JAMIA HAMDARD

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CBCS ENABLED SYLLABUS
B.TECH.
COMPUTER SCIENCE & ENGINEERING

SYLLABUS FOR B.TECH COMPUTER SCIENCE & ENGINEERING

Choice Based credit system (CBCS)

Approval Date: 26th June 2022

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

JAMIA HAMDARD

Deemed to be University

Accredited in 'A' Grade by NAAC

Declared to be designated as Institute of Eminence (IoE) by MHRD, GOI,

New Delhi -110062

www.Jamiahamdard.edu.in

PROGRAMME NAME: B.TECH. COMPUTER SCIENCE & ENGINEERING
PROGRAME CODE: 310 & 208 (LATERAL ENTRY)
ACADEMIC SESSION OF INTRODUCTION OF THE PROGRAMME: (2022-23)
SCHOOL NAME: SEST
DEPARTMENT NAME: COMPUTER SCIENCE & ENGINEERING

APPROVAL DATE OF THE BOARD OF STUDIES (BOS) MEETING FOR THE PRESENT SYLLABUS **26 JUNE 2022**
APPROVAL DATE NUMBER OF ACADEMIC COUNCIL OF MEETING FOR THE PRESENT SYLLABUS

ADMISSION & EXAMINATION

BYE-LAWS

FOR

BACHELOR OF TECHNOLOGY

(COMPUTER SCIENCE & ENGINEERING)

B. TECH. (CSE)

&

BACHELOR OF TECHNOLOGY

(COMPUTER SCIENCE & ENGINEERING)

B. TECH. (CSE) (LATERAL ENTRY)

Program Code: 310& 209 (LE)

CHOICE BASED CREDIT SYSTEM (CBCS)

(with effect from 2022-23)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

School of Engineering Sciences and Technology

JAMIA HAMDARD

(DEEMED TO BE UNIVERSITY)

Hamdard Nagar, New Delhi-110 062

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Content

- **Approval date of the BOS meeting for the present syllabus**

Name of the program	Program Code	Dates of Revision
B.Tech CSE	310	02.11.2018 25.02.2020
B.Tech CSE(lateral entry)	310	20.09.2019

- **Approval date and number for the Academic Council meeting for the present syllabus**

SCHOOL OF ENGINEERING SCIENCES AND TECHNOLOGY

Vision Statement (School Level): To become the best institution in the national and international map in terms of quality of teaching and research, technical knowledge and academics in the field Computer Science & Engineering, Electronics & Communication Engineering, Bioinformatics with sincere honesty adding values in the core aspect of students 'life.

Mission Statements (3 to 4) (School Level):

MS1: To offer state-of-the-art undergraduate, postgraduate and doctoral programs in Computer Science & Engineering, Electronics and Communication Engineering & Engineering and Bioinformatics.

MS 2: To provide one of the best working environments to motivate faculty and students to work towards vision of the Department.

MS 3: To develop association with industry, other Universities/Institute/Research Laboratories and work in collaboration with them.

MS 4: To use our expertise in all the relevant disciplines for helping society in solving its real life problem.

MS 5: To develop entrepreneurship skills in the students so that they can become problem solver and innovative developer and contribute to the society by providing employment to others.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Vision Statement (Department/Centre Level): To become the best institution in the national and international map in terms of quality of teaching and research, technical knowledge and academics in the field Computer Science & Engineering, Electronics & Communication Engineering, Bioinformatics with sincere honesty adding values in the core aspect of students 'life.

Mission Statements (3 to 4) (Department/Centre Level):

MS1: To offer state-of-the-art undergraduate, postgraduate and doctoral programs in Computer Science & Engineering, Electronics and Communication Engineering & Engineering and Bioinformatics.

MS 2: To provide one of the best working environments to motivate faculty and students to work towards vision of the Department.

MS 3: To develop association with industry, other Universities/Institute/Research Laboratories and work in collaboration with them.

MS 4: To use our expertise in all the relevant disciplines for helping society in solving its real life problem.

MS 5: To develop entrepreneurship skills in the students so that they can become problem solver and innovative developer and contribute to the society by providing employment to others.

Program Educational Objectives (PEO)

(Program Code 310)

PEO-1: To produce graduates having a strong background of basic science, Mathematics &

Engineering and ability to use these tools.

