CMR COLLEGE OF ENGINEERING& TECHNOLOGY
(UGC Autonomous)
Kandlakoya, Medchal Road, Hyderabad – 501 401

Institute Vision
- Our Vision is to remain a premier academic institution striving continuously for excellence in technical education, research and render technological services to the nation.

Institute Mission
- Our Mission is to create and sustain a community of learning in which students acquire knowledge and learn to apply it professionally with a concern for the society.
- Pursue and Disseminate Research Findings and Offer Knowledge-Based Technological Services to Satisfy the Needs of Society and Industry.
- Promote Professional Ethics, Leadership Qualities and Social Responsibilities.

Department Vision
- To evolve as a centre of academic excellence in Computer Science & Engineering by building a strong teaching and research environment.

Department Mission
- To offer high quality graduate and post graduate programs in computer science education and to prepare students for professional career and/or higher studies globally.
- To develop self-learning abilities and professional ethics to serve society.

Program Education Objectives
- Graduates Excel in their professional career and higher education in Computer Science & Engineering and chosen fields.
- Graduates Demonstrate leadership qualities, teamwork and Professional ethics to serve the society.
- Graduates Adapt to state of art technology through continuous learning in the areas of interest.

Program Outcomes
1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to professional engineering practice.

7. **Environment and sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

9. **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSO)

- **Problem Solving Skills:** Ability to apply mathematical concepts, algorithm design techniques and suitable Data structures to solve practical problems using different problem-solving strategies.
- **Professional Skills:** Ability to design computing solutions for problems in interdisciplinary areas.

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B. Tech- Computer Science & Engineering
CBCS & OUTCOME BASED COURSE STRUCTURE & SYLLABUS
(Effective for the students admitted into I year from the Academic Year 2022-23)

S.No	Course Code	Course Title	Category	L	T	P	Credits	CIE	SEE
SEMESTER - I									
				Hours per Week				**Maximum Marks**	
1	A400001	Matrices and Calculus	BSC	3	1	0	4	40	60
2	A400009	Engineering Chemistry	BSC	3	1	0	4	40	60
3	A405201	Programming for Problem Solving	ESC	3	0	0	3	40	60
4	A405501	Elements of Computer Science & Engineering	ESC	0	0	2	1	50	-
5	A402201	Basic Electrical Engineering	ESC	2	0	0	2	40	60
6	A400502	Engineering Chemistry Laboratory	BSC	0	0	2	1	40	60
7	A405502	Programming for Problem Solving Laboratory	ESC	0	0	2	1	40	60
8	A402502	Basic Electrical Engineering Laboratory	ESC	0	0	2	1	40	60
9	A403502	Computer Aided Engineering Drawing	ESC	0	1	2	2	40	60
10	A400505	Introduction to Social Innovation	HSMC	0	0	2	1	40	60
11	A400703	Constitution of India	MC	2	0	0	0	-	-
		Total:		**13**	**3**	**12**	**20**		
		Total hours per Week:		**28**					

S.No	Course Code	Course Title	Category	L	T	P	Credits	CIE	SEE
SEMESTER – II									
				Hours per Week				**Maximum Marks**	
1	A400101	English for Skill Enhancement	HSMC	2	0	0	2	40	60
2	A400002	Ordinary Differential Equation and Vector Calculus	BSC	3	1	0	4	40	60
3	A400008	Applied Physics	BSC	3	1	0	4	40	60
4	A405301	Data Structures	PCC	3	0	0	3	40	60
5	A400503	English Language and Communication Skills Laboratory	HSMC	0	0	2	1	40	60
6	A400501	Applied Physics Laboratory	BSC	0	0	3	1.5	40	60
7	A405505	Data Structures Laboratory	PCC	0	0	3	1.5	40	60
8	A405504	IT Workshop	ESC	0	0	3	1.5	40	60
9	A400506	Engineering Exploration & Practice	HSMC	0	0	3	1.5	40	60
10	A400704	Universal Human Values	MC	2	0	0	0	-	-
		Total:		**13**	**2**	**14**	**20**		
		Total hours per Week		**29**					
		Total Credits in I Year: 40							

SEMESTER – III

S.No	Course Code	Course Title	Category	Hours per Week			Credits	Maximum Marks	
				L	T	P		CIE	SEE
1	A404204	Digital Electronics	ESC	3	0	0	3	40	60
2	A405308	Software Engineering	PCC	3	0	0	3	40	60
3	A404203	Electronics Devices and Circuits	ESC	2	0	0	2	40	60
4	A405303	Object Oriented Programming through Java	PCC	3	0	0	3	40	60
5	A405304	Database Management Systems	PCC	3	0	0	3	40	60
6	A405506	Python Programming Laboratory	ESC	0	1	2	2	40	60
7	A405507	Object Oriented Programming through Java Laboratory	PCC	0	0	3	1.5	40	60
8	A405508	Database Management Systems Laboratory	PCC	0	0	3	1.5	40	60
9	A405510	Skill Development Course (Data Visualization – R Programming)	PCC	0	0	2	1	40	60
10	A400701	Environmental Science	MC	2	0	0	0	-	-
			Total:	17	1	10	20		
			Total hours per Week:	28					

SEMESTER – IV

S.No	Course Code	Course Title	Category	Hours per Week			Credits	Maximum Marks	
				L	T	P		CIE	SEE
1	A400006	Computer Oriented Statistical Methods	BSC	3	1	0	4	40	60
2	A405305	Operating Systems	PCC	3	0	0	3	40	60
3	A400102	Business Economics & Financial Analysis	HSMC	3	0	0	3	40	60
4	A405306	Discrete Mathematics	PCC	3	0	0	3	40	60
5	A405307	Computer Organization and Architecture	PCC	3	0	0	3	40	60
6	A405509	Operating Systems Laboratory	PCC	0	0	2	1	40	60
7	A400507	Social Innovation in Practice	ESC	0	0	2	1	40	60
8	A405801	Real-time Research Project/Field Project	PROJ	0	0	4	2	50	-
9	A400702	Gender Sensitization	MC	2	0	0	0	-	-
		Total:		17	1	8	20		
		Total hours per Week		26					
		Total Credits in II Year: 40							

S.No	Course Code	Course Title	Category	Hours per Week			Credits	Maximum Marks	
				L	T	P		CIE	SEE
		SEMESTER – V							
1	A405302	Design and Analysis of Algorithms	PCC	3	1	0	4	40	60
2	A405310	Computer Networks	PCC	3	0	0	3	40	60
3	A405311	DevOPS	PCC	3	0	0	3	40	60
4	A405312	Full stack development	PCC	3	0	0	3	40	60
5	PEC	Professional Elective-I	PEC	3	0	0	3	40	60
6	A405511	DevOPS Laboratory	PCC	0	0	2	1	40	60
7	A405512	Computer Networks Laboratory	PCC	0	0	2	1	40	60
8	A400504	Advanced English Communication Skills Laboratory	HSMC	0	0	2	1	40	60
9	A405513	Skill Development Laboratory (Node JS/React JS/DJANGO)	PCC	0	0	2	1	40	60
10	A400705	Intellectual Property Rights	MC	2	0	0	0	-	-
		Total:		17	1	8	20		
		Total hours per Week:		**26**					

S.No	Course Code	Course Title	Category	Hours per Week			Credits	Maximum Marks	
				L	T	P		CIE	SEE
		SEMESTER – VI							
1	A466302	Machine Learning	PCC	3	0	0	3	40	60
2	A405313	Formal Languages and Automata Theory	PCC	3	0	0	3	40	60
3	A466301	Artificial Intelligence	PCC	3	0	0	3	40	60
4	A405314	Cryptography and Network Security	PCC	3	0	0	3	40	60
5	A405315	Compiler Design	PCC	3	0	0	3	40	60
6	A466503	Machine Learning Laboratory	PCC	0	0	2	1	40	60
7	A405515	Cryptography and Network Security Laboratory	PCC	0	0	2	1	40	60
8	A405516	Compiler Design Laboratory	PCC	0	0	2	1	40	60
9	A405802	Industrial Oriented Mini Project/ Internship	Proj	0	0	4	2	-	100
		Total:		14	0	12	20		
		Total hours per Week		**26**					
		Total Credits in III Year: 40							

				SEMESTER – VII						
S.No	Course Code	Course Title	Category	Hours per Week			Credits	Maximum Marks	
				L	T	P		CIE	SEE
1	OE	Open Elective- I	OEC	3	0	0	3	40	60
2	PE	Professional Elective -II	PEC	3	0	0	3	40	60
3	PE	Professional Elective -III	PEC	3	0	0	3	40	60
4	PE	Professional Elective-IV	PEC	3	0	0	3	40	60
5	PE	Professional Elective -V	PEC	3	0	0	3	40	60
6	A400103	Organizational Behavior	HSMC	2	0	0	2	40	60
7	A405803	Major Project Phase-I	PROJ	0	0	6	3	40	60
		Total:		17	0	6	20		
		Total hours per Week: 23							

				SEMESTER – VIII						
S.No	Course Code	Course Title	Category	Hours per Week			Credits	Maximum Marks	
				L	T	P		CIE	SEE
1	PE	Professional Elective -VI	PEC	3	0	0	3	40	60
2	OE	Open Elective- II	OEC	3	0	0	3	40	60
3	OE	Open Elective-III	OEC	3	0	0	3	40	60
4	A405805	Technical Seminar	PROJ	0	0	4	2	-	100
5	A405804	Major Project Phase-II	PROJ	0	0	18	9	40	60
		Total:		9	0	22	20		
		Total hours per Week		31					
		Total Credits in IV Year: 40							

Professional Elective#	Code	Name of the subject
PE-I	A405401	Quantum Computing
	A466306	Data Analytics
	A405402	Graph Theory
	A405403	Principles of Programming Languages
PE-II	A405404	Information Retrieval Systems
	A405405	Distributed Databases
	A405406	Software Testing Methodologies
	A405407	Internet of Things
PE-III	A466307	Natural Language Processing
	A405408	Mobile Application Development
	A412306	Scripting Languages
	A405409	Computer Graphics
PE-IV	A405410	Soft Computing
	A462301	Cyber Security
	A405411	Agile Methodology
	A405412	Adhoc & Sensor Networks
PE-V	A405413	Robotic Process Automation
	A405414	Blockchain Technology
	A405415	Software Process & Project Management
	A405416	Advanced Algorithm
PE-VI	A466303	Deep Learning
	A405417	Human Computer Interaction
	A405418	Cyber Forensics
	A405419	Distributed Systems

List of Open Electives

Open Elective-I		
Sr.No	**Course Code**	**Course Name**
1	A404601	Fundamentals of Internet of Things
2	A404602	Principles of Digital Signal Processing
3	A402601	Renewable Energy Sources
4	A402602	Basics of Power Electronics & Drives
5	A405604	Java Programming
6	A405602	Fundamentals of Operating Systems
7	A403601	Fundamentals of Engineering Materials
8	A403602	Basics of Thermodynamics
9	A400601	Basics of Logistics and Supply Chain Management
10	A400602	Industrial Relations
11	A401601	Disaster Preparedness & Planning Management
12	A401602	Environmental Impact Assessment
Open Elective-II		
1	A404603	Sensors and Transducers
2	A404604	Image Processing
3	A402603	Electrical Vehicle Technology
4	A402604	Basics of Power Plant Engineering
5	A405601	Fundamentals of Database Management Systems
6	A405605	Web programming
7	A403603	Fundamentals of Manufacturing Processes
8	A403604	Fundamentals of Automobile Engineering
9	A400603	Entrepreneurship
10	A400604	Ethics in Business & Corporate Governance
11	A401603	Remote Sensing & Geographical Information Systems
12	A401604	Solid Waste Management
Open Elective-III		
1	A404605	Fundamentals of Embedded Systems
2	A404606	Data Communications
3	A402605	Nano Technology
4	A402606	EV Batteries & Charging System
5	A405603	Fundamentals of Computer networks
6	A405606	Fundamentals of DevOps
7	A403605	Industrial safety Engineering
8	A403606	Waste to Energy
9	A400605	Basics of Marketing
10	A405607	Cloud Computing
11	A401605	Energy Efficient Buildings
12	A401606	Environmental Pollution

(A400001) MATRICES AND CALCULUS
(Common to All)

B. Tech (CSE) I Semester

L	T	P	C
3	1	0	4

UNIT-I
Matrices: Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous equations and non-homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

UNIT-II
Eigen values and Eigen vectors:
Linear Transformation and Orthogonal transformation: Eigen values, Eigen vectors and their properties, Diagonalization of a square matrix, Cayley-Hamilton theorem (without proof) -Inverse and power of a matrix by Cayley-Hamilton theorem, Quadratic forms and nature of the quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformations.

UNIT-III
Calculus:
Mean value theorems: Rolle's theorem, Lagrange's mean value theorem with their geometrical interpretation and applications, Cauchy's mean value theorem, Taylor's series, Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (only in Cartesian coordinates),
Improper Integral: Beta, Gamma functions and their applications.

UNIT-IV
Multivariable calculus (Partial Differentiation and applications):
Partial differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V
Multivariable Calculus (Integration):

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and(Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

TEXTBOOKS
1. Higher Engineering Mathematics, (36thEdition), B.S. Grewal, Khanna Publishers, 2010.
2. Advanced Engineering Mathematics, (5thEdition), R.K. Jain and S.R.K Iyengar, Narosa Publications,2016.

REFERENCE BOOKS
1. Advanced Engineering Mathematics, (9th Edition), Erwin kreyszig, John Wiley & Sons, 2006.
2. Calculus and Analytic geometry, (9thEdition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.
3. A textbook of Engineering Mathematics, (10th Edition), N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2019.
4. Higher Engineering Mathematics, (11thReprint), Ramana B.V., Tata McGraw Hill New Delhi, 2010.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Solve linear system of equations represented by matrices.
2. Obtain eigen values, eigen vectors and perform diagonalization of a square matrix.
3. Verify mean value theorems & evaluation of improper integrals by using Beta and Gamma functions.
4. Develop the skill of determining optimal values of multivariable functions using classical methods.
5. Evaluate the multiple integrals and apply the concept to find areas, volumes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	-	-	-	-	-	-	-	2
CO2	3	2	3	2	-	-	-	-	-	-	-	2
CO3	2	3	2	2	-	-	-	-	-	-	-	2
CO4	3	2	3	3	-	-	-	-	-	-	-	3
CO5	3	2	3	2	-	-	-	-	-	-	-	3

END

(A400009) ENGINEERING CHEMISTRY
(Common to all Branches)

L	T	P	C
3	1	0	4

B. Tech (CSE) I Semester

UNIT-I
Electrochemistry, Batteries and Corrosion
Electrochemistry: Electrode potential, Standard electrode potential and E.M.F of the cell. Electrochemical cell, Nernst equation- derivation and applications, Types of electrodes- Quinhydrone electrode, Calomel electrode and Glass electrode. Electro chemical series and its applications. **Batteries**- primary (Lithium cell), secondary (Lead acid storage battery and Lithium-ion battery) and Fuel cells (H_2-O_2 and methanol-oxygen), Solar cells - Introduction and applications of Solar cells.
Corrosion: Introduction, Definition, Causes and effects of corrosion, Theories of chemical and electrochemical corrosion, Pilling-Bedworth rule, Types of corrosion- Galvanic, Waterline and Pitting corrosion, Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection, Sacrificial anode and Impressed current cathodic methods, Surface coatings- Metallic coatings, hot dipping, galvanizing and tinning, Electroplating- Copper plating and electroless plating - Nickel plating.

UNIT-II
Material Chemistry - High Polymers
Types of polymerizations (addition, condensation and copolymerization).
Plastics: Thermoplastic and Thermosetting resins, Compounding and fabrication of plastics (compression and injection molding). Preparation, properties, Engineering applications of PVC, Teflon and Bakelite.
Fibers: Characteristics of fibers - preparation, properties and uses of Nylon-6,6 and Dacron, Fiber Reinforced Plastics (FRP) - applications.
Rubbers: Natural rubber and its vulcanization. Elastomers: Buna-s, Butyl rubber and Thiokol rubber. **Conducting polymers:** Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.
Biodegradable polymers: Preparation and applications of Polyvinyl acetate, Polylactic acid and poly vinyl alcohol.

UNIT-III
Energy Sources
Introduction, Calorific value of fuel – HCV, LCV- Dulongs formula. Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Transesterification, advantages

UNIT-IV
Water Technology
Sources of water, Impurities in water, Hardness of water, Temporary and permanent hardness, Units of hardness, Estimation of temporary and permanent hardness of water, EDTA method, Numerical problems, Potable water Treatment-Specifications, Steps involved in Treatment-Sedimentation, Coagulation, Filtration, Sterilization, Desalination of Brackish Water, Reverse Osmosis and Electro dialysis.
Industrial water treatment, Boiler Troubles-Scales and sludges, Caustic embrittlement, Boiler corrosion, Priming and foaming. Hot lime and cold lime soda Process-Numerical problems, Zeolite process and Ion exchange process. Internal conditioning methods like Phosphate, Carbonate, Calgon and Colloidal conditioning.

UNIT-V
Engineering Materials
Cement: Portland cement, its composition, setting and hardening.
Smart materials: Smart materials and their engineering applications
Advanced Glass Technology: Structure and nature of glasses, transformation range behavior, dependence of physico-chemical characteristic of glasses on their constituents. Strength of glass and glass articles.
Lubricants: Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

TEXTBOOKS
1. Engineering chemistry (1st edition), B. Rama Devi & Ch. Venkata Ramana Reddy; Cengage Learning, 2012.
2. Engineering Chemistry (1st edition), P. C. Jain and M. Jain, Dhanapat Rai& Sons.

3. Engineering chemistry (1st edition), Dr. Bharathikumari, Dr. Jyotsna.

REFERENCE BOOKS
1. Engineering Chemistry (2nd edition), Shikha Agarwal; Cambridge University Press, 2015.
2. Engineering Chemistry (1st edition), Prasanth Rath, Cengage Learning, 2015.
3. Engineering Chemistry (3rd edition), B. Siva Shankar, Tata Mc Graw Hill Publishing Limited, 2015.
4. Text of Engineering Chemistry (12th edition), S. S. Dara, Mukkanti, S. Chand & Co, New Delhi, 2006.
5. Chemistry of Engineering Materials (5th edition), C. V. Agarwal, C. P. Murthy, A. Naidu, Wiley India, 2013.

COURSE OUTCOMES:

On completion of the course students will be able to
1. Apply the principles of electrochemistry, corrosion science and analyse application of battery technologies, fuel cells in practical applications.
2. Acquire knowledge on polymer technology and uses of key polymers in engineering fields.
3. Analyse various types of energy sources and understand the significance of alternative energy sources, including biodiesel and solar energy.
4. Investigate the impact of water hardness in industries, implement water purification technologies to ensure water quality for industrial and domestic use
5. Illustrate the composition, properties and application of engineering materials, including cement, smart materials, glass, and lubricants

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	2	-	2	-	-	-	-	-
CO2	3	-	2	-	2	-	-	-	-	-	-	1
CO3	3	2	-	-	-	-	3	-	-	-	-	2
CO4	3	-	-	3	-	2	2	-	-	-	-	-
CO5	3	-	2	-	2	-	2	-	-	-	-	-

END

(A405201) PROGRAMMING FOR PROBLEM SOLVING
(Common to CSE, IT, CSE-DS, CSE-AI&ML, AI&ML, AI&DS, CSE-CS)

B. Tech (CSE) I Semester

L	T	P	C
3	0	0	3

UNIT-I
Representation of Algorithm: Algorithms for simple task, decision making task like finding maximum numbers of a given set and repetitive task like sum of numbers, Flowchart/Pseudo code with examples, Introduction to C Programming Language: Simple C Programs, Desirable Program Characteristics. C Character Set, Identifiers and Keywords, Data Types, Constants, Variables, Expressions
Operators and Expressions: Unary Operators, Arithmetic Operators, Relational and Logical Operators, Bitwise Operators, Conditional Operator, Assignment Operators, Special Operators, Precedence & Associatively of Operators, Evaluation of Expressions. **Data Input and Output:** Preliminaries, Single Character Input- The get char Function, Single Character Output- The putchar Function, Entering Input Data- The scanf Function, More About the scanf Function, Writing Output Data- The printf Function, More About the printf Function, the jets and puts Functions.

UNIT-II
Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do- while loops I/O: Simple input and output with scanf and printf, formatted I/O,
Arrays: one-and two-dimensional arrays, creating, accessing, and manipulating of arrays

UNIT-III
Functions: Defining a Function, accessing a Function, declaring a function, Parameters and return type of a function, passing parameters to functions, call by value, passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries, Storage classes (auto, extern, static and register). **Recursion:** Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions
Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

UNIT-IV
Structures: Defining structures, initializing structures, unions, Array of structures **Pointers:** Idea of pointers, defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self-referential structures in linked list (no implementation) Enumeration data type **Dynamic memory allocation:** Allocating and freeing memory, Allocating memory for arrays of different data types. **Preprocessor:** Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef

UNIT-V
Files: Text and Binary files, Creating and Reading and writing text and binary files, appending data to existing files, Writing, and reading structures using binary files, Random access using fseek, ftell and rewind functions, Command line arguments.
Searching and Sorting: Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs.

TEXTBOOKS
1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCE BOOKS
1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson

COURSE OUTCOMES:

On completion of the course students will be able to

1. Describe the structure of C-program and use iterative and decision control statements for developing solutions to computational problems.
2. Organize data in Arrays, structures and perform operations on data stored in Arrays.
3. Design and develop modular solutions using C-functions and allocate memory dynamically for variables.
4. Create and manipulate C-File structures and use preprocessing directives to control C source code.
5. Compare and contrast various searching and sorting strategies.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	2	3					1	1	2
CO2	1	3	2		2							
CO3	1	2	3	2								
CO4	1	1	3		3							
CO5		3	2		2						1	1

END

(A405501) ELEMENTS OF COMPUTER SCIENCE AND ENGINEERING
(Common to CSE, IT, CSE-DS, CSE-AI&ML, AI&ML, AI&DS, CSE-CS)

B. Tech (CSE) I Semester

L	T	P	C
0	0	2	1

UNIT – I
Basics of a Computer – Hardware, Software, Generations of computers. Hardware - functional units, Components of CPU, Memory – hierarchy, types of memory, Input and output devices. Software – systems software, application software, packages, frameworks, IDEs.

UNIT – II
Software development – waterfall model, Agile, Types of computer languages – Programming, markup, scripting Program Development – steps in program development, flowcharts, algorithms, data structures – definition, types of data structures

UNIT – III
Operating systems: Functions of operating systems, types of operating systems, Device & Resource Management
Database Management Systems: Data models, RDBMS, SQL, Database Transactions, data centers, Cloud services

UNIT – IV
Computer Networks: Advantages of computer networks, LAN, WAN, MAN, internet, Wi-Fi, sensor Networks, vehicular networks, 5G communication.
World Wide Web – Basics, role of HTML, CSS, XML, Tools for web designing, social media, online social networks.
Security – information security, cyber security, cyber laws

UNIT – V
Autonomous Systems: IoT, Robotics, Drones, Artificial Intelligence – Learning, Game Development, Natural language processing, image and video processing. Cloud Basics

TEXT BOOK
1. Invitation to Computer Science, G. Michael Schneider, Macalester College, Judith L. Gersting University of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield.

REFERENCE BOOKS
1. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press.
2. Introduction to computers, Peter Norton, 8th Edition, Tata McGraw Hill.
3. Computer Fundamentals, Anita Goel, Pearson Education India, 2010.
4. Elements of computer science, Cengage

COURSE OUTCOMES:
On completion of the course students will be able to

1. Know the working principles of functional units of a basic Computer
2. Understand program development, the use of data structures and algorithms in problem solving.
3. Know the need and types of operating system, database systems.
4. Understand the significance of networks, internet, WWW and cyber security.
5. Understand Autonomous systems, the application of artificial intelligence.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-		-	-	-	-	-	-	-	-	2
CO2	3	-	2	-	-	-	-	-	-	-	-	2
CO3	3	-	2	-	-	-	-	-	-	-	-	2
CO4	3	-	1	-	-	1	-	2	-	-	-	2
CO5	3	1	2	-	2	-	-	-	-	-	-	2

END

(A402201) BASIC ELECTRICAL ENGINEERING
(Common to CSE, INF, ECE)

B. Tech (CSE) I Semester

L T P C
2 0 0 2

Prerequisites: Mathematics

UNIT-I

D.C. Circuits: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT-II

A.C. Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III

Transformers: Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV

Electrical Machines: Construction and working principle of dc machine, performance characteristics of dc shunt machine. Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Significance of torque-slip characteristics. Single-phase induction motor, Construction and working. Construction and working of synchronous generator.

UNIT-V

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

TEXTBOOKS
1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS
1. P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, "Basic Electrical Engineering", S. Chand, 2nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

COURSE OUTCOMES:

On completion of the course students will be able to
1. Understand and analyze basic concepts of DC Circuits
2. Understand and analyze basic concepts of AC Circuits
3. Discus the technical aspects of transformers
4. Study the working principles of Electrical Machines.
5. Introduce components of Low Voltage Electrical Installations

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12
CO1	3	3	0	1	0	0	0	2	3	2	0	1
CO2	3	3	0	1	0	0	0	2	3	2	0	1
CO3	3	3	0	1	0	0	0	2	3	2	0	1
CO4	3	3	0	1	0	0	0	2	3	2	0	1
CO5	3	3	0	1	0	0	0	2	3	2	0	1

END

(A400502) ENGINEERING CHEMISTRY LAB

(Common to all Branches)

L	T	P	C
0	0	2	1

B. Tech (CSE) I Semester

Lab Experiments:

1. Estimation of Hardness of water by EDTA Method.
2. Estimation of Alkalinity of Water.
3. Estimation of Copper by Colorimetric Method.
4. Conductometric Titration of a Strong Acid vs a Strong Base.
5. Conductometric Titration of a Weak Acid vs a Strong Base.
6. Potentiometric Titration of a Strong Acid vs a Strong Base.
7. Potentiometric Titration of Ferrous Ammonium Sulphate (FAS) vs Potassium Dichromate.
8. Preparation of Thiokol Rubber.
9. Determination of Viscosity of a Liquid.
10. Determination of Surface Tension of a liquid.
11. Adsorption of acetic acid on Activated charcoal.
12. Estimation of Iodine in Table Salt (by potentiometric)
13. Thin Layer Chromatography (Ortho-Nitro phenol &Para-Nitro phenol).
14. Determination of rate constant of acid catalyzed hydrolysis of methyl acetate.

Textbooks:

1. Engineering Chemistry Lab Manual (1st edition), Dr. K. Soujanya, Dr. J. Saroja, Lt. D. Divya, Skytech Publishers, 2022

REFERENCE BOOKS

1. Engineering Chemistry Lab Manual (1st edition), Glaze Publishers 2018.
2. Engineering chemistry (1st edition), B. Rama Devi & Ch. Venkata Ramana Reddy; Cengage Learning, 2012.
3. A Textbook of Engineering Chemistry (1st edition), Sashi Chawla, Dhanapath Rai& Sons.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Determine the extent of hardness present in water and its consequences in industrial operations.
2. Understand the principles, preparation and applications of key polymers like Thiokol rubber
3. Assess the properties of titrations involving acids, bases, redox reactions using potentiometric and conductometric analysis.
4. Develop proficiency in colorimetric analysis to accurately determine the amount of metals present in various industrial effluents
5. Apply analytical tools such as viscosity, and surface tension measurements to evaluate the physicochemical properties of liquid samples

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	2	-	-	-	-	-	-	-	-
CO2	3	2	2	-	3	-	2	-	-	-	-	-
CO3	3	-	-	3	2	-	-	-	-	-	-	-
CO4	3	-	-	3	3	-	2	-	-	-	-	-
CO5	3	-	-	3	2	-	-	-	-	-	-	-

END

(A405502) PROGRAMMING FOR PROBLEM SOLVING LAB
(Common to CSE, IT, CSE-DS, CSE-AI&ML, AI&ML,AI&DS,CSE-CS)

B. Tech (CSE) I Semester

L	T	P	C
0	0	3	1.5

[Note: The programs may be executed using any available Open Source/ Freely available IDE
Some of the Tools available are:
CodeLite: https://codelite.org/
Code: Blocks: http://www.codeblocks.org/
DevCpp: http://www.bloodshed.net/devcpp.html
Eclipse: http://www.eclipse.org
This list is not exhaustive and is NOT in any order of preference]

I.OPERATORS AND EVALUATION OF EXPRESSIONS
Demonstration
1.Write a C program to print greetings message on the screen.
2.Write a C program to illustrate usage of comments in C.
3.Write a simple program that prints the results of all the operators available in C
(Including pre/post increment, bitwise and/or/not. etc.). Read required operand values from standard input.
4.Write a C program that converts given data type to another using auto conversion and casting. Take the values from standard input.
5.Write a program for finding the max and min from the three numbers (using ternary operator).
Experiment
6.Write a C program to compute simple, compound interest.
7.Write a C Program that declares Class awarded for a given percentage of marks, where mark = 70% = Distinction.
   (Read percentage from standard input.)

8.Write a C Program that prints a multiplication table for a given number and the number of rows in the table.
(For example, for a number 5 and rows = 3, the output should be: 5 x 1 = 5, 5 x 2 = 10, 5 x 3 = 15….
9.Write a program that shows the binary equivalent of a given positive number between 0 to 255.
10. Write a program that asks the user to enter the total time elapsed, in seconds, since an event and converts the time to hours, minutes and seconds. The time should be displayed as hours: minutes: seconds. [Hint: Use the remainder operator]

II. Expression Evaluation
Demonstration
1. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula $s = ut+(1/2)at^2$ where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).
2. Write a program that asks the user to enter the highest rainfall ever in one season for a country, and the rainfall in the current year for that country, obtains the values from the user, checks if the current rainfall exceed the highest rainfall and prints an appropriate message on the screen. If the current rainfall is higher, it assigns that value as the highest rainfall ever. Use only the single-selection form of the if statement.
3. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement).
4. Write a program that finds if a given number is a prime number
5. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
6.Write a program that reads the radius of a circle (as a float value) and computes and prints the diameter, the circumference and the area. Use the value 3.14159 for π.
7.Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.
Experiment
8. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
9. Write a C program to find the roots of a Quadratic equation.

III. Iterative statements
Demonstration
1. Input an integer (5 digits or fewer) containing only 0s and 1s (i.e., a "binary" integer) and print its decimal equivalent. [Hint: Use the remainder and division operators to pick off the "binary" number's digits one at a time from right to left. Just as in the decimal number system, in which the rightmost digit has a positional value of 1, and

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the next digit left has a positional value of 10, then 100, then 1000, and so on, in the binary number system the rightmost digit has a positional value of 1, the next digit left has a positional value of 2, then 4, then 8, and so on. Thus, the decimal number 234 can be interpreted as 4 * 1 + 3 * 10 + 2 * 100. The decimal equivalent of binary 1101 is 1 * 1 + 0 * 2 + 1 * 4 + 1 * 8 or 1 + 0 + 4 + 8 or 13.]

2. Armstrong numbers are numbers that are equal to the sum of their digits raised to power of the number of digits in them. The number 153, for example, equals 13 + 53 + 33. Thus, it is an Armstrong number. Write a program to display all three-digit Armstrong numbers.

3. Write a program that reads an integer (5 digits or fewer) and determines and prints how many digits in the integer are 9s.

4. Write a program that keeps printing the powers of the integer 3, namely 3, 9, 27, 91, 273, and so on. Your loop should not terminate (i.e., you should create an infinite loop). What happens when you run this program?

5. Write a C program to calculate the following, where x is a fractional value. $1-x/2 +x^2/4-x^3/6$ ……

6. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: $1+x+x^2+x^3+\ldots\ldots+x^n$. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

7. Write a C program to construct a pyramid of numbers as follows:

```
1                       1
1   2                   2   2
1   2   3               3   3   3
1   2   3   4           4   4   4   4
1   2   3   4   5       5   5   5   5   5
```

Experiment

8. Write a program that reads three nonzero integer values and determines and prints whether they could represent the sides of a triangle.

9. Write a program that reads three nonzero integers and determines and prints whether they could be the sides of a right triangle

10. Write a program that reads a nonnegative integer and computes and prints its factorial

11. Write a program that estimates the value of the mathematical constant *e* by using the formula:
$$e^1 = 1 + \frac{1}{1!} + \frac{1^2}{2!} + \frac{1^3}{3!} + \cdots$$

12. Write a program that computes the value of e^x by using the formula
$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots, -\infty < x < \infty$$

IV. Arrays, Pointers, and Functions
Demonstration
1. Write a C program to find the minimum, maximum and average in an array of integers.
2. Write a function to compute mean, variance, Standard Deviation, sorting of n elements in a single dimension array.
3. Write a C program that uses functions to perform the following:
   i. Addition of Two Matrices ii. Multiplication of Two Matrices iii. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be the same.
4. Write C programs that use both recursive and non-recursive functions
5. To find the factorial of a given integer.
Experiment
6. Write a C program to find the GCD (greatest common divisor) of two given integers.
7. Write a C program to compute x^n
8. Write a program for reading elements using a pointer into an array and display the values using the array.
9. Write a program for display values reverse order from an array using a pointer.
10. Write a program through a pointer variable to sum of n elements from an array.

V. Files
Demonstration
1. Write a C program to display the contents of a file to standard output device.
2. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
3. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
Experiment
4. Write a C program that does the following:
It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using a to i function) Now the program asks for an index and a value from

the user and the value at that index should be changed to the new value in the file. (hint: use fseek function) The program should then read all 10 values and print them back

5. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

VI. Strings
Demonstration
1. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
2. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent c.
3. Write a C program that uses functions to perform the following operations:
  - To insert a sub-string into a given main string from a given position.
  - To delete n Characters from a given position in each string.

Experiment
4.Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
5.Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
6.Write a C program to count the lines, words and characters in each text.

VII. Sorting and Searching:
1.Write a C program that uses non recursive function to search for a key value in each list of integers using linear search method.
2.Write a C program that uses non recursive function to search for a key value in a givensorted list of integers using binary search method.
3.Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.

Experiment
4.Write a C program that sorts the given array of integers using selection sort in descending order
5. Write a C program that sorts the given array of integers using insertion sort in ascending order
6.Write a C program that sorts a given array of names

Project
Students must submit a report on one of the following micro-projects before commencement of second internal examination.
1.Library management system
2.Payrol management system
3.Telecom billing management system
4.Bank management system
5.Employee's management system
6.Library management system
7.Personal Diary management system
8.Medical store management system.
9.Phone Contacts management
10.Fee Collection system

TEXTBOOKS
1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCE BOOKS
1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PHI
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, how to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

COURSE OUTCOMES:
On completion of the course students will be able to
1. Formulate the algorithms for simple problems and translate given algorithms to a working and correct program
2. Correct syntax errors as reported by the compilers identify and correct logical errors encountered during execution.

3. Represent and manipulate data with arrays, strings and structures and use pointers of different types
4. Create, read and write to and from simple text and binary files
5. Develop reusable code with the help c-functions

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	1							
CO2			3	3	1						2	2
CO3	3	3		2								
CO4			3		2						2	
CO5	2	2	3								1	1

END

(A402502) BASIC ELECTRICAL ENGINEERING LABORATORY
(Common to CSE, INF, ECE)

B. Tech (CSE) I Semester

L	T	P	C
0	0	2	1

List of experiments/demonstrations:
PART- A (compulsory)

1. Verification of KVL and KCL
2. Verification of Thevenin's and Norton's theorem
3. Transient Response of Series RL and RC circuits for DC excitation
4. Resonance in series RLC circuit
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series Circuits.
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of aSingle-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Torque-Speed Characteristics of a Three-phase Induction Motor.

