Edition, 2014.

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2.	Soumitra Kumar Mandal "Microprocessors and Microcontrollers Architecture Programming and Interfacing using 8085 8086 & 8051" Tata McGraw Hill Publishing Co Ltd, 1st Edition, 2011.

REFERENCE(S)

1.	U.S.Shah, "Microprocessor & Application", Macmillan Publishers India Limited, 2nd Edition, 2011.
2.	Kenneth J. Ayala, "The 8051 Microcontroller. Architecture, Programming and Applications", 3rd Edition, West publishing company 2014
3.	Myke Predko, "Programming and Customizing the 8051 Microcontroller", 1st Edition, 2012.

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Department	B.E. COMPUTER SCIENCE AND DESIGN					R 2019	Semester	IV
Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks	
		L	T	P	C			
19CT401	DATA BASE DESIGN	3	0	0	3	45	100	

Course Objective (s):

The purpose of learning this course is

- To understand the fundamentals of DBMS and E-R Diagrams
- To impart the concepts of the Relational model and SQL
- To disseminate the knowledge on various Normal Forms
- To inculcate the fundamentals of transaction management and Query processing
- To give an introduction on current trends in data base technologies

Course Outcomes:

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

- Differentiate database systems from file systems by enumerating the features provided by database systems.
- Analyze data storage problem and derive a data model using E-R Diagrams
- Formulate the solutions to a broad range of query and data update problems using SQL
- Understand the normalization theory and apply such knowledge to the normalization of a database
- Inculcate the various implementation techniques and current trends

Unit I	INTRODUCTION AND CONCEPTUAL MODELING	9

Introduction to File and Database systems- Database system structure – Data Models – Introduction to Network and Hierarchical Models – ER model – Relational Model –Views of data – Data Models – Database Languages – Database Management System Services – Overall System Architecture – Data Dictionary.

Unit II	RELATIONAL MODEL	9

Relational Approach: Relational Model – Relational Data Structure – Relational Data Integrity – Domain Constraints – Entity Integrity – Referential Integrity – Operational Constraints – Keys – Relational Algebra – Fundamental operations – Additional Operations –Relational Calculus - Tuple Relational Calculus – Domain Relational Calculus - SQL – Basic Structure – Set operations – Aggregate Functions – Null values – Nested Sub queries – Derived Relations – Views – Modification of the database – Joined Relations – Data Definition Language – Triggers.

Unit III	DATABASE DESIGN	9

Database Design: Functional Dependencies – Pitfalls in Relational Database Design – Decomposition – Normalization using Functional Dependencies – Normalization using Multi-valued Dependencies – Normalization using Join Dependencies – Domain - Key Normal form.

Unit IV	QUERY PROCESSING AND TRANSACTION MANAGEMENT	9

Query Processing and Transaction Management: Query Processing Overview – Estimation of Query Processing Cost - Join strategies – Transaction Processing – Concepts and States – Implementation of Atomicity and Durability – Concurrent Executions – Serializability – Implementation of Isolation – Testing for Serializability – Concurrency control – Lock Based Protocols – Timestamp Based Protocols

Unit V	TRENDS IN DATABASE TECHNOLOGY	9

Distributed Databases - Homogeneous and Heterogeneous Databases - Distributed Data Storage - Distributed Transactions - Commit Protocols - Concurrency Control in Distributed Databases - Availability - Distributed Query Processing - Heterogeneous Distributed Databases- Cloud-Based Databases - Directory Systems- Multidimensional and Parallel databases- Spatial and multimedia databases- Mobile and web databases- Data Warehouse-Mining- Data marts.

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TEXT BOOK(S)	
1.	Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Tata McGraw Hill, Sixth Edition, 2010.
2.	Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Addision Wesley, Sixth Edition, 2010.
REFERENCE(S)	
1.	Raghu Ramakrishnan, Johannes Gehrke "Database Management Systems", McGraw Hill, Third Edition, 2002.
2.	Peter Rob and Carlos Coronel, "Database Systems – Design, Implementation and Management", Thompson Learning, Course Technology, Seventh Edition, 2006.
3.	C. J. Date, A.Kannan , S.Swamynathan , "An Introduction to Database Systems", Addison Wesley, 8th Edition, 2012

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Department	B.E. COMPUTER SCIENCE AND DESIGN				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

Course Objective (s): The purpose of learning this course is to
- To help the students appreciate the essential complementarily 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

Salient Features of the Course: The salient features this course is to
- 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.

Course Methodology: The methodology of this course is :
- 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.

Module 1 – Introduction to Value Education   **6+3**
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
Tutorials [Practice Session] - *Sharing about Oneself* - *Exploring Human Consciousness* - *Exploring Natural Acceptance*

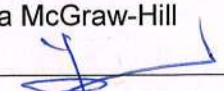**Module 2 – Harmony in the Human Being**   **6+3**
Lectures - Understanding Human being as the Co-existence of the Self and the Body - Distinguishing between the Needs of the Self and the Body – The Body as an Instrument of the Self - Understanding Harmony in the Self - Harmony of the Self with the 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*

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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:

- 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

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	B.E. COMPUTER SCIENCE AND DESIGN				R 2019	Semester	IV
Course Code	Course Name	Hours/ Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19TPS04	QUANTITATIVE APTITUDE AND LOGICAL REASONING - II	2	0	0	0	30	100

Course Objective (s): The purpose of learning this course is to
- Learn the basic of partnership and chain rule in simplified way.
- Solve problems using fast track method by learning profit and loss with percentage.
- Teach the angle of elevation and depression.
- Know the relationship, direction concepts in easy way.
- Know about coding and decoding through logical way.