PEO-2: To produce graduates who can demonstrate technical competence in the field of computer science and engineering and develop solutions to the complex problems.

PEO-3: To produce graduates having professional competence through life-long learning such as advanced degrees, professional skills and other professional activities related globally to engineering & society.

PEO- 4: To produce graduates who function effectively in a multi-disciplinary environment and individually, within a societal and environmental context.

PEO-5: To produce graduates who would be able to take individual responsibility and work as a part of a team towards the fulfilment of both individual and organizational goals.

Mapping Program Educational Objectives (PEOs)with Mission Statements (MS)

	MS-1	MS-2	MS-3	MS-4	MS-5
PEO-1	3	2	2	1	1
PEO-2	2	1	3	3	3
PEO-3	1	2	2	3	3
PEO-4	2	3	2	2	2
PEO-5	3	2	3	3	3

Write ‘3 ’in the box for ‘high-level ’mapping, 2 for ‘Medium-level ’mapping, 1 for ‘Low-level ’mapping.

Program Outcomes(PO)

(Program Code 310)

PO1: Communication Skills: The students will be able to demonstrate English language proficiency to perform effectively in the professional and personal life by being able to comprehend and write effectively and efficiently.

PO2: Domain knowledge: Develop domain knowledge in the Computer Science field, relevant to market needs and at pace with the rapidly changing working environment.

PO3: Technical skills: The students will be able to draw upon the foundational knowledge of Computer Science to develop solutions for the societal and technological challenges and issues.

PO4: Knowledge inter-disciplinary in nature: The students will be exposed to acquires sufficient knowledge of the interdisciplinary subjects much as Mathematics, Physics, Chemistry, Environment Sciences etc, for enhanced applications of software's developed.

PO5: Positive attitude: The students will be able to inculcate a positive attitude through various programs.

PO6: Critical thinking and problem-solving skills: The students will be able to apply the fundamentals of computer science and engineering to understand, analyze and develop computer programs in the areas related to algorithms, multimedia, big data analytics, machine learning, artificial intelligence and networking for efficient design of computer-based systems of varying complexity.

PO7: Dynamism and team building skills: The students will be able to develop required skills to work efficiently on multidisciplinary projects and teams to accomplish a common goal.

PO8: Professional ethics and social values: The students will develop an understanding of work ethics and will have the ability to carry out any task with professional ethics and without deviating from social values

PO9: Self-awareness and emotional intelligence: The students will identify their strengths and talents and learn to establish a balance at the time of crisis.

PO10:Entrepreneurshipand Innovative qualities: The students will acquire entrepreneurship and innovative qualities through various learning programs.

PO11: Responsibility towards society and environment: The students will realize their social responsibilities. The students are expected to learn tools and techniques for designing and integrating technology-based solutions for real world problems and drive scientific and societal advancement through technological innovation.

PO12:Lifelong learning: The students are expected to engage in lifelong learning for the advancement of technology and its adaptation in multi-disciplinary environments.

Program Specific Outcomes (PSO)

(Program Code 310)

At the end of the program, the student

PSO 1: should be able to understand the concepts of Computer Science and engineering and their applications in the relevant areas.

PSO 2: Should have an ability to apply technical knowledge and usage of modern hardware & software tools related to Computer Science and engineering for solving real world problems.

PSO 3: Should have the capability to analyze, comprehend, design & develop solutions for a variety of engineering applications and thus demonstrating professional ethics & concern for societal well being.

Mapping of Program Outcomes (POs) and Program Specific Outcomes (PSOs) with Program Educational Objectives (PEOs)

	PEO-1	PEO-2	PEO-3	PEO-4	PEO-5
PO-1	3	3	2	2	1
PO-2	3	3	1	2	1
PO-3	3	2	2	2	3
PO-4	2	3	2	3	2
PO-5	3	2	2	3	2
PO-6	2	3	3	1	2
PO-7	2	3	3	2	2
PO-8	2	3	2	3	1
PO-9	1	2	3	2	3
PO-10	2	2	1	2	2
PO-11	2	2	3	2	1
PO-12	1	2	2	3	3
PSO-1	3	2	3	2	3
PSO-2	2	3	2	2	2
PSO-3	3	2	3	2	3

Mapping of Program Specific Outcomes (PSOs) where applicable.