PART-B (any two experiments from the given list)
1. Verification of Superposition theorem.
2. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
3. Measurement of Active and Reactive Power in a balanced Three-phase circuit
4. Magnetization Characteristics of DC Shunt Generator.

TEXTBOOKS
1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition,2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition,2008.

REFERENCE BOOKS
1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker,"Basic Electrical Engineering", S. Chand,2nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1stEdition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Verify the basic Electrical circuit Laws through different experiments.
2. Analyze the transient responses of R, L and C circuits for DC input.
3. Calculate the Impedance and Current of RL, RC and RLC series Circuits.
4. Evaluate the performance of Electrical Machines through various testing methods.
5. Measure the Active and Reactive Power in a single-phase transformer.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12
CO1	3	3	0	1	0	0	0	2	3	2	2	1
CO2	3	3	0	1	0	0	0	2	3	2	2	1
CO3	3	3	0	1	0	0	0	2	3	2	2	1
CO4	3	3	0	1	0	0	0	2	3	2	2	1
CO5	3	3	0	1	0	0	0	2	3	2	2	1

END

(A403502) COMPUTER AIDED ENGINEERING DRAWING

B. Tech (CSE) I Semester

L	T	P	C
1	0	2	2

UNIT – I
Introduction to Engineering Drawing: Principles of Engineering Drawing and their Significance, Introduction to Computer aided drafting – views, commands.
Computer aided drafting of conic Sections: Ellipse, Parabola and Hyperbola – General Method (eccentricity) only.
Computer aided drafting of Cycloid, Epicycloids and Hypocycloid.

UNIT- II
Orthographic Projections: Introduction to Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.
Computer aided orthographic projections – points, lines and planes

UNIT – III
Projections of Regular Solids: Introduction to   Regular Solids – Prism, Cylinder, Pyramid, Cone
Computer aided projections of solids – Regular views

UNIT – IV
Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views –Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric
Projection of objects having non- isometric lines, Isometric Projection of Spherical Parts using computer aided drafting.

UNIT – V
Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions
Conversion of orthographic projection into isometric view and vice versa using computer aided drafting.

TEXT BOOKS
1. Engineering Drawing, 51st Edition, N.D. Bhatt, Charotar Pub, 2012
2. Computer Aided Engineering Drawing, 2nd Edition, K. Balaveera Reddy et al, CBS Publishers, 2015

REFERENCE BOOKS
1. Engineering Drawing, 2nd Edition, Basant Agrawal and C M Agrawal, McGraw Hill, 2014
2. Engineering Drawing, 1st Edition, M. B. Shah, B.C. Rane, Pearson, 2015
3. Engineering Drawing, 1st Edition, N. S. Parthasarathy and Vela Murali, Oxford, 2015
4. Engineering Drawing and graphics Using AutoCAD, 3rd Edition, T. Jeyapoovan, Vikas, S.Chand and Company Ltd, 2000

COURSE OUTCOMES:
On completion of the course students will be able to
1. Apply computer aided drafting tools to create 2D objects like Conic section and Cycloidal curves
2. Sketch the Orthographic projection of Point, Line and Plane objects by drafting tools
3. Create, read and interpret engineering drawings of Solids by computer tools
4. Create and interpret 2D and 3D Isometric objects by drafting tools
5. Conversion of orthographic projection into isometric view and vice versa by using computer aided drafting tools

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	3	-	3	-	-	2	3	3	1	2
CO2	3	1	3	-	3	-	-	2	3	3	1	2
CO3	3	1	3	-	3	-	-	2	3	3	1	2
CO4	3	1	3	-	3	-	-	2	3	3	1	2
CO5	3	1	3	-	3	-	-	2	3	3	1	2

END

(A400505) INTRODUCTION TO SOCIAL INNOVATION
(Common to all branches)

B. Tech (CSE) I Semester

L	T	P	C
0	0	2	1

WEEK-1
Types and features of community- Rural, Suburban, Urban and Regional
WEEK-2
Service based learning, Aims of Community based projects, Sustainable Development Goals
WEEK-3
Community visit, Report Writing, Resource Diagram, Chapati Diagram, Transect Walk
WEEK-4
The non-profit sector, public sector, the private sector, the informal sector
WEEK-5
Poster presentation on four sectors
WEEK-6
Process of Design Thinking
WEEK-7
Social organizations and enterprises, social movements
WEEK-8
Social software and open-source methods
WEEK-9
Introduction to Ethics, moral values, significance of professional ethics
code of conduct for engineers
WEEK-10
Identify ethical dilemmas in different tasks of engineering, applying moral theories and codes of conduct for resolution of ethical dilemmas.
WEEK-11
Case studies on Engineering Ethics
WEEK-12
Documentation, Steps for Patent filing and Startups, Poster presentation
TEXTBOOKS
1. Social Entrepreneurship for the 21st Century: Innovation Across the Non Profit, Private and Public Sectors; Georgia Levenson Keohane; Tata McGraw Hill
2. Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author)
REFERENCE BOOKS:
1. Fundamentals of Intellectual Property (English) 1st Edition (Paperback, Dr. Kalyan C. Kankanala) Publisher: Asia Law House ISBN: 9789381849514, 938184951X Edition: 1st Edition, 2012.
2. Indian Patent Law (English, Paperback, Kalyan C. Kankanala) Publisher: Oxford University Press-New Delhi, ISBN: 9780198089605, 0198089600 Edition: 2012.
3. Social Enterprises: An Organizational Perspective edited; Benjamin Gidron, YeheskelHasenfeld; Palgrave Macmillan
4. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011.
5. Engineering Ethics: An Industrial Perspective; Gail Baura; Elsevier
6. Intellectual Property and Financing Strategies for Technology Startups; Gerald B. Halt, Jr., John C. Donch, Jr., Amber R. Stiles, Robert Fesnak; Springer

COURSE OUTCOMES:
On completion of the course students will be able to
1. Identify community issues through community Interaction.
2. Illustrate the factors affecting social innovation in various sectors.
3. Apply design thinking concept to analyze the community problems.
4. Adopt ethical values in implementing the social innovation.
5. Describe the process of property rights and patent filing.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						1	2		3	2		
CO2						2	2		3	3		
CO3				2		2	3		2	3		
CO4						2	3	3	2	2		

CO5		2		2		2	3		2	3		

END

(A400703) CONSTITUTION OF INDIA
(Common to all branches)

B. Tech (CSE) I Semester	**L**	**T**	**P**	**C**
	2	**0**	**0**	**0**

UNIT-I

History of Making of the Indian Constitution- History of Drafting Committee.

UNIT-II

Philosophy of the Indian Constitution- Preamble Salient Features

UNIT-III

Contours of Constitutional Rights & Duties - 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: 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: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, **CEO Zila Panchayat:** Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

REFERENCE BOOKS
1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. B. R. Ambedkar framing of Indian Constitution, Dr. S. N. Busi, 1st Edition, 2015.
3. Indian Constitution Law (7thEdn), M. P. Jain, Lexis Nexis, 2014.
4. Introduction to the Constitution of India, D.D. Basu, Lexis Nexis, 2015.

COURSE OUTCOMES:

On completion of the course students will be able to
1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru.
4. Discuss the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
5. Discuss the passage of the Hindu Code Bill of 1956.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	2
CO3	-	-	-	-	-	2	-	-	-	-	-	-
CO4	-	-	-	2	-	3	-	-	-	-	-	-
CO5	-	2	-	-	-	-	-	-	-	-	-	-

(A400101) ENGLISH FOR SKILL ENHANCEMENT
(Common to all branches)

B. Tech (CSE) II Semester

L T P C
0 0 2 1

UNIT - I
Chapter entitled 'Toasted English' by R.K.Narayan from "English: Language, Contextand Culture" published by Orient BlackSwan, Hyderabad.
Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes -Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives -Synonyms and Antonyms
Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.
Reading: Reading and Its Importance- Techniques for Effective Reading.
Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation-Techniques for writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT – II
Chapter entitled 'Appro JRD 'by Sudha Murthy from "English Language, Context and Culture" published by Orient Black Swan, Hyderabad.
Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.
Reading: Sub-Skills of Reading – Skimming and Scanning

UNIT – III
Chapter entitled 'Lessons from Online Learning' by F.Haider Alvi, Deborah Hurst et al from "English: Language, Context and Culture" published by Orient BlackSwan, Hyderabad.
Vocabulary: Words Often Confused - Words from Foreign Languages and their Use in English.
Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.
Reading: Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.
Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

UNIT - IV
Chapter entitled 'Art and Literature' by Abdul Kalam from "English: Language, Context and Culture" published by Orient BlackSwan, Hyderabad.
Vocabulary: Standard Abbreviations in English Grammar: Redundancies and Clichés in Oral and Written Communication.
Reading: Writing: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice Writing Practices
Essay Writing-Writing Introduction and Conclusion -Précis Writing

UNIT - V
Grammar: Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)
Reading: Writing: Reading Comprehension-Exercises for Practice Technical Reports- Introduction.

NOTE
Listening and Speaking Skills which are given under in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.

  ➢ NOTE 1: As the syllabus of English given in AICTE Model Curriculum-2018 for B. Tech First Year is Open-ended, besides following the prescribed textbook, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.

➢ NOTE 2: Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

TEXTBOOK
   1. "English: Language, Context and Culture" by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.

REFERENCE BOOKS
   1. Effective Academic Writing, (2nd edition) by Liss and Davis (OUP) 2014.
   2. Richards, Jack C. Interchange Series. Introduction, (4th edition), Cambridge University Press 2022
   3. Remedial English Grammar by Wood F.T, Macmillan.2007.
   4. Learn English: A Fun Book of Functional Language, Grammar and Vocabulary, (2nd edition) Chaudhuri, Santanu Sinha, Sage Publications India Pvt. Ltd.2018
   5. Technical Communication, (1st edition), Wiley India Pvt. Ltd.2019
   6. English for Technical Communication for Engineering, Vishwamohan, Aysha 2013

COURSE OUTCOMES:
 On completion of the course students will be able to
   1. Understand the importance of vocabulary and sentence structures.
   2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
   3. Demonstrate their understanding of the rules of functional grammar.
   4. Develop comprehension skills from the known passages.
   5. Acquire basic proficiency in reading and writing modules of English and take an active part in drafting paragraphs, letters, essays, abstracts, precis, and reports in various contexts.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	2	3	-	-
CO2	-	-	-	-	-	-	-	-	-	2	2	
CO3	-	-	-	-	-	-	-	-	-	2	-	-
CO4	-	-	-	-	-	-	-	-		3	-	2
CO5	-	-								2		3

END

(A400002) ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(Common to All)

B. Tech (CSE) II Semester

L	T	P	C
3	1	0	4

UNIT-I
First Order ODE:

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's differential equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

UNIT-II
Ordinary Differential Equations of Higher Order:

Second and higher order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax}, $\sin ax$, $\cos ax$, polynomials in x, $e^{ax}(x)$ and $x\,V(x)$, method of variation of parameters.

UNIT-III
Laplace transforms:

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem and Second shifting theorem. Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't'. Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions. Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

UNIT-IV
Vector Differentiation:

Vector point functions and scalar point functions, Gradient, Tangent plane and normal line, Directional derivatives, Divergence and Curl, Solenoidal and Irrotational vectors, Scalar potential functions, Vector Identities.

UNIT-V
Vector Integration:

Line, Surface, and Volume Integrals. Theorems of Green, Gauss and Stoke's (without proofs) and their applications.

TEXTBOOKS
1. Higher Engineering Mathematics, (36th Edition), B.S. Grewal, Khanna Publishers, 2010.
2. Advanced Engineering Mathematics, (5th Edition), R.K. Jain and S.R.K. Iyengar, Narosa Publications, 2016.
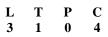
REFERENCE BOOKS
1. Advanced Engineering Mathematics, (9th Edition), Erwin kreyszig, John Wiley & Sons, 2006.
2. Calculus and Analytic geometry, (9th Edition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.
3. A text book of Engineering Mathematics, (10thEdition), N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2019.
4. Higher Engineering Mathematics, (9th Edition), H. K. Dass and Er. Rajnish Verma, S Chand and company Limited, New Delhi, 2011.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Determine first order differential equations and obtain solutions.
2. Solve the Higher order differential equations and apply the differential equation concepts to real world problems.
3. Use the Laplace transforms techniques for solving ODE's.
4. Evaluate Gradient – Divergence – Curl, Directional derivatives.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	-	-	-	-	-	2
CO2	3	3	3	2	-	-	-	-	-	-	-	2
CO3	3	2	3	2	-	-	-	-	-	-	-	2
CO4	3	2	3	2	-	-	-	-	-	-	-	3
CO5	3	2	3	2	-	-	-	-	-	-	-	3

END

(A400007) APPLIED PHYSICS
(Common to all branches)

B. Tech (CSE) II Semester

L	T	P	C
3	1	0	4

UNIT – I
QUANTUM MECHANICS:
Introduction to quantum physics, blackbody radiation – Stefan-Boltzmann's law, Wein's and Rayleigh-Jean's law, Planck's radiation law - photoelectric effect – de Broglie hypothesis- Davisson and Germer experiment –Heisenberg uncertainty principle - Born interpretation of the wave function – time independent Schrodinger wave equation - particle in one dimensional potential box.

ELECTRIC PROPERTIES OF SOLIDS:
Free electron theory (Drude & Lorentz, Sommerfeld) - Fermi-Dirac distribution - Bloch's theorem -Kronig-Penney model – E-K diagram- effective mass of electron-origin of energy bands- classification of solids.

UNIT – II
SEMICONDUCTORS AND DEVICES:
Intrinsic and extrinsic semiconductors, Variation of Fermi level with temperature – Hall Effect - Construction, principle of operation and characteristics of P-N Junction diode, Zener diode

PHOTONIC DEVICES
Direct and indirect band gap semiconductors –LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.

UNIT – III
LASERS
Laser beam characteristics-three quantum processes-Einstein coefficients and their relations- lasing action - pumping methods- ruby laser, He-Ne laser, CO_2 laser - semiconductor laser-applications of laser.

FIBER OPTICS:
Introduction to optical fiber - advantages of optical fibers - total internal reflection - construction of optical fiber - acceptance angle - numerical aperture- classification of optical fibers- losses in optical fiber - optical fiber for communication system - applications.

UNIT - IV
DIELECTRIC MATERIALS
Dielectric Materials: Basic definitions- types of polarizations (qualitative) –Local field – Clasius Mossoti Equation ferroelectric, piezoelectric, and pyroelectric materials – applications

MAGNETIC MATERIALS:
Introduction to magnetic materials - Hysteresis-soft and hard magnetic materials- magnetostriction, magnetoresistance - applications - bubble memory devices, magnetic field sensors and multiferroics.

UNIT - V
ENERGY MATERIALS:
Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors - rechargeable ion batteries, solid fuel cells.
NANOTECHNOLOGY
Nanoscale, quantum confinement, surface to volume ratio, bottom-up fabrication: sol-gel, precipitation, combustion methods – top-down fabrication: ball milling - physical vapour deposition (PVD) - chemical vapor deposition (CVD) - characterization techniques - XRD, SEM &TEM - applications of nanomaterials.

TEXTBOOKS
1. Engineering Physics (3rd edition), PK Palanisamy, SciTech Publications, 2015.
2. Essentials of Nan science& Nanotechnology (1st Edition), Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 2021.

REFERENCES
1. Fundamentals of Physics. (6th edition), Halliday, R.Resnick and J.Walker,John Wiley and Sons, 2001.
2. Quantum Physics, (2nd edition), H.C. Verma, TBS Publication, 2012
3. Introduction to Solid State Physics, (7th edition), Charles Kittel, Wiley Eastern, 2019.
4. Physics of Semiconductor devices (4th edition), Simon.M Sze and Kwok K . Ng, Wiley Student Edition,2006.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understand the concepts of Quantum mechanics and visualize the differences between the solids by their classification.
2. Identify and analyse the importance of semiconductors and semiconductor devices in science and Engineering Applications.
3. Appreciate the features and applications of Lasers and Optical fibers.
4. Applying the fundamental properties of dielectric and magnetic materials in different engineering fields.
5. Evaluate various aspects of Energy Materials and Nano-materials and their applications in diverse fields.

CO PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	1	-	-	-	-	-	-	1
CO2	3	3	2	1	1	1	1	-	-	1	-	2
CO3	3	3	2	1	1	1	1	-	-	1	-	2
CO4	3	3	2	1	1	-	-	-	-	1	-	1
CO5	3	3	2	1	1	1	1	1	-	1	-	2

END

(A405301) DATA STRUCTURES
(Common to CSE, IT, CSE-DS, CSE-AI&ML, AI&ML, AI&DS, CSE-CS)

B. Tech (CSE) II Semester

L	T	P	C
3	0	0	3

UNIT-I
Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, concepts of circular linked link list, double linked list, Stacks-Operations, array and linked representations of stacks, stack applications- infix to postfix conversion, postfix evaluation, Queues- operations, array, and linked representations.

UNIT-II
Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching. Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

UNIT-III
Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, B-Trees, B+ Trees, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, concepts of Red –Black, Splay Trees.

UNIT-IV
Graphs: Graph Implementation Methods. Graph Traversal Methods. Sorting: Quick Sort, Heap Sort, External Sorting- Model for external sorting, Merge Sort.

UNIT-V
Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

TEXTBOOKS
1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. Data Structures using C – A. Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

REFERENCE BOOK
1. Data Structures: A Pseudocode Approach with C, 2 nd Edition, R. F. Gilbergand, B.A.Forouzan, Cengage Learning.

COURSE OUTCOMES:
 On completion of the course students will be able to
1. Design and Implement Linear Data structures.
2. Explain the need of Dictionary data structure and implement dictionary data structure using Hash tables and skip lists.
3. Design and implement various forms of tree data structures.
4. Explain, analyze, and implement various graph traversal, sorting techniques.
5. Describe various pattern matching algorithms.

CO PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	-	-	-	-	-	-	-	1
CO2	3	3	1	1	-	-	-	-	-	-	-	1
CO3	3	3	1	1	-	-	-	-	-	-	-	1
CO4	3	3	1	1	-	-	-	-	-	-	-	1
CO5	3	3	1	1	-	-	-	-	-	-	-	1

END

(A400503) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY
(Common to all branches)

L T P C
0 0 2 1

B. Tech (CSE) I Year II Semester

The English Language and Communication Skills (ELCS) Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

English Language and Communication Skills Lab (ELCS) shall have two parts:
a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

Listening Skills Objectives
1. To enable students, develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions. Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.
   ➤ Listening for general content
   ➤ Listening to fill up information
   ➤ Intensive listening
   ➤ Listening for specific information

Speaking Skills Objectives
1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional
   ➤ Oral practice
   ➤ Describing objects/situations/people
   ➤ Role play – Individual/Group activities
   ➤ Just A Minute (JAM) Sessions
   The following course content is prescribed for the English Language and Communication Skills Lab

Exercise – I
CALL Lab: Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening. Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs - Past Tense Marker and Plural Marker- Testing Exercises
ICS Lab: Understand: Spoken vs. Written language- Formal and Informal English. Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II
CALL Lab: Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern in sentences – Intonation. Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences – Intonation - Testing Exercises.
ICS Lab: Understand: Features of Good Conversation – Strategies for Effective Communication. Practice: Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise – III
 CALL Lab: Understand: Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI). Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -Testing Exercises
ICS Lab: Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

Exercise – IV

CALL Lab: Understand: Listening for General Details. Practice: Listening Comprehension Tests - Testing Exercises

ICS Lab: Understand: Public Speaking – Exposure to Structured Talks - Non-verbal CommunicationPresentation Skills. Practice: Making a Short Speech – Extempore- Making a Presentation.

Exercise – V

CALL Lab: Understand: Listening for Specific Details. Practice: Listening Comprehension Tests -Testing Exercises

ICS Lab: Understand: Group Discussion Practice: Group Discussion

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab:** The Computer Assisted Language Learning Lab has to accommodate 30 students with 30 systems, with one Master Console, LAN facility and English language learning software for self- study by students. System Requirement (Hardware component): Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications: i) Computers with Suitable Configuration ii) High Fidelity Headphones
2. **Interactive Communication Skills (ICS) Lab:** The Interactive Communication Skills Lab: A Spacious room with movable chairs and audiovisual aids with a Public Address System, a T. V. or LCD, a digital stereo –audio & video system and camcorder etc. Source of Material (Master Copy): • Exercises in Spoken English. Part 1,2,3. CIEFL and Oxford University Press Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus

REFERENCE BOOKS

1. English Language Communication Skills Lab Manual cum Workbook, (1st edition), by Rajesh Kumar Cengage Learning India Pvt. Ltd, 2022
2. Communicative English - A workbook, (Revised Edition) by Shobha, KN & Rayen, J. Lourdes, Cambridge University Press, 2019.
3. Communication Skills: A Workbook. Kumar, (2nd edition) by Sanjay & Lata, Pushp, Oxford University Press, 2019.
4. ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities, (Board of Editors), Orient Black Swan Pvt. Ltd, 2016
5. English Language Skills: A Practical Approach, Mishra, Veerendra et al., Cambridge University Press, 2020.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understand the nuances of English language through audio- visual experience and group activities.
2. Neutralize their accent for intelligibility.
3. Speak with clarity and confidence which in turn enhances their employability skills
4. Students will learn public speaking skills and overcome stage fear.
5. Express clarity of thoughts, capability to hold the discussion with everyone and develop analytical thinking.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-		2	-	-
CO2	-	-	-	-	-	-	-	-	-	2	-	-
CO3	-	-	-	-	-	-	-	-	-	3	2	-
CO4	-	-	-	-	-	-	-	-	-	3	-	2
CO5	-	-	-	-	-	-	-	-	-	2	-	2

END

(A400501) APPLIED PHYSICS LAB

B. Tech (CSE) II Semester

L	T	P	C
0	0	3	1.5

(Any 8 experiments are to be performed)

1. Determination of work function and Planck's constant using photoelectric effect.

2. Determination of Hall co-efficient and carrier concentration of a given semiconductor.

3. Characteristics of series and parallel LCR circuits.

4. V-I characteristics of a p-n junction diode and Zener diode

5. a) V-I and L-I characteristics of light emitting diode (LED)b) V-I Characteristics of solar cell

6. Determination of Energy gap of a semiconductor.

7. Determination of the resistivity of semiconductor by two probe method.

8. Study of B-H curve of a magnetic material.

9. Determination of dielectric constant of a given material

10. a) Determination of the beam divergence of the given LASER beam) Determination of Acceptance Angle and Numerical Aperture of an optical fiber.

11. Understanding the method of least squares – torsional pendulum as an example.

12. Diffraction grating: Determination of wavelength of a source (LASER).

LABORATORY MANUAL:

1. Applied Lab (2nd Edition) Dr M Chandra Shekhar Reddy, Dr Neelima Patnaik, Jaya Prakash Reddy Kasu, SciTech Publications, 2022.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Appreciate quantum physics in optoelectronics.
2. Determine the Planck's constant using Photo electric effect
3. Determine energy gap of a semiconductor diode and magnetic fields.
4. Identify the material whether it is n-type or p-type by Hall experiment.
5. Evaluate the basic properties of lasers and optical fibers.

CO PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	-	-	-	-	-	1	-	1
CO2	3	3	2	1	-	-	-	-	-	1	-	1
CO3	3	3	2	1	-	-	1	-	-	1	-	1
CO4	3	3	2	1	-	-	-	-	-	1	-	1
CO5	3	3	2	1	-	-	1	-	-	1	-	1

END

(A405503) DATA STRUCTURES LAB
(Common to CSE, IT, CSE-DS, CSE-AI&ML, AI&ML, AI&DS, CSE-CS)

L	T	P	C
0	0	3	1.5

B. Tech (CSE) II Semester

List of Experiments

Week 1: Practice lab to perform the following:
      1. Write a C program to implement the following operations on to a 1D Array:
          b. INSERT
          c. DELETE
          d. SEARCH
          e. TRAVERSE
      2. Write a C program to implement Self-referential Structure.
      3. Write a C program to Perform Dynamic Memory Allocation.

Week 2: Linked List
Demonstration
    1. Write a C program to implement Single linked list i) Insertion ii) Deletion iii) Display
    2. Write a function to reverse the nodes of a Single linked list
Experimentation
1. Write a program that uses functions to perform the following operations on doubly linked list:
      i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on circular linked list:
      i) Creation ii) Insertion iii) Deletion iv) Traversal

Week 3: **Stacks, Queues.**
Demonstration
      1. Write a program that implement Stack (its operations) using Arrays
      2. Write a program that implement Circular Queue (its operations) using Arrays
Experimentation
    1. Write C programs to implement Stack ADT using Linked List
    2. Write C programs to implement Circular Queue ADT using Linked List

Week 4: **Applications of Stacks, Dictionaries and Hashing**
Demonstration
        1. Write a C program to Convert the given Infix Expression to Postfix Expression.
    2. Write a C program to implement different hash methods
    3. Write a C program to implement the following collision resolving i) Quadratic probing. ii) Linear Probing

Week 5: Applications of Stacks. & Dictionaries and Hashing
Experimentation
1. **Write a C program to Evaluate the given Postfix Expression.**
2. Implement Dictionary ADT using list data structure.
3. Implement Dictionary ADT using skip list data structure.

Week 6: Search Trees
Demonstration
1.Write a C program to implement Binary search tree
i) Insertion ii) deletion iii) Traversals
2.Write a C program to implement binary search tree non-recursively traversals
i) Pre- Order ii) Post –Order iii) In-Order

Week 7: Search Trees
Experimentation
1. (A) Write a C Program to Check if a Given Binary Tree is an AVL Tree or Not
(B) Write a C program to find height of a Binary tree
2. Write a C program to count the number of leaf nodes in a tree.
3. Write a C program to implement AVL tree
i) Creation ii) Deletion iii) Traversals

Week 8: Graphs
Demonstration
1. Write a C program for implementing Graph traversal

i) DFS
Experimentation
1. Write a C program for implementing Graph traversal
i) BFS
Week 9: Sorting
Demonstration
1. Write C programs for implementing the following Sorting methods and display the important steps.
i) Quick Sort ii) Heap sort
Week 10: Sorting
Experimentation
3. Write C programs for implementing the following Sorting methods and display the important steps.
i) Merge sort ii) External Merge sort.
Week 11: Pattern Matching Algorithms
Demonstration
1. Write a C program for implementing pattern matching algorithms
i) Knuth-Morris-Pratt ii) Brute Force
Week 12: Pattern Matching Algorithms
Experimentation
1.Write a C program for implementing pattern matching algorithms
i. Boyer –Moore

TEXTBOOKS
1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, PHI/Pearson Education.

REFERENCE BOOKS
1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, Cengage Learning.
COURSE OUTCOMES:
On completion of the course students will be able to
1. Design and Implement Linked List Data structure.
2. Design and Implement Linear Data structures.
3. Implement Sorting and Tree traversal techniques.
4. Design and Implement Non-Linear Data structures.
5. Implement KMP and Boyre-Moore pattern matching algorithms.

CO PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	3	-	-	-	-	-	-	1
CO2	3	3	1	1	3	-	-	-	-	-	-	1
CO3	3	3	1	1	3	-	-	-	-	-	-	1
CO4	3	3	1	1	3	-	-	-	-	-	-	1
CO5	3	3	1	1	3	-	-	-	-	-	-	1

END

(A405505) IT WORKSHOP
(Common to CSE, ECE, IT, CSE-DS, CSE-AI&ML, AI&ML, AI&DS, CSE-CS)

	L	**T**	**P**	**C**
B. Tech (CSE) II Semester	**0**	**0**	**3**	**1.5**

PC Hardware

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also, students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally, students should demonstrate to the instructor how to access the websites and email. If there are no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop-up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create a project certificate. Features to be covered: - Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered: -Formatting Styles, inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered: - Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2: Calculating GPA - Features to be covered: - Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

PowerPoint

Task 1: Students will be working on basic power point utilities and tools which help them create basic powerpoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

REFERENCE BOOKS
1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dreamtech
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft)
5. LaTeX Companion – Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. –
   CISCO Press, Pearson Education.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan– CISCO Press, Pearson Education.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Identify various hardware components of a system and their significances.
2. Assemble and disassemble the computer.
3. Use various Microsoft tools for text processing, visual presentations, and number crunching.
4. Retrieve the information from the Internet using web browsers.
5. Safeguard the system from external and internal threats.

CO PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	3	2	1	1	-	-	-	-	-	-	1
CO2	-	1	3	1	1	-	-	-	-	-	-	1
CO3	1	2	2	-	3	-	-	-	-	-	-	3
CO4	1	2	1	-	3	-	-	-	-	-	-	3
CO5	1	1	1	1	1	-	-	-	-	-	-	3

**** END ****

(A400506) ENGINEERING EXPLORATION & PRACTICE
(Common to all branches)

B. Tech (CSE) II Semester

L	T	P	C
0	0	3	1.5

Week-1
Difference between Science and Engineering, Scientist and Engineer needs and wants, various disciplines of engineering, some misconceptions of engineering, Expectation for the 21st century engineer. Significance of teamwork, Importance of communication in engineering profession

Week-2
Engineering Design Process, Need statement to Problem conversion, Pair wise comparison chart, decision matrix, Concepts of reverse engineering.

Week-3
Project management tools: Checklist, Timeline, Gantt chart, Requirement Analysis

Week-4
Basic Components of a Mechanism, Degrees of Freedom or Mobility of a Mechanism, 4 Bar Chain, Crank Rocker Mechanism, Slider Crank Mechanism

Week-5
3-D Modelling of a Box with two holes and curvature

Week-6
3-D Modelling of Electronic Enclosure and Assembly of two parts

Week-7
Introduction to various platform-based development, Introduction to basic components, transducers, actuators and sensors, Introduction to Tinker cad

Week-8
Introduction to Arduino, basics of programming

Week-9
Interfacing Arduino with actuators and transducers

Week-10
Interfacing Arduino with Sensors, Liquid Crystal Display (LCD)

Week-11
Assembly and Crafting the Prototype

Week-12
Test and Validate the Prototype, Documentation, Panel Presentation

TEXTBOOKS
1. Engineering Fundamentals: An Introduction to Engineering (Mind Tap Course List) 5th Edition by SaeedMoaveni
2. Concepts in Engineering Design – 2016; by Sumesh Krishnan (Author), Dr. Mukul Shukla (Author),Publisher: Notion Press.

REFERENCE BOOKS
1. A Ghosh and AK Malik: Theory of Mechanism and Machine; East West Press (Pvt) Ltd., New Delhi.
2. Arduino Cookbook, 2nd Edition by Michael Margolis: O'Reilly Media
3. Introduction to autocad®2017-2D and 3D design by Bernd S. Palm and Alf Yarwood, Routledge (Taylorand Francis group)
4. Software Project Management (SIE), (Fifth Edition); Bob Hughes, Mike Cotterell, Rajib Mall; Publishedby Tata McGraw-Hill Education Pvt. Ltd (2011) ; ISBN 10: 0071072748 ISBN 13: 9780071072748

COURSE OUTCOMES:
On Completion of the course, the students will be able to
1. Explain the importance of engineering profession in the world.
2. Identify multi-disciplinary approach required in solving an engineering problem.
3. Build a mechanism for a given application.
4. Create basic 3D models and animations.
5. Design a mechatronic system using Arduino and electronic components.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1					3	3	2		3	
CO2		3	1	3	2				3		3	
CO3	3		2		3				3		3	

CO4	2	3	2		3				3	2	3	
CO5			2	1	2		3		3		3	

** END **

(A400704) UNIVERSAL HUMAN VALUES
(Common to all branches)

B. Tech (CSE) I Year II Semester

L	T	P	C
2	0	0	0

UNIT - I
Basic Guidelines, Content and Process for Value Education
- ➢ Purpose and motivation for the course, recapitulation from Universal Human Values-I
- ➢ Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
- ➢ Continuous Happiness and Prosperity- A look at basic Human Aspirations
- ➢ Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
- ➢ Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
- ➢ Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

UNIT - II
Understanding Harmony in the Human Being - Harmony in Myself!
- ➢ Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- ➢ Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
- ➢ Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) • Understanding the characteristics and activities of 'I' and harmony in 'I'
- ➢ Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
- ➢ Programs to ensure Sanyam and Health. Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

UNIT – III
Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship
- ➢ Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship.
- ➢ Understanding the meaning of Trust; Difference between intention and competence • Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- ➢ Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals • Visualizing a universal harmonious order in society- Undivided Society, Universal Order from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc., Gratitude as a universal value in relationships. Discuss scenarios. Elicit examples from students' lives.

UNIT - IV
Understanding Harmony in the Nature and Existence – Whole existence as Coexistence
- ➢ Understanding the harmony in the Nature
- ➢ Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature
- ➢ Understanding Existence as Co-existence of mutually interacting units in all- pervasive space
- ➢ Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human beings as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

UNIT – V

Implications of the above Holistic Understanding of Harmony on Professional Ethics

➢ Natural acceptance of human values
➢ Definitiveness of Ethical Human Conduct
➢ Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
➢ Competence in professional ethics:
   a. Ability to utilize the professional competence for augmenting universal human order
   b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems,
   c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
➢ Case studies of typical holistic technologies, management models and production systems
➢ Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
➢ Sum up. Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

TEXTBOOKS

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019.

REFERENCE BOOKS

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amar kantak, 1999.
2. A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"

COURSE OUTCOMES:

On completion of the course students will be able to

1. Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
2. They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. •
3. They would have better critical ability about various issues in life.
4. They would also become sensitive to their commitment towards what they have understood (human values, human relationships and human society).
5. It is hoped that they 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.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						2						
CO2			2									
CO3									2			
CO4								2				
CO5												2

** END **

(A404204) DIGITAL ELECTRONICS
(CSE, CSE(CS), CSE(DS), CSE(AIML), AIML, IT)

B. Tech (CSE) III Semester

L	T	P	C
3	0	0	3

UNIT-I
BOOLEAN ALGEBRA AND LOGIC GATES: Digital Systems, Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes, Binary Storage and Registers, Binary logic.
Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, other logic operations, Digital logic gates.

UNIT-II
GATE – LEVEL MINIMIZATION: The map method, Four-variable map, Five-Variable map, product of sums simplification Don't-care conditions, NAND and NOR implementation other Two-level implementations, Exclusive – Or function.

UNIT-III
COMBINATIONAL LOGIC: Combinational Circuits, Analysis procedure Design procedure, Binary Adder-Subtractor Decimal Adder, Binary multiplier, magnitude comparator, Decoders, Encoders, Multiplexers, HDL for combinational circuits.

UNIT-IV
SEQUENTIAL LOGIC: Sequential circuits, latches, Flip-Flops Analysis of clocked sequential circuits, state Reduction and Assignment, Design Procedure**.** Registers, shift Registers, Ripple counters, synchronous counters, other counters.

UNIT-V
MEMORIES AND ASYNCHRONOUS SEQUENTIAL LOGIC: Introduction, Random-Access Memory, Memory Decoding, Error Detection, and correction Read-only memory, Programmable logic Array programmable Array logic, Sequential Programmable Devices.
Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of state and FlowTables, Race-Free state Assignment Hazards, Design Example.