Course Outcomes: At the end of this course, learners will be able to:
- Solve problems by using shortcut in partnership and chain rule.
- Know the tips and tricks of profit and loss with percentage through fast track methods.
- Understand the concepts of angles.
- Evaluate critically the real life situations by resorting and analyzing analytical reasoning of key 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.

TOTAL : 30 HOURS

REFERENCES:
1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Tata McGraw-Hill Publishing Company Ltd, 2012

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

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Course Code	**Course Name**	**Hours / Week**			**Credit**	**Total Hours**	**Maximum Marks**	
		L	T	P	C			
19CT407	MICROPROCESSOR AND MICROCONTROLLER AND INTERFACING LABORATORY	0	0	4	2	60	100	

Course Objective (s):

The purpose of learning this course is

- Students will gain knowledge on architecture, accessing data and instruction from memory for processing.
- Ability to do programs with instruction set and control the external devices through I/O interface
- Generate a system model for real world problems with data acquisition, processing and decision making with aid of micro controllers and advanced processors.

Course Outcomes:

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

- Develop 8051 Assembly Language Programs for Arithmetic, Logic, Bit manipulation,
- Develop Assembly Language Program for String operations and Demonstrate an application for 8051 microcontroller using Traffic light controller, ADC & DAC interfacing boards
- Demonstrate 8051 Embedded C Coding for Programming the GPIO, Timer, Interrupts & Serial Port
- Write embedded C Coding for temperature monitoring using Ardiuno target Board
- Develop communication skills and capability to work in team

List of Experiments

Developing Assembly Language Programs using 8051 Microcontroller Kits

1. Data manipulating Operations and Delay Routines

2. String operations

3. Interfacing Traffic light controller

4. Interfacing ADC

5. Interfacing DAC

Using IDE Tool for Microcontroller

6. Memory Data Transfer Operations & Input/Output Port Programming.

7. Timer/Counter Programming.

8. Serial Port Programming.

9. Handling Interrupts

10. Temperature monitoring using Arduino Target Board

TEXT BOOK(S)	
1.	Krishna Kant, "Microprocessor and Microcontroller Architecture, Programming and System Design using 8085, 8086, 8051, 8096", Prentice Hall of India, 1st Edition, 2011.
2.	Soumitra Kumar Mandal "Microprocessors and Microcontrollers Architecture Programming and Interfacing using 8085 8086 & 8051" Tata McGraw Hill Publishing Co Ltd, 1st Edition, 2011.

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REFERENCE(S)	
1.	U.S.Shah, "Microprocessor & Application", Macmillan Publishers India Limited, 2nd Edition, 2011.
2.	Kenneth J. Ayala, "The 8051 Microcontroller. Architecture, Programming and Applications", 3rd Edition, West publishing company 2014
3.	Myke Predko, "Programming and Customizing the 8051 Microcontroller", 1st Edition, 2012.

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Course Code	Course Name	Hours / Week			Credit	Total Hours	Maximum Marks
		L	T	P	C		
19CT405	DATABASE DESIGN LABORATORY	0	0	4	2	60	100

Course Objective (s):

The purpose of learning this course is

- Learn to create and use a database
- Be familiarized with a query language
- Have hands on experience on DDL Commands
- Have a good understanding of DML Commands and DCL commands
- Familiarize advanced SQL queries.
- Be Exposed to different applications

Course Outcomes:

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

- Design and implement a database schema for a given problem-domain
- Populate and query a database
- Create and maintain tables using PL/SQL.
- Prepare reports

List of Experiments

11. Data Definition Language (DDL) commands in RDBMS

12. Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS.

13. High-level language extension with Cursors.

14. High level language extension with Triggers

15. Procedures and Functions.

16. Embedded SQL.

17. Write a PL/SQL block to satisfy some conditions by accepting input from the user.

18. Database design using E-R model and Normalization.

19. Creation of Procedures.

20. Creating an Employee database to set various constraints.

21. Creating relationship between the databases.

22. Design and implementation of Payroll Processing System.

23. Design and implementation of Banking System.

24. Design and implementation of Library Information System

TEXT BOOK(S)

1.	Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Tata McGraw Hill, Sixth Edition, 2010.
2.	Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Addision Wesley, Sixth Edition, 2010.

REFERENCE(S)

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1.	Raghu Ramakrishnan, Johannes Gehrke "Database Management Systems", McGraw Hill,Third Edition, 2002.
2.	Peter Rob and Carlos Coronel, "Database Systems – Design, Implementation and Management", Thompson Learning, Course Technology, Seventh Edition, 2006.
3.	C. J. Date, A.Kannan , S.Swamynathan , "An Introduction to Database Systems", Addison Wesley, 8th Edition, 2012