Write ‘3 ’in the box for ‘high-level ’mapping, 2 for ‘Medium-level ’mapping, 1 for ‘Low-level ’mapping.

ADMISSION & EXAMINATION RULES

for

BACHELOR OF TECHNOLOGY
(COMPUTER SCIENCE & ENGINEERING)
B. TECH. (CSE)

1. OBJECTIVE

The objective of the B.Tech. programme in Computer Science and Engineering (CSE) is to prepare students to undertake careers involving innovation and problem solving using computational techniques and technologies, or to undertake advanced studies for research careers or to take up Entrepreneurship.

2. THE PROGRAMME

Highlights of the course are described in the following table:

2.1 B.TECH CSE

a.	Name of the Programme	BACHELOR OF TECHNOLOGY (COMPUTER SCIENCE & ENGINEERING)
b.	Nature	Regular and Full Time
c.	Duration	Four Years (8 Semesters)
d.	Total number of credits	194
e.	Medium of Instruction and English Examinations	English
f.	Eligibility Criteria	A candidate seeking admission to this program must have passed Senior Secondary (12th / Intermediate) examination with Mathematics and Physics compulsory, and one subject out of the following: Computer Science, Chemistry, Electronics from CBSE or any other Board recognized by Jamia Hamdard as equivalent thereto, securing at least 50% marks or equivalent CGPA in aggregate.
g.	Selection procedure	Selection will be based on merit in Paper-1 (B.E. /B.Tech.) of JEE (Main) In case the seats remain unfilled, Jamia Hamdard may admit candidates on the basis of merit of qualifying examination or the merit of internal test and/or Interview conducted by Jamia Hamdard which will be announced separately, if situation arises.
h.	Total Seats	180, inclusive of seats reserved for NRI / sponsored candidates; additional seats are available for Foreign Nationals.

i.	Period of Completion	Not more than 07 years (14 Semesters)
j.	Commencement of the Programme	July of every academic session

2.2 B.TECH CSE (Lateral Entry)

a.	Name of the Programme	BACHELOR OF TECHNOLOGY (COMPUTER SCIENCE & ENGINEERING) B. TECH. (CSE) (Lateral Entry)
b.	Nature	Regular and Full Time
c.	Duration	Three Years (6 Semesters)
d.	Total number of credits	150
e.	Medium of Instruction and English Examinations	English
f.	Eligibility Criteria	A candidate seeking admission to B.Tech (CSE) lateral entry must have passed Diploma Engineering in Computer Science and Engineering/ Information Technology/ Electronics and Communication/ Allied branches from a recognized institution/university securing at least 50% marks or equivalent CGPA in aggregate.
g.	Selection procedure	Jamia Hamdard will admit candidates on the basis of merit of qualifying examination.
h.	Total Seats	Maximum of 10% of “Approved Intake”, plus the unfilled vacancies of First year.
i.	Period of Completion	Not more than 06 years (12 Semesters)
j.	Commencement of the Programme	July of every academic session

3. PROGRAMME STRUCTURE

Semester-wise course structure, guidelines for teaching, practical and associated assessment of the programme is described in the following tables:

Course Type	**Subject Area**	**Credits**	**Percentage (%)** *(Approx.)*
Foundation Core (FC)	Humanities and Social Sciences (HS), including Management	9	20.7
	Basic Sciences (BS) including Mathematics, Physics, Chemistry, Biology	31	
Professional Core (PC)	Engineering Science (ES) courses including Workshop, Drawing, Basics of Electrical/ Mechanical/ Computer etc	33	63.9
	Professional core courses	76	
	Project Work, Seminar and/or Internship in Industry or elsewhere.	15	
Departmental Electives (DE)	Professional Elective (DE) courses relevant to chosen specialization/branch	9	4.6
Open Electives (OE)	Open subjects – Electives (OE) from other technical and /or emerging subjects	12	6.2
Mandatory Courses (MC)	Mandatory Courses (MC)	0	Non-Credit
MOOC*	Online Courses	9	4.6
Total		194	**100**

*** The list of online courses to be cleared through MOOCs shall be floated in the respective semester after approval from the Board of Studies.**

Course Codes:

Course code	Definitions
BS	Basic Science Courses
ES	Engineering Science Courses
HS	Humanities and Social Sciences including Management courses
PC	Professional core courses
DE	Departmental Elective courses
OE	Open Elective courses
LC	Laboratory course
MC	Mandatory courses
PROJ	Project
DISS	Dissertation
MOOCs	Massive Open Online Courses

Mandatory Induction Program of 3 weeks duration (Non-Credit)

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas
- Familiarization to Dept./Branch & Innovations

Induction program for students will be offered right at the start of the first year.
L-T-P stands for number of contact hours as Lecture-Tutorial-Practical in a week.