TEXTBOOKS
1. Digital Design – Third Edition, M. Morris Mano, Pearson Education/PHI.
2. Digital Principles and Applications Albert Paul Malvino Donald P. Leach TATA McGraw HillEdition.
3. Fundamentals of Logic Design, Roth, 5th Edition, Thomson.

REFERENCE BOOKS
1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
2. Switching and Logic Design, C.V.S. Rao, Pearson Education
3. Digital Principles and Design – Donald D.Givone, Tata McGraw Hill, Edition.
4. Fundamentals of Digital Logic and Microcomputer Design, 5TH Edition, M. Rafiquzzaman JohnWiley.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Analyse various Boolean theorems and apply to Boolean functions.
2. Apply Boolean algebra and K-Maps to minimize Boolean functions.
3. Design various combinational circuits.
4. Design different Sequential circuits.
5. Design digital systems using different PLDs.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2									2
CO2	3	3	2									2
CO3	3	3	2									2
CO4	3	3	2									2
CO5	3	3	2									2

** END **

(A405308) SOFTWARE ENGINEERING

B. Tech (CSE) III Semester

L	T	P	C
3	**0**	**0**	**3**

UNIT - I
Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths. A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI). Process models: The waterfall model, Spiral model and Agile methodology

UNIT - II
Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.
Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

UNIT - III
Design Engineering: Design process and design quality, design concepts, the design model. Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT - IV
Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.
Metrics for Process and Products: Software measurement, metrics for software quality.

UNIT - V
Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM. Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

TEXTBOOKS
1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.

REFERENCE BOOKS
1. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
3. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.
4. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand the basic role and nature of software and acquire knowledge to select process framework and process model for business system.
2. Ability to translate end-user requirements into system and software requirements and able to identify, analyse, validate, manage, and specify the requirements for the development of an application.
3. Demonstrate an ability to use the Design tools for designing software architecture and conceptual model through UML diagram.
4. Concede product quality through testing techniques employing appropriate metrics by understanding the practical challenges associated with the development of a significant software system.
5. Apply the Risk management strategies, Quality management strategies and Quality Assurance knowledge for handling the Application.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3					1					2	2
CO2	3			2		1				2	2	1
CO3	2	1	3	3	3				1			

CO4	3	1	2	1	3				1			1
CO5	1					1		2			3	

** END **

(A404203) ELECTRONIC DEVICES AND CIRCUITS
(Common to CSE, CSE(CS), CSE(DS), CSE(AIML), AIML, IT)

B. Tech (CSE) III Semester

L T P C
2 0 0 2

UNIT - I

Diodes: Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch- switching times.

UNIT - II

Diode Applications: Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

UNIT - III

Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times,

UNIT - IV

Junction Field Effect Transistor (FET): Construction, Principle of Operation, Pinch-Off Voltage, Volt- Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.

UNIT – V

Special Purpose Devices: Zener Diode **-** Characteristics, Zener diode as Voltage Regulator, Principle ofOperation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

TEXTBOOKS

1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11th Edition, 2009, Pearson**.**

REFERENCE BOOKS

1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5thEdition, Oxford.
2. Chinmoy Saha, Arindam Halder, Debaati Ganguly - Basic Electronics-Principles and Applications, Cambridge, 2018.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understand PN junction diode characteristics under various conditions.
2. Design different diode applications such as rectifiers, clippers& clampers.
3. Analyze the Bipolar Junction Transistor and its characteristics.
4. Understand the Field Effect Transistor characteristics and its applications
5. Acquiretheknowledgeabouttheroleofspecialpurposedevicesandtheirapplications**.**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2									2
CO2	3	3	2									2
CO3	3	3	2									2
CO4	3	3	2									2
CO5	3	3	2									2

** END **

(A405303) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

B. Tech (CSE) III Semester

L	T	P	C
3	0	0	3

UNIT - I

Object oriented thinking and Java Basics- Need for oop paradigm, summary of oop concepts, coping with complexity, abstraction mechanisms. A way of viewing world – Agents, responsibility, messages, methods, History of Java, Java buzzwords, data types, variables, scope and lifetime of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, method binding, inheritance, overriding and exceptions, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT - II

Inheritance, Packages and Interfaces – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism-method overriding, abstract classes, the Object class.
Packages: Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages
Interfaces: Defining an interface, differences between classes and interfaces, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT - III

Exception handling and Multithreading-- Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception subclasses. String handling, exploring java.util. Differences between multithreading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication, thread groups, daemon threads. Enumerations, autoboxing, annotations, generics.

UNIT - IV

The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, checkbox groups, choices,
lists panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.
Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

UNIT - V

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.
Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets. Servlets, JDBC, Collection framework, JAVA8 features (Functional Programming and Lambda Functions).

TEXTBOOKS
1.Java the complete reference, 7th edition, Herbert schildt, TMH.
2.Understanding OOP with Java, updated edition, T. Budd, Pearson education.

REFERENCE BOOKS
1.An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John wiley & sons.
2.An Introduction to OOP, third edition, T. Budd, Pearson education.
3.Introduction to Java programming, Y. Daniel Liang, Pearson education.
4.An introduction to Java programming and object-oriented application development, R.A. Johnson- Thomson.

5.Core Java 2, Vol 1, Fundamentals, Cay.S. Horstmann and Gary Cornell, eighth Edition, Pearson Education.
6.Core Java 2, Vol 2, Advanced Features, Cay.S. Horstmann and Gary Cornell, eighth Edition, Pearson Education
7.Object Oriented Programming with Java, R.Buyya, S.T.Selvi, X.Chu, TMH.
8.Java and Object Orientation, an introduction, John Hunt, second edition, Springer. 9. Maurach's Beginning Java2 JDK 5, SPD.

COURSE OUTCOMES:
On completion of the course students will be able to
  1. Demonstrate the behavior of programs involving the basic programming constructs like control structures, constructors, string handling and garbage collection.
  2. Develop reusable programs using the concepts of inheritance, polymorphism, interfaces, and packages
  3. Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.
  4. Design event driven GUI and web related applications which mimic the real word scenarios using AWT, Swing
  5. Able to develop interactive programs using Event Handler and applets.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3							1			1	2
CO2	3	2	3								1	1
CO3	1	2	2	1	3							
CO4	3	1	3	1	3				1		1	1
CO5	1	1	3		3				1		1	1

END

(A405304) DATABASE MANAGEMENT SYSTEMS

B. Tech (CSE) II Year II Semester

L	**T**	**P**	**C**
3	**0**	**0**	**3**

Prerequisites: A course on "Data Structures".

UNIT - I

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS
Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model

UNIT - II

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical database design, introduction to views, destroying/altering tables and views.
Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT - III

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active databases.
Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, First, Second, Third normal forms, BCNF, lossless join decomposition, multivalued dependencies, Fourth normal form, Fifth normal form.

UNIT - IV

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT - V

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing (static and extensible hashing) Tree based Indexing, Comparison of File Organizations, Indexes- Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXTBOOKS

1.Database System Concepts, Silberschatz, Korth, McGraw hill, V edition.3rd Edition
2.Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill

REFERENCE BOOKS

1.Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2.Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3.Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
4.Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

COURSE OUTCOMES:

On completion of the course students will be able to
1. Gain knowledge of fundamentals of DBMS, database design
2. Understanding Relational Model and Relational Algebra.
3. Master the basics of SQL for retrieval and management of data and normal forms.
4. Be acquainted with the basics of transaction processing and concurrency control.
5. Familiarity with database storage structures and access techniques

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1											2
CO2	1	2	1									2
CO3	1	2	2	1	3							2
CO4	1	2	2	1	3							2
CO5	1	1	1		3							2

END

(A405506) PYTHON PROGRAMMING LABORATORY
(Common to all)

	L	**T**	**P**	**C**
B. Tech (CSE) III Semester	**0**	**1**	**2**	**2**

Week 1.
(Python Language Fundamentals-Installation -Identifiers, Reserved Words, Data Types, Type Casting, Immutability)

Demonstration
Experiment-1: Install Anaconda open-source framework for python.
Experiment-2: Write a program to display 'Hello World'.

Experimentation
Experiment-3: Explore various IDEs for python program development.
Experiment-4: The volume of a sphere with radius r is $4/3\ \pi r^3$. Write a Python program to find the volume of a sphere with

radius 5?

Week 2.
(Arithmetic Operators, Relational Operators, Logical operators, Bitwise operators, Assignment operators, Special operators)

Demonstration
Experiment-1; Write a python program to find minimum and maximum of given three numbers.
Experiment-2: Suppose the cover price of a book is $24.95, but bookstores get a 40% discount. Shipping costs $3 for the first copy and 75 cents for each additional copy. Write a python program to compute the total wholesale cost for 60 copies.

Experimentation
Experiment-3: Write a Python Program to Find the Square Root of a number without using sqrt function.
Experiment-4: Python Program to Convert Celsius to Fahrenheit.
Experiment-5: Python program to find the maximum of two numbers using ternary operator

Week 3.
(Mathematical Functions, Input and Output statements, Command Line Arguments, String Functions)
Demonstration
Experiment-1: Write a Python program to find area of circle.
Experiment-2: Write a program to read Employee data from the keyboard and print that data.

Experimentation
Experiment-3: Write a program to read 3 float numbers from the keyboard with comma separator and print their sum.
Experiment-4: Write a Program to display Command Line Arguments.

Week 4.
(Flow Control Statements-Conditional Statements, Transfer Statements, Iterative Statements)
Demonstration
Experiment-1. Write a Python program to take a single digit number from the keyboard and print is value in English word.
Experiment-2. Write a Python Program to check whether an n-digit integer is an Armstrong number or not.

Experimentation
Experiment-3. Write a Python program to display *'s in pyramid style (also known as equivalent triangle).
Experiment-4. Write a Python Program to Display the multiplication Table.

Week 5.
(Functions-Built in functions, user defined functions, Parameters, return statement, returning multiple values from function, type of arguments, Types of variables-global, local. Recursive functions, Lambda functions, filter function, reduce function, Function aliasing, Function decorators, Generators)

Demonstration
Experiment-1: Write a python function to find factorial of given number?
Experiment-2: Write a program to create a lambda function to find square of given number?

Experimentation
Experiment-3: Lambda Function to find biggest of given values.
Experiment-4: Program to filter only even numbers from the list by using filter() function?

Week 6.
(Working with Strings-Defining String, Multi-line Strings, accessing characters of a string, Mathematical operators for strings, Membership operator, Comparison of Strings, removing spaces from the string, Finding Substring, String replacement, Splitting of Strings, changing cases of a string, Formatting the strings)

Demonstration
Experiment-1: Write a program to accept some string from the keyboard and display its characters by index wise (both positive and negative index).
Experiment-2: Write a program to access each character of string in forward and backward direction by using while loop?

Experimentation
Experiment-3: Program to display all positions of substring in each main string.
Experiment-4: Write a program to reverse the given String.

Week 7.
(Python Data Structures-List: Creating a list- Accessing elements of a List, Traversing the List, List Manipulation, Ordering the elements of a List, Mathematical Operators for List objects, Membership Operator, Nested Lists, List Comprehensions)
Demonstration
Experiment-1: Write a Python program to display unique vowels present in the given word.
Experiment-2: Write a Python program to Count the Occurrence of an Item in a List.
Experimentation
Experiment-3: Write a Python program to segregate even and odd numbers from the given list of numbers.
Experimnet-4: Write a Python program to find the cumulative sum of elements of the list.

Week 8.
(Python Data Structures-Tuple: Creating a Tuple, Accessing the elements of a tuple, mathematical operators for tuple,
Tuple packing and Unpacking)

Demonstration
Experiment-1: Python program for adding a Tuple to List and Vice-Versa.
Experiment-2: Write a Python program to perform the summation of all elements of each tuple from the list of tuples.

Experimentation
Experiment-3: Write a Python program to multiply adjacent elements of a tuple.
Experiment-4: Write a Python program to find the maximum element in the tuple list.

Week 9.
(Python Data Structures-Set: Creating a Set object, functions of set, Mathematical operations on set, Membership Operators, Set Comprehension, Python Data Structures-Dictionary: Creating a Dictionary Object, accessing data from the dictionary, updating dictionaries, Deleting from dictionary, Functions on dictionary, dictionary comprehension)

Demonstration
Experiment-1. Write a Python program to perform set operations.
Experiment-2: Write a program to print different vowels present in the given word?
Experiment-3: Write a Python program to generate powers of 2 using set comprehensions.
Experiment-4: Write a program to eliminate duplicates present in the list using set
Experiment-5: Write a Python program to enter name and percentage marks in a dictionary and display information on the console.

Experimentation

Experiment-6: Write a program to take dictionary from the keyboard and print the sum of values?

Experiment-7: Write a program to find number of occurrences of each letter present in the given string using dictionary.

Experiment-8: Write a program to accept student name and marks from the keyboard and creates a dictionary. Also display student marks by taking student name as input?

Week 10.

(Python Modules-Creating Modules, accessing members, module aliasing, member aliasing, reloading a module, The special variable: __name___. Working with Math, random modules, Python Packages. Python-File Handling-Types of Files, opening a file, closing a file, properties of File object, writing data to text file, reading character data from text files, seek (), tell () functions.)

Demonstration

Experiment-1: Create a module **fibo.py** containing Fibonacci(**n**) function(s) and import fibo module in a python script to print Fibonacci series up to **n**.

Experiment-2: Write a python program to print all the contents of a given module.

Experiment-3: Write a python program to create a package containing two or modules.

Experiment-4: Write a python program to import module from a package created in Experiment-3.

Experimentation

Experiment-5: Write a program to check whether the given file exists or not. If it is available then print its content?

Experiment-6: Write a python Program to print the number of lines, words and characters present in the given file?

Experiment-7: Program to read image file and write to a new image file?

Experiment-8: Write a python program to read and write to a   CSV file.

Note:

Experiments under the Demonstration section is to be demonstrated by the concerned faculty and the experiments under Experimentation section must be performed by the students individually.

REFERENCE BOOKS

1. Allen B. Downey, "Think Python", 2nd edition, SPD/O'Reilly, 2016.
2. Martin C.Brown, "The Complete Reference: Python", McGraw-Hill, 2018.
3. Kenneth A. Lambert, B.L. Juneja, "Fundamentals of Python", CENGAGE, 2015.
4. R. Nageswara Rao, "Core Python Programming", 2nd edition, Dreamtech Press, 2019.

WEB LINKS:
1. https://docs.python.org/3/tutorial/modules.html#packages
2. https://www.includehelp.com/python/programs.aspx.
3. https://www.anaconda.com/products/individual
4. https://www.jetbrains.com/pycharm/

COURSE OUTCOMES:

On completion of the course students will be able to
1. Design solutions to computational problems using Python programming language constructs.
2. Write python programs to manipulate string objects.
3. Use appropriate Data structures to organize and manipulate data items.
4. Design modular application using python module & package concepts.
5. Develop application to read and write from various file formats.

CO PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	3	2	2	-	-	-	-	-	-	1
CO2	2	2	3	1	3	-	-	-	-	-	-	1
CO3	3	2	2	1	3	-	-	-	-	-	-	1
CO4	1	3	2	2	3	-	-	-	-	-	-	1
CO5	-	2	1	1	3	-	-	-	-	-	-	1

END

(A405507) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

	L	T	P	C
B. Tech (CSE) II Semester	0	0	3	1.5

Note:

1. Use LINUX and MySQL for the Lab Experiments. Though not mandatory, encourage the useof the Eclipse platform.

2. The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed.

List of Experiments:

1. Use Eclipse or Net bean platform and acquaint yourself with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.

2. Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.

3. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle suchthat each one of the classes extends the class Shape. Each one of the classes contains only the methodprint Area () that prints the area of the given shape.

4. Write a Java program that correctly implements the producer – consumer problem using the concept of inter thread communication.

5. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.

6. A) Develop an applet in Java that displays a simple message.
B) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked.

7. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.

8. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas.
Write a java program to display the table using Labels in Grid Layout.

9. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in the selected color. Initially, there is no message shown.

10. Write a Java program that loads names and phone numbers from a text file where the data is

organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).

11. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).

12. Write a Java program to list all the files in a directory including the files present in all itssubdirectories.

REFERENCE BOOKS
1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition Pearson education.
2. Thinking in Java, Bruce Eckel, Pearson Education.
3. Java Programming, D. S. Malik and P. S. Nair, Cengage Learning.
4. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, Pearson.

COURSE OUTCOMES:
1. Demonstrate the technical skills to handle the Java program development tools such as Eclipse or NetBeans
2. Develop the Java programs for solving real world problems using the java collection framework.
3. Implement the Java programs using abstract classes, multithreaded programs to show technical skills.
4. Able to write Java programs for real world application using various OOPS concepts
5. Develop the GUI programs using Applet, swing controls in Java for user friendly interaction

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				3							3
CO2	3	1	3	1	2						1	2
CO3	2	1	3	2								
CO4	3	1	3	1	2				1		1	1
CO5	3	1	3		2				1	1	1	1

END

(A405508) DATABASE MANAGEMENT SYSTEMS LABORATORY

B. Tech (CSE) III Semester

L	T	P	C
0	0	3	1.5

Co-requisites: "Database Management Systems"

List of Experiments:
1.Concept design with E-R Model
 Draw an ER diagram for the following.

   a. There are two entity sets **Employee** and **Department**. These entity sets are participating in a relationship **works in.** The relationship set is converted into relation with attributes EmpNo from **Employee** relation, D_id from **Department** relation and **since**, the attribute of the relationship set itself.

2.Relational Model
   a. Convert the above ER diagram into Relational Model

3.Normalization

Consider the following table.

 a)   Normalize the given Relation. Consider the given schema is in first normal form and
Schema (Student id ,Student name, Project Id, Project name, City, country, ZIP)
Primarykey(Student id,Project id)
Fd's: Project Id-→ Project name
 country-→ZIP, ZIP

 b)   Normalize the given Table to the BCNF
 Consider the set of Functional Dependencies.
Eid → EName, Ph.no, Empcity, CityZip   PrimaryKey = (EmpId, ProjId)
 ProjId → ProjName, ProjLeader
 EmpId,ProjId → ProjLeader
 EmpCity → CityZip
 ProjId → ProjLeader

Eid	E.Name	Ph.no	Proj Id	Proj Name	Proj Leader	Emp City	City Zip
101	John	98765623,99 8234123	P03	Project103	Grey	ModelTown	110033
102	John	89023467	P01	Project101	Christian	Badarpur	110044
103	Ryan	76213908	P04	Project104	Hudson	Naraina	110028
104	stephine	98132452	P02	Project102	Petro	HariNagar	110064

4.Practicing DDL commands

5.Practicing DML commands
1. a. Create a user and grant all permissions to the user.
   b. Insert the any three records in the employee table and use rollback. Check the result.
   c. Add primary key constraint and not null constraint to the employee table.
   d. Insert null values to the employee table and verify the result.
2. a. Create a user and grant all permissions to the user.
   b. Insert values in the department table and use commit.
   c. Add constraints like unique and not null to the department table.
   d. Insert repeated values and null values into the table.
3. a. Create a user and grant all permissions to the user.
   b. Insert values into the table and use commit.
   c. Delete any three records in the department table and use rollback.
   d. Add constraint primary key and foreign key to the table
 4. a. Create a user and grant all permissions to the user.
    b. Insert records in the sailor table and use commit.
   c. Add save point after insertion of records and verify save point.
   d. Add constraints not null and primary key to the sailor table.
5. a. Create a user and grant all permissions to the user.

b. Use revoke command to remove user permissions.

c. Change password of the user created.

d. Add constraint foreign key and not null.

6. a. Create a user and grant all permissions to the user.

   b. Update the table reserves and use save point and rollback.

   c. Add constraint primary key, foreign key and not null to the reserves table

   d. Delete constraint not null to the table column

6.A. Querying (using ANY, ALL, UNION, INTERSECT, JOIN, Constraints etc.)
6.B. Nested, Correlated subqueries

A. Find the Sid's of sailors who have reserved a red or a green boat.
B. Find the names of sailors who have reserved a red and a green boat.
C. Find the names of sailors who have reserved a red but not green boats.
D. Find all sids of sailors who have a rating of 10 or reserved boat 104.
E. Find the names of sailors who have reserved boat 103 using independent nested query.
F. Find the names of sailors who have reserved a red boat.
G. Find the names of sailors who have not reserved a red boat.
1. Find the names of sailors who have reserved boat number 103 using correlated nested query.
H. Find sailors whose rating is better than some sailor called 'Horatio'.
I. Find the sailors with the highest rating.
2. Find the names of sailors who have reserved both a red and a green boat using nested queries.
J. Find the names of sailors who have reserved all boats.

7.Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
a. who is the youngest sailor
b. Find the name of the sailor who have maximum rating
c. What is the average rating of all Sailors
d. how many sailors are there with the rating above 7
e. The following SQL lists the number of customers in each country, sorted high to low
f. The following SQL lists the number of customers in each country, sorted high to low (Only include countries with more than 5 customers):

8.Triggers (Creation of insert trigger, delete trigger, update trigger)
1.
  a. Create a pl/SQL trigger which will calculate the total marks and percentage of students after   insert/update the details of a student in database.
  b. Write a trigger that keeps backup of deleted records of emp_trig table. Deleted records of
     emp_trigger inserted in emp_backup table.

2. Creation of insert trigger, delete trigger, update trigger practice triggers using the passenger database.
        Passenger (Passport_ id INTEGER PRIMARY KEY, Name VARCHAR (50) Not NULL, Age Integer Not
        NULL, Sex Char, Address VARCHAR (50) Not NULL);
     a. Write an Insert Trigger to check if the Passport_id is exactly six digits or not.
     b. Write a trigger on passenger to display messages '1 Record is inserted', '1 record is deleted', '1 record is
        updated' when insertion, deletion and updating are done on passenger respectively.

9.Procedures and functions
   a. Create a procedure which displays employee salary for given employee number using out variable
   b. Write a pl/sql block which displays the department name for department 40.
   c. Create a procedure to check whether the given number is prime or not
   d. Create a function which returns week day of a given date
   e. Create a function which returns number of sailors for a given rating level.
   f. Create a procedure to find the lucky number of a given birth date
   g. Create a function which returns average age of sailors for a given rating level.

10.Usage of Cursors
   a. Display the employee names and their salary for the accepted department number.
   b. Display the top N earners for an accepted department number.
   c. To write a Cursor to display the list of employees who are working as a manager or Analyst.
   d. Write a Cursor to find an employee with the given job and dept no.
   e. Write a PL/SQL block using implicit cursor that will display message, the salaries of all the employees in
      the 'employee' table are updated. If none of the employee's salary are updated, we get a message 'None of

the salaries were updated'. Else we get a message like for example, 'Salaries for 1000 employees are updated' if there are 1000 rows in 'employee' table.

11. Packages
a. creates HR package which contains Hire and Fire functions.
Hire function adds the details of employee and Fire function deletes the details of Employee.

TEXTBOOKS
1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition.

REFERENCE BOOKS
1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, ElmasriNavrate, Pearson Education
3. Introduction to Database Systems, C.J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S. Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Design database schema for a given application and apply normalization.
2. Demonstrate the usage of SQL statements for the creation, manipulation of data in the Database.
3. Write and execute queries on the given Database.
4. Write and execute PL/SQL programs for a given application.
5. Develop solutions for database applications using procedures, cursors, and triggers.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1				2							3
CO2	1	1	2	1	2							3
CO3	1	1	2	2	2							3
CO4	1	1	2	1	2							3
CO5	1	1	2		2							3

END

(A405309) SKILL DEVELOPMENT COURSE
(DATA VISUALIZATION - R PROGRAMMING)

B. Tech (CSE) III Semester	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

Lab Problems:

1. Understanding Data, what is data, where to find data, Foundations for building Data Visualizations, Creating Your First visualization?

2. Getting started with Tableau Software using Data file formats, connecting your Data to Tableau, creating basic charts (line, bar charts, Tree maps), Using the Show me panel.

3. Tableau Calculations, Overview of SUM, AVR, and Aggregate features, Creating custom calculations and fields.

4. Applying new data calculations to your visualizations, Formatting Visualizations, Formatting Tools and Menus, Formatting specific parts of the view.

5. Editing and Formatting Axes, Manipulating Data in Tableau data, Pivoting Tableau data.

6. Structuring your data, Sorting and filtering Tableau data, Pivoting Tableau data.

7. Advanced Visualization Tools: Using Filters, Using the Detail panel, using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colors.

8. Creating Dashboards & Storytelling, creating your first dashboard and Story, Design for different displays, adding interactivity to your Dashboard, Distributing & Publishing your Visualization.

9. Tableau file types, publishing to Tableau Online, Sharing your visualizations, printing, and Exporting.

10. Creating custom charts, cyclical data and circular area charts, Dual Axis charts.

REFERENCE BOOKS

1. Microsoft Power BI cookbook, Brett Powell, 2nd edition.
2. R Programming for Data Science by Roger D. Peng (References)
3. The Art of R Programming by Norman Matloff Cengage Learning India.

COURSE OUTCOMES: At the end of the course a student should be able to

1. Understand How to import data into Tableau.
2. Understand Tableau concepts of Dimensions and Measures.
3. Develop Programs and understand how to map Visual Layouts and Graphical Properties.
4. Create a Dashboard that links multiple visualizations.
5. Use graphical user interfaces to create Frames for providing solutions to real world problems.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1				3					3		3
CO2	1	1	2	1	3					3		2
CO3	1	1	2	2	3					3		2
CO4	1	1	2	1	3				1	3		2
CO5	1	1	2		3				1	3		2

END

(A400701) ENVIRONMENTAL SCIENCES
(MANDATORCOURSE)

B. Tech (CSE) III Semester

L	T	P	C
2	0	0	0

UNIT-I

Introduction, Definition, scope and importance, Ecosystems: Introduction, types, characteristic features, structure, and functions of ecosystems. Bio geo chemical cycle, Classification of Eco system.

UNIT-II

Natural Resources, Classification of Resources, Land resources, Land as resource, Common property resources, Land degradation, Soil erosion and desertification, Effects of modern agriculture, fertilizer – pesticide problems, Forest resources, Use and over-exploitation. Mining and dams – their effects on forest and tribal people, Water resources, Use and over- utilization of surface and groundwater, Floods, droughts, Water logging and salinity, Dams –benefits and costs, Conflicts over Water, Energy resources.

UNIT-III

Biodiversity and its conservation, Value of bio-diversity -consumptive and productive use, social, ethical, aesthetic and option values, Bio-geographical classification of India – India as a mega diversity habitat, Threats to bio-diversity –Hot-spots, habitat loss, poaching of wildlife, loss of species, seeds, etc. Conservation of bio-diversity – Insitu and Ex-situ conservation.

UNIT-IV

Environmental Pollution –Local and Global Issues, Nature of thermal pollution and nuclear hazards, Global warming, Acid rain, Ozone depletion. Environmental case studies.

UNIT-V

Environmental Problems in India, drinking water, sanitation and public health, Effects of the activities onthe quality of environment, Water scarcity and groundwater depletion, Controversies on major dams – resettlement and rehabilitation of people: problems and concerns, Rain water harvesting, cloud seeding and watershed management. Economy and Environment, The economy and environment interaction, Economics of development, preservation and conservation, Sustainability: theory and practices, Limits to growth, Equitable use of resources for sustainable life styles, Environmental Impact Assessment.

TEXTBOOKS
1. Environmental Science (1st edition), Y. Anjaneyulu, B S Publications.
2. Environmental studies (1st edition), Deekshadave, Cengage learning India Pvt. Ltd.

REFERENCE BOOKS
1. Environmental sciences and Engineering (1st edition), P. Venugopal Rao, PHI learning Pvt. Ltd.,
2. Environmental Science and Technology (1st edition), M. Anji Reddy, B S Publications.
3. Environmental Encyclopedia (Cunningham, W.P., et al., Jaico Publishing House, Mumbai, 2003.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand the basic concepts, scope, and importance of environmental studies
2. Acquire knowledge on natural resources and analyze the impacts of modern agriculture
3. Evaluate the value, threats, and conservation methods of biodiversity, understand India's as a mega diversity habitat.
4. Analyze global environmental pollution issues and understand the hazardous effects of environmental pollution
5. Examine environmental problems in India, and understand various environmental issues to focus on sustainable practices for Environmental Impact Assessment

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	2	3	1	-	1	-	2
CO2	3	3	2	2	-	2	3	1	-	-	-	2
CO3	2	2	3	1	-	2	3	1	-	-	-	2
CO4	2	3	2	2	-	2	3	1	-	-	-	2
CO5	2	2	3	3	-	3	3	1	-	-	-	2

END

(A400702) GENDER SENSITIZATION

(Common to all branches)

B. Tech (CSE) IV Semester

L	T	P	C
0	0	2	0

UNIT-I: UNDERSTANDING GENDER

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood-Growing up Male, First lessons in Caste.

UNIT – II: GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences Declining Sex Ratio-Demographic Consequences-Gender Spectrum: Beyond the Binary

UNIT – III: GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn"t Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. –Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

UNIT – IV: GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No!-Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu". Domestic Violence: Speaking OutIs Home a Safe Place? –When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

UNIT – V: GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular LiteratureGender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature – Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters-Mothers and Fathers- Rosa ParksThe Brave Heart.

REFERENCE BOOKS

1. Towards a World of Equals: A Bilingual Textbook on Gender, A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government, 2015.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. (This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film).
3. Students will attain a finer grasp of how gender discrimination works in our society and acquire insight into the gendered divisin of labour and its relatuion to politics and economics.
4. Men and women students and professionals will be better equipped to work and live together as equals.
5. Students will develop a sense of appreciation of women in all walks of life by going through accounts of studies and movements as well as the new laws that provide protection and relief to women.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	-	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	2	-	-	-	-	-	-

| CO4 | - | - | - | 2 | - | - | - | - | - | - | - | - |
| CO5 | - | - | 3 | - | - | -- | - | - | - | - | - | - |

END

(A400006) COMPUTER ORIENTED STATISTICAL METHODS
(Common to CSE, CSC, IT and CSD)

	L	**T**	**P**	**C**
B. Tech (CSE) IV Semester	**3**	**1**	**0**	**4**

UNIT-I
Probability:

Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, ConditionalProbability, Independence, and the Product Rule, Baye's Rule.

Random Variables: Concept of a Random Variable, Discrete and Continuous random Variable.

UNIT-II
Expectation and Discrete Distributions:

Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem.

Discrete Probability Distributions: Binomial Distribution, Poisson distribution.

UNIT-III
Continuous Distributions and Sampling Distributions:

Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial Distributions.

Fundamental Sampling Distributions: Random Sampling, Some Important Statistics, Sampling Distributions: Sampling Distribution of Means and the Central Limit Theorem, t - Distribution, F- Distribution.

UNIT-IV
Sample Estimation & Tests of Hypotheses:

Introduction, Statistical Inference, Classical Methods of Estimation, Single Sample: Estimating themean, standard error of a point estimate, prediction interval. Two sample: Estimating the differencebetween two means, Single sample: Estimating a proportion, two samples: Estimating the difference between two proportions, Two samples: Estimating the ratio of two variances.

Statistical Hypotheses: General Concepts, testing a Statistical Hypothesis, Single sample: Tests concerning single mean, Two samples: tests on two means, One sample: test on single proportion.Two samples: tests on two proportions, Two- sample tests concerning variances.

UNIT-V
Stochastic Processes and Markov Chains:

Introduction to Stochastic processes: Markov process. Transition Probability, Transition ProbabilityMatrix, First order and Higher order Markov process, n-step transition probabilities, Markov chain,Steady state condition, Markov analysis.

TEXTBOOKS
1. Probability & Statistics frEngineers & Scientists, (9th Edition), Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Pearson Publishers, 2011.

2. Fundamentals of Mathematical statistics, S C Gupta and V K Kapoor, Khanna publications.

REFERENCE BOOKS
1. Fundamentals of Probability and Statistics for Engineers, T.T. Soong, John Wiley & Sons, Ltd, 2004.
2. Probability and statistics for Engineers and scientists, (5th Edition), Sheldon M Ross, Academic press, 2014.
3. Probability and Statistics for Engineers, (8th Edition), Miller and Freund's, Pearson Educations, 2015.

COURSE OUTCOMES:
On completion of the course students will be able to

1. Apply the concepts of probability and Random variables to case studies.
2. Formulate and solve problems involving random variables and discrete distributions.
3. Apply sampling techniques for analyzing experimental data.

4. Apply concept of estimation and testing of hypothesis to case studies.
5. Analyze the data using Stochastic process and Markov chains.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	-	2	-	-	-	-	2
CO2	3	3	2	2	2	-	2	-	-	-	-	2
CO3	3	3	2	2	2	-	-	-	-	-	-	2
CO4	3	3	2	3	2	-	2	-	-	-	-	2
CO5	3	3	2	3	2	-	-	-	-	-	-	2

END

(A405305) OPERATING SYSTEMS

B. Tech (CSE) IV Semester

L	T	P	C
3	0	0	3

Prerequisites:
1.A course on "Computer Programming and Data Structures".
2.A course on "Computer Organization and Architecture".

UNIT - I
Operating System - Introduction, Structures - Simple Batch, Multi-programmed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls
Process - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads

UNIT - II
CPU Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, exec
Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock

UNIT - III
Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors
Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT - IV
Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

UNIT - V
File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls.
Disk Scheduling Algorithms

TEXTBOOKS
1.Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2.Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOKS
1. Operating Systems- Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System A Design Approach- Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Demonstrate the knowledge of the components of computers and their respective roles in computing
2. Explain CPU Scheduling Algorithms and Explain the methods for handling Deadlocks.
3. Explain Process Management and Synchronization and Demonstrate Inter process Communication.
4. Analyze various Memory Management and Allocation Methods.
5. Discuss File System Interface and Operations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2									2
CO2	1	1	2									2
CO3	1	1	2		2							2
CO4	1	1	2		2				1			2
CO5	1	1	2		2				1			2

END

(A400102) BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

B. Tech (CSE) IV Semester

L	**T**	**P**	**C**
3	**0**	**0**	**3**

Unit – I: Introduction to Business and Economics
Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance. Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply and Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT - II: Demand and Supply Analysis
Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting. Supply Analysis: Determinants of Supply, Supply Function and Law of Supply.

UNIT - III: Production, Cost, Market Structures & Pricing
Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions. Cost analysis: Types of Costs, Short run and long run Cost Functions. Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition. Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

UNIT - IV: Financial Accounting
Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts (Simple Problems).

UNIT - V: Financial Ratios Analysis
Concept of Ratio Analysis, Importance and Types of Ratios, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios – Analysis and Interpretation (simple problems).

TEXTBOOKS
1. D. D. Chaturvedi, S. L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata Mc –Graw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata Mc Graw Hill Education Pvt. Ltd. 2012.

REFERENCE BOOKS
1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

Course Outcome:
On completion of the course students will be able to

1. The students will understand the various Principles and functions of Management and apply in real scenarios
2. The students can have the systematic knowledge of the synchronization of various departments of organization
3. Forecast demand, production, cost, capital, price under different market situations for various products of business enterprise in general.
4. Employ various factors of production to gain the maximum out of them and learn the cost concepts
5. Understand the financial aspects and sources of accumulation of funds and maintenance.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		2										3
CO2										2	3	
CO3					2				3			
CO4				2			3					

CO5		2										3	

END

END

(A405306) DISCRETE MATHEMATICS

B. Tech (CSE) IV Semester

L	T	P	C
3	0	0	3

UNIT - I Mathematical logic:
Introduction, Statements and Notation, Connectives, Normal Forms, Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus.

UNIT - II Set theory:
Introduction, Basic Concepts of Set Theory, Representation of Discrete Structures, Relations and Ordering, Functions.

UNIT - III Algebraic Structures:
Introduction, Algebraic Systems, Semi groups and Monoids, Lattices as Partially Ordered Sets, Boolean Algebra.

UNIT - IV Elementary Combinatorics:
Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutation with Constrained Repetitions, Binomial Coefficient, The Binomial and Multinomial Theorems, The Principle of Exclusion.

UNIT - V Graph Theory:
Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi-graphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.

TEXTBOOKS
1. Discrete Mathematical Structures with Applications to Computer Science: J.P. Tremblay, R. Manohar, McGraw-Hill, 1st ed.
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe l. Mott, Abraham Kandel, Teodore P. Baker, Prentis Hall of India, 2nd ed.

REFERENCE BOOKS
1. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, Pearson education, 5th edition.
2. Discrete Mathematical Structures: Thomas Kosy, Tata McGraw Hill publishing co.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand and construct precise mathematical proofs
2. Apply logic and set theory to formulate precise statements.
3. Analyze and solve counting problems on finite and discrete structures.
4. Describe and manipulate sequences
5. Apply graph theory in solving computing problems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2									
CO2	3	2	2	1								
CO3	3	2	2	2								
CO4	3	2	2	1								
CO5	3	2	2									2

** END **

(A405307) COMPUTER ORGANIZATION AND ARCHITECTURE

B. Tech (CSE) IV Semester

L	**T**	**P**	**C**
3	**1**	**0**	**4**

Co-requisite: A Course on "Digital Electronics".

UNIT - I

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro-operations, shift micro-operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

UNIT - II

Microprogrammed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT - III

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.

Computer Arithmetic: Addition and subtraction, Booth's multiplication Algorithms, Restoring and Non-Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT - IV

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt, Direct memory Access.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory, Cache Coherence.

UNIT - V

Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics.

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor.

Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor arbitration, Interprocessor communication and synchronization, Cache Coherence. Introduction to 8085 Architecture

TEXT BOOK:

1. Computer System Architecture – M. Morris Mano, Third Edition, Pearson/PHI.

REFERENCE BOOKS

1. Computer Organization – Carl Hamacher, ZvonksVranesic, SafeaZaky, V th Edition, McGraw Hill.
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
3. Structured Computer Organization – Andrew S. Tanenbaum, 4 th Edition, PHI/Pearson.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Understand the basics of instruction sets and their impact on processor design.
2. Demonstrate an understanding of the design of the functional units of a digital computer system.
3. Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.
4. Design a pipeline for consistent execution of instructions with minimum hazards.
5. Recognize and manipulate representations of numbers stored in digital computers

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	1	2									
CO2	1	1	2	1								
CO3	1	2	2	2								
CO4	1	2	2	1								
CO5	1	1	2									

END

(A405509) OPERATING SYSTEMS LABORATORY

B. Tech (CSE) IV Semester

L	T	P	C
0	0	2	1

Prerequisites:
1. A course on "Programming for Problem Solving",

Co-requisite: A course on "Operating Systems".

List of Experiments:
1. A) Demonstrate the Installation & Configuration of Linux Operating Systems.
   B) Explore the following Linux File System commands.
   i) pwd ii) cd iii) mkdir iv) rmdir v) ls vi) cp vii) mv viii) rm ix) cat x) more xi)grep
2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir).
3. Write C programs to simulate the following CPU Scheduling algorithms.
   a) FCFS b) SJF c) Round Robin d) priority
4. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.
5. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.
6. Write C programs to illustrate the following IPC mechanisms.
   a) Pipes b) FIFOs c) Message Queues d) Shared Memory
7. Write C programs to simulate the following memory management techniques.
   a) Paging   b) Segmentation
7. Write a C program to simulate the following contiguous memory allocation techniques
   a). First-fit b) Best-fit c) Worst-fit
8. Write C programs to simulate Page replacement policies a) FCFS b) LRU c) Optimal.
9. Simulate the following File Allocation Strategies
   a). Sequential b). Indexed c. Linked
10. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or directory and reports accordingly. Whenever the arguments is a file it reports number of lines present in it.
11. Simulate the following disk scheduling algorithms
    a). SCAN b). CSCAN c).SSTF

TEXTBOOKS
1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.

REFERENCE BOOKS
1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System - A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI
4. UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education
5. UNIX Internals: The New Frontiers, U. Vahalia, Pearson Education

COURSE OUTCOMES:
On completion of the course students will be able to
1. Demonstrate and implement C programs using Unix/Linux system calls.
2. Simulate and implement operating system concepts such as scheduling and deadlock management.
3. Simulate and implement Inter process Communication Mechanisms.
4. Simulate and implement memory management techniques.
5. Simulate and implement File Management and Disk Scheduling Algorithms.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10		PO11	PO12
CO1		2	2		2								
CO2		2	2	2	2								
CO3		2	2	2	2								
CO4		2	2	2	2								
CO5		2	2	2	2								

END

(A400507) SOCIAL INNOVATION IN PRACTICE

(Common for all branches)

B. Tech (CSE) IV Semester

L	T	P	C
0	0	2	1

UNIT I
Identify community issues to be addressed, Requirements Analysis: ExtensiveUser requirements analysis, Generating effective System Requirement document.

UNIT II
Social Innovation – Case Studies
Presentation of the case studies with a focus on impact and vision on society.

UNIT III
Process of Social Innovation
Prompts – identifying needs, Proposals – generating ideas, Prototyping – testingthe idea in practice,

UNIT IV
Sustaining-developing a business model, Scaling and diffusion-growing socialinnovations, Systematic change.

UNIT V
Report writing, Documentation and Panel presentation.

TEXTBOOKS
1. Requirements Analysis: From Business Views to Architecture; David C. Hay; Prentice Hall Professional
2. Social Enterprises: An Organizational Perspective edited; Benjamin Gidron, Yeheskel Hasenfeld; PalgraveMacmillan

REFERENCE BOOKS
1. Social Enterprise Law: Trust, Public Benefit and Capital Markets By Dana Brakman Reiser & Steven A. Dean
2. Introduction to Sustainability by Robert Brinkmann, Wiley-Blackwell

COURSE OUTCOMES:
On Completion of the course, the students will be able to
1. Identify several social issues to be addressed
2. Analyze the impact of social innovations on the society
3. Illustrate the process of social innovation for a community problem
4. Demonstrate the solution from sustainability perspectives.
5. Develop a scalable business model

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			2				3					1
CO2			2				3					1
CO3			2				3					1
CO4			2				3					1
CO5			2				3					1

END

(A405302) DESIGN AND ANALYSIS OF ALGORITHMS

B. Tech (CSE) V Semester

L	**T**	**P**	**C**
3	**1**	**0**	**4**

UNIT - I

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and Little oh notation.
Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT - II

Disjoint Sets: Disjoint set operations, union and find algorithms, Priority Queue- Heaps, Heapsort Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph Coloring, Hamiltonian cycles.

UNIT - III

Dynamic Programming: General method, applications- Optimal binary search tree, 0/1 knapsack problem, all pairs shortest path problem, Traveling salesperson problem, Reliability design.

UNIT - IV

Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.
Basic Traversal and Search Techniques: Techniques for Binary Trees, Techniques for Graphs, Connected components, Biconnected components.

UNIT - V

Branch and Bound: General method, applications - Traveling salesperson problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution.
NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP-Hard and NP-Complete classes, Cook's theorem.

TEXTBOOK:
1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University press, 1998.
2. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill

REFERENCE BOOKS
1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C. Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and sons.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Analyze the Performance of An Algorithm
2. Analyze Greedy and Dynamic Approach to Calculate Optimal Solutions
3. Design algorithms to Solve complex Problems like Backtracking and Branch and Bound.
4. Describe Various Shortest Path Problems.
5. Illustrate P & NP –Type Problems

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	1									
CO2	1	3	2									2
CO3	1	2	3									2
CO4	1	3	2									2
CO5	1	2	3									3

END

(A405310) COMPUTER NETWORKS

B. Tech (CSE) V Semester

L	T	P	C
3	0	0	3

UNIT - I
Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet.
Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless Transmission.
Data link layer: Design issues, framing, Error detection and correction.

UNIT - II
Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel.
Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.
Medium Access sublayer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

UNIT - III
Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer on the internet.

UNIT - IV
Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

UNIT - V
Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

TEXTBOOKS
1.   Andrew S Tanenbaum, David. j. Wetherall, Computer Networks, 5th Edition. Pearson Education/PHI.

REFERENCE BOOKS
1.   An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2.   Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

COURSE OUTCOMES:
On completion of the course students will be able to
1.   Describe the functions of each layer in OSI and TCP/IP model and explainthe types of transmission media with real time applications
2.   Examine the functions of data link layer and explain the protocols
3.   Classify the routing protocols and analyze how to assign the IP addresses forthe given network
4.   Describe the Transport layer services.
5.   Explain the functions of Application layer Protocols

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	1	2							1
CO2			3		2							2
CO3		1	2		2							1
CO4			3		3							1
CO5			3		3							1

END

(A405311) DEVOPS

B. Tech (CSE) V Semester

L	T	P	C
3	0	0	3

UNIT-I
Introduction to DevOps:
Introduction, Agile development model, DevOps and ITIL. DevOps process and Continuous Delivery, Release management, Scrum, Kanban, delivery pipeline, identifying bottlenecks**.**

UNIT-II
Software development models and DevOps:
DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing. DevOps influence on Architecture: Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Micro services and the data tier, DevOps, architecture, and resilience**.**

UNIT-III
Introduction to project management:
The need for source code control, the history of source code management, Roles and code, source code management system and migrations, shared authentication, Hosted Git servers, Different Git server implementations, Docker intermission, Gerrit, The pull request model, GitLab.

UNIT-IV
Integrating the system:
Build systems, Jenkins build server, managing build dependencies, Jenkins plugins, and file system layout, The host server, build slaves, Software on the host, Triggers, Job chaining and build pipelines, build servers and infrastructure as code, Building by dependency order, Build phases, Alternative build servers, Collating quality measures.

UNIT-V
Testing Tools and Deployment:
Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development. Deployment of the system: Deployment systems, Virtualization stacks, code execution at the client, Puppet master and agents, Ansible, Deployment tools: Chef, Salt Stack and Docker.

TEXTBOOKS
1. Joakim Verona., Practical DevOps, Packt Publishing, 2016.

REFERENCE BOOKS
1. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications.
2. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley

COURSE OUTCOMES:
On completion of the course students will be able to
1. Identify components of Devops environment.
2. Describe Software development models and architectures of DevOps.
3. Apply various Source control systems for different project managements
4. Integrate the Systems with various build Servers for various software application practices.
5. Choose an appropriate testing tool and deployment model for the project

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1			3				1			1
CO2	1	2	3		3				3			2
CO3	1	2	3		3				3			2
CO4	1	2	3		3				3			2
CO5	1	2	3		3				1			2

END

(A405312) FULL STACK DEVELOPMENT

B. Tech (CSE) V Semester

L	T	P	C
3	0	0	3

UNIT-I
Introduction to Full Stack Development:
Understanding the Basic Web Development Framework- User, Browser, Webserver, Backend Services, Full Stack Components - Node.js, MongoDB, Express, React, Angular. Java Script Fundamentals, NodeJS- Understanding Node.js, Installing Node.js, Working with Node Packages, creating a Node.js Application, Understanding the Node.js Event Model, Adding Work to the Event Queue, Implementing Callbacks

UNIT-II
Node.js:
Working with JSON, Using the Buffer Module to Buffer Data, Using the Stream Module to Stream Data, Accessing the File System from Node.js- Opening, Closing, Writing, Reading Files and Other File System Tasks. Implementing HTTP Services in Node.js- Processing URLs, Processing Query Strings and Form Parameters, Understanding Request, Response, and Server Objects, Implementing HTTP Clients and Servers in Node.js, Implementing HTTPS Servers and Clients. Using Additional Node.js Modules-Using the os Module, Using the util Module, Using the dns Module, Using the crypto Module.

UNIT-III
MongoDB:
Need of NoSQL, Understanding MongoDB, MongoDB Data Types, Planning Your Data Model, Building the MongoDB Environment, Administering User Accounts, Configuring Access Control, Administering Databases, Managing Collections, Adding the MongoDB Driver to Node.js, Connecting to MongoDB from Node.js, Understanding the Objects Used in the MongoDB Node.js Driver, Accessing and Manipulating Databases, Accessing and Manipulating Collections

UNIT-IV
Express and Angular:
Getting Started with Express, Configuring Routes, Using Requests Objects, Using Response Objects. Angular: importance of Angular, Understanding Angular, creating a Basic Angular Application, Angular Components, Expressions, Data Binding, Built-in Directives, Custom Directives, Implementing Angular Services in Web Applications.

UNIT-V
React:
Need of React, Simple React Structure, The Virtual DOM, React Components, Introducing React Components, Creating Components in React, Data and Data Flow in React, Rendering and Life Cycle Methods in React, working with forms in React, integrating third party libraries, Routing in React.

TEXTBOOKS
1. Brad Dayley, Brendan Dayley, Caleb Dayley., Node.js, MongoDB and Angular Web Development, 2nd Edition, Addison-Wesley, 2019.
2. Mark Tielens Thomas, React in Action, 1st Edition, Manning Publications.

REFERENCE BOOKS
1. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, 2nd Edition, Apress, 2019.
2. Chris Northwood, The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer', 1st edition, Apress, 2018.
3. Kirupa Chinnathambi, Learning React: A Hands-On Guide to Building Web Applications Using React and Redux, 2nd edition, Addison-Wesley Professional, 2018.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand Full stack components for developing web application.
2. Apply packages of NodeJS to work with Data, Files, Http Requests and Responses.
3. Use MongoDB data base for storing and processing huge data and connecting with NodeJS application.
4. Design faster and effective single page applications using Express and Angular.

5. Create interactive user interfaces with react components.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	3		3							1
CO2	1	2	3		3							1
CO3	1	1	3		3							2
CO4	1	2	3		3							2
CO5	1	1	3		3							1

END

(A405511) DEVOPS LABORATORY

B. Tech (CSE) V Semester

L	T	P	C
0	0	2	1

List of Experiments:

1. Write code for a simple user registration form for an event.
2. Explore Git and GitHub commands.
3. Practice Source code management on GitHub. Experiment with the source code written inexercise 1.
4. Jenkins installation and setup, explore the environment.
5. Demonstrate continuous integration and development using Jenkins.
6. Explore Docker commands for content management.
7. Develop a simple containerized application using Docker.
8. Integrate Kubernetes and Docker
9. Automate the process of running containerized application developed in exercise 7 usingKubernetes.
10. Install and Explore Selenium for automated testing.
11. Write a simple program in JavaScript and perform testing using Selenium.
12. Develop test cases for the above containerized application using selenium.

TEXTBOOKS

1. Joakim Verona. Practical Devops, Second Edition. Ingram short title; 2nd edition (2018). ISBN-10: 1788392574

REFERENCE BOOKS / LEARNING RESOURCES:

1. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications. ISBN: 9788126579952
2. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

1. Remember the importance of DevOps tools used in software development life cycle
2. To obtain the complete knowledge of the "version control systems" wth GIt and Git Hub
3. Understand the importance of Jenkins to Build, Deploy and Test Software Applications
4. Analyze & Illustrate the Containerization of OS images and deployment of applications over Docker
5. Create applications and test with various automation tools.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	3		1				2			2
CO2	1	1	3		3				3			3
CO3	2	2	3		3				3			2
CO4	1	2	3		3				3			2
CO5	1	2	3		3				2			2

END

(A405512) COMPUTER NETWORKS LABORATORY

B. Tech (CSE) V Semester

L	T	P	C
0	0	2	1

List of Experiments

1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
3. Develop a simple data link layer that performs flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijsktra's algorithm to compute the shortest path through a network.
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption.
8. Write a program for congestion control using Leaky bucket algorithm.
9. Write a program for frame sorting techniques used in buffers.
10. Wireshark
    i. Packet Capture Using Wire shark.
    ii. Starting Wire shark
    iii. Viewing Captured Traffic
    iv. Analysis and Statistics & Filters. How to run Nmap scan

Operating System Detection using Nmap Do the following using NS2 Simulator

   i. NS2 Simulator-Introduction
   ii. Simulate to Find the Number of Packets Dropped
   iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
   iv. Simulate to Find the Number of Packets Dropped due to Congestion
   v. Simulate to Compare Data Rate & Throughput.
   vi. Simulate to Plot Congestion for Different Source/Destination
   vii. Simulate to Determine the Performance with respect to Transmission of Packets

COURSE OUTCOMES:
On successful completion of this course, students will be able to:
1. Implement data link layer farming methods
2. Analyze error detection and error correction codes.
3. Implement and analyze routing and congestion issues in network design.
4. analyze the captured packet by Wireshark
5. To be able to work with different network tools

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	3		1				2			2
CO2	1	1	3		3				3			3
CO3	2	2	3		3				3			2
CO4	1	2	3		3				3			2
CO5	1	2	3		3				2			2

END

(A400504) ADVANCED ENGLISH COMMUNICATION SKILLS LAB

B. Tech (CSE) V Semester

L	T	P	C
0	0	2	1

1.INTRODUCTION:

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

2.OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

3.SYLLABUS:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. **Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.
3. **Activities on Writing Skills** – Structure and presentation of different types of writing – *letter writing/Resume writing/ e-correspondence/Technical report writing/* — planning for writing — improving one's writing.
4. **Activities on Presentation Skills** — Oral presentations (individual and group) through JAM sessions/seminars/**PPTs** and written presentations through posters/projects/reports/e-mails/assignments etc.
5. **Activities on Group Discussion and Interview Skills** — Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & videoconference and Mock Interviews.

4.MINIMUM REQUIREMENT:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system

- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

5.SUGGESTED SOFTWARE:

The software consisting of the prescribed topics elaborated above should be procured and used.

- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dream tech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

TEXT BOOKS:

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2nd Edition
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

REFERENCE BOOKS

1. Learn Correct English — A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.
6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										3		
CO2									3			
CO3									2	3		
CO4									3			
CO5										3		

END

(A405513) SKILL DEVELOPMENT LABORATORY (NODE JS/REACT JS/DJANGO)

B. Tech (CSE) V Semester

L	**T**	**P**	**C**
0	**0**	**2**	**1**

Exercises:

1. Build a responsive web application for shopping carts with registration, login, catalog and cart pages using CSS3 features, flex and grid.
2. Make the above web application responsive web application using Bootstrap framework.
3. Use JavaScript for doing client – side validation of the pages implemented in experiment 1 and experiment 2.
4. Explore the features of ES6 like arrow functions, callbacks, promises, async/await. Implement an application for reading the weather information from openweathermap.org and display the information in the form of a graph on the web page.
5. Develop a java standalone application that connects with the database (Oracle / mySql) and performs the CRUD operation on the database tables.
6. Create an xml for the bookstore. Validate the same using both DTD and XSD.
7. Design a controller with servlet that provides the interaction with application developed in experiment 1 and the database created in experiment 5.
8. Maintaining the transactional history of any user is very important. Explore the various session tracking mechanism (Cookies, HTTP Session)
9. Create a custom server using http module and explore the other modules of Node JS like OS, path, event.
10. Develop an express web application that can interact with REST API to perform CRUD operations on student data. (Use Postman)
11. For the above application create authorized end points using JWT (JSON Web Token).
12. Create a react application for the student management system having registration, login, contact, about pages and implement routing to navigate through these pages.
13. Create a service in react that fetches the weather information from openweathermap.org and the display the current and historical weather information using graphical representation using chart.js
14. Create a TODO application in react with necessary components and deploy it into GitHub.

REFERENCE BOOKS

1. Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Wrox Publications, 2010
2. Bryan Basham, Kathy Sierra and Bert Bates, Head First Servlets and JSP, O'Reilly Media, 2nd Edition, 2008.
3. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, 2nd Edition, A Press.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Build a custom website with HTML, CSS, and Bootstrap and little JavaScript.
2. Demonstrate Advanced features of JavaScript and learn about JDBC
3. Develop Server – side implementation using Java technologies like
4. Develop the server – side implementation using Node JS.
5. Design a Single Page Application using React.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1		2		3				2			1
CO2	2	2	2	3	3				2		1	2
CO3	2	2	3	3	3		2		3	2	2	2
CO4	2	2	3	3	3		2		2		2	2
CO5	2	2	2		3						3	3

END

(A400705) INTELLECTUAL PROPERTY RIGHTS

B. Tech (CSE) V Semester

L	T	P	C
2	0	0	0

COURSE OBJECTIVES

- Significance of intellectual property and its protection
- Introduce various forms of intellectual property

UNIT – I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copyrights: Fundamental of copyright law, originality of material, rights of reproduction, rights to perform the work publicly, copyright ownership issues, copyright registration, notice of copyright, international copyright law.
Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation.
Unfair competition: Misappropriation of right of publicity, false advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law; copyright law, patent law, intellectual property audits.

International overview on intellectual property, international — trade mark law, copyright law, international patent law, and international development in trade secrets law.

TEXT BOOK

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.

REFERENCE BOOKS

1. Intellectual property right — Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Skill to understand the concept of intellectual property rights.
2. Develops procedural knowledge to Legal System and solving the problem relating Patents.
3. Gain knowledge on development and owning of Trade Marks, Copy Rights, and Patents.
4. Develops conceptual exposure on legal aspects related to IPR
5. Knowledge on different types of competition and ethical and unethical practices of advertising.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

END

(A466302) MACHINE LEARNING

B. Tech (CSE) VI Semester

L	**T**	**P**	**C**
3	**0**	**0**	**3**

UNIT - I

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants: – Perceptron – Linear Separability – Linear Regression.

UNIT - II

Multi-layer Perceptron– Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines

UNIT - III

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms

UNIT - IV

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms

UNIT - V

Reinforcement Learning – Overview – Getting Lost Example
Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo
– Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

TEXTBOOKS
1. Stephen Marsland, ―Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

REFERENCE BOOKS
1. Tom M Mitchell, ―Machine Learning, First Edition, McGraw Hill Education, 2013.
2. Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖, First Edition, Cambridge University Press, 2012.
3. Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014
4. Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand foundational concepts of machine learning approaches.
2. Understand algorithms for building classifiers applied on datasets of non-linearly separable classes.
3. Recognize the characteristics of machine learning strategies with various supervised learning methods to appropriate problems.
4. Identify and integrate more than one technique to enhance the performance of learning analysis.
5. Apply learned machine learning techniques for reinforcement learning on Markov chain Monte Carlo methods.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1		2		3				2			1
CO2	2	2	2	3	3				2		1	2
CO3	2	2	3	3	3		2		3	2	2	2
CO4	2	2	3	3	3		2		2		2	2
CO5	2	2	2		3						3	3

END

(A466301) ARTIFICIAL INTELLIGENCE

B. Tech (CSE) VI Semester

L	**T**	**P**	**C**
3	**0**	**0**	**3**

UNIT - I
Introduction to AI - Intelligent Agents, Problem-Solving Agents,
Searching for Solutions - Breadth-first search, Depth-first search, Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces.

UNIT-II
Games - Optimal Decisions in Games, Alpha–Beta Pruning, Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Knowledge-Based Agents, Logic- Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses.

UNIT-III
First-Order Logic - Syntax and Semantics of First-Order Logic, Using First Order Logic, Knowledge Engineering in First-Order Logic. Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification, Forward Chaining, Backward Chaining, Resolution.
Knowledge Representation: Ontological Engineering, Categories and Objects, Events.

UNIT-IV
Planning - Definition of Classical Planning, Algorithms for Planning with State Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches. Hierarchical Planning.

UNIT-V
Probabilistic Reasoning:
Acting under Uncertainty, Basic Probability Notation Bayes' Rule and Its Use, Probabilistic Reasoning, Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First- Order Probability.

TEXTBOOK:
1. Artificial Intelligence: A Modern Approach, Third Edition, Stuart Russell and Peter Norvig,Pearson Education.

REFERENCE BOOKS
1. Artificial Intelligence, 3rd Edn., E. Rich and K. Knight (TMH)
2. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Implement basic search algorithms to solve AI problems in discrete and continuous spaces.
2. Explain the principles of optimal decision-making in games and the process of alpha-beta pruning.
3. Use first-order logic for knowledge engineering, representing complex information and relationships in AI systems.
4. Use classical planning algorithms to solve planning problems in AI.
5. Utilize Bayes' Rule and probabilistic methods to reason under uncertainty and make informed decisions.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3		2		3							1
CO2	2	2	2	3	3							1
CO3	3	2	3	3	3		2					1
CO4	3	2	3	3	3		2					2
CO5	2	2	2		3							2

END

(A405313) FORMAL LANGUAGES AND AUTOMATA THEORY

B. Tech (CSE) VI Semester

L	**T**	**P**	**C**
3	**0**	**0**	**3**

UNIT - I

Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems.
Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions.
Deterministic Finite Automata: Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA, Moore and Melay machines

UNIT - II

Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions.
Pumping Lemma for Regular Languages, Statement of the pumping lemma, Applications of the Pumping Lemma.
Closure Properties of Regular Languages: Closure properties of Regular languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT - III

Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Sentential Forms, Parse Trees, Applications of Context-Free Grammars, Ambiguity in Grammars and Languages.
Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Acceptance by final state, Acceptance by empty stack, Deterministic Pushdown Automata. From CFG to PDA, From PDA to CFG.

UNIT - IV

Normal Forms for Context- Free Grammars: Eliminating useless symbols, Eliminating €-Productions. Chomsky Normal form Greibach Normal form.
Pumping Lemma for Context-Free Languages: Statement of pumping lemma, Applications Closure Properties of Context-Free Languages: Closure properties of CFL's, Decision Properties of CFL's Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine

UNIT - V

Types of Turing machine: Turing machines and halting
Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines, Recursive languages, Properties of recursive languages, Post's Correspondence Problem, Modified Post Correspondence problem, Other Undecidable Problems, Counter machines.

TEXTBOOKS
1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekaran, 2nd edition, PHI.

REFERENCE BOOKS
1. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
2. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
3. A Textbook on Automata Theory, P. K. Srimani, Nasir S. F. B, Cambridge University Press.
4. Introduction to the Theory of Computation, Michael Sipser, 3rd edition, Cengage Learning.
5. Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan, Rama R, Pearson.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Explain the concepts of finite automata models and their power to recognize the languages.
2. Design Finite automata for a given regular expression.
3. Design context-free grammars for formal languages.
4. Design Turing Machines for the given language.

5. Distinguish between decidability and undecidability problems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	_	-	_	_	_	_	_	_	1
CO2	3	3	3	_	-	_	_	_	_	_	_	1
CO3	2	3	3	_	-	_	_	_	_	_	_	1
CO4	1	3	3	2	-	_	_	_	_	_	_	1
CO5	2	3	2	2	-	_	_	_	_	_	_	1

END

(A405314) CRYPTOGRAPHY AND NETWORK SECURITY

B. Tech (CSE) VI Semester

L	T	P	C
3	0	0	3

UNIT - I
Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT - II
Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.
Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

UNIT - III
Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.
Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure

UNIT - IV
Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH)
Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security

UNIT - V
E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, Internet Key Exchange
Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.

TEXTBOOKS
1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition

REFERENCE BOOKS
1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

COURSE OUTCOMES:
On completion of the course students will be able to
1. Classify the various classical encryption techniques.
2. Compare various public key cryptographic techniques.
3. Evaluate authentication and hash algorithms.
4. Choose the intrusion detection and its solutions to overcome the attacks.
5. Ability to understand and develop strong password methods.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										3
CO2	3	2		2							2	
CO3	3	2		2		2						

| CO4 | 3 | 3 | 3 | 3 | 2 | | | | 2 | | 3 | |
| CO5 | 3 | 2 | 3 | 3 | 3 | | | | 2 | | 3 | 3 |

END

(A405315) COMPILER DESIGN

B. Tech (CSE) VI Semester

L	T	P	C
3	0	0	3

UNIT -I

Introduction: The structure of a compiler, the science of building a compiler, programming language basics.
Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

UNIT –II

Syntax Analysis: Introduction, Context-Free Grammars, writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars and Parser Generators.

UNIT –III

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's.
Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Switch-Statements, Intermediate Code for Procedures.

UNIT –IV

Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.
Code Generation: Issues in the Design of a Code Generator, The Target Language, addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

UNIT –V

Machine-Independent Optimization: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

TEXTBOOKS
1. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D.Ullman, 2nd Edition, Pearson.

REFERENCE BOOKS
1. lex & yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Compiler Construction, Kenneth C. Louden, Thomson. Course Technology.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.
2. Design and implement LL and LR parsers for the given CFGs
3. Generate intermediate code for a given program
4. Design algorithms to generate machine code
5. Analyse different code optimization techniques to improve the performance of a program.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1	2	_	_	_	_	_	_	1
CO2	1	3	3	1	2	_	_	_	_	_	_	1
CO3	2	2	3	2	2	_	_	_	_	_	_	1
CO4	2	3	1	_	_	_	_	_	_	_	_	1
CO5	2	3	2	_	_	_	_	_	_	_	_	1

END

(A405515) CRYPTOGRAPHY AND NETWORK SECURITY LABORATORY

B. Tech (CSE) VI Semester

L	T	P	C
0	0	2	1

List of Experiments:

1. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should XOR each character in this string with 0 and displays the result.

2. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should AND or and XOR each character in this string with 127 and display the result.

3. Write a Java program to perform encryption and decryption using the following algorithms a. Ceaser cipher b. Substitution cipher c. Hill Cipher

4. Write a C/JAVA program to implement the DES algorithm logic.

5. Write a C/JAVA program to implement the Blowfish algorithm logic.

6. Write a C/JAVA program to implement the Rijndael algorithm logic.

7. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish. Create your own key using Java key tool.

8. Write a Java program to implement RSA algorithm.

9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.

10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.

11. Calculate the message digest of a text using the MD5 algorithm in JAVA.

TEXTBOOKS
1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: Atul Kahate, McGraw Hill, 3rd Edition

REFERENCE BOOKS
1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, McGraw Hill, 3rd Edition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

COURSE OUTCOMES:
On completion of the course students will be able to
1. Identify the information system requirements for a client and server
2. Execute cryptographic algorithms, authentication and security issues
3. Develop algorithms and methods for web security with IPV4 and IPV6
4. Understand the current legal issues towards information security.
5. Implement the fundamental of secret and public cryptography

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2									
CO2	2	3	3	2	3							3
CO3	3	3	3	2	2							2
CO4	3	3	3	2	3							1
CO5	3	3	3	2								

END

(A466503) MACHINE LEARNING LABORATORY

B. Tech (CSE) VI Semester

L	T	P	C
0	0	2	1

List of Experiments

1. Write a python program to compute Central Tendency Measures: Mean, Median, Mode Measure of Dispersion: Variance, Standard Deviation
2. Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy
3. Study of Python Libraries for ML application such as Pandas and Matplotlib
4. Write a Python program to implement Simple Linear Regression
5. Implementation of Multiple Linear Regression for House Price Prediction using sklearn
6. Implementation of Decision tree using sklearn and its parameter tuning
7. Implementation of KNN using sklearn
8. Implementation of Logistic Regression using sklearn
9. Implementation of K-Means Clustering
10. Performance analysis of Classification Algorithms on a specific dataset (Mini Project)

TEXTBOOK:
1. Machine Learning – Tom M. Mitchell, - MGH.

REFERENCE BOOKS
1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand modern notions in predictive data analysis
2. Select data, model selection, model complexity and identify the trends
3. Understand a range of machine learning algorithms along with their strengths and weaknesses.
4. Build predictive models from data and analyze their performance.
5. Design the performance analysis of classification algorithms

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1			3							2
CO2	2	3		3	3	3			3	3	3	2
CO3	3	3	1	3	3					3	3	3
CO4	3	3		3	3					3	3	3
CO5		2	3	2	2							2

END

(A405516) COMPILER DESIGN LABORATORY

B. Tech (CSE) III Year VI Semester

L	**T**	**P**	**C**
0	**0**	**2**	**1**

1. Implementation of symbol table.
2. Develop a lexical analyzer to recognize a few patterns inc (ex. Identifiers, constants, comments, operators etc.)
3. Implementation of lexical analyzer using lex tool.
4. Generate yacc specification for a few syntactic categories.
   a) Program to recognize a valid arithmetic expression that uses operator +,-, * and /.
   b) Program to recognize a valid variable which starts with a letter followed by any number of letter or digits.
   c) Implementation of calculator using lex and yacc.
5. Convert the bnf rules into yacc form and write code to generate abstract syntax tree.
6. Implement type checking.
7. Implement any one storage allocation strategies (heap, stack, static)
8. Write a lex program to count the number of words and number of lines in each file or program.
9. Write a 'C' program to implement lexical analyzer using c program.
10. write recursive descent parser for the grammar.
    E->E+T E->T T->T*F T->F F->(E)/id.
11. write recursive descent parser for the grammar.
    S->(L)   S->a L->L, S L->S
12. Write a C program to calculate the first function for the grammar.
    E->E+T E->T   T->T*F T->F F->(E)/id
13. Write a YACC program to implement a top-down parser for the given grammar.
14. Write a YACC program to evaluate algebraic expression.

TEXTBOOK:
1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Design, develop, and implement a compiler for any language.
2. Use Lex and Yacc tools for developing a scanner and a parser.
3. Design and implement LL and LR parsers.
4. Develop a type of checker for a given language.
5. Implement storage allocation technique for a given program.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	3					2		1
CO2		2	2	2	3							1
CO3		2	2	2	3							1
CO4		2	2	2	3							1
CO5	1	2	2	2	3							1

END

(A405401) QUANTUM COMPUTING
(Professional Elective- I)

B. Tech (CSE) V Semester

L	T	P	C
3	0	0	3

UNIT - I
History of Quantum Computing: Importance of Mathematics, Physics and Biology. Introduction to Quantum Computing: Bits Vs Qubits, Classical Vs Quantum logical operations

UNIT - II
Background Mathematics: Basics of Linear Algebra, Hilbert space, Probabilities and measurements. Background Physics: Paul's exclusion Principle, Superposition, Entanglement and super-symmetry, density operators and correlation, basics of quantum mechanics, Measurements in bases other than computational basis. Background Biology: Basic concepts of Genomics and Proteomics (Central Dogma)

UNIT - III
Qubit: Physical implementations of Qubit. Qubit as a quantum unit of information. The Bloch sphere Quantum Circuits: single qubit gates, multiple qubit gates, designing the quantum circuits. Bell states.

UNIT - IV
Quantum Algorithms: Classical computation on quantum computers. Relationship between quantum and classical complexity classes. Deutsch's algorithm, Deutsch's-Jozsa algorithm, Shor's factorization algorithm, Grover's search algorithm.