A. **Definition of Credit:**

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit
2 Hours Practical (Lab)/week	1 credit

B. Range of credits:

A total credit 194 is required for a regular student and a total credit of 150 is required for a lateral entry student to be eligible to get Under Graduate degree in Engineering. A student will be eligible to get Under Graduate degree with Honours, if he/she completes an additional 20 credits. These could be acquired through MOOCs.

Semester – I

Paper Code	Title of the Paper	Course type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BTCSE 101	Applied Physics I	BS	40	60	100	3-1-0	4
BTCSE 102	Mathematics – I	BS	40	60	100	3-1-0	4
BTCSE 103	Basic Electrical Engineering	ES	40	60	100	3-1-0	4
BTCSE 104	Engineering Graphics & Design	ES	40	60	100	1-0-0	1
BTCSE 105	Applied Physics I Lab	BS	40	60	100	0-0-4	2
BTCSE 106	Basic Electrical Engineering Lab	ES	40	60	100	0-0-2	1
BTCSE 107	Engineering Graphics & Design Lab	ES	40	60	100	0-0-4	2

BTCSE 108	Essence of Indian Traditional knowledge	MC	40	60	100	2-0-0	0
					Total	**12-3-10**	**18**

Semester – II

Paper Code	Title of the Paper	Course type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BTCSE 201	Applied Physics II	BS	40	60	100	3-1-0	4
BTCSE 202	Mathematics – II	BS	40	60	100	3-1-0	4
BTCSE 203	Programming for Problem Solving	ES	40	60	100	3-1-0	4
BTCSE 204	Workshop /Manufacturing Practices	ES	40	60	100	1-0-0	1
BTCSE 205	English Language	HS	40	60	100	2-0-0	2
BTCSE 206	Applied Physics – II Lab	BS	40	60	100	0-0-4	2
BTCSE 207	Programming for Problem Solving Lab	ES	40	60	100	0-0-4	2
BTCSE 208	Workshop /Manufacturing Practices Lab	ES	40	60	100	0-0-4	2
BTCSE 209	English Language Lab	HS	40	60	100	0-0-2	1
BTCSE 210	Basic Engineering Mechanics	BS	40	60	100	3-1-0	4

BTCSE 211	Environmental Sciences	MC	40	60	100	2-0-0	0
					Total	**17-4-14**	**26**

Semester – III

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BTCSE 301	Software Engineering	ES	40	60	100	3-1-0	4
BTCSE 302	Chemistry	BS	40	60	100	3-1-0	4
BTCSE 303	Data structure & Algorithms	PC	40	60	100	3-1-0	4
BTCSE 304	Analog and Digital Electronics	ES	40	60	100	3-1-0	4
BTCSE 305	IT Workshop (Sci Lab/MATLAB)	PC	40	60	100	1-0-0	1
BTCSE 306	Humanities-I (Effective Technical Communication)	HS	40	60	100	3-0-0	3
BTCSE 307	Software Engineering Lab	ES	40	60	100	0-0-4	2
BTCSE 308	Data structure & Algorithms Lab	PC	40	60	100	0-0-4	2
BTCSE 309	Analog and Digital Electronics Lab	ES	40	60	100	0-0-4	2

BTCSE 310	IT Workshop (Sci Lab/MATLAB) Lab	PC	40	60	100	0-0-4	2
BTCSE 311	Mathematics III	PC	40	60	100	3-1-0	4
					Total	**19-5-16**	**32**