UNIT - V
Noise and error correction: Graph states and codes, Quantum error correction, fault-tolerant computation. Quantum Information and Cryptography: Comparison between classical and quantum information theory. Quantum Cryptography, Quantum teleportation

TEXTBOOKS
1. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge

REFERENCE BOOKS
1. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
2. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol. I: Basic Concepts, Vol II
3. Basic Tools and Special Topics, World Scientific. Pittenger A. O., An Introduction to Quantum Computing Algorithms

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand basics of quantum computing
2. Understands the basics mathematics and physics of quantum computing.
3. Understand physical implementation of Qubit
4. Understand Quantum algorithms and their implementation
5. Understand The Impact of Quantum Computing on Cryptography

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2		2									
CO2	2	3	3	2	3							3
CO3	3	3	3	2	2							2
CO4	3	3	3	2	3							1
CO5	3	3	3	2	2`							

END

(A466306) DATA ANALYTICS
(Professional Elective- I)

B. Tech (CSE) V Semester

L	**T**	**P**	**C**
3	**0**	**0**	**3**

UNIT - I
Data Management: Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signals/GPS etc. Data Management, Data Quality(noise, outliers, missing values, duplicate data) and Data Processing & Processing.

UNIT - II
Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and Variables, Data Modeling Techniques, Missing Imputations etc. Need for Business Modeling.

UNIT - III
Regression – Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc.

Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

UNIT - IV
Object Segmentation: Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc. Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc. and analyze for prediction

UNIT - V
Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

TEXT BOOKS:
1. Student's Handbook for Associate Analytics – II, III.
2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers.

REFERENCE BOOKS
1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addision Wisley, 2006.
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford Univ. Anand Rajaraman Milliway Labs Jeffrey D Ullman Stanford Univ.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand the impact of data analytics for business decisions and strategy
2. Carry out data analysis/statistical analysis
3. To carry out standard data visualization and formal inference procedures
4. Design Data Architecture
5. Understand various Data Sources

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	2	1	2	1					2	2
CO2	2	2	3	2	3	1					2	2
CO3	2	1	2	1	2	1					2	2
CO4	3	2	3	2	2	1					1	2
CO5	2	1	2	2	2	1					1	1

END

(A405402) GRAPH THEORY
(Professional Elective- I)

B. Tech (CSE) V Semester

L	T	P	C
3	0	0	3

UNIT - I
Introduction-Discovery of graphs, Definitions, Subgraphs, Isomorphic graphs, Matrix representations of graphs, Degree of a vertex, Directed walks, paths and cycles, Connectivity in digraphs, Eulerian and Hamilton digraphs, Eulerian digraphs, Hamilton digraphs, Special graphs, Complements, Larger graphs from smaller graphs, Union, Sum, Cartesian Product, Composition, Graphic sequences, Graph theoretic model of the LAN problem, Havel-Hakimi criterion, Realization of a graphic sequence.

UNIT - II
Connected graphs and shortest paths - Walks, trails, paths, cycles, connected graphs, Distance, Cut-vertices and cut-edges, Blocks, Connectivity, Weighted graphs and shortest paths, Weighted graphs, Dijkstra"s shortest path algorithm, Floyd-Warshall shortest path algorithm.

UNIT - III
Trees- Definitions and characterizations, Number of trees, Cayley"s formula, Kircho matrix-tree theorem, Minimum spanning trees, Kruskal"s algorithm, Prim"s algorithm, Special classes of graphs, Bipartite Graphs, Line Graphs, Chordal Graphs, Eulerian Graphs, Fleury"s algorithm, Chinese Postman problem, Hamilton Graphs, Introduction, Necessary conditions and sufficient conditions.

UNIT - IV
Independent sets coverings and matchings– Introduction, Independent sets and coverings: basic equations, Matchings in bipartite graphs, Hall"s Theorem, K¨onig"s Theorem, Perfect matchings in graphs, Greedy and approximation algorithms.

UNIT - V
Vertex Colorings- Basic definitions, Cliques and chromatic number, Mycielski"s theorem, Greedy coloring algorithm, Coloring of chordal graphs, Brooks theorem, Edge Colorings, Introduction and Basics, Gupta-Vizing theorem, Class-1 and Class-2 graphs, Edge-coloring of bipartite graphs, Class-2 graphs, Hajos union and Class-2 graphs, A scheduling problem and equitable edge-coloring.

TEXTBOOKS
1. J. A. Bondy and U. S. R. Murty. Graph Theory, volume 244 of Graduate Texts in Mathematics. Springer, 1st edition, 2008.
2. J. A. Bondy and U. S. R. Murty. Graph Theory with Applications.

REFERENCE BOOKS
1. Lecture Videos: http://nptel.ac.in/courses/111106050/13
2. Introduction to Graph Theory, Douglas B. West, Pearson.

COURSE OUTCOMES:
On the completion of course student will be able to
1. Differentiate between various types of special graphs and graph operations, including union, sum, Cartesian product, and composition.
2. Utilize the concepts of distance and blocks to analyze the structure and connectivity of graphs.
3. Utilize algorithms like Fleury's and those for solving the Chinese Postman problem to specific graph types.
4. Use Hall's Theorem and Kőnig's Theorem to identify and analyze matchings in bipartite graphs.
5. Use the greedy coloring algorithm to color chordal graphs and other graph types effectively.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	2							2
CO2	3	2	2	1	2							2
CO3	3	2	2	1	2							2
CO4	3	2	2	1	1							2
CO5	3	2	2	1	1							2

END

(A405403) PRINCIPALS OF PROGRAMMING LANGUAGES
(Professional Elective- I)

B. Tech (CSE) V Semester

L	**T**	**P**	**C**
3	**0**	**0**	**3**

UNIT - I
Preliminary Concepts: Reasons for Studying Concepts of Programming Languages, Programming Domains, Language Evaluation Criteria, Influences on Language Design, Language Categories, Language Design Trade-Offs, Implementation Methods, Programming Environments Syntax and Semantics: General Problem of Describing Syntax and Semantics, Formal Methods of Describing Syntax, Attribute Grammars, Describing the Meanings of Programs

UNIT – II
Names, Bindings, and Scopes: Introduction, Names, Variables, Concept of Binding, Scope, Scope and Lifetime, Referencing Environments, Named Constants Data Types: Introduction, Primitive Data Types, Character String Types, User Defined Ordinal Types, Array, Associative Arrays, Record, Union, Tuple Types, List Types, Pointer and Reference Types, Type Checking, Strong Typing, Type Equivalence Expressions and Statements: Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational and Boolean Expressions, Short Circuit Evaluation, Assignment Statements, Mixed-Mode Assignment Control Structures – Introduction, Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands.

UNIT - III
Subprograms and Blocks: Fundamentals of Sub-Programs, Design Issues for Subprograms, Local Referencing Environments, Parameter Passing Methods, Parameters that Are Subprograms, Calling Subprograms Indirectly, Overloaded Subprograms, Generic Subprograms, Design Issues for Functions, User Defined Overloaded Operators, Closures, Coroutines Implementing Subprograms: General Semantics of Calls and Returns, Implementing Simple Subprograms, Implementing Subprograms with Stack-Dynamic Local Variables, Nested Subprograms, Blocks, Implementing Dynamic Scoping Abstract Data Types: The Concept of Abstraction, Introductions to Data Abstraction, Design Issues, Language Examples, Parameterized ADT, Encapsulation Constructs, Naming Encapsulations

UNIT - IV
Concurrency: Introduction, Introduction to Subprogram Level Concurrency, Semaphores, Monitors, Message Passing, Java Threads, Concurrency in Function Languages, Statement Level Concurrency. Exception Handling and Event Handling: Introduction, Exception Handling in Ada, C++, Java, Introduction to Event Handling, Event Handling with Java and C#.

UNIT - V
Functional Programming Languages: Introduction, Mathematical Functions, Fundamentals of Functional Programming Language, LISP, Support for Functional Programming in Primarily Imperative Languages, Comparison of Functional and Imperative Languages Logic Programming Language: Introduction, an Overview of Logic Programming, Basic Elements of Prolog, Applications of Logic Programming. Scripting Language: Pragmatics, Key Concepts, Case Study: Python – Values and Types, Variables, Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library. (Text Book 2)

TEXTBOOKS
1. Concepts of Programming Languages Robert. W. Sebesta 10/E, Pearson Education.
2. Programming Language Design Concepts, D. A. Watt, Wiley Dreamtech, 2007.

REFERENCE BOOKS
1. Programming Languages, 2nd Edition, A.B. Tucker, R. E. Noonan, TMH.
2. Programming Languages, K. C. Louden, 2nd Edition, Thomson, 2003

COURSE OUTCOMES:
On successful completion of course students will be able to
1. Acquire the skills for expressing syntax and semantics in formal notation
2. Identify and apply a suitable programming paradigm for a given computing application
3. Design subprograms and blocks with static and dynamic parameters.
4. Gain knowledge of the features of various programming languages and their comparison.

5. Compare functional and imperative programming languages.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2										
CO2			3									
CO3		2	3									2
CO4		3	2									
CO5	1	2	3									2

END

(A405404) INFORMATION RETRIEVAL SYSTEMS
(Professional Elective- II)

B. Tech (CSE) VII Semester

L	T	P	C
3	0	0	3

UNIT - I
Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

UNIT – II
Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models

UNIT - III
Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters

UNIT - IV
User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies

UNIT – V
Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval

TEXTBOOK:
1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. Maybury, Springer

REFERENCE BOOKS
1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.

2. Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons. 3. Modern Information Retrieval by Yates and Neto Pearson Education.

COURSE OUTCOMES:
1. Explain the functional overview of information retrieval systems and their relationship to database management systems, digital libraries, and data warehouses.
2. Compare different data structures used in indexing, such as N-grams, PAT trees, signature files, hypertext, and XML.
3. Implement statistical and natural language indexing methods to index documents automatically.
4. Compare different similarity measures and ranking algorithms to evaluate their effectiveness in information retrieval

5. Compare and contrast different multimedia information retrieval techniques, including spoken language audio, non-speech audio, graph, imagery, and video retrieval.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1		1								1
CO2	2	2	1	2								1
CO3	3	2	2	2								1
CO4	1	1	2	1								1
CO5	2	1	2	1								1

END

(A405405) DISTRIBUTED DATABASES
(Professional Elective- II)

B. Tech (CSE) VII Semester

L	**T**	**P**	**C**
3	**0**	**0**	**3**

UNIT - I
Introduction: Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas.
Distributed DBMS Architecture: Architectural Models for Distributed DBMS, DDMBS Architecture. Distributed Database Design: Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

UNIT - II
Query processing and decomposition: Query processing objectives, characterization of query processors, layers of query processing, query decomposition, localization of distributed data.
Distributed query Optimization: Query optimization, centralized query optimization, distributed query optimization algorithms.

UNIT - III
Transaction Management: Definition, properties of transaction, types of transactions, distributed concurrency control: serializability, concurrency control mechanisms & algorithms, time - stamped & optimistic concurrency control Algorithms, deadlock Management.

UNIT - IV
Distributed DBMS Reliability: Reliability concepts and measures, fault-tolerance in distributed systems, failures in Distributed DBMS, local & distributed reliability protocols, site failures and network partitioning.
Parallel Database Systems: Parallel database system architectures, parallel data placement, parallel query processing, load balancing, database clusters.

UNIT - V
Distributed object Database Management Systems: Fundamental object concepts and models, object distributed design, architectural issues, object management, distributed object storage, object query Processing.
Object Oriented Data Model: Inheritance, object identity, persistent programming languages, persistence of objects, comparison OODBMS and ORDBMS

TEXTBOOKS
1. M. Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems, Pearson Edn. Asia, 2001.
2. Stefano Ceri and Giuseppe Pelagatti: Distributed Databases, McGraw Hill.

REFERENCE BOOKS
1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: "Database Systems: The Complete Book", Second Edition, Pearson International Edition.

COURSE OUTCOMES:
On successful completion of course student will be able to
1. Understand theoretical and practical aspects of distributed database systems.
2. Apply query optimization and query processing in Distributed DBMS.
3. Study and identify various issues related to the development of distributed database systems.
4. Understand the Parallel database system architectures and Distributed DBMS Reliability concepts

5. Understand the design aspects of object-oriented database systems and related developments.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	-	1	-	-	-	-	-	-	1
CO2	1	2	1	-	2	-	-	-	-	-	-	1
CO3	1	3	2	2	3	-	-	-	-	-	-	2
CO4	1	1	2	2	3	-	-	-	-	-	-	2
CO5	1	1	2	2	3	-	-	-	-	-	-	2

END

(A405406) SOFTWARE TESTING METHODOLOGIES
(Professional Elective- II)

B. Tech (CSE) VII Semester

L	**T**	**P**	**C**
3	**0**	**0**	**3**

UNIT-I
Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs.
Flow graphs and Path testing: - Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT–II
Transaction Flow Testing: -transaction flows, transaction flow testing techniques.
Data flow testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.
Domain Testing: -domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domains and testability

UNIT–III
Paths, Path products and Regular expressions: - path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.
Logic Based Testing: - overview, decision tables, path expressions, kv charts, specifications.

UNIT-IV
State, State Graphs and Transition testing: - state graphs, good & bad state graphs, state testing, Testability tips.

UNIT–V
Graph Matrices and Application: -Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools (Student should be given an exposure to a tool like Jmeter/selenium/soapUI/Catalon).).

TEXTBOOKS
1. Software Testing techniques – Boris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.

REFERENCE BOOKS
1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications
3. Software Testing, N. Chauhan, Oxford University Press.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Apply the process of testing and various methodologies in testing for developed software.
2. Write test cases for given software to test it before delivery to the customer.
3. Explain and perform Domain Testing.
4. Explain and perform path Testing.
5. Describe Graph based Testing

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	3	2	2	1		1			1	1
CO2	2	3	3	2	3	1		1			2	1
CO3	2	3	3	2	2			1			1	1
CO4	2	3	3	2	2			1			1	1
CO5	2	2	3	2	2			1			1	1

END

(A405407) INTERNET OF THINGS
(Professional Elective- II)

B. Tech (CSE) VII Semester

L	**T**	**P**	**C**
3	**0**	**0**	**3**

UNIT - I
Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels and Deployment Templates Domain Specific IoTs – Home automation, Environment, Agriculture, Health and Lifestyle

UNIT - II
IoT and M2M – M2M, Difference between IoT and M2M, SDN and NFV for IoT,
IoT System Management with NETCOZF, YANG- Need for IoT system Management, Simple Network management protocol, Network operator requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG

UNIT - III
IoT Systems – Logical design using Python-Introduction to Python – Python Data types & Data structures, Control flow, Functions, Modules, Packaging, File handling, Data/Time operations, Classes, Exception, Python packages of Interest for IoT

UNIT - IV
IoT Physical Devices and Endpoints - Raspberry Pi, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry PI with Python, Other IoT devices.
IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs, WAMP-AutoBahn for IoT, Xively Cloud for IoT, Python web application framework
–Django, Designing a RESTful web API

UNIT V
Case studies- Home Automation, Environment-weather monitoring-weather reporting- air pollution monitoring, Agriculture.

TEXTBOOK:
1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547.

REFERENCE BOOKS
1. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand the fundamental concepts and enabling technologies of IoT and apply them to various domains.
2. Explain the differences and interconnections between IoT and M2M and manage IoT systems using NETCONF and YANG.
3. Implement IoT system designs using Python programming.
4. Interface and program physical IoT devices and understand cloud storage and communication for IoT.
5. Apply IoT solutions to real-world case studies in domains such as home automation, environment monitoring, and agriculture.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2		2	1					1	1
CO2		3			2							
CO3			3	2	2							1
CO4			3		2							1
CO5		2	3		2	1						1

END

(A4066307) NATURAL LANGUAGE PROCESSING
(Professional Elective- III)

B. Tech (CSE) VII Semester

L	T	P	C
3	0	0	3

UNIT - I
Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models
Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches, Features

UNIT – II
Syntax I: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms,

UNIT - III
Syntax II: Models for Ambiguity Resolution in Parsing, Multilingual Issues
Semantic Parsing I: Introduction, Semantic Interpretation, System Paradigms, Word Sense S

UNIT - IV
Semantic Parsing II: Predicate-Argument Structure, Meaning Representation Systems.

UNIT - V
Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Bayesian Parameter Estimation, Language Model Adaptation, Language Models- class based, variable length, Bayesian topic based, Multilingual and Cross lingual Language Modeling

TEXTBOOKS
1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication

REFERENCE BOOKS
1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

COURSE OUTCOMES:
On completion of the course students will be able to
1. Show sensitivity to linguistic phenomena and an ability to model them with formal grammar.
2. Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems.
3. Manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
4. Design, implement, and analyze NLP algorithms.
5. Design different language modeling Techniques.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	2	-	2	2	-	-	-	-	1	-
CO2	-	2	-	-	2	-	-	-	-	1	-	-
CO3	2	-	2	-	-	1	-	-	-	-	-	2
CO4	3	2	2	-	2	-	-	-	-	-	1	-
CO5	1	1	-	-	2	1	-	-	-	-	-	2

END

(A405408) MOBILE APPLICATION DEVELOPMENT
(Professional Elective- III)

B. Tech (CSE) IV Year VII Semester

L	**T**	**P**	**C**
3	**0**	**0**	**3**

UNIT - I

Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

UNIT - II

Android User Interface: Measurements – Device and pixel density independent measuring UNIT - s Layouts – Linear, Relative, Grid and Table Layouts User Interface (UI) Components – Editable and non-editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers Event Handling – Handling clicks or changes of various UI components Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT - III

Intents and Broadcasts: Intent – Using intents to launch Activities, explicitly starting new Activity, Implicit Intents, passing data to Intents, getting results from Activities, Native Actions, using Intent to dial a number or to send SMS Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity Notifications – Creating and Displaying notifications, Displaying Toasts

UNIT – IV

Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

UNIT – V

Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data, Registering Content Providers, using content Providers (insert, delete, retrieve and update)

TEXTBOOKS
1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012

REFERENCE BOOKS
1. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013
2. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand the design and features of the Android OS and the development framework and implement best practices in Android programming.
2. Design and implement various user interfaces using different layouts and UI components, and handle events in Android applications.
3. Utilize intents and broadcasts to launch activities, handle data, and manage notifications in Android applications.
4. Implement persistent storage solutions in Android applications using files and shared preferences.
5. Work with SQLite databases in Android applications, including creating and managing databases and utilizing content providers.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	2							2
CO2	3	3	3	-	2							2
CO3	3	3	2	-	2							2
CO4	2	2	3	-	2							2
CO5	3	3	3	2	2							2

END

(A412306) SCRIPTING LANGUAGES
(Professional Elective- III)

B. Tech (CSE) VII Semester

L	T	P	C
3	0	0	3

UNIT - I
Introduction: Ruby, Rails, the structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and webservices **RubyTk** – Simple Tk Application, widgets, Binding events, Canvas, scrolling

UNIT - II
Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interperter

UNIT – III
Introduction to PERL and Scripting Scripts and Programs
Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT - IV
Advanced perl
Finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT - V
TCL
TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.
Tk
Tk-Visual Tool Kits, Fundamental Concepts of Tk, , Tk by example, Events and Binding, Perl-Tk.

TEXTBOOKS
1. The World of Scripting Languages, David Barron,Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pramatic Programmers guide by Dabve Thomas Second edition

REFERENCE BOOKS
1. Open-Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J. Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education. 5. Perl Power, J. P. Flynt, Cengage Learning
5. Perl Power, J. P. Flynt, Cengage Learning

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understanding the scripting languages such as Ruby,Ruby on Rails and Implementation of Ruby TK applications
2. Examine the Ruby Extension and Embedding ruby with other language
3. Apply the knowledge of the Scripting language usage and Implementation of basic PERL Programs
4. Implement the advanced PERL programs and Explain security issues.
5. Design the TCL TK Application and explain TCL structures

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1		3						2	2
CO2	1	2	1		3						1	2
CO3	2	1	1		3						1	2
CO4	2	1	1		3						1	2
CO5	2	1	1		3						2	2

END
(A405409) COMPUTER GRAPHICS
(Professional Elective- III)

B. Tech (CSE) VII Semester

L	T	P	C
3	0	0	3

UNIT - I
Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices
Output primitives: Points and lines, line drawing algorithms (Bresenham's and DDA Algorithm), midpoint circle and ellipse algorithms
Polygon Filling: Scan-line algorithm, boundary-fill and flood-fill algorithms

UNIT – II
2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems
2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT - III
3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

UNIT - IV
3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.
3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

UNIT - V
Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications
Visible surface detection methods: Classification, back-face detection, depth-buffer, BSP-tree methods, and area sub-division methods and octree method.

TEXTBOOKS
1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson Education

REFERENCE BOOKS
1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.
4. "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education.
5. Computer Graphics, Steven Harrington, TMH

COURSE OUTCOMES:
On completion of the course students will be able to
1. Describe the fundamental algorithms used in computer graphics and to some extent be able to compare and evaluate.
2. Work and interact, through hands-on experiences, to design, develop, and modify electronically generated imaginary using a wide range of sophisticated graphical tools and techniques.
3. Summarize different hidden surface elimination algorithms and shading techniques used in computer graphics and digital media production.
4. Explain about the technology necessary for creating multimedia content for the web, video, DVD, 2D and 3D graphics, Sound and programming.
5. Knowledge, techniques, skills and modern tools to become successful professionals in communication and media industries.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	2	-	-	-	-	-	-	-	-	-

CO2	2	2	-	-	-	-	-	-	-	-	-
CO3	2	-	1	-	3	-	-	-	-	-	-
CO4	2	2	-	2	-	1	-	-	-	-	-
CO5	1	2	-	-	-	-	-	-	-	-	-

END

(A405410) SOFT COMPUTING
(Professional Elective- IV)

B. Tech (CSE) VII Semester

L	**T**	**P**	**C**
3	**0**	**0**	**3**

UNIT - I
Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.

UNIT-II
Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

UNIT-III
Fuzzy Decision Making, Particle Swarm Optimization

UNIT-IV
Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

UNIT-V
Rough Sets, Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques.

TEXTBOOK:
1. Soft Computing – Advances and Applications - Jan 2015 by B.K. Tripathy and J. Anuradha – Cengage Learning

REFERENCE BOOKS
1. S. N. Sivanandam & S. N. Deepa, "Principles of Soft Computing", 2nd edition, Wiley India, 2008.
2. David E. Goldberg, "Genetic Algorithms-In Search, optimization and Machine learning", Pearson Education.
3. J. S. R. Jang, C.T. Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", Pearson Education, 2004.
4. G.J. Klir & B. Yuan, "Fuzzy Sets & Fuzzy Logic", PHI, 1995.
5. Melanie Mitchell, "An Introduction to Genetic Algorithm", PHI, 1998.
6. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw- Hill International editions, 1995

COURSE OUTCOMES:
On completion of this course, the students will be able to
1. Understand the principles, characteristics, and applications of soft computing techniques.
2. Apply concepts of fuzzy sets, fuzzy relations, and fuzzy logic to develop fuzzy rule-based systems.
3. Implement fuzzy decision-making techniques and particle swarm optimization for problem-solving.
4. Utilize genetic algorithms, including operators and fitness functions, to solve optimization problems.
5. Integrate rough sets and rule induction with other soft computing techniques to develop comprehensive solutions.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	2	-	-	-	-	-	-	2
CO2	3	3	3	-	3	-	-	-	-	-	-	2
CO3	3	3	2	-	3	-	-	-	-	-	-	2
CO4	3	2	3	2	3	1	-	-	-	-	-	2
CO5	3	3	3	2	3	-	-	-	-	-	-	2

END

(A462301) CYBER SECURITY
(Professional Elective- IV)

B. Tech (CSE) VII Semester

L	T	P	C
3	0	0	3

UNIT- I
Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software
attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT - II
Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy.
Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics.

UNIT - III
Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Organizational security Policies and Measures in Mobile Computing Era, Laptops.

UNIT- IV
Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

UNIT - V
Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.
Cybercrime: Examples and Mini-Cases
Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances.
Mini-Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

TEXTBOOKS
1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley

REFERENCE BOOKS
1. B. B. Gupta, D.P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press
2. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
3. Introduction to Cyber Security, Chwan-Hwa(john) Wu, J.David Irwin, CRC Press T&F Group.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Analyze and evaluate the cybersecurity needs of an organization
2. understand cybersecurity regulations and roles of international law
3. Design and develop esecurity architecture for an organization
4. Understand Fundamentals concepts of data privacy attacks
5. Evaluate the mindset and skills of hackers and be able to apply data privacy policies and their specifications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	2					2		2
CO2	3	3								2		2

CO3	3	3	3	1						2		2
CO4	3	3	3	2						2		2
CO5	3	3	3	1	2			3		2		2

END

(A405411) AGILE METHODOLOGY
(Professional Elective- IV)

B. Tech (CSE) VII Semester

L	T	P	C
3	0	0	3

UNIT - I
Introduction Extreme Programming (XP) - Agile Development
Why Agile? Understanding Success, Beyond Deadlines, Importance of Organizational Success, Introduction to Agility, Agile methods-Scrum and XP, Manifesto for Agile Software Development, Principles of Agile Process. Understanding XP (Extreme Programming) - XP life cycle, XP team, XP Concepts, Adopting XP - Knowing whether XP is suitable, Implementing XP, assessing Agility, Practicing XP - Thinking, Pair Programming, Energized work, Informative Workspace, Root cause Analysis, Retrospectives.

UNIT - II
Collaborating
Trust, Sit together, Real customer involvement, Ubiquitous language, Stand-Up meetings, coding standards, Iteration demo, Reporting.

UNIT - III
Releasing
Bugfree Release, Version Control, Ten-Minute Build, continuous integration, Collective ownership and Documentation.

UNIT – IV
Planning
Version, Release Planning, The Planning Game, Risk Management, Iteration Planning, Slack, Stories, and Estimating

UNIT - V
Developing
Incremental requirements, Customer tests, Test driven development, Refactoring, Incremental design and architecture, spike solutions, Performance optimization, Exploratory testing.

TEXTBOOK:
1. The art of Agile Development, James Shore and Shane Warden, 11th Indian Reprint, O'Reilly, 2018.

REFERENCE BOOKS
1. Learning Agile, Andrew Stellman and Jennifer Greene, O'Reilly, 4th Indian Reprint, 2018
2. Practices of an Agile Developer, Venkat Subramaniam and Andy Hunt, SPD, 5th Indian Reprint, 2015
3. Agile Project Management - Jim Highsmith, Pearson Low price Edition 2004

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand the principles and practices of Extreme Programming (XP) and Agile methodologies, including the XP life cycle and team roles.
2. Develop collaboration skills through practices such as trust-building, customer involvement, stand-up meetings, and iteration demos.
3. Implement effective release strategies including bug-free releases, version control, continuous integration, and collective ownership.
4. Apply planning techniques such as release planning, risk management, the planning game, and iteration planning.
5. Develop software incrementally using techniques such as test-driven development, refactoring, incremental design, and performance optimization.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2		2				1	2	1	2
CO2		2			2				3	2	2	2
CO3		2	3		2				2	2		2
CO4		3	3		2				2	2	3	2
CO5	3	3	3		2			3	1			2

END

(A405412) AD HOC & SENSOR NETWORKS
(Professional Elective- IV)

B. Tech (CSE) VII Semester

L	T	P	C
3	0	0	3

UNIT - I

Introduction to Ad Hoc Networks - Characteristics of MANETs, Applications of MANETs and Challenges of MANETs.

Routing in MANETs - Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms-Proactive: DSDV; Reactive: DSR, AODV; Hybrid: ZRP; Position-based routing algorithms-Location Services-DREAM, Quorum-based; Forwarding Strategies: Greedy Packet, Restricted Directional Flooding-DREAM, LAR.

UNIT - II

Data Transmission - Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbor Knowledge-based: SBA, Multipoint Relaying, AHBP. Multicasting: Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP; Hybrid: AMRoute, MCEDAR.

UNIT - III

Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR. TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

UNIT – IV

Basics of Wireless, Sensors and Lower Layer Issues: Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

UNIT – V

Upper Layer Issues of WSN: Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.

TEXTBOOKS
1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P. Aggarwal, World Scientific Publications, March 2006, ISBN – 981–256–681–3.
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman).

REFERENCE BOOKS
1. C. Siva Ram Murthy, B.S. Manoj Ad Hoc Wireless Networks: Architectures and Protocols.
2. Taieb Znati Kazem Sohraby, Daniel Minoli, Wireless Sensor Networks: Technology, Protocols and Applications, Wiley.

COURSE OUTCOMES:
1. Appraise the importance of Adhoc networks such as MANET.
2. Explain the design considerations for deploying the wireless network infrastructure
3. Explain the various adhoc routing protocols and transport layer mechanisms
4. Establish a Sensor network environment for different types of applications.
5. Illustrate the issues of routing in WSN.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				1							1
CO2	3	1	3		1							1
CO3	3	2	3		1							1
CO4	3	3	3	2	1							1
CO5	3	3	2	2	1							1

END

(A405413) ROBOTIC PROCESS AUTOMATION
(Professional Elective- V)

B. Tech (CSE) VII Semester

L	T	P	C
3	0	0	3

UNIT - I
Robotic Process Automation: Introduction, Scope and techniques of automation, Robotic process automation, Components of RPA, RPA platforms, About UiPath
UIPath Stack Uipath Studio, Uipath Robot, Types of Robots, UiPath Orchestrator
UIPath Studio Projects, User interface
The User Interface: Task recorder, Advanced UI interactions: Input methods, Output methods

UNIT - II
Sequence, Flowchart, and Control Flow: Sequencing the workflow, Activities, Control Flow, various types of loops and decision making
Data Manipulation: Variables and scope, Collections, Arguments – Purpose and use, Data table usage with examples, File operation with step-by-step example, CSV/Excel to data table and vice versa

UNIT - III
Taking Control of the Controls: Finding and attaching windows, Finding the control, Techniques for waiting for a control, Act on controls – mouse and keyboard activities, Handling events, revisit recorder, when to use OCR, Types of OCR available, how to use OCR
Plugins and Extensions: Terminal Plugin, SAP Automation, Citrix automation and Credential management

UNIT - IV
Handling User Events and Assistant Bots: Assistant bots, Monitoring system event triggers, Monitoring image and element triggers, Launching an assistant bot on a keyboard event.
Exception Handling, Debugging, and Logging: Exception handling, Common exceptions and ways to handle them, Logging and taking screenshots, debugging techniques, Collecting crash dumps, Error reporting.

UNIT - V
Managing and Maintaining the Code: Project organization, nesting workflows, Reusability of workflows, commenting techniques, State Machine, When to use Flowcharts, State Machines, or Sequences, Using config files
Deploying and Maintaining the Bot: Publishing using publish utility, using Orchestration Server to control bots, deploy bots, License Management, Publishing and Managing updates

TEXTBOOK:
1. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath: Create Software robots. with the leading RPA tool – UiPath Kindle Edition

REFERENCE BOOKS
1. Robotic Process Automation a Complete Guide - 2020 Edition Kindle Edition.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand the concepts of Robotic Process Automation.
2. Apply the flow chart mechanism in various calculations.
3. Applying UIPath tool for debugging process
4. Design system management techniques.
5. Create application for process automation using UIPath tool.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3							1
CO2	2	3	3	2	3							1
CO3	2	3	3	2	3							1
CO4	2	3	3	2	3							1
CO5	2	3	2	2	3							1

END

(A405414) BLOCKCHAIN TECHNOLOGIES
(Professional Elective- V)

B. Tech (CSE) VII Semester

L	T	P	C
3	0	0	3

UNIT-I
Fundamentals of Blockchain: Introduction, Origin of Blockchain, Blockchain Solution, Components of Blockchain, Block in a Blockchain, The Technology and the Future.
Blockchain Types and Consensus Mechanism: Introduction, Decentralization and Distribution, Types of Blockchain, Consensus Protocol.
Cryptocurrency – Bitcoin, Altcoin and Token: Introduction, Bitcoin and the Cryptocurrency, Cryptocurrency Basics, Types of Cryptocurrencies, Cryptocurrency Usage.

UNIT-II
Public Blockchain System: Introduction, Public Blockchain, Popular Public Blockchains, The Bitcoin Blockchain, Ethereum Blockchain.
Smart Contracts: Introduction, Smart Contract, Characteristics of a Smart Contract, Types of Smart Contracts, Types of Oracles, Smart Contracts in Ethereum, Smart Contracts in Industry.

UNIT-III
Private Blockchain System: Introduction, Key Characteristics of Private Blockchain, Need of Private Blockchain, Private Blockchain Examples, Private Blockchain and Open Source, E- commerce Site Example, Various Commands (Instructions) in E-commerce Blockchain, Smart Contract in Private Environment, State Machine, Different Algorithms of Permissioned Blockchain, Byzantine Fault, Multichain.
Consortium Blockchain: Introduction, Key Characteristics of Consortium Blockchain, Need of Consortium Blockchain, Hyperledger Platform, Overview of Ripple, Overview of Corda.
Initial Coin Offering: Introduction, Blockchain Fundraising Methods, Launching an ICO, Investing in an ICO, Pros and Cons of Initial Coin Offering, Successful Initial Coin Offerings, Evolution of ICO, ICO Platforms.

UNIT-IV
Security in Blockchain: Introduction, Security Aspects in Bitcoin, Security and Privacy Challenges of Blockchain in General, Performance and Scalability, Identity Management and Authentication, Regulatory Compliance and Assurance, Safeguarding Blockchain Smart Contract (DApp), Security Aspects in Hyperledger Fabric.
Applications of Blockchain: Introduction, Blockchain in Banking and Finance, Blockchain in Education, Blockchain in Energy, Blockchain in Healthcare, Blockchain in Real Estate, Blockchain in Supply Chain, The Blockchain and IoT. Limitations and Challenges of Blockchain.

UNIT-V
Blockchain Case Studies: Case Study 1 – Retail, Case Study 2 – Banking and Financial Services, Case Study 3 – Healthcare, Case Study 4 – Energy and Utilities.
Blockchain Platform using Python: Introduction, Learn How to Use Python Online Editor, Basic Programming Using Python, Python Packages for Blockchain.
Blockchain platform using Hyperledger Fabric: Introduction, Components of Hyper ledger Fabric Network, Chain codes from Developer.ibm.com, Blockchain Application Using Fabric Java SDK.

TEXTBOOK:
1. "Blockchain Technology", Chandramouli Subramanian, Asha A. George, Abhilasj K A and Meena Karthikeyan, Universities Press.

REFERENCE BOOKS
1. Michael Juntao Yuan, Building Blockchain Apps, Pearson, India.
2. Blockchain Blueprint for Economy, Melanie Swan, SPD O'reilly.
3. Blockchain for Business, Jai Singh Arun, Jerry Cuomo, Nitin Gaur, Pearson.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand the fundamental concepts and types of blockchain technology, including its origin, components, and consensus mechanisms.
2. Analyze public blockchain systems and the functionality of smart contracts in Ethereum and other blockchains.
3. Differentiate between private and consortium blockchain systems and explore their applications, algorithms, and use in various industries.

4. Evaluate the security aspects, challenges, and applications of blockchain technology across different sectors.
5. Apply blockchain technology through practical case studies and develop blockchain platforms using Python and Hyperledger Fabric.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	3							1
CO2	2	3	2	2	3							1
CO3	2	3	2	2	3							1
CO4	2	3	2	2	3							1
CO5	2	3	3	3	3							1

END

(A405415) SOFTWARE PROCESS & PROJECT MANAGEMENT
(Professional Elective- V)

B. Tech (CSE) VII Semester

L	T	P	C
3	0	0	3

UNIT - I
Software Process Maturity
Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process.
Process Reference Models
Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP).

UNIT - II
Software Project Management Renaissance
Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way.
Life-Cycle Phases and Process artifacts
Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model-based software architecture.

UNIT - III
Workflows and Checkpoints of process
Software process workflows, Iteration workflows, Major milestones, minor milestones, periodic status assessments.
Process Planning
Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

UNIT - IV
Project Organizations
Line-of- business organizations, project organizations, evolution of organizations, process automation.
Project Control and process instrumentation
The seven-core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, metrics automation.

UNIT - V
CCPDS-R Case Study and Future Software Project Management Practices
Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

TEXTBOOKS
1. Managing the Software Process, Watts S. Humphrey, Pearson Education
2. Software Project Management, Walker Royce, Pearson Education

REFERENCE BOOKS
1. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education, 2000
2. Process Improvement essentials, James R. Persse, O'Reilly, 2006
3. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, TMH, 2006
4. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006.
5. Software Engineering Project Management, Richard H. Thayer & Edward Yourdon, 2nd edition, Wiley India, 2004.
6. Agile Project Management, Jim Highsmith, Pearson education, 2004.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand the software process maturity framework and various process models such as CMM, CMMI, and PCMM.
2. Analyze and compare conventional software management with modern practices, focusing on improving software economics and life-cycle phases.

3. Develop process workflows and milestones and apply effective planning techniques for software project management.
4. Evaluate different project organizations and implement process control and instrumentation to track project progress and quality.
5. Explore modern project profiles and future trends in software project management through case studies and next-generation practices.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	3					2	1	1
CO2	2	3	2	2	3				1	2	1	1
CO3	2	3	2	2	3		1		2	2	1	1
CO4	2	3	2	2	3		2		2	2	1	1
CO5	2	3	3	3	3		2		2	2	1	1

END

(A405416) ADVANCED ALGORITHMS
(Professional Elective- V)

B. Tech (CSE) VII Semester

L	**T**	**P**	**C**
3	**0**	**0**	**3**

UNIT – I
Introduction to Algorithms, Classification of Algorithms, Asymptotic Analysis, Introduction to Recurrence equations - Linear recurrences, Non-linear recurrences, Formulation of recurrence equations, techniques for solving recurrence equations, solving recurrence equations using polynomial reduction, **Master's theorem**
Graph: Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edge-weighted case (Dijkstra's), depth-first search and computation of strongly connected components, Multistage Graph, topological sorting

UNIT – II
Graph Matching: Algorithm to compute maximum matching. Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path, Bipartite matching problem
Matroids: Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set, Optimal tree problems- optimal merge, huffman coding, tree vertex splitting problem. Shortest Path in Graphs: Floyd-Warshall algorithm, Travelling Sales Person Problem and introduction to dynamic programming paradigm. Optimal Graph Problems - Minimum Spanning Tree, Single source shortest path.

UNIT - III
Flow-Networks: Maxflow - mincut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm.
Matrix Computations: Strassen's algorithm and introduction to divide and conquer paradigm, Chain Matrix Multiplication, Matrix operations – Gaussian Elimination method, LUP-decomposition, Crout's method of decomposition, inverse of a triangular matrix,

UNIT - IV
Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Conversion between base-representation and modulo-representation, interpolation problem. Multiplication of long integers by using Divide and Conquer paradigm, Schonhage-Strassen's Integer Multiplication algorithm.
String Algorithms: Naïve String, Rabin Karp, KMP, Boyer Moore, Harspool algorithms

UNIT - V
Basics of Computational Complexity: Introduction to computational complexity, complexity classes, Satisfiability problem and Cook's theorem, Examples of NP- Complete problems
Randomized algorithms: Introduction, Types of Randomized algorithms, Example of Randomized algorithms.
Approximation algorithms: Introduction, Types of Approximation algorithms, Examples of Approximation algorithms

TEXTBOOK
1. Design and Analysis of Algorithms, S. Sridhar, Oxford University Press.

REFERENCE BOOKS
1. Introduction to Algorithms, Cormen, Leiserson, Rivest, Stein.
2. The Design and Analysis of Computer Algorithms, Aho, Hopcroft, Ullman. Algorithm Design, Kleinberg and Tardos.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand various methodology for analyzing the algorithms.
2. Apply different graph algorithms and analyze its Complexity.
3. Analyze the various algorithm design techniques and solve different problems using those techniques and analyse its Complexity.
4. Evaluate the performance of various Network flow algorithms.
5. Understand NP completeness and Polynomial Reduction Techniques.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1			3							
CO2	3	1	2	2	3							

CO3	3	3	2	3	2						
CO4	3	2	2	2	3						
CO5	3	3	2	3	2						

END

(A466303) DEEP LEARNING
(Professional Elective- VI)

B. Tech (CSE) VIII Semester

L	**T**	**P**	**C**
3	**0**	**0**	**3**

UNIT -I
Machine Learning Basics
Learning Algorithms, Capacity, Overfitting and Underfitting, Hyperparameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent, building a Machine Learning Algorithm, Challenges Motivating Deep Learning
Deep Feedforward Networks Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

UNIT -II
Regularization for Deep Learning
Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under- Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi- Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop, and Manifold Tangent Classifier, Optimization for Training Deep Models, Learning vs Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates

UNIT-III
Convolutional Networks
The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features

UNIT -IV
Recurrent and Recursive Nets
Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Challenge of Long-Term Dependencies, Echo State Networks, Leaky Units and Other Strategies for Multiple Time Scales, The Long Short-Term Memory and Other Gated RNNs, Optimization for Long- Term Dependencies, Explicit Memory

UNIT -V
Practical Methodology: Performance Metrics, Default Baseline Models, Determining Whether to Gather More Data, Selecting Hyperparameters, Debugging Strategies, Example: Multi-Digit Number Recognition
Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications.

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

REFERENCE BOOKS
1. The Elements of Statistical Learning. Hastie, R. Tibshirani, and J. Friedman, Springer.
2. Probabilistic Graphical Models. Koller, and N. Friedman, MIT Press.
3. Bishop, C., M., Pattern Recognition and Machine Learning, Springer, 2006.
4. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
5. Golub, G., H., and Van Loan, C.,F., Matrix Computations, JHU Press, 2013.
6. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

COURSE OUTCOMES:
1. Understand the basics of machine learning, including learning algorithms, overfitting, underfitting, and the fundamental concepts of deep feedforward networks.
2. Apply regularization techniques and optimization strategies to improve deep learning models.
3. Develop convolutional neural network architectures and apply them to various data types and tasks.
4. Design and implement recurrent and recursive neural networks for sequential data and understand their optimization challenges.
5. Apply practical methodologies for performance evaluation, hyperparameter selection, and debugging in machine learning models, and explore their applications in various domains.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1							3
CO2	3	3	3	2	1							3
CO3	3	3	3	2	1							3
CO4	3	2	3	2	3							3
CO5	3	3	3	2	3							3

END

(A405417) HUMAN COMPUTER INTERACTION
(Professional Elective- VI)

B. Tech (CSE) VIII Semester

L	**T**	**P**	**C**
3	**0**	**0**	**3**

COURSE OUTCOMES:
- Ability to apply HCI and principles to interaction design.
- Ability to design certain tools for blind or PH people.

UNIT - I
Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design.
The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT - II
Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.
Screen Designing: Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT- III
Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT- IV
HCI in the software process, The software life cycle Usability engineering Iterative design and prototyping Design Focus: Prototyping in practice Design rationale Design rules Principles to support usability Standards Golden rules and heuristics HCI patterns Evaluation techniques, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method. Universal design, Universal design principles Multi-modal interaction

UNIT- V
Cognitive models Goal and task hierarchies Design Focus: GOMS saves money Linguistic models The challenge of display-based systems Physical and device models Cognitive architectures Ubiquitous computing and augmented realities Ubiquitous computing applications research Design Focus: Ambient Wood – augmenting the physical Virtual and augmented reality Design Focus: Shared experience
Design Focus: Applications of augmented reality Information and data visualization Design Focus: Getting the size right.

TEXTBOOKS
1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dream Tech. Units 1, 2, 3
2. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education Units 4,5

REFERENCE BOOKS
1. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.
3. User Interface Design, Soren Lauesen , Pearson Education.
4. Human –Computer Interaction, D. R. Olsen, Cengage Learning.
5. Human –Computer Interaction, Smith - Atakan, Cengage Learning.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Acquire knowledge of principles and components of HCI.
2. Designing the process based on human consideration and designing an effective user interface.
3. Analyze the window components and presentation styles.
4. Describe how technologies can be designed to change people's attitudes and behavior.

5. Explain the main principles of a user-centered approach.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	2				1	1		2
CO2	2	3	3	2	3				2	2		2
CO3	2	3	2	2	2				1	1		2
CO4	2	2	1	2	2	2	2	2	1	1		2
CO5	2	2	2	2	2		2		1	2		2

END

(A405418) CYBER FORENSICS
(Professional Elective- VI)

B. Tech (CSE) VIII Semester

L	T	P	C
3	0	0	3

UNIT- I
Introduction of Cybercrime: Types, The Internet spawn's crime, Worms versus viruses, Computers' roles in crimes, Introduction to digital forensics, Introduction to Incident - Incident Response Methodology – Steps - Activities in Initial Response, Phase after detection of an incident

UNIT-II
Initial Response and forensic duplication, Initial Response & Volatile Data Collection from Windows system - Initial Response & Volatile Data Collection from Unix system – Forensic Duplication: Forensic duplication: Forensic Duplicates as Admissible Evidence, Forensic Duplication Tool Requirements,
Creating a Forensic. Duplicate/Qualified Forensic Duplicate of a Hard Drive

UNIT - III
Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions.
Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project.

UNIT -IV
Current Forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.
Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

UNIT- V
Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS startup tasks, virtual machines.

TEXT BOOKS:
1. Kevin Mandia, Chris Prosise, "Incident Response and computer forensics", Tata McGraw Hill, 2006.
2. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
3. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning

REFERENCE BOOKS
1. Real Digital Forensics by Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison- Wesley Pearson Education
2. Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brian Jenkinson, Springer International edition.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand the basic terminology of cybercrimes
2. Create Initial Response and forensic duplication
3. Analyze and validate digital forensic data
4. Choose various forensic tools for a wide variety of investigations
5. Elaborate To understand Working with Windows and DOS Systems

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2					2						2
CO2	2	3	3		3	2						2
CO3		1	3		3	2						2
CO4	2	3	3		3	2						2
CO5	1	2			2	1						2

END

(A405419) DISTRIBUTED SYSTEMS
(Professional Elective- VI)

B. Tech (CSE) VIII Semester

L	**T**	**P**	**C**
3	**0**	**0**	**3**

UNIT - I
Characterization of Distributed Systems-Introduction, Examples of Distributed systems, Resource sharing and web, challenges,
System models -Introduction, Architectural and Fundamental models,
Networking and Internetworking, Interprocess Communication,
Distributed objects and Remote Invocation-Introduction, Communication between distributed objects, RPC, Events and notifications, Case study-Java RMI.

UNIT - II
Operating System Support- Introduction, OS layer, Protection, Processes and Threads, Communication and Invocation, Operating system architecture,
Distributed File Systems-Introduction, File Service architecture.

UNIT - III
Peer to Peer Systems–Introduction, Napster and its legacy, Peer to Peer middleware,
Time and Global States-Introduction, Clocks, events and Process states, Synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging.
Coordination and Agreement-Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.

UNIT - IV
Transactions and Concurrency Control-Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering.
Distributed Transactions-Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions,
Distributed deadlocks, Transaction recovery.

UNIT - V
Replication-Introduction, System model and group communication, Fault tolerant services, Transactions with replicated data.
Distributed shared memory, Design and Implementation issues, Consistency models.

TEXTBOOKS
1. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Fourth Edition, Pearson Education.
2. Distributed Systems, S.Ghosh, Chapman & Hall/CRC, Taylor & Francis Group, 2010.

REFERENCE BOOKS
1. Distributed Systems – Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, Pearson Education.
2. Distributed Computing, Principles, Algorithms and Systems, Ajay D. Kshemakalyani and Mukesh Singhal, Cambridge, rp 2010.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand the characterization of Distributed system and system models.
2. Interpret the Operating system architecture and File Service architecture
3. Analyze the peer-to-peer system, Time and global states and multicast communication.
4. Explain Distributed transactions and Concurrency control.
5. Examine the replication, Fault Tolerant Services and Distributed shared memory.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		1							1		1
CO2	3		1									
CO3	2	3	1									1
CO4	3	2										1
CO5	3	2	1									

END

(A400103) ORGANIZATIONAL BEHAVIOUR

B. Tech (CSE) VII Semester

L	T	P	C
2	0	0	2

UNIT - I Organizational Behaviour
Definition, need for and importance of organizational behaviour – Nature and scope – Framework – Organizational behaviour models.

UNIT - II Individual Behaviour
Personality – types – Factors influencing personality – Theories – Learning – Types of learners – The learning process – Learning theories – Organizational behaviour modification, Misbehaviour – Types – Management Intervention. Emotions - Emotional Labour – Emotional Intelligence – Theories. Attitudes
– Characteristics – Components – Formation – Measurement- Values. Perceptions – Importance – Factors influencing perception – Interpersonal perception- Impression Management. Motivation – importance – Types – Effects on work behavior.

UNIT - III Group Behaviour
Organization structure – Formation – Groups in organizations – Influence – Group dynamics – Emergence of informal leaders and working norms – Group decision making techniques – Team building - Interpersonal relations – Communication – Control.

UNIT - IV Leadership and Power
Meaning – Importance – Leadership styles – Theories of leadership – Leaders Vs Managers – Sources of power – Power centers – Power and Politics.

UNIT - V Dynamics of Organizational Behaviour
Organizational culture and climate – Factors affecting organizational climate – Importance. Job satisfaction – Determinants – Measurements – Influence on behavior. Organizational change – Importance – Stability Vs Change – Proactive Vs Reaction change – the change process – Resistance to change – Managing change. Stress – Work Stressors – Prevention and Management of stress – Balancing work and Life. Organizational development – Characteristics – objectives –. Organizational effectiveness

TEXTBOOKS
1. Stephen P. Robins, Organizational Behavior, PHI Learning / Pearson Education, 11th edition, 2008.
2. Fred Luthans, Organizational Behavior, McGraw Hill, 11th Edition, 2001.

REFERENCE BOOKS
1. Schermerhorn, Hunt and Osborn, Organizational behavior, John Wiley, 9th Edition, 2008.
2. Udai Pareek, Understanding Organizational Behavior, 2nd Edition, Oxford Higher Education, 2004.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

END

(A404601) FUNDAMENTALS OF INTERNET OF THINGS
(Open Elective-I)

B. Tech. (CSE)

L T P C
3 0 0 3

UNIT – I
Introduction to Arduino: Introduction to Arduino Uno, Features, Pin functionality, Basic Arduino Programming: Interfacing LEDs, Switches using Digital I/O Read/Write, Acquiring and generating signals using Analog I/O Read/Write, Serial functions.

UNIT – II
Introduction to Raspberry Pi: Introduction to Raspberry Pi, Pin functionality, Revision of Python Programming; Raspberry Pi commands, GPIO programming.
Other Open-Source Devices: Features and pin functions of NodeMCU, ESP8266, ESP32.

UNIT - III
Introduction to IOT: Terms and definitions, Logical design of IoT, IOT Reference Model;
IOT and M2M: Introduction to M2M, Difference between IoT and M2M and other types;
IOT Servers and Cloud Offerings: IoT enabling technologies – Cloud Computing; Introduction to Cloud Storage/Services – Google, Microsoft Azure, IBM, Amazon Web services for IOT, setting up to read and write using Thing speak.

UNIT – IV
IOT & Communication Protocols: Serial –RS 485, IEEE1394 Firewire, I2C, SPI, USB,CAN; Wireless sensor networks and their technologies, IOT Protocols.

UNIT – V
Domain Specific IOT Applications & Case Studies:
IOT Application & case studies for Agriculture, Smart Cities & Transport, Home Automation, Environment, Retail, Logistics, Health, Life style, Industry – Energy.

TEXT BOOKS:
1. Srinivasa K G, Siddesh G M, Hanumantha Raju R, Internet of Things, Cengage, 2019.

REFERENCE BOOKS
1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-on-Approach", VPT, 1stEdition, 2014
2. Jeremy Blum, Exploring Arduino: Tools and Techniques for Engineering Wizardry, Wiley, 2013.
3. Simon Monk, Raspberry Pi Cookbook, O'Reilly 3rd Edition, 2019
4. Michael Margolis, Arduino Cookbook, 2nd Edition, December 2011, O'Reilly Media, Inc.
5. Rahul Dubey, An Introduction to Internet of Things – Connecting Devices, Edge Gateway, and Cloud with Applications, Cengage, 2019.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Have knowledge of programming open-source Edge devices like Arduino, Raspberry Pi.
2. Apply the knowledge of Arduino and raspberry pi with clouds for IOT applications.
3. Analyze the different communication and IOT protocols.
4. Aware of various cloud services and providers.
5. Understand various IOT implementations in different domains.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1		2	1							1
CO2		2										1
CO3				3	1	1						1
CO4		3										1
CO5			2	3	1							1

END

(A404602) PRINCIPLES OF DIGITAL SIGNAL PROCESSING
(Open Elective-I)

B. Tech. (CSE)

L	T	P	C
3	0	0	3

UNIT-I
Introduction to Signala nd Systems

Basic Signals and Systems – properties and basic operations-1-D Signals and Filters – Random Signals - Multi-dimensional Signals – Analog and Digital signals and their conversion techniques Convolution process, Filtering process, Z-transform concepts.

UNIT-II
Time domain analysis and Characteristics

Correlation and Discrete sequences: notation, signal characteristics, and operations Discrete linear time invariant systems -Properties and analysis of discrete linear time invariant systems Periodic sampling: aliasing and lowpass filtering.

UNIT-III
Frequency domain Analysis

Discrete Fourier transforms (DFT) DFT properties: symmetry, linearity, magnitudes, frequency axis, and shifting InverseDFT-FastFouriertransform(FFT):relationshiptoDFT,implementation considerations, radix-2 algorithm, and input/output indexing FFT: butterfly algorithm structures.

UNIT-IV
FIR filter design

FIR filters–Introduction-Basic Properties-Design using Hamming, Hanning Windows-Realization of FIR filters.

UNIT-V
IIR filter design

Review of design of analogue Butterworth Filters, - Design of IIR digital filters using impulse invariance technique-Realization using direct, cascade and parallel forms.

TEXTBOOKS

1. Richard G. Lyons, Understanding Digital Signal Processing, Third edition, Prentice-Hall, 2011.2. Introduction to Digital Signal Processing, J.Proakis &E.Manolakis, MacMillan, 2007 (4thEdition)

REFERENCE BOOKS

1.S.Salivahanan,A.Vallavaraj,C.Gnanapriya,DigitalSignalProcessing,TMH/McGrawHillInternational,2007
2.E.C.IfeachorandB.W.Jervis,"Digitalsignalprocessing-Apracticalapproach",Secondedition,Pearson,2002.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Characterize discrete time signals and LTI signal processing systems mathematically.
2. Analyze the functions performed by simple discrete-time systems.
3. Develop the discrete Fourier transform (DFT) over time domain signals, its applications and its implementation by FFT techniques.
4. Apply the design techniques for FIR type digital filters known as the ―windowing method.
5. Design IIR type digital filters over the given specifications

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										1
CO2	3	3										1
CO3	3	3	2									1
CO4	3	3	2	2								1
CO5	3	3	2	2								1

END

(A402601) RENEWABLE ENERGY SOURCES
(Open Elective-I)

	L	**T**	**P**	**C**
B. Tech. (CSE)	**3**	**0**	**0**	**3**

UNIT I
Global And National Energy Scenario
Over view of conventional & renewable energy sources, need & development of renewable energy sources, types of renewable energy systems, Future of Energy Use, Global and Indian Energy scenario, Renewable and Non-renewable Energy sources, Energy for sustainable development, Potential of renewable energy sources, renewable electricity and key elements, Global climate change, CO_2 reduction potential of renewable energy-concept of Hybrid systems.

UNIT II
Solar Energy
Solar energy system, Solar Radiation, Availability, Measurement and Estimation, Solar Thermal Conversion Devices and Storage, Applications Solar Photovoltaic Conversion solar photovoltaic, solar thermal, applications of solar energy systems.

UNIT III
Wind Energy
Wind Energy Conversion, Potential, Wind energy potential measurement, Site selection, Types of wind turbines, Wind farms, wind Generation and Control. Nature of the wind, power in the wind, factors influencing wind, wind data and energy estimation, wind speed monitoring, classification of wind, characteristics, applications of wind turbines, offshore wind energy – Hybrid systems, wind resource assessment, Betz limit, site selection, wind energy conversion devices. Wind mill component design, economics and demand side management, energy wheeling, and energy banking concepts. Safety and environmental aspects, wind energy potential and installation in India.

UNIT IV
Bio Gas
Properties of biogas (Calorific value and composition), biogas plant technology and status, Bio energy system, design and constructional features. Biomass resources and their classification, Biomass conversion processes, Thermo chemical conversion, direct combustion, biomass gasification, pyrolysis and liquefaction, biochemical conversion, anaerobic digestion, types of biogas Plants, applications, alcohol production from biomass, bio diesel production, Urban waste to energy conversion, Biomass energy programme in India.

UNIT V
Ocean Energy
Ocean wave energy conversion, principle of Ocean Thermal Energy Conversion (OTEC), ocean thermal power plants, tidal energy conversion, Tidal and wave energy its scope and development, Scheme of development of tidal energy.
Small hydro Power Plant: Importance of small hydro power plants and their Elements, types of turbines for small hydro, estimation of primary and secondary power.
Geothermal Energy: Geothermal power plants, various types, hot springs and steam ejection.

TEXT BOOKS
1. Renewable Energy Sources / Twidell, J.W. and Weir, A./ EFN Spon Ltd., 1986.
2. Non-Conventional Energy Sources / G.D Rai/ Khanna Publishers

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand the importance of renewable energy sources
2. Explain the operation of solar energy system
3. Illustrate various wind energy conversion systems
4. Explain the operation Bio gas conversion
5. Explain the principle and operation of Ocean wave energy conversion.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1			1			2		
CO2	2	1	1	1			1			2		
CO3	2	1	1	1			1			2		
CO4	2	1	1	1			1			2		
CO5	2	1	1	1			1			2		

END

(A402602) BASICS OF POWER ELECTRONICS & DRIVES
(Open Elective-I)

B. Tech (CSE)

L	T	P	C
3	0	0	3

UNIT I
Power Semiconductor Devices
Power Semiconductor Devices Construction and Characteristics of Power diodes, Power Transistors, Power MOSFET, Insulated Gate Bipolar transistors (IGBTs) Introduction to Thyristor family: SCR, DIACs, TRIACs.

UNIT II
Phase Controlled (Ac to Dc) Converters
Principle of phase-controlled converter operation; Operation of 1-phase half wave converter with R, RL and RLE load; 1- phase full wave converter, Bridge Configuration; Operation with R, RL, RLE load; Operation of 1-phase Semi-converter/ Half controlled converter:

UNIT III
Three -Phase Converters
Operation of half wave converter: Full wave fully controlled converters: Semi-controlled converter; Dual Converter: Principle and operation; Applications of AC-DC converters

UNIT IV
Dc To Dc Converters
The chopper, Basic principle of DC chopper, Classification of DC choppers, Control strategies Basic DC-DC converter (switch regulator) topologies: Principle, operation Step-down (Buck), Step-up (Boost), Step up/down (Buck-Boost), Continuous conduction and Discontinuous conduction operation, two zone operation, Four quadrant operation (Operating modes),

UNIT V
Power Converters Fed Drives
Single phase separately excited drives: Half Wave converter, Semi converter and Fully Controlled converter-based drives; Braking operation of separately excited drive Semi-converter and Fully Controlled converter-based drives 3-phase separately excited drives: Half Wave converter, Semi-converter and Fully Controlled converter based drives; Principle of power control (motoring control) of separately excited and series motor with DC-DC Converter.

TEXT BOOKS
1. M D Singh and K B Khanchandani, "Power electronics", TMH, New Delhi, 2nd ed., 2007.
2. P.S. Bimbhra, "Power Electronics", Khanna Publishers, New Delhi, 2012.
3. Muhammad H. Rashid, "Power Electronics - Circuits, Devices and Applications", Prentice Hall of India, 3rd ed., 2003.

REFERENCE BOOKS
1. VedamSubramanyam, "Power Electronics – Devices, Converters and Applications", New Age International Publishers Pvt. Ltd., Bangalore, 2nd ed. 2006.
2. Ned Mohan, Undeland and Robbins, "Power Electronics – Converters, Applications and Design", John Willey & sons, Inc., 3rd ed., 2003.
3. V.R.Moorthi, "Power Electronics", Oxford University press, 2005.
4. G..K. Dubey, S.R. Doradla, A. Joshi, and R.M.K. Sinha, "Thyristorised Power Controllers", New Age International Ltd. Publishers, 1986 (Reprint 2008).
5. P.T. Krein, "Elements of Power Electronics", Oxford University Press, 1998.
6. G..K. Dubey, " Fundamentals of Electrical Drives", Narosa Publishing House, New Delhi, 2nd ed. 2001

COURSE OUTCOMES:
On completion of the course students will be able to
1. Explain the construction and characteristics of Power semiconductor devices
2. Analyze the operation of single phase and three phase ac-to-dc converters.
3. Analyze various three phase converters
4. Compare the various types of dc-to-dc converters.
5. Apply the knowledge of power electronic converter for various applications.

CO- PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1							2		
CO2	3	3	3	1						2		
CO3	3	3	3	1						2		
CO4	3	3	1	1						2		
CO5	3	3	1	2						2		

END

(A405604) JAVA PROGRAMMING

(Open Elective-I)

B. Tech (CSE)

L	T	P	C
3	0	0	3

UNIT-I
Introduction: Java Essentials, JVM, Java Features, Creation and Execution of Programs, Data Types, Type Conversion, Casting, Conditional Statements, Loops, Branching Mechanism, Classes, Objects, Class Declaration, Creating Objects, Method Declaration and Invocation, Method Overloading, Constructors– Parameterized Constructors, Constructor Overloading, Cleaning-up unused Objects, Class Variables & Methods-static Keyword, this Keyword.

UNIT–II
Arrays: One-Dimensional Arrays, Two-Dimensional Arrays, Command-Line Arguments, Inner Class. **Inheritance**: Introduction, Types of Inheritance, extends Keyword, Examples, Method Overriding, super, final Keywords, Abstract classes, Interfaces, Abstract Classes Verses Interfaces.

UNIT–III
Packages–Creating and Using Packages, Access Protection, Wrapper Classes, String Class, StringBuffer Class. **Exception**: Introduction, Types, Exception Handling Techniques, User-Defined Exception.

UNIT-IV
Multithreading: Introduction, Main Thread, Creation of New Threads – By Inheriting the Thread Class or Implementing the Runnable Interface, Thread Lifecycle, Thread Priority, Synchronization.

UNIT–V
java.io Package, File Class, File Input Stream Class, File Output Stream Class, Scanner Class, Buffered Input Stream Class, Buffered Output Stream Class, Random Access File Class.

TEXTBOOKS
1.Sachin Malhotra, Saurabh Choudhary, Programming in Java (2e), Oxford publications.

REFERENCE BOOKS
    1.Herbert Schildt, Java: The Complete Reference (9e), McGraw Hill Education.
    2. C. Thomas Wu, An introduction to object-oriented programming with Java (5e), McGraw-Hill Education;

COURSE OUTCOMES:
On completion of the course students will be able to
    1. Explain the OOPs concepts.
    2. Describe various types of Inheritance in Java.
    3. Develop robust Java applications using Packages, Exceptions.
    4. Implement Java applications using Java Threads.
    5. Design Java applications with various modes of Input and output

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2		2							1
CO2	1	2	2		2							1
CO3	1	2	2	2	2							2
CO4	1	2	2	2	2					2		2
CO5	1	2	2	2	2					2		2

END

(A405602) FUNDAMENTALS OF OPERATING SYSTEMS
(Open Elective-I)

L	T	P	C
3	0	0	3

B. Tech (CSE)

UNIT - I

Operating System - Introduction, Structures - Simple Batch, Multiprogrammed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

Process - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads

UNIT - II

CPU Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, exec

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock

UNIT - III

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors

UNIT – IV

Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT – V

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms

TEXTBOOKS

1.Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2.Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOKS

1.Operating Systems- Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI
2.Operating System A Design Approach- Crowley, TMH.
3.Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
4.UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
5.UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

COURSE OUTCOMES:

On completion of the course students will be able to
1. Explain the basic concepts and structures of operating systems.
2. Analyze CPU scheduling algorithms and methods for handling deadlocks.
3. Implement process synchronization techniques and solve synchronization problems.
4. Utilize interprocess communication mechanisms in different operating systems.
5. Describe memory management techniques and apply virtual memory concepts.

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1											
CO2	1	2	2	2								
CO3	1	2	2	2								
CO4	1	2	2	2								
CO5	1	2	2	2								

END

(A403601) FUNDAMENTALS OF ENGINEERING MATERIALS
(Open Elective-I)

B. Tech (CSE)

L	T	P	C
3	0	0	3

UNIT – I
Structure of Metals: Crystallography, Miller's indices, Packing Efficiency, Density calculations. Grains and Grain Boundaries. Effect of grain size on the properties. Determination of grain size by different methods. Constitution of Alloys: Necessity of alloying, Types of solid solutions, Hume - Rothery rules, Intermediate alloy phases.

UNIT –II
Phase Diagrams: Construction and interpretation of phase diagrams, Phase rule. Lever rule. Binary phase Diagrams, Isomorphous, Eutectic and Eutectoid transformations with examples.

UNIT – III
Steels: Iron-Carbon Phase Diagram and Heat Treatment: Study of Fe-Fe3C phase diagram. Construction of TTT diagrams. Annealing, Normalizing, Hardening and Tempering of steels, Hardenability. Alloy steels.

UNIT – IV
Cast Irons: Structure and properties of White Cast iron, Malleable Cast iron, Grey cast iron. Engineering Materials-III: Non-ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminium and its alloys, Al-Cu phase diagram, Titanium and its alloys.

UNIT – V
Ceramics, Polymers and Composites: Crystalline ceramics, glasses, cermets: structure, properties and applications. Classification, properties and applications of composites. Classification, Properties and applications of Polymers.

TEXT BOOKS:
1. Material Science and Metallurgy/ Kodgire
2. Essentials of Materials Science and engineering / Donald R. Askeland / Thomson.
REFERENCE BOOKS

1. Introduction to Physical Metallurgy / Sidney H. Avner.
2. Materials Science and engineering / William and callister.
3. Elements of Material science / V. Rahghavan

COURSE OUTCOMES:
On completion of the course students will be able to
1. Identify the crystalline structure of steel.
2. Understand the theory of time temperature and transformation
3. Determine of different uses of heat treatment in steel.
4. Distinguish between the various forms of steel.
5. Understand the properties of non-ferrous alloys and uses of composite materials.

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2				1						1
CO2	3	2				1						1
CO3	3	2				1						1
CO4	3	2				1						1
CO5	3	2				1						1

END

(A403602) BASICS OF THERMODYNAMICS
(Open Elective-I)

B. Tech (CSE)

L	T	P	C
3	0	0	3

UNIT – I

Introduction: Basic Concepts: System, Control Volume, Surrounding, Boundaries, universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Exact & Inexact Differentials, Cycle, Reversibility – Quasi – static Process, Irreversible Process, Causes of Irreversibility.

UNIT - II

Types, Displacement & Other forms of Work, Heat, Point and Path functions, Zeroth Law of Thermodynamics – Concept of Temperature – Principles of Thermometry – Reference Points – Const. Volume gas Thermometer – Scales of Temperature, Ideal Gas Scale.

UNIT – III

First and Second Laws of Thermodynamics: First Law: Cycle and Process, Specific Heats (cpand cv), Heat interactions in a Closed System for various processes, Limitations of First Law,Concept of Heat Engine (H.E.) and Reversed H.E. (Heat Pump and Refrigerator), Efficiency/COP, Second Law: Kelvin-Planck and Clausius Statements, Carnot Cycle, Carnot Efficiency, Statement of Clausius Inequality, Property of Entropy, T-S and P-V Diagrams

UNIT - IV

Mixtures of perfect Gases – Mole Fraction, Mass friction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction, Volume fraction and partial pressure, Equivalent Gas const.
Atmospheric air - Psychrometric Properties – Dry bulb Temperature, Wet BulbTemperature, Dew point Temperature, , Specific Humidity, Relative Humidity, saturated Air, Vapour pressure, Degree of saturation – Adiabatic Saturation ,Psychrometric chart

UNIT - V

Power Cycles: Otto, Diesel cycles - Description and representation on P–V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis
Refrigeration Cycles: Bell-Coleman cycle, Vapour compression cycle-performance Evaluation.

TEXT BOOKS:
1. Basic Engineering Thermodynamics / PK Nag / Mc Graw Hill
2. Engineering Thermodynamics / chattopadhyay/ Oxford

REFERENCE BOOKS
1. Thermodynamics for Engineers / Kenneth A. Kroos, Merle C. Potter/ Cengage
2. Thermodynamics /G.C. Gupta /Pearson

COURSE OUTCOMES:
On completion of the course students will be able to
1. Apply energy balance to systems and control volumes, in situations involving heat and work interactions.
2. Evaluate changes in thermometric properties of substances.
3. Apply the laws of thermodynamics to different systems.
4. Understand the psychrometric properties of air
5. Compare different air standard cycles.

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	1	2	-	2	-	-	2
CO2	3	3	2	3	3	1	2	-	2	-	-	2
CO3	3	3	1	3	1	1	2	-	2	-	-	2
CO4	3	3	1	3	1	1	2	-	2	-	-	2
CO5	3	3	1	3	2	1	2	-	1	-	-	2

END

(A400601) – BASICS OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

(Open Elective-I)

B. Tech (CSE)

L	T	P	C
3	0	0	3

Unit – I
Understanding Supply Chain: Objectives of a Supply Chain, Importance, Stages of Supply Chain, Value Chain Process, Cycle View of Supply Chain Process, Key Issues in SCM, Logistics & SCM, Supply Chain Drivers and Obstacles, Supply Chain Strategies, Strategic Fit, Best Practices in SCM,Obstacles of Streamlined SCM, Green Supply Chain Management, Supply Chain Sustainability.

Unit – II
Logistics: Evolution, Objectives, Components and Functions of Logistics Management, Difference between Logistics and Supply Chain, Distribution related Issues and Challenges. Gaining Competitive Advantage through Logistics Management, Transportation: Functions, Costs, and Mode of Transportation Network and Decision, Models, Containerization, Cross Docking, Reverse Logistics.Outsourcing: Nature and Concept, Strategic Decision to Outsourcing, Third-party Logistics (3PL), Fourth-party Logistics (4PL).

Unit – III

Designing the Supply Chain Network: Designing the Distribution Network, Role of Distribution, Factors Influencing Distribution, Design Options, e-Business and its Impact, Distribution Networks in Practice, Network Design in the Supply Chain, Role of Network, Factors Affecting the Network Design Decisions, Modeling for Supply Chain. Unit – IV: Supply Chain Performance: Bullwhip Effect and Reduction, Performance Measurement: Dimension, Tools of Performance Measurement, SCOR Model. Demand Chain Management, Global Supply Chain, Challenges in Establishing Global Supply Chain, Factors that influence Designing Global Supply Chain Network.