Semester – IV

Paper Code	Title of the Paper	Course type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BTCSE 401	Discrete Mathematics	PC	40	60	100	3-1-0	4
BTCSE 402	Computer Organization and Architecture	PC	40	60	100	3-1-0	4
BTCSE 403	Operating Systems	PC	40	60	100	3-1-0	4
BTCSE 404	Design and Analysis of Algorithms	PC	40	60	100	3-1-0	4
BTCSE 405	Object Oriented Programming	PC	40	60	100	3-0-0	3
BTCSE 406	Computer Organization and Architecture + Operating Systems Lab	PC	40	60	100	0-0-4	2
BTCSE 407	Design and Analysis of Algorithms Lab	PC	40	60	100	0-0-4	2

BTCSE 408	Object Oriented Programming Lab	PC	40	60	100	0-0-4	2
BTCSE 409	Disaster Management	PC	40	60	100	3-0-0	3
					Total	**18-4-12**	**28**

Semester – V

Paper Code	**Title of the Paper**	**Course type**	**Marks**			**L-T-P**	**Credits**
			Internal Assessment	**Semester Exam**	**Total**		
BTCSE 501	System Software	ES	40	60	100	3-1-0	4
BTCSE 502	Database Management Systems	PC	40	60	100	3-1-0	4
BTCSE 503	Formal Language & Automata Theory	PC	40	60	100	3-1-0	4
BTCSE 504	Java Programming	PC	40	60	100	3-1-0	4
BTCSE 505	Humanities II (Professional Practice, Law & Ethics)	HS	40	60	100	3-0-0	3
	Departmental Elective –I	DE	40	60	100	3-0-0	3
BTCSE 507	Database Management Systems Lab	PC	40	60	100	0-0-4	2

BTCSE 508	Java Programming Lab	PC	40	60	100	0-0-4	2
BTCSE 509	Constitution of India	MC	40	60	100	2-0-0	0
					Total	**20-4-8**	**26**

Semester – VI

Paper Code	Title of the Paper	Course type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BTCSE 601	Project – I	PROJ	40	60	100	0-0-6	3
BTCSE 602	Compiler Design	PC	40	60	100	3-1-0	4
BTCSE 603	Computer Networks	PC	40	60	100	3-1-0	4
BTCSE 604	Compiler Design Lab	PC	40	60	100	0-0-4	2
BTCSE 605	Computer Networks Lab	PC	40	60	100	0-0-4	2
	Departmental Elective – II	DE	40	60	100	3-0-0	3
	Departmental Elective – III	DE	40	60	100	3-0-0	3

	Open Elective – I	OE	40	60	100	3-0-0	3
					Total	**15-2-14**	**24**

Semester – VII

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BTCSE 701	Project-II	PROJ	200	100	300	0-0-12	6
BTCSE 702	Advanced Java	BS	40	60	100	2-1-0	3
BTCSE 703	Data Encryption & Compression	PC	40	60	100	3-0-0	3
BTCSE 704	Advanced database Management System	PC	40	60	100	3-1-0	4
	Departmental Elective – IV	DE	40	60	100	3-0-0	3
	Departmental Elective –	DE	40	60	100	3-0-0	3

	V						
	Open Elective – II	OE	40	60	100	3-0-0	3
					Total	**17-2-12**	**25**

Semester – VIII

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BTCSE 801	Dissertation	DISS	300	200	500	0-0-12	6
	Departmental Elective - VI	DE	40	60	100	3-0-0	3
	Open Elective – III	OE	40	60	100	3-0-0	3
	Open Elective –IV	OE	40	60	100	3-0-0	3
					Total	**9-0-12**	**15**

*** The list of online courses to be cleared through MOOCs shall be floated in the respective semester after approval from the Board of Studies with a provision for in house examination.**

Total Credits – 194

Electives (Programme & Open Electives)

Professional Electives will be introduced in 4 threads besides the Open Elective. There are 6 slots for Professional Electives and 4 slots for Open Electives. The department may permit students to take 50% of these (Professional electives + open electives) from other disciplines, based on the choices of the students and consent of course advisors.

A. **Theory** B.**Systems** C. **Data Science** D. **Applications** and E. **Open Electives**

The students will have options of selecting the electives from the different threads depending on the specialization they wish to acquire. **There should be at least two electives from the open elective choices; the rest two can be taken from the other threads, if intended.**

Pls. see the Table.

The Electives are shown in different threads. The list is suggestive. The actual list of electives will depend on the availability of faculty and their research interests. However, there should be courses available in each thread.