Unit – V

Coordination in a Supply Chain: Importance of Coordination, Lack of Supply Chain Coordination and the Bullwhip Effect, Obstacles to Coordination, Managerial Levels, Building Partnerships and Trust, Continuous Replenishment and Vendor Managed Inventories, Collaborative Planning, Forecasting and Replenishment. Role of Information Technology in Supply Chain, Supply Chain 4.0.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand the cyclical perspective of logistics and supply chain process.
2. Learn about the distribution, transportation, warehousing related issues and challenges in supply chain.
3. Appreciate the significance of network design in the supply chain.
4. Gain knowledge of various models / tools of measuring the Supply Chain Performance.
5. Appreciate the role of coordination and technology in supply chain management.

REFERENCE BOOKS
1. IMT Ghaziabad, Advanced Supply Chain Management, Sage Publications, 2021.
2. Rajat K. Basiya, Integrated Supply Chain Management, Sage Publications, 2020.
3. K Sridhara Bhat, Logistics & Supply Chain Management, HPH,1e,2017.
4. Chopra, Sunil, Meindl, Peter and Kalra, D. V., Supply Chain Management: Strategy, Planningand Operation; Pearson Education, 6e, 2016.
5. Altekar, Rahul V, Supply Chain Management: Concepts and Cases; PHI Learning ,1e,2005.
6. Donald J. Bowersox and David J. Closs, Logistical Management" The Integrated Supply Chain Process, TMH, 2017
7. Edward J Bradi, John J Coyle, A Logistics Approach to Supply Chain Management, Cengage Learning, New Delhi, 2012
8. Sunil Chopra and Peter Meindl, Supply chain Management: Strategy, Planning and Operation, Pearson Education, New Delhi 2013.

CO- PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	-	2	2	2	2	-	-	-
CO2	3	2	3	-	-	2	2	-	-	3	-	2
CO3	-	3	3	2	3	3	2	-	3	-	-	-
CO4	-	-	-	2	3	3	-	-	-	-	3	-
CO5	-	-	-	-	3	-	2	2	3	-	3	2

END

(A400602) - INDUSTRIAL RELATIONS

(Open Elective-I)

B. Tech (CSE)

L	**T**	**P**	**C**
3	**0**	**0**	**3**

UNIT-I

Overview of Industrial Relations: Meaning & Objectives, Scope, Importance, Approaches to Industrial Relations – Role of Three Actors to Industrial Relations – State, Employer & Employees, Causes for poor IR, Developing sound IR. Ethical approach to IR: Idea of trusteeship – Principles & features, Code of conduct. The industrial policy resolution 1991.ILO in IR. Collective Bargaining (Perspective, Bargaining Structure, Procedure and Machinery for Collective Bargaining) – The Bargaining Process – Strengths and Skills

UNIT-II

Laws on Industrial Relations: The Trade Union Act 1926: Role & function of Trade union, Registration, Rights and privileges, Duties, Dissolution of Trade Unions.

Industrial Disputes Act 1947: Strike, Lockout, Layoff, Retrenchment, Grievance and disciplinaryprocedures, Penalties, Causes, Tripartite & Bipartite Bodies, Grievance Procedure.

Industrial Employment Act, 1946: Information in standing orders, Procedure for submission

UNIT-III

Laws on Wages, Welfare and Social Security: Minimum Wages Act, 1948, Payment of WagesAct, 1936, Payment of Bonus Act, 1965 Laws on Labour Welfare: The Workmen's Compensation Act, 1923, The Employees' State Insurance Act,1948, The Maternity Benefit Act, 1961.Laws on Social Security: The Employee's Provident Fund Act, 1952, The Payment of Gratuity Act, 1972.

UNIT-IV

Laws on Working Conditions: Factories Act, 1948: Health, Welfare, Safety, Working Hours, Annual Leave with wages, Registers and Records. Contract Labour (Regulation and Abolition) Act, 1986 – Child Labour (Prohibition and Regulation Act, 1986)

UNIT-V

Quality of Work Life and Quality Circles: Meaning of quality of work life – Quality Circles- Objectives- Process, Structure and problems- workers participation in management and quality circles – Concept of empowerment.

TEXT BOOKS
1. ArunMonappa (2020). Industrial Relations. New Delhi: Tata McGraw- Hill PublishingcompanyLtd.
2. Mamoria C.B, Mamoria, G. (2021). Dynamics of Industrial Relations. New Delhi: HimalayanPublications,

REFERENCE BOOKS
1. Padhi,P.K.(2012).Labour&IndustrialLaws.NewDelhi:PHILearningP.Ltd.
2. Kapoor, N.D. (2014). Elements of Mercantile Law. New Delhi: S.Chand&Co.
3. Subramani, P N. &Rajendran, G. (2001). Human Resources Management and IndustrialRelations. New Delhi: Himalaya Publishing House.
4. Pylee, P V. & A Simon George. (2007). Industrial relations and personnel Management.New Delhi: Vikas Publishing House Pvt. Ltd., NewDelhi.
5. Verma, P. (1991). Management of Industrial Relations Reading and cases. Oxford andIBH publications

COURSE OUTCOMES:

On completion of the course students will be able to
1. Access the concept and Scope of Industrial Relations and its resolution.
2. Outline the knowledge towards Trade unions, Industrial disputes and GrievanceProcedure.
3. Identify various Laws on Wages, Welfare and Social Security.
4. Illustrate rules and regulations of working conditions.
5. Enlighten on quality standards in industry.

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	2	2	3		-	-	-
CO2	-	-	-	-	-	2	2	3	2	2	-	-
CO3	1	-	-	-	-	-	-	-	2	2	-	3
CO4	-	-	-	-	-	2	2	2	2	-	-	-
CO5	-	-	-	-	-	2	-	-	3	-	-	-

END

(A401601)-DISASTER PREPAREDNESS & PLANNINGMANAGEMENT
(Open Elective – I)

B. Tech (CSE)   **L T P C**

                                                                                     3 0 0 3

UNIT - I

Introduction - Concepts and definitions: disaster, hazard, vulnerability, resilience, risks severity, frequency and details, capacity, impact, prevention, mitigation.

UNIT - II

Disasters - Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

UNIT - III

Disaster Impacts - Disaster impacts (environmental, physical, social, ecological, economic, political, etc.);health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.

UNIT - IV

Disaster Risk Reduction (DRR) - Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

UNIT - V

Disasters, Environment and Development - Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land use changes, urbanization etc.), sustainable and environmentally friendly recovery; reconstruction and development methods.

TEXT BOOKS

1. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
2. Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, RajatPublication.
3. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation

REFERENCE BOOKS

1. http://ndma.gov.in/ (Home page of National Disaster Management Authority)
2. http://www.ndmindia.nic.in/ (National Disaster management in India, Ministry of Home Affairs).
3. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State ofCalifornia, EMSA no.214, June 2003
4. Inter-Agency Standing Committee (IASC) (Feb. 2007). IASC
5. Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC

COURSE OUTCOMES:
On completion of the course students will be able to
1. Analyze impact of disasters
2. Identify the natural and manmade e disasters and its vulnerability
3. Relate the disaster impacts at national and global context
4. Develop strategies to cope with disasters.
5. Build disaster management plan

CO- PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	2	2	-	3	2	1	3
CO2	3	3	2	2	1	2	2	-	3	2	1	3
CO3	3	3	2	2	1	2	2	-	3	2	1	3
CO4	3	3	2	2	1	2	2	-	3	2	1	3
CO5	3	3	2	2	1	2	2	-	3	2	1	3

END

(A401602)- ENVIRONMENTAL IMPACT ASSESSMENT
(Open Elective – I)

B. Tech (CSE)

L T P C
3 0 0 3

UNIT - I:

Introduction: The Need for EIA, Indian Policies Requiring EIA, The EIA Cycle and Procedures, Screening, Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation of Mitigation Measure and EIA Report, Public Hearing, Decision Making, Monitoring the Clearance Conditions, Components of EIA, Roles in the EIA Process. Government of India Ministry of Environment and Forest Notification (2000), List of projects requiring Environmental clearance, Application form, Composition of Expert Committee, Ecological sensitive places, international agreements.

UNIT- II

EIA Methodologies: Environmental attributes -Criteria for the selection of EIA methodology, impact identification, impact measurement, impact interpretation & Evaluation, impact communication, Methods-Ad hoc methods, Checklists methods, Matrices methods, Networks methods, Overlays methods. EIA review- Baseline Conditions -Construction Stage Impacts, post project impacts.

UNIT- III

Environmental Management Plan: EMP preparation, Monitoring Environmental Management Plan, Identification of Significant or Unacceptable Impacts Requiring Mitigation, Mitigation Plans and Relief & Rehabilitation, Stipulating the Conditions, Monitoring Methods, Pre- Appraisal and Appraisal.

UNIT- IV

Environmental Legislation and Life cycle Assessment: Environmental laws and protection acts, Constitutional provisions-powers and functions of Central and State government, The Environment (Protection) Act 1986, The Water Act 1974, The Air act 1981, Wild Life act 1972, Guidelines for control of noise, loss of biodiversity, solid and Hazardous waste management rules. Life cycle assessment: Life cycle analysis, Methodology, Management, Flow of materials-cost criteria case studies.

UNIT- V

Case Studies: Preparation of EIA for developmental projects- Factors to be considered in making assessment decisions, Water Resources Project, Pharmaceutical industry, thermal plant, nuclear fuel complex, Highway project, Sewage treatment plant, Municipal Solid waste processing plant, Air ports.

TEXT BOOKS

1. Anjaneyulu. Y and Manickam. V., Environmental Impact Assessment Methodologies, B.S. Publications, Hyderabad, 2007
2. Barthwal, R. R., Environmental Impact Assessment, New Age International Publishers, 2002

REFERENCE BOOKS

1. Jain, R.K., Urban, L.V., Stracy, G.S., Environmental Impact Analysis, Van Nostrand Reinhold Co., New York, 1991.

2. Rau, J.G. and Wooten, D.C., Environmental Impact Assessment, McGraw Hill Pub. Co., New York, 1996

COURSE OUTCOMES:
On completion of the course students will be able to
1. identify the attributes to be considered for EIA
2. assess impact of deforestation
3. interpret impact prediction, significance of soil quality and mitigation
4. conduct environmental audit and prepare reports
5. illustrate environmental policies and provisions

CO- PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	2	-	-	2	-	3	2	-	3
CO2	3	1	-	2	-	-	2	-	3	2	-	3
CO3	3	1	-	2	-	-	2	-	3	2	-	3
CO4	3	1	-	2	-	-	2	-	3	2	-	3
CO5	3	1	-	2	-	-	2	-	3	2	-	3

END

(A404603) SENSORS & TRANSDUCERS
(Open Elective-II)

B. Tech (CSE)

L	T	P	C
3	0	0	3

Unit – I: Introduction: Definition, principle of sensing & transduction, classification.
Mechanical and Electromechanical sensor: Resistive (potentiometric type): Forms, material, resolution, accuracy, sensitivity. Strain gauge: Theory, type, materials, design consideration, sensitivity, gauge factor, variation with temperature, adhesive, rosettes. Inductive sensor: common types- Reluctance change type, Mutual inductance change type, Magnetostrictive type, material, construction and input output variable, Ferromagnetic plunger type, short analysis.

Unit – II: Capacitive sensors: variable distance-parallel plate type, variable area- parallel plate, serrated plate/teeth type and cylindrical type, variable dielectric constant type, calculation of sensitivity, Proximity sensor. Stretched diaphragm type: microphone, response characteristics. Piezoelectric element: piezoelectric effect, charge and voltage co-efficient, crystal model, materials, natural & synthetic type, their comparison, force & stress sensing, ultrasonic sensors.

Unit – III: Thermal sensors: Resistance change type: RTD materials, tip sensitive & stem sensitive type, Thermistor material, shape, ranges and accuracy specification. Thermoemf sensor: types, thermoelectric power, general consideration, Junction semiconductor type IC and PTAT type. Radiation sensors: types, characteristics and comparison, Pyro electric type.

Unit – IV: Magnetic sensors: Sensor based on Villari effect for assessment of force, torque, proximity, Wiedemann effect for yoke coil sensors, Thomson effect, Hall effect, and Hall drive, performance characteristics. Radiation sensors: LDR, Photovoltaic cells, photodiodes, photo emissive celltypes, materials, construction, response. Geiger counters, Scintillation detectors.

Unit – V: Film Sensors: Thick film and thin film types, Electroanalytic sensors – Electrochemical cell, Polarization types, and membrane electrode types.
Biosensors, Smart/Intelligent sensors, Nano-sensors, Nano-tube sensors, molecular and quantum sensors.

TEXT BOOKS:
1. Sensor & transducers, D. Patranabis, 2nd edition, PHI
2. Instrument transducers, H.K.P. Neubert, Oxford University press.
3. Measurement systems: application & design, E.A.Doebelin, McGraw Hill.

REFERENCE BOOKS
1. Sensor and Transducers, Third Edition, Ian Sinclair, Newnes.
2. Sensor Technology, Hand Book, JON S. Wilson, Newnes.ELSEVIER.
3. Sensor and Transducers, Characteristics, Applications, Instrumentation, Interfacing, Second Edition, M.J.Usher and D.A.Keating, MACMILLAN Press Ltd.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Explain the basic concepts of mechanical and electromechanical sensors, their electrical characteristics.
2. Analyze various capacitor sensors, ultrasonic sensors their electrical characteristics.
3. Compare and elaborate various thermal sensors, principle of operation.
4. Distinguish various magnetic sensors based on their operations, radiation sensors and their operation.
5. Analyze various film sensors and operation of different nano sensors and their applications.

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2										1
CO2	3	2										1
CO3	3	2										1
CO4	3	2										1
CO5	3	2										1

END

(A404604) IMAGE PROCESSING
(Open Elective-II)

B. Tech (CSE)

L	T	P	C
3	0	0	3

Unit- I: Digital Image Fundamentals
Digital Image fundamentals, Components of Digital Image Processing, Sampling and Quantization, Relationship between pixels.
Image Transforms: 2-D FFT, Properties, Walsh transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform.

Unit-II: Image Enhancement (Spatial Domain)
Introduction, Image Enhancement in Spatial domain, Enhancement through point operation, Types of point operation, Histogram manipulation, Linear and nonlinear gray level Transformation, Local or neighborhood operation, Median filter, image Smoothing & Sharpening
Image Enhancement (Frequency Domain)
Filtering in Frequency domain, obtaining frequency domain filters from spatial filters, generating filters directly in the frequency domain, image Smoothing & Sharpening.

Unit- III: Image Restoration
Degradation model, Algebraic approach to restoration, Inverse filtering, least mean square filters, Constrained Least Squares Restoration.

Unit- IV: Image Segmentation
Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation.
Morphological Image Processing: Dilation and Erosion, Structuring Element Decomposition, Opening and Closing, Hit or Miss Transformation.

Unit- V: Image Compression
Redundancies and their removal methods, Fidelity criteria, Image compression models, Huffman and Arithmetic Coding, Error free compression, Lossy compression, Lossy and Lossless Predictive Coding, Transform based Compression, JPEG 2000 Standards.

TEXTBOOKS
1**.** Digital Image Processing – Rafael C. Gonzalez, Rechard E. Woods, 3rd edition. Pearson, 2008
2. Digital Image Processing – S. Jayaraman, S Esakkirajan, T Veerakumar- TMH, 2010

REFERENCE BOOKS
1. Digital Image Processing using MATLAB – Rafael C. Gonzalez, Richard E woods and Steven L. Eddings, 2nd Edition, TMH, 2010.
2. Fundamentals of Digital Image Processing – A. K. Jain, PHI, 1989.
3. Digital Image processing and Computer vision – Somka, Hlavac, Boyle Cengage learning (Indian edition) 2008.
4. Introductory Computer vision Imaging Techniques and Solutions – Adrian low, 2008, 2nd Edition.
5. Introduction to Image Processing & Analysis – John C. Russ, J. Christian Russ, CRC press, 2010.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Describe the fundamentals of digital image processing.
2. Distinguish between spatial domain enhancement and frequency domain enhancement.
3.Explain various image degradation models for image restoration.
4. Analyze the image restoration and segmentation methods.
5. Discriminate between lossless and lossy compression techniques.

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										1
CO2	3	3										1
CO3	3	3	2									1
CO4	3	3	2									1
CO5	3	3	2									1

END

(A402603) ELECTRICAL VEHICLE TECHNOLOGY
(Open Elective-II)

B. Tech (CSE)

L	T	P	C
3	0	0	3

Prerequisites: Basics of Electrical Engineering (or equivalent subject)

Unit-I
Introduction to Hybrid Electric Vehicle:
Review of Conventional Vehicle: Introduction to Hybrid Electric Vehicles: Types of EVs, Hybrid Electric Drive-train, Tractive effort in normal driving

Unit-II
Electric Drives:
Energy consumption Concept of Hybrid Electric Drive Trains, Architecture of Hybrid Electric Drive Trains, Series Hybrid Electric Drive Trains, Parallel hybrid electric drive trains, Electric Propulsion unit, Configuration and control of DC Motor drives, Induction Motor drives, Permanent Magnet Motor drives, switched reluctance motor

Unit- III
Energy Storage:
Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles:- Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Hybridization of different energy storage devices. Sizing the drive system, Design of Hybrid Electric Vehicle and Plug-in Electric Vehicle.

Unit-IV
Energy Management System:
Energy Management Strategies, Automotive networking and communication, EV charging standards, V2G, G2V, V2B, V2H. Business: E-mobility business, electrification challenges, Business- E-mobility business, electrification challenges.

Unit- V
Mobility and Connectors:
Connected Mobility and Autonomous Mobility- case study Emobility Indian Roadmap Perspective. Policy: EVs in infrastructure system, integration of Evs in smart grid, social dimensions of Evs. Connectors- Types of EV charging connector, North American EV Plug Standards, DC Fast Charge EV Plug Standards in North America, CCS (Combined Charging System), CHAdeMO, Tesla, European EV Plug Standards.

TEXTBOOKS
1. Emadi, A. (Ed.), Miller, J., Ehsani, M., "Vehicular Electric Power Systems" Boca Raton, CRC Press, 2003
2. Husain, I. "Electric and Hybrid Vehicles" Boca Raton, CRC Press, 2010.

REFERENCE BOOKS
1. Larminie, James, and John Lowry, "Electric Vehicle Technology Explained" John Wiley and Sons, 2012
2. Tariq Muneer and Irene IllescasGarcía, "The automobile, In Electric Vehicles: Prospects and Challenges", Elsevier, 2017
3. Sheldon S. Williamson, "Energy Management Strategies for Electric and Plug-in Hybrid Electric Vehicles", Springer, 2013

COURSE OUTCOMES:
On completion of the course, students will be able to
1. Explain Hybrid Electric Vehicle technology
2. Understand the operation of various Electric Drives used in Hybrid Electric Vehicle
3. Illustrate various energy storage techniques in Hybrid Electric Vehicle
4. Gain Knowledge on Energy Management Strategies in Hybrid Electric Vehicle
5. Understand the different types of Mobility and Connectors in Hybrid Electric Vehicle

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3								2		
CO2	3	3								2		
CO3	3	3								2		

| CO4 | 3 | 3 | | | | | | | | 2 | | |
| CO5 | 3 | 3 | | | | | | | | 2 | | |

END

(A402604) BASICS OF POWER PLANT ENGINEERING
(Open Elective-II)

B. Tech (CSE)	L	T	P	C
	3	0	0	3

UNIT - I
Coal Based Thermal Power Plants: Basic Rankine cycle and its modifications, layout of modern coal power plant, super critical boilers, FBC boilers, turbines, condensers, steam and heating rates, subsystems of thermal power plants, fuel and ash handling, draught system, feed water treatment, binary cycles and cogeneration systems.

UNIT - II
Gas Turbine and Combined Cycle Power Plants: Brayton cycle analysis and optimization, components of gas turbine power plants, combined cycle power plants, Integrated Gasifier based Combined Cycle (IGCC) systems.

UNIT - III
Basics of Nuclear Energy Conversion: Layout and subsystems of nuclear power plants, Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANDU Reactor, Pressurized Heavy Water Reactor (PHWR), Fast Breeder Reactors (FBR), gas cooled and liquid metal cooled reactors, safety measures for nuclear power plants.

UNIT - IV
Hydroelectric Power Plants: Classification, typical layout and components, principles of wind, tidal, solar PV and solar thermal, geothermal, biogas and fuel cell power systems.

UNIT - V Energy, Economic and Environmental Issues: Power tariffs, load distribution parameters, load curve, capital and operating cost of different power plants, pollution control technologies including waste disposal options for coal and nuclear plants.

TEXT BOOKS
1. Nag P.K., Power Plant Engineering, 3rd ed., Tata McGraw Hill, 2008.
2. El Wakil M.M., Power Plant Technology, Tata McGraw Hill, 2010.

REFERENCE BOOKS
1. Elliot T.C., Chen K and Swanekamp R.C., Power Plant Engineering, 2nd ed., McGraw Hill, 1998.

COURSE OUTCOMES:
On completion of the course, students will be able to
1. Understand the layout of and various components of Coal Based Thermal Power Plants
2. Understand the operation of Gas Turbine and Combined Cycle Power Plants
3. Illustrate the Nuclear Energy Conversion system
4. Explain the operation and Classification, typical layout and components of Hydroelectric Power Plants
5. Understand the different parameters associated with Energy, Economic and Environmental Issues

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1					2	0	0	0
CO2	2	2	2	1					2	0	0	0
CO3	3	3	3	1					2	0	0	0
CO4	3	3	3	1					2	0	0	0
CO5	2	2	2	1					2			0

END

(A405601) FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEMS

(Open Elective-II)

	L	T	P	C
B. Tech (CSE)	**3**	**0**	**0**	**3**

UNIT-I
Introduction to Databases: Introduction, Traditional File-Based Systems, Database Approach, Roles in the Database Environment, Advantages and Disadvantages of DBMS, The Three-Level ANSI-SPARC Architecture, Database Languages, Data Models, Functions of a DBMS, Components of DBMS. Relational Model: Introduction, Terminology, Integrity Constraints, Views. The Relational Algebra: Unary Operations, Set Operations, Join Operations, Division Operation, Aggregation and Grouping Operations.

UNIT–II
SQL: The ISO SQL Data Types, Integrity Enhancement Feature–Domain Constraints, Entity Integrity, Referential Integrity, General Constraints, Data Definition–Creating a Database, creating a Table, changing a Table Definition, removing a Table, Creating an Index, Removing an Index, Views–Creating a View, Removing a View, View Resolution, Restrictions on Views, View Updatability 'WITH CHECK OPTION', Advantages and Disadvantages of Views, View Materialization.

UNIT–III
SQL: Introduction, Data Manipulation–Simple Queries, Sorting Results, Using the SQL Aggregate Functions, Grouping Results, Sub-queries, ALL, Multi-table Queries, EXISTS and NOT EXIST, Combining Result Tables, Database Updates.

UNIT-IV
Advanced SQL: The SQL Programming Language–Declarations, Assignments, Control Statements, Exceptions, Cursors, Subprograms, Stored Procedures, Functions, and Packages, Triggers, Recursion.

UNIT–V
Normalization: The Purpose of Normalization, How Normalization Supports Database Design, Data Redundancy and Update Anomalies, Functional Dependencies in brief, The Process of Normalization,1NF, 2NF, 3NF, BCNF.

TEXTBOOKS
1.Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, McGraw-Hill Education, 2003
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, McGraw-Hill Education

REFERENCE BOOKS
1.Thomas M. Connolly, Carolyn E. Begg, Database Systems–A Practical Approach to Design, Implementation, and Management (6e), Pearson publisher
2. Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, Pearson publisher

COURSE OUTCOMES:
On completion of the course students will be able to
1.Describe Database Management System Architecture.
2.Create, update, modify Relational Database Objects.
3.Manipulate data in Relational Database
4.Develop PL/SQL programs using Cursors, Subprograms, Stored Procedures, Functions, and Packages, Triggers.
5.Explain the purpose of normalization and types of Normal forms.

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1										
CO2	2	2	2	2	2							
CO3	2	2	2	2	2							
CO4	2	2	2	2	2							
CO5	2	2	2	2	2							

**END*

(A405605) WEB PROGRAMMING
(Open Elective-II)

	L	**T**	**P**	**C**
B. Tech (CSE)	**3**	**0**	**0**	**3**

UNIT-I

Structuring Documents for the Web: Introducing HTML and XHTML, Basic Text Formatting, Presentational Elements, Phrase Elements, Lists, Editing Text, Core Elements and Attributes, Attribute Groups Links and Navigation: Basic Links, Creating Links with the **< a>** Element, Advanced E- mail Links. Images, Audio, and Video: Adding Images Using the **<img>** Element, Using Images as Links Image Maps, Choosing the Right Image Format, Adding Flash, Video and Audio to your web pages. Tables: Introducing Tables, Grouping Section of a Table, Nested Tables, Accessing Tables Forms: Introducing Forms, Form Controls, Sending Form Data to the Server Frames: Introducing Frameset, <frame>Element, Creating Links Between Frames, setting a Default Target Frame Using **<base>**Element, Nested Framesets, Inline or Floating Frames with **<iframe>**. Changing font size, color of text using <font> Element, scrolling text/image using <marquee> Element

UNIT-II

Cascading Style Sheets: Introducing CSS, where you can Add CSS Rules. **CSS Properties**: Controlling Text, Text Formatting, Text Pseudo Classes, Selectors, Lengths, Introducing the Box Model. **More Cascading Style Sheets:** Links, Lists, Tables, Outlines, the: focus and: activate Pseudo classes Generated Content, Miscellaneous Properties, Additional Rules, Positioning and Layout with CSS, **Page Layout**: Understating the Site's Audience, Page Size, Designing Pages, coding your Design, Developing for Mobile Devices. **Design Issues:** Typography, Navigation, Tables, Forms.

UNIT-III

Learning JavaScript: How to Add Script to Your Pages, the Document Object Model, Variables, Operators, Functions, Control Statements, Looping, Events, Built- In Objects, Working with JavaScript: Practical Tips for Writing Scripts, Form Validation, Form Enhancements, JavaScript Libraries. Putting Your site on the web: Meta tags, testing your site, Taking the Leap to Live, Telling the World about your site, Understanding your visitors.

UNIT-IV

XML - Introduction, XML Basics, Structuring Data, XML Namespaces, Document Type Definitions (DTDs), W3C XML Schema Documents, XML Vocabularies, Extensible Style sheet Language and XSL Transformations, Document Object Model (DOM).

UNIT-V

Ajax-Enabled Rich Internet Applications: introduction, history of Ajax, traditional web applications Vs Ajax Applications, RIAs with Ajax, Ajax example using XML HttpRequest object, XML and DOM, creating full scale Ajax-enabled application, Dojo Toolkit.

TEXTBOOK
1. Jon Duckett, Beginning HTML, XTML, CSS and JavaScript
2. Dietel and Dietel : "Internet and World Wide Web - How to Program", 5th Edition, PHI/Pearson Education, 2011.

REFERENCE BOOKS
1. Chris Bates, Web Programming
2. M. Srinivasan, Web Technology: Theory and Practice
3. Achyut S. Godbole, AtulKahate, Web Technologies
4. Kogent Learning Solutions Inc, Web Technologies Black Book
5. Ralph Moseley and M. T. Savaliya, Developing Web Applications

COURSE OUTCOMES:
On completion of the course students will be able to
1. write well-structured, easily maintained, standards-compliant, accessible HTML code.
2. write well-structured, easily maintained, standards-compliant CSS code to present HTML pages in different way
3. use JavaScript to add dynamic content to pages.
4. effectively debug JavaScript code, making use of good practice and debugging tools.
5. use JavaScript to access and use web services for dynamic content (AJAX, JSON, etc.)

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2	2	2	2							2
CO2		2	2	2	2							2
CO3		2	2	2	2				2			2
CO4		2	3	3	3				2	2		3
CO5		2	3	3	3				2	2		3

END

(A403603) FUNDAMENTALS OF MANUFACTURING PROCESSES
(Open Elective-II)

B. Tech (CSE)

L	T	P	C
3	0	0	3

UNIT – I
Casting: Steps involved in making a casting – Advantage of casting and its applications; Patterns - Pattern making, Types, Materials used for patterns, pattern allowances and their construction; Properties of moulding sands. Methods of Melting - Crucible melting and cupola operation – Defects in castings; Casting processes – Types – Sand moulding, Centrifugal casting, die- casting, Investment casting, shell moulding; Principles of Gating – Requirements – Types of gates, Design of gating systems – Riser – Function, types of Risers and Riser design.

UNIT – II
Welding: Classification – Types of welds and welded joints; Gas welding - Types, oxy-fuel gas cutting. Arc welding, forge welding, submerged arc welding, Resistance welding, Thermit welding. Inert Gas Welding - TIG Welding, MIG welding, explosive welding, Laser Welding; Soldering and Brazing; Heat affected zone in welding. Welding defects – causes and remedies; destructive and non- destructive testing of welds.

UNIT – III
Hot working, cold working, strain hardening, recovery, recrystallisation, and grain growth. Stamping, forming, and other cold working processes. Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning. Types of presses and press tools. Forces and power requirement in the above operations.

UNIT – IV
Extrusion of Metals: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion – Extruding equipment – Tube extrusion and pipe making, Hydrostatic extrusion. Forces in extrusion

UNIT – V
Forging Processes: Forging operations and principles – Tools – Forging methods – Smith forging, Drop Forging – Roll forging – Forging hammers: Rotary forging – forging defects –cold forging, swaging, Forces in forging operations.

TEXT BOOKS:
1. Manufacturing Technology / P.N. Rao / Mc Graw Hill
2. Manufacturing Engineering and Technology/Kalpakjin S/ Pearson.

REFERENCE BOOKS
1. Metal Casting / T.V Ramana Rao / New Age
2. Métal Fabrication Technology/ Mukherjee/PHI

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand the idea for selecting materials for patterns.
2. Learn different types and allowances of patterns used in casting and analyze the components of moulds.
3. Design core, core print and gating system in metal casting processes Understand arc, gas, solid state and resistance welding processes.
4. Develop process-maps for metal forming processes using plasticity principles.
5. Identify the effect of process variables to manufacture defect free products.

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	1	1		-	-	-	1	1
CO2	2	2	2	2			1	-	-	-	1	1
CO3	2	2	2	2			1	-	-	-	1	1
CO4	2	2	2	2			1	-	-	-	1	1
CO5	3	3	3	2	2	2		-	-	-	1	1

END

(A403604) FUNDAMENTALS OF AUTOMOBILE ENGINEERING
(Open Elective-II)

B. Tech (CSE)

L	T	P	C
3	0	0	3

Unit – I
Introduction: Components of four-wheeler automobile – chassis and body – power unit – power transmission rear wheel drive, front wheel drive, 4-wheel drive – types of automobile engines, engine construction – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, re boring, decarburization

Unit – II
Fuel System: S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pumps – Carburetor – types – air filters – petrol injection.
C.I. Engines: Requirements of diesel injection systems, types of injection systems, fuel pump, nozzle, Alternative fuels for Automobiles-injection, Classification, Properties, Hybrid vehicles injection timing, testing of fuel, pumps.
Cooling System: Cooling Requirements, Air Cooling, Liquid Cooling and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporating cooling – pressure sealed cooling – antifreeze solutions.

Unit – III
Electrical System: Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc.
Ignition System: Function of an ignition system, battery ignition system, constructional features of storage battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

Unit – IV
Transmission System: Clutches, principle, types- cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – Gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box, over drive torque converter.
Propeller shaft – Hoatch – Kiss drive, Torque tube drive universal joint, differential rear axles – types – wheels and tyres.
Steering System: Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism

Unit-V Suspension System: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, independent suspension system.
Braking System: Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder tandem master cylinder Requirement of brake fluid, Pneumatic and vacuum brakes.

TEXTBOOKS
1. Automobile Engineering, Vol. 1 & Vol. 2/ Kripal Singh
2. Automobile Engineering, Vol. 1 & Vol. 2, by K.M Gupta, Umesh publication

REFERENCE BOOKS
1. A System approach to Automotive Technology by Jack Erjavec YesDee publishing Pvt Ltd.
2. Automobile Engineering / William Crouse
3. Automotive Mechanics / Heitner
4. Alternative fuels of Automobiles by P. Rami Reddy, Frontline publications.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Identify power generation, transmission and control mechanisms in an automobile
2. Manipulate the chemical, thermal, mechanical and electrical energies in an automobile
3. Infer the interaction between subsystems
4. Analyze how transmission system works
5. Learn different components of suspension systems.

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	1	1	1	3	3	-	-	-	-	3
CO2	3	-	1	1	1	3	3	-	-	-	-	3
CO3	3	-	3	2	1	3	3	-	-	-	-	3
CO4	3	-	3	2	1	3	3	-	-	-	-	3
CO5	3	-	1	1	1	3	3	-	-	-	-	3

END

A400603 – ENTREPRENEURSHIP
(Open Elective-II)

B. Tech (CSE)

L	T	P	C
3	0	0	3

Unit I

Understanding Entrepreneurial Mindset- The revolution impact of entrepreneurship- The evolution of entrepreneurship- Approaches to entrepreneurship- Process approach- Twenty first centaury trends in entrepreneurship.

Unit II

The individual entrepreneurial mind-set and Personality- The entrepreneurial journey- Stress and the entrepreneur- the entrepreneurial ego- Entrepreneurial motivations. Corporate Entrepreneurial Mindset- the nature of corporate entrepreneur- conceptualization of corporate entrepreneurship Strategy-sustaining corporate entrepreneurship.

Unit III

Launching Entrepreneurial Ventures- opportunities identification- entrepreneurial Imagination and Creativity- the nature of the creativity process-Innovation and entrepreneurship. Methods to initiate Ventures-Creating new ventures-Acquiring an Established entrepreneurial venture- Franchising-hybrid- disadvantage of Franchising.

Unit IV

Legal challenges of Entrepreneurship-Intellectual property protection-Patents, Copyrights-Trademarks and Trade Secrets-Avoiding trademark pitfalls. Formulation of the entrepreneurial Plan- The challenges of new venture start-ups, Poor financial Understanding-Critical factors for new venture development-The Evaluation Process-Feasibility criteria approach.

Unit V

Strategic perspectives in entrepreneurship- Strategic Planning-Strategic actions- strategic positioning-Business stabilization- Building the adaptive firms-Understanding the growth stage- Unique managerial concern of growing ventures.

COURSE OUTCOMES:

1. Identify the evolution and approaches of Entrepreneurship.
2. Analyze and develop the conceptualization of corporate Entrepreneurship Personality.
3. Explore different possibilities to start an Enterprise for young Entrepreneurs.
4. Outline challenging benchmarks for formulation of Entrepreneurship.
5. Evaluate the application of Strategic action for growing ventures.

TEXT BOOKS

1. D F Kuratko and T V Rao "Entrepreneurship- A South-Asian Perspective "Cengage Learning, 1st edition, 2012. **(For PPT, Case Solutions Faculty may visit : login.cengage.com)**
2. Vasant Desai "Small Scale industries and entrepreneurship" Himalaya publishing, 9th Edition, 2017.
3. Rajeev Roy "Entrepreneurship" 3e, Oxford, 2020.

REFERENCE BOOKS

1. B.Janakiram and M.Rizwana" Entrepreneurship Development :Text & Cases, ExcelBooks, 1st Edition,2011.
2. Stuart Read, Effectual Entrepreneurship, Routledge, 2nd Edition, 2016.
3. Robert Hisrich et al "Entrepreneurship" 6th e, TMH, 2012.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	2
CO2	-	-	-	-	-	-	-	-	3	3	-	2
CO3	3	2	3	-	-	2	2	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	2	3
CO5	-	-	3	-	3	-	-	-	-	3	2	-

END

A400604 - ETHICS IN BUSINESS & CORPORATE GOVERNANCE
(Open Elective-II)

B. Tech (CSE)

L	T	P	C
3	0	0	3

Unit – I: Business Ethics in the Changing Environment: Business Ethics, Levels of Business Ethics, Myths about Business Ethics, Stages of Moral Development Kohlberg's Study, Carol Gilligan's Theory, Principles of Ethics.

Unit – II: Professional Ethics: Introduction to Professional Ethics, Ethics in Production and Product Management, Ethics of Marketing Professionals, Ethics in HRM, Ethics of Finance and Accounting Professionals, Ethics of Advertisement, Ethics of Media Reporting, Ethics of Healthcare Services. Ethical Dilemma, Mounting Scandals, Ethical Issues, Preparatory Ethics: Proactive Steps, Cyber Ethics.

Unit – III: Corporate Governance: Introduction to Corporate Governance, Major Corporate Governance Failures, Need for Corporate Governance, Corporate Governance in India, Theories of Corporate Governance: Agency Theory, Stewardship Theory and Stakeholder Theory, Problems of Governance in Companies, Role of Capital Markets, Regulator, Government in Corporate Governance.

Corporate Governance Codes and Committees: Global Reporting Initiative, OECD Principles, Cadbury Committee Report, Kumara Mangalam Birla Committee Report, Naresh Chandra Committee Report, Narayana Murthy Committee Report, SEBI Clause 49 Guidelines, Corporate Governance Committees.

Unit – IV: Role of Board: Types of Directors Functions of the Board, Structure of the Board, Role of the Board in Subcommittees, Audit, Compensation Committee, Role, Duties and Responsibilities of Directors, Conflicts of Interest, Remedial Actions. Governance Ratings,Merits and Demerits of Governance Ratings.

Unit – V: Corporate Social Responsibility (CSR): Models for Implementation of CSR, Scope of CSR, Steps to attain CSR, Business Council for Sustainable Development (BCSD) India, Ethics and Social Responsibility of Business, Social Responsibility and Indian Corporations,CSR as a Business Strategy for Sustainable Development, CSR Committee, Recent Amendments in Companies Act (Sec:135).

TEXT BOOKS

1. Jyotsna G B, R C Joshi, Business Ethics and Corporate Governance, TMH, 1e, 2019.
2. Martin J. Ossewaarde, Introduction to Sustainable Development, sage,1e,2018.

REFERENCE BOOKS

1. T.N. Sateesh Kumar, Corporate Governance, Oxford University Press, 2015.
2. SK Mandal, Ethics in Business and Corporate Governance, TMH, 2/e,2017.
3. Archie. B Carroll, Business Ethics-Brief Readings on Vital Topics, Routledge, 2013.
4. A.C. Fernando, Corporate Governance: Principles, Policies and Practices, 2nd Edition, Pearson,2018.
5. C.S.V. Murthy, Business Ethics, 1st Edition, Himalaya Publishing House,2019.
6. N. Balasubramanian, Corporate Governance and Stewardship,TMH,2012.
7. Nina Godbole &SunitBelapure, Cyber Security, wileyindia, 2012.
8. Joseph W.Weiss, Business Ethics, Thomson,2006.
9. Geethika, RK Mishra, Corporate Governance Theory andPractice,Excel,2013.
10. Dr.S.S. Khanka, Business Ethics and Corporate Governance, S.Chand,2013.
11. K. Praveen Parboteeach, Business Ethics, Routledge,2019.
12. Praveen B Malla, Corporate Governance, Routledge2016.

COURSE OUTCOMES:
Students will be able to

1. Understand the Need for Business Ethics and Corporate Governance in India.
2. Apply Knowledge of Established Methodologies of Solving Professional Ethical Issues.
3. Learn Codes and Committees in Corporate Governance.
4. Understand the Role of Board in Corporate Governance.
5. Assess the Stakeholder perspective of Corporate Governance.

CO- PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	3	3	2	3	-	3
CO2	-	-	-	-	-	-	3	3	2	2	-	3
CO3	3	-	-	-	3	-	-	-	-	-	3	-
CO4	-	-	-	-	-	3	3	3	-	-	-	-
CO5	-	-	-	-	3	2	3	-	-	-	2	3

END

(A401603) REMOTE SENSING & GEOGRAPHICAL INFORMATION SYSTEMS

(Open Elective-II)

B. Tech (CSE)   **L T P C**
                                                                3 0 0 3

UNIT I

Introduction to Photogrammetry: Principles and types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement to single vertical aerial photograph, height measurement based on relief displacement, Fundamentals of stereoscopy, fiducial points, parallax measurement using fiducial line.

UNIT II

Remote Sensing: Basic concept of remote sensing, Data and Information, Remote sensing data collection, Remote sensing advantages & Limitations, Remote Sensing process. Electromagnetic Spectrum, Energy interactions with atmosphere and with earth surface features (soil, water, vegetation), Indian Satellites and Sensors characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.

UNIT III

Geographic Information System: Introduction to GIS; components of a GIS; Geo spatial Data: Spatial Data- Attribute Data-Joining Spatial and attribute data; GIS Operations: Spatial Data Input – Attribute data Management -Data display Data Exploration – Data Analysis.
Coordinate Systems: Geographic coordinate System: approximation of the Earth, Datum; Map Projections: Types of Map Projections – Map projection parameters – Commonly used Map Projections- Projected coordinate Systems.

UNIT IV

Vector Data Model: Representation of simple features – Topology and its importance; coverage and its data structure, Shape fire; Data models for compost feature Object Based Vector Data Model; Classes and their Relationship; The geo-base data model; Geometric representation of Spatial Feature and data structure, Tomography rules.

UNIT V

Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data conversion, Integration of Raster and Vector data. Data Input: Metadata, on version of Existing data, creating new data; remote sensing data, filed data

COURSE OUTCOMES:

On completion of the course students will be able to

1. illustrate the principles of photogrammetry.
2. make use of remote sensing process
3. utilize GIS principles in real life.
4. explain the concepts of topology, OBVDM and tomography.
5. develop the geospatial data model with various file formats.

TEXTBOOKS
1. Remote Sensing and GIS, M. Anji Reddy JNTU Hyderabad, B.S. Publications.
2. Basics of remote sensing & GIS by A. Kumar, Laxmi publications.

REFERENCE BOOKS
1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W Young, PHI.
2. Introduction to GIS, Kang,Tsurg Charg.Tata McGraw Hill Education Private Ltd.

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	3	2	-	3
CO2	3	3	-	-	-	-	-	-	3	2	-	3
CO3	3	3	-	-	-	-	-	-	3	2	-	3
CO4	3	3	-	-	-	-	-	-	3	2	-	3
CO5	3	3	-	-	-	-	-	-	3	2	-	3

END

(A401604)-SOLID WASTE MANAGEMENT
(Open Elective-II)

B. Tech (CSE)

L	T	P	C
3	0	0	3

UNIT - I

Solid Waste: Definitions, Types of solid wastes, sources of solid wastes, Characteristics, and perspectives; properties of solid wastes, Sampling of Solid wastes, Elements of solid waste management - Integrated solid waste management, Solid Waste Management Rules 2016.

UNIT - II

Engineering Systems for Solid Waste Management: Solid waste generation; on-site handling, storage and processing; collection of solid wastes; Stationary container system and Hauled container systems – Route planning - transfer and transport; processing techniques.

UNIT- III

Engineering Systems for Resource and Energy Recovery: Processing techniques; materials recovery systems; recovery of biological conversion products – Composting, pre and post processing, types of composting, Critical parameters, Problems with composing - recovery of thermal conversion products; Pyrolisis, Gasification, RDF - recovery of energy from conversion products; materials and energy recovery systems.

UNIT- IV

Landfills: Evolution of landfills – Types and Construction of landfills – Design considerations – Life of landfills- Landfill Problems – Lining of landfills – Types of liners – Leachate pollution and control – Monitoring landfills – Landfills reclamation.

UNIT- V

Hazardous waste Management: – Sources and characteristics, Effects on environment, Risk assessment – Disposal of hazardous wastes – Secured landfills, incineration - Monitoring – Biomedical waste disposal, E-waste management, Nuclear Wastes, Industrial waste Management

TEXT BOOKS

1. Tchobanoglous G, Theisen H and Vigil SA 'Integrated Solid Waste Management, EngineeringPrinciples and Management Issues' McGraw-Hill, 1993.
2. Vesilind PA, Worrell W and Reinhart D, 'Solid Waste Engineering' Brooks/Cole Thomson LearningInc., 2002.

REFERENCE BOOKS

1. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, 'Environmental Engineering', McGraw Hill Inc.,New York, 1985.
2. Qian X, Koerner RM and Gray DH, 'Geotechnical Aspects of Landfill Design and Construction'Prentice Hall, 2002.

COURSE OUTCOMES:

On completion of the course students will be able to
1. Explain the sources of solid waste and its impact
2. Describe the process of solid waste and its management
3. Illustrate the process of handling hazardous wastes
4. Classify various biomedical waste management systems
5. Apply e-waste management techniques

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	1	-	-	-	-	3	2	1	3
CO2	3	2	-	1	-	-	-	-	3	2	1	3
CO3	3	2	-	1	-	-	-	-	3	2	1	3
CO4	3	2	-	1	-	-	-	-	3	2	1	3
CO5	3	2	-	1	-	-	-	-	3	2	1	3

END

(A404605) FUNDAMENTALS OF EMBEDDED SYSTEMS
(Open Elective-III)

B. Tech (CSE)

L	T	P	C
3	0	0	3

Unit- I
Introduction to Embedded Systems
Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems

Unit- II
Typical Embedded System
Core of the Embedded System: General Purpose and Domain Specific Processors, Memory, ROM, RAM, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: On-board and External Communication Interfaces.

Unit –III
Embedded Firmware
Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

Unit – IV
RTOS Based Embedded System Design
Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

Unit – V
Task Communication
Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/ Synchronization issues, Task Synchronization Techniques, Device Drivers

TEXTBOOKS
1. Introduction to Embedded Systems – Shibu K.V. McGraw Hill
2. Embedded Systems – Raj Kamal, TMH

REFERENCE BOOKS
1. Embedded System Design – Frank Vahid, Tony Givargis, John Wiley.
2. Embedded Systems – Lyla, Pearson, 2013
3. An Embedded Software Primer- David E Simon, Pearson Education

COURSE OUTCOMES:
   1. On completion of the course students will be able to
2. Explain the basics of embedded systems and classify its applications
3. Compare various types of memories, sensors and Input / Output devices.
4. Summarize the embedded firmware for various applications.
5. Interpret the characteristics of Real time operating Systems
6. Illustrate the concepts of shared memory and task communications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3	1	1									
CO3	2											1
CO4	2	1	1	1								
CO5	3				1							

END

(A404606) DATA COMMUNICATIONS
(Open Elective-III)

B.Tech(CSE)

L	T	P	C
3	0	0	3

Unit I

Introduction to data communications, networking, signals, noise, modulation and demodulation. Data communication network architecture, layered network architecture, open systems interconnection, data communications circuits, serial and parallel data transmission, data communications circuit arrangements, data communication networks, alternate protocol suites. Information capacity, bits, bit rate, baud, and M-ARY encoding.

Unit II

Metallic cable transmission media & optical fiber transmission media: metallic transmission lines, transverse electromagnetic waves, characteristics of electromagnetic waves, transmission line classifications, metallic transmission line types, metallic transmission line equivalent circuit, wave propagation on metallic transmission lines, metallic transmission line losses, block diagram of an optical fiber communications system, optical fiber versus metallic cable facilities.

Unit III

Digital transmission & multiplexing and t-carriers digital transmission: pulse modulation, pulse code modulation, dynamic range, signal–to-quantization noise voltage Ratio, linear versus nonlinear PCM codes
Multiplexing: Time- division multiplexing, t1 digital carrier system, north American digital multiplexing hierarchy, digital line encoding, t carrier systems, European digital carrier system, statistical time – division multiplexing, frame synchronization, frequency- division multiplexing, wavelength- division multiplexing, synchronous optical network

Unit IV

Telephone instruments and signals: The subscriber loop, standard telephone set, basic telephone call procedures, call progress tones and signals, cordless telephones, caller id, electronic telephones, paging systems.
The telephone circuit: The local subscriber loop, telephone message- channel noise and noise weighting, units of powers measurement, transmission parameters and private-line circuits, voice-frequency circuit arrangements, crosstalk.

Unit V

Data communication codes, bar codes, error control, error detection, error correction, data formats, data communications hardware, character synchronization.

TEXTBOOKS

1. Introduction to Data Communications and Networking, Wayne Tomasi, Pearson Education.

REFERENCE BOOKS

1.Data Communications and Networking, Behrouz A Forouzan, Fourth Edition.Tmh.
2. Computer Communications and Networking Technologies, Gallow, Secondedition Thomson
3. Computer Networking and Internet, Fred Halsll, Lingana Gouda Kulkarni, Fifth Edition, Pearson Education

COURSE OUTCOMES:

On completion of the course students will be able to
1. Explain the basic concepts of data communication systems.
2. Distinguish various types of transmission medias for data communications.
3. Compare different multiplexing techniques for digital transmission
4. Analyze different telephone instruments, signal and circuits
5. Identify different error detecting and correcting codes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2									2
CO2	3	3	2									2
CO3	3	3	2									2
CO4	3	3	2									2
CO5	3	3	2									2

END

(A402605) NANO TECHNOLOGY
(Open Elective-III)

B. Tech (CSE)

L	T	P	C
3	0	0	3

UNIT I
INTRODUCTION
History and Scope, Can Small Things Make a Big Difference? Classification of Nanostructured Materials, Fascinating Nanostructures, Applications of Nanomaterials, Nature: The Best of Nanotechnologist, Challenges, and Future Prospects.

UNIT II
UNIQUE PROPERTIES OF NANOMATERIALS
Microstructure and Defects in Nanocrystalline Materials: Dislocations, Twins, stacking faults and voids, Grain Boundaries, triple and declinations, Effect of Nano-dimensions on Materials Behavior: Elastic properties, Melting Point, Diffusivity, Grain growth characteristics, enhanced solid solubility. Magnetic Properties: Soft magnetic nano crystalline alloy, Permanent magnetic nano-crystalline materials, Giant Magnetic Resonance, Electrical Properties, Optical Properties, Thermal Properties, and Mechanical Properties.

UNIT III
SYNTHESIS ROUTES
Bottom up approaches: Physical Vapor Deposition, Inert Gas Condensation, Laser Ablation, Chemical Vapor Deposition, Molecular Beam Epitaxy, Solgel method, Self-assembly, Top down approaches: Mechanical alloying, Nanolithography, Consolidation of Nano powders: Shock wave consolidation, Hot isostatic pressing and Cold isostatic pressing, Spark plasma sintering.

UNIT IV
TOOLS TO CHARACTERIZE NANO MATERIALS
X-Ray Diffraction (XRD), Small Angle X-ray scattering (SAXS), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Scanning Tunneling Microscope (STM), Field Ion Microscope (FEM), Three-dimensional Atom Probe (3DAP), Nanoindentation.

UNIT V
APPLICATIONS OF NANOMATERIALS
Nano-electronics, Micro- and Nano-electromechanical systems (MEMS/NEMS), Nano sensors, Nano catalysts, Food and Agricultural Industry, Cosmetic and Consumer Goods, Structure and Engineering, Automotive Industry, Water Treatment and the environment, Nano-medical applications, Textiles, Paints, Energy, Défense and Space Applications, Concerns and challenges of Nanotechnology.

TEXT BOOKS
1. Text Book of Nano Science and Nano Technology – B.S. Murthy, P. Shankar, Baldev Raj, B.B. Rath and James Munday, University Press-IIM.
2. Introduction to Nanotechnology – Charles P. Poole, Jr., and Frank J. Owens, Wley India Edition, 2012.

REFERENCES BOOKS
1. Nano: The Essentials by T. Pradeep, McGraw- Hill Education.
2. Nanomaterials, Nanotechnologies and Design by Michael F. Ashby, Paulo J. Ferreira and Daniel L. Schodek.
3. Transport in Nano structures- David Ferry, Cambridge University press 2000
4. Nanofabrication towards biomedical application: Techniques, tools, Application and impact – Ed. Challa S., S. R. Kumar, J. H. Carola.
5. Carbon Nanotubes: Properties and Applications- Michael J. O'Connell.
6. Electron Transport in Mesoscopic systems - S. Dutta, Cambridge University press

COURSE OUTCOMES:
On completion of the course, students will be able to
1. Classify nanostructured materials
2. Illustrate the characteristics and properties of nano-materials.
3. Identify the synthesis routes of nano-materials
4. Make use of the tools to characterize the nano-materials.

5. Utilize the nanomaterials for various applications

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2						2		
CO2	3	3	3							2		
CO3	3	3								2		
CO4	3	3			2					2		
CO5	3	3								2		

END

(A402606) EV BATTERIES & CHARGING SYSTEM
(Open Elective-III)

L	T	P	C
3	0	0	3

B. Tech (CSE)

Prerequisites: Basics of Electrical Engineering (or equivalent subject)

UNIT I
Battery parameters:
Cell and battery voltages, Charge (or Amphour) capacity, Energy stored, Energy density, Specific power, Amphour (or charge) efficiency, Energy efficiency, Self-discharge rates, Battery geometry, Battery temperature, heating and cooling needs, Battery life and number of deep cycles

UNIT II EV Batteries:
Lead Acid Batteries Lead acid battery basics, Special characteristics of lead acid batteries, Battery life and maintenance, Batter
y charging, Summary Nickel-based Batteries Introduction, Nickel cadmium, Nickel metal hydride batteries

UNIT III
Sodium, Lithium and Metal air batteries:
Sodium-based Batteries Introduction, Sodium Sulphur batteries, Sodium metal chloride (Zebra) batteries Lithium Batteries Introduction, The lithium polymer battery, The lithium ion battery Metal Air Batteries Introduction, The aluminum air battery, The zinc air battery

UNIT IV
Charging Infrastructure:
Domestic Charging Infrastructure, Public Charging Infrastructure, Normal Charging Station, Occasional Charging Station, Fast Charging Station, Battery Swapping Station, Move-and-charge zone.

UNIT V
EV Charging   Battery Chargers:
Charge equalization, Conductive (Basic charger circuits, Microprocessor based charger circuit. Arrangement of an off-board conductive charger, Standard power levels of conductive chargers, Inductive (Principle of inductive charging, Soft-switching power converter for inductive charging), Battery indication methods

TEXTBOOKS
  1. James Larminie Oxford Brookes University, Oxford, UK John Lowry Acenti Designs Ltd., UK, Electric Vehicle Technology Explained
  2. C.C Chan, K.T Chau: Modern Electric Vehicle Technology, Oxford University Press Inc., New York 2001.

REFERENCE BOOKS
  1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
  2. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.

COURSE OUTCOMES:
On completion of the course, students will be able to
  1. Gain knowledge on various battery parameters
  2. Classify different types of EV batteries
  3. Illustrate Sodium, Lithium and Metal air batteries
  4. Understand the different types of Charging Infrastructure.
  5. Understand the operation of EV Charging   Battery Chargers

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3								2		
CO2	3	3								2		
CO3	3	3								2		
CO4	3	3								2		
CO5	3	3								2		

END

(A405603) FUNDAMENTALS OF COMPUTER NETWORKS
(Open Elective-III)

	L	**T**	**P**	**C**
B. Tech (CSE)	**3**	**0**	**0**	**3**

UNIT-I
Fundamental of Data Communication and Computer Network: Components, Data Representation, Data Flow, Data and Signal, Classification Network: LAN, WAN, MAN, **Network Architecture:** Peer to Peer, Client Server Network, History of Internet.

UNIT-II
Network Model: OSI Reference Model and TCP/IP Protocol Suit
Network Connecting Devices: Hub, Switch, Router, Repeater, Bridge, Gateway, Modem
Network Topologies: Types of Topology-Bus, Ring, Star, Mesh, Tree, Hybrid, and IEEE Standards.

UNIT-III
Physical Layer: Guided Transmission Media and Unguided Transmission Media
Data Link Layer: Design Issues, Error Detection and Correction, Simplex Stop and wait protocol.

UNIT-IV
Network Layer: Design Issues, Routing Algorithm: Shortest Path Routing algorithm, Congestion Control, IPv4, IPv6, DHCP
Transport Layer: Process to process Delivery, Addressing, UDP and TCP, Error control and flow control.

UNIT-V
Application Layer: Domain Name System, E-Mail, FTP, WWW and Http.
Network Security: Cryptography, Symmetric Key and Public Key, Firewall, VPN, Web Security

TEXTBOOKS
1. Computer Networks, Andrew S Tanenbaum, David. j. Wetherall, 5th Edition.Pearson Education/PHI
2. Data Communications and Networking – Behrouz A. Forouzan. 3rd Edition, TMH.

REFERENCE BOOKS
1. An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition, Pearson Education.
2. Computer Networking a Top-Down Approach – Kurose James F, Keith W, 6th Edition, Pearson
3. Data communication and Networks - Bhusan Trivedi, Oxford university press, 2016.

COURSE OUTCOMES:
On completion of the course students will be able to
1 Explain the Data in communication and two types of networks architecture.
2 Compare OSI Reference model and TCP/IP Protocol Suit and able to Sketch the different topologies and network connecting devices.
3 Describe about Transmission media in Physical layer and Analyze the Error detection and correction methods in Data link layer.
4 Apply knowledge in developing routing algorithm and Explain transport layer protocols.
5 Examine the Application layer Protocols and Analyze various network security approaches.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		2								
CO2	2	2		2								
CO3	2	2		2								
CO4	2	2	2	2								
CO5	2	2	2	2								

END

(A405606) Fundamentals of DEVOPS
(Open Elective-III)

B. Tech (CSE)

L	T	P	C
3	0	0	3

UNIT - I
Introduction: Introduction, Agile development model, DevOps, and ITIL. DevOps process and Continuous Delivery, Release management, Scrum, Kanban, delivery pipeline, bottlenecks, examples

UNIT - II
Software development models and DevOps: DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing.
DevOps influence on Architecture: Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Microservices, and the data tier, DevOps, architecture, and resilience.

UNIT - III
Introduction to project management: The need for source code control, The history of source code management, Roles and code, source code management system and migrations, Shared authentication, Hosted Git servers, Different Git server implementations, Docker intermission, Gerrit, The pull request model, GitLab.

UNIT - IV
Integrating the system: Build systems, Jenkins build server, managing build dependencies, Jenkins plugins, and file system layout, The host server, build slaves, Software on the host, Triggers, Job chaining and build pipelines, Build servers and infrastructure as code, Building by dependency order, Build phases, Alternative build servers, Collating quality measures.

UNIT - V
Testing Tools and automation: Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development Deployment of the system: Deployment systems, Virtualization stacks, code execution at the client,
Puppet master and agents, Ansible, Deployment tools: Chef, Salt Stack and Docker

TEXTBOOKS
1. Joakim Verona. Practical Devops, Second Edition. Ingram short title; 2nd edition (2018). ISBN-10: 1788392574
2. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications. ISBN: 9788126579952

REFERENCE BOOKS
1. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley; ISBN-10,

COURSE OUTCOMES:
On successful completion of this course, students will be able to
1. Identify components of Devops environment
2. Describe Software development models and architectures of DevOps
3. Apply different project management, integration, testing and code deployment tool
4. Investigate different DevOps Software development models
5. Assess various Devops practices and collaborate and adopt Devops in real-time projects

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					2							2
CO2		3										2
CO3			3	3							2	2
CO4			3	3					1	1	2	2
CO5				3					2	1	2	2

END

(A403605) INDUSTRIAL SAFETY ENGINEERING
(Open Elective III)

B. Tech (CSE)

L	T	P	C
3	0	0	3

UNIT-I

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

UNIT-II

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relationship with replacement economy, Service life of equipment.

UNIT-III

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT-IV

Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault-finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

UNIT-V

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

TEXT BOOKS
1. Mobley, R. Keith, Lindley R. Higgins, and Darrin J. Wikoff. *Maintenance Engineering Handbook*. New York, NY: Mcgraw-Hill, 2008.
2. Garg, H. P. *Industrial Maintenance*. S Chand, 1976.

REFERENCE BOOKS
1. Graham, F. D. "Audels Pumps, Hydraulics and Air Compressors. Theo." (1998).
2. Winterkorn, Hans F., and Hsai-Yang Fang. *Foundation engineering handbook*. Springer, Boston, MA, 1991.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand various hazards and their prevention.
2. Apply maintenance techniques to various equipment.
3. Understand types of wear and corrosions and their prevention.
4. Explain fault tracing and its applications.
5. Apply periodic and preventive maintenance techniques to various equipment.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12
CO1	3	3	3	3	1	-	-	-	1	-	3	3
CO2	3	3	3	3	1	-	-	-	1	-	3	3
CO3	3	3	3	3	1	-	-	-	1	-	3	3
CO4	3	3	3	3	1	-	-	-	1	-	3	3
CO5	3	3	3	3	1	-	-	-	1	-	3	3

END

(A403606) WASTE TO ENERGY
(Open Elective III)

B. Tech (CSE)

L	T	P	C
3	0	0	3

Unit-I:
Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Unit-II:
Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods – Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit-III:
Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers –Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Unit-IV:
Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Unit-V:
Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion – Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

TEXT BOOKS:
1. Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.

REFERENCE BOOKS
1. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
2. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons,1996.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Understand different Conversion Devices.
2. Explain Biomass Pyrolysis.
3. Understand the working Principle of biomass gasification
4. Explain Biomass Combustion.
5. Know the application of Bio Gas.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12
CO1	2	3	3	3	2	1	2	-	2	-	-	2
CO2	3	2	2	3	3	1	2	-	2	-	-	2
CO3	3	3	1	3	1	1	2	-	2	-	-	2
CO4	3	3	1	3	1	1	2	-	2	-	-	2
CO5	3	2	1	3	2	1	2	-	1	-	-	2

END

(A400605) - BASICS OF MARKETING

(Open Elective III)

B. Tech (CSE)

L T P C

3 0 0 3

Unit I

Understanding Marketing Management: Concepts of Marketing, Marketing Strategies & Plans, Creating long term Loyalty relationships, Marketing mix, Product Life Cycle.

Unit II

Connecting with Customers & Building Strong Brands: Analyzing Competitors, Conducting Marketing Research, Consumer Behaviour, Identifying market segments and targets, crafting Brand Positioning.

Unit III

New Product and Promotions: Introducing New Market Offering, Developing Pricing Strategies & Programmes, Designing & Managing Integrated Marketing Communications, Advertising & Sales Promotions, Managing Digital Communication – Online, Social Media & Mobile, Personal Selling.

Unit IV

Delivering Value: Managing Retailing, Wholesaling and logistics, Designing and Managing Integrated Marketing Channels.

Unit V

Sales Management: Nature and Importance of Sales Management, Skills of Sales Manager, Sales objectives, Concepts of Sales organization, Type of Sales organization.

TEXT BOOKS
1. Marketing Management, Philip Kotler, Kevin Lane Keller, Pearson

REFERENCE BOOKS
1. Rosalind Masterson, Nichola Philips, David Pickton, Marketing : An Introduction, 5e, Sage Publications, 2021.
2. G. Shainesh Philip Kotler, Kevin Lane Keller, Alexander Cherneb, Jagdish N Sheth, Marketing Management, 16e, Pearson, 2022.
3. Lamb, Hair, Sharma, Mc Daniel: MKTG, A South Asian Perspective, Cengage Learning, 2016. (For PPT, Case Solutions, video cases, Faculty may visit : login.cengage.com)
4. Philip Kotler, Gray Armstrong, Principles of Marketing, Pearson Education, 18e,2020.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Analyze the scope, concepts of Marketing and forecasting techniques in presentGlobal Market Environment.
2. Outline marketing research, consumer behaviour, segmentation and targeting.
3. Develop conceptual knowledge on new product development, marketing mix and promotional mix
4. Illustrate marketing channels of distribution and logistics
5. Identify the skills and importance of sales management.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12
CO1	-	3	3	-	2	3	-	-	-	3	-	-
CO2	-	-	-	-	3	3	-	3	-	-	2	-
CO3	-	-	-	-	-	3	2	-	3	-	3	-
CO4	-	-	3	-	-	-	-	-	3	-	2	-
CO5	3	-	-	-	-	-	3	-	-	3	-	-

END

(A405607) CLOUD COMPUTING
(OPEN ELECTEIVE-III)

B. Tech (CSE)

L	T	P	C
3	0	0	3

UNIT - I

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

UNIT - II

Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models.

UNIT - III

Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managingthe Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

UNIT - IV

Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

UNIT V

Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue, service, Microsoft, Windows Azure

TEXTBOOKS
1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

REFERENCE BOOKS
1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier,2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather,Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp 2011.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Explain Distributed System Modeling, Clustering and Virtualization
2. Discuss basic concepts of cloud computing.
3. Distinguish Infrastructure as a Service(IAAS) & Platform and Softwareas a Service(PAAS/SAAS).
4. Design & implement cloud computing applications.
5. Explore some important cloud computing driven commercial systems.

CO- PO MAPPING :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3					2						
CO2	3					2		2				
CO3	3						2					
CO4	3	1	1		1							
CO5	3	2										

END

(A401605) ENERGY EFFICIENT BUILDINGS
(Open Elective-III)

B. Tech (CSE)   **L T P C**
                                                                      3 0 0 3

Unit I

Climates and buildings, Thermal properties and energy content of building materials, Psychrometry, thermal comfort: Criteria and various parameters, Air conditioning systems, Energy conservation techniques in Air conditioning systems. Climate and comfort zones, Introduction to the design of shadingdevices, Overhangs. Factors that effects energy use in buildings: ventilation and its significance.

Unit II

Passive and active methods of heating and cooling, Passive heating concepts: direct heat gain, indirect heat gain, isolated gain and sunspaces. Passive cooling concepts: evaporative cooling, radiative cooling; application of wind, water and earth for cooling; shading, paints and cavity walls for cooling; roof radiation traps; earth air-tunnel.

Unit III

Heat transmission in buildings: surface co-efficient: air cavity, Internal and external surfaces Overall thermal transmittance, Wall and windows; Heat transfer due to ventilation/infiltration, Internal heat transfer; Decrement factor; Phase lag; Lighting (Daylighting and Electric lighting), Design of day-lighting, Concept of sol-air temperature and its significance.

Unit IV

Estimation of building loads, Steady state method, Network method, Numerical method, Correlations. Energy conservation through site selection, Planning and design; Siting and orientation Green buildings, Zero emission buildings. Energy Efficient Landscape Design: Modification of microclimatic through landscape element for energy conservation.

Unit V

Bioclimatic classification of India; Passive concepts appropriate for the various climatic zones in India; Typical design of selected buildings in various climatic zones; Thumb rules for design of buildings and building codes Energy Efficient Landscape Design: Modification of microclimatic through landscape element for energy conservation

TEXT BOOKS

1. Tiwari G N, Goyal R K, Greenhouse Technology: Fundamentals, Design Modelingand Application, Narosa Publishing House.
2. Krieder J, Rabi A, Heating and Cooling of Buildings: Design for Efficiency, McGrawHill.

REFERENCE BOOKS

1. Archie, Culp W, Principles of Energy Conservation, McGraw Hill.
2. Callaghan P O, Energy Management, McGraw - Hill Book Company.
3. Williams J R, Passive Solar Heating, Ann Arbar Science.
4. Majumder Milli, Energy Efficient Buildings, TERI, New Delhi.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Identify different Energy conservation techniques in Air conditioning systems
2. Demonstrate a good ability to calculate the energy balance of buildings
3. Assess whether there is a potential conflict between energy conservation and indoor climate for different energy saving measures
4. Evaluate different opportunities to save energy with measures regarding both building technology and building services engineering
5. Able to design different buildings in various climatic zones

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12
CO1	3	3	-	2	3	3	-	-	3	2	-	3
CO2	3	3	-	2	3	3	-	-	3	2	-	3
CO3	3	3	-	2	3	3	-	-	3	2	-	3
CO4	3	3	-	2	3	3	-	-	3	2	-	3
CO5	3	3	-	2	3	3	-	-	3	2	-	3

END

(A401606) ENVIRONMENTAL POLLUTION
(Open Elective-III)

B. Tech (CSE)
                                                             L T P C
                                                             3 0 0 3

UNIT - I

Air Pollution: Air pollution Control Methods – Particulate control devices – Methods of Controlling Gaseous Emissions –Air quality standards. Noise Pollution: Noise standards, Measurement and control methods –Reducing residential and industrial noise –ISO: 14000.

UNIT - II

Industrial waste water Management: Strategies for pollution control –Volume and Strength reduction – Neutralization –Equalization – Proportioning –Common Effluent Treatment Plants –Recirculation of industrial wastes –Effluent standards.

UNIT - III

Solid Waste Management: Solid Waste Management: solid waste characteristics –basics of on-site handling and collection – separation and processing –Incineration-Composting-Solid waste disposal methods –fundamentals of Land filling. Hazardous Waste: Characterization –Nuclear waste –Biomedical wastes –Electronic wastes –Chemical wastes –Treatment and management of hazardous waste-Disposal and Control methods.

UNIT - IV

Environmental Sanitation: Environmental Sanitation: Environmental Sanitation Methods for Hostels and Hotels, Hospitals, Swimming pools and public bathing places, social gatherings (melas and fares), Schools and Institutions, Rural Sanitation-low cost waste disposal methods.

UNIT - V

Sustainable Development: Sustainable Development: Definition-elements of sustainable developments-Indicators of sustainable development-Sustainability Strategies-Barriers to Sustainability–Industrialization and sustainable development –Cleaner production in achieving sustainability-sustainable development.

TEXT BOOKS

1. Peavy, H. S., Rowe, D.R, Tchobanoglous, "Environmental Engineering", G. Mc - Graw Hill International Editions, New York 1985.
     .
2. J. G. Henry and G.W. Heinke, "Environmental Science and Engineering", Pearson Education.

REFERENCE BOOKS

1. G. L. Karia and R.A. Christian, "Waste water treatment-concepts and design approach", Prentice Hallof India
2. M.N.Rao and H.V. N. Rao, "Airpollution", Tata Mc.GrawHill Company.
3. Ruth F. "Weiner andRobin Matthews Environmental Engineering", 4thEdition Elesevier, 2003.
4. K. V. S. G. Murali Krishna, "Air Pollution and Control"by, Kousal & Co. Publications, New Delhi.

COURSE OUTCOMES:

On completion of the course students will be able to

1. define the air pollution control methods
2. able to evaluate Volume and Strength reduction
3. identify the different ways to dispose Solid waste
4. Identify the sanitation methods.
5. Products that accelerate more sustainable lifestyles

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12
CO1	3	3	-	2	-	2	3	-	3	2	-	3
CO2	3	3	-	2	-	2	3	-	3	2	-	3
CO3	3	3	-	2	-	2	3	-	3	2	-	3
CO4	3	3	-	2	-	2	3	-	3	2	-	3
CO5	3	3	-	2	-	2	3	-	3	2	-	3

END