On-line MOOC courses may contribute up to 20% of the credits, with in-house examination being conducted.

Programme Electives

Paper Code	Title of the Paper	Marks			L-T-P	Credits
		Internal Assessment	Semester Exam	Total		
Theory and Algorithms						
Departmental Elective –I						
BTCSE DET11	Quantum Computing	40	60	100	3-0-0	3
BTCSE DET12	MOOCS1	40	60	100	3-0-0	3
BTCSE DET13	Advanced Algorithms	40	60	100	3-0-0	3
Departmental Elective –II						
BTCSE DET21	Parallel and Distributed Algorithms	40	60	100	3-0-0	3
BTCSE DET22	Computational Complexity	40	60	100	3-0-0	3
BTCSE DET23	MOOCS2	40	60	100	3-0-0	3
Departmental Elective –III						
BTCSE DET31	Queuing Theory and Modeling	40	60	100	3-0-0	3
BTCSE DET32	Computational Number Theory	40	60	100	3-0-0	3
BTCSE DET33	MOOCS3	40	60	100	3-0-0	3
Departmental Elective –IV						
BTCSE DET41	Information Theory and Coding	40	60	100	3-0-0	3
BTCSE DET42	Information Retrieval	40	60	100	3-0-0	3
BTCSE DET43	Quantum Computing	40	60	100	3-0-0	3

Departmental Elective –V						
BTCSE DET51	Distributed Computing Systems	40	60	100	3-0-0	3
BTCSE DET52	Software Architecture	40	60	100	3-0-0	3
BTCSE DET53	Approximation of Algorithms	40	60	100	3-0-0	3
Departmental Elective –VI						
BTCSE DET61	Combinational Optimization	40	60	100	3-0-0	3
BTCSE DET62	Software Project Management	40	60	100	3-0-0	3
BTCSE DET63	Game Theory	40	60	100	3-0-0	3
Systems						
Departmental Elective –I						
BTCSE DES11	MOOCS1	40	60	100	3-0-0	3
BTCSE DES12	Advanced Software Engineering	40	60	100	3-0-0	3
BTCSE DES13	Distributed Systems	40	60	100	3-0-0	3
Departmental Elective –II						
BTCSE DES21	Embedded Systems	40	60	100	3-0-0	3
BTCSE DES22	Advanced Operating Systems	40	60	100	3-0-0	3
BTCSE DES23	MOOCS2	40	60	100	3-0-0	3

Departmental Elective –III						
BTCSE DES31	MOOCS3	40	60	100	3-0-0	3
BTCSE DES32	Real Time Systems	40	60	100	3-0-0	3
BTCSE DES33	Software Re-engineering	40	60	100	3-0-0	3
Departmental Elective –IV						
BTCSE DES41	Signals and Networks	40	60	100	3-0-0	3
BTCSE DES42	Internet-of-Things	40	60	100	3-0-0	3
BTCSE DES43	Ad-Hoc and Sensor Networks	40	60	100	3-0-0	3
Departmental Elective –V						
BTCSE DES51	Agile Software Developments & DevOps	40	60	100	3-0-0	3
BTCSE DES52	Simulation and Modelling	40	60	100	3-0-0	3
BTCSE DES53	Software Testing & Quality Assurance	40	60	100	3-0-0	3
Departmental Elective –VI						
BTCSE DES61	Engineering System Analysis and Design	40	60	100	3-0-0	3
BTCSE DES62	Engineering System Design Optimization	40	60	100	3-0-0	3
BTCSE DES63	Fault Tolerant Computing	40	60	100	3-0-0	3

Data Science and Machine Intelligence						
Departmental Elective –I						
BTCSE DED11	Artificial Intelligence	40	60	100	3-0-0	3
BTCSE DED12	MOOCS1	40	60	100	3-0-0	3
BTCSE DED13	Machine Learning	40	60	100	3-0-0	3
Departmental Elective –II						
BTCSE DED21	MOOCS2	40	60	100	3-0-0	3
BTCSE DED22	Soft Computing	40	60	100	3-0-0	3
BTCSE DED23	Speech and Natural Language Processing	40	60	100	3-0-0	3
Departmental Elective –III						
BTCSE DED31	Data Analytics	40	60	100	3-0-0	3
BTCSE DED32	Pattern Recognition	40	60	100	3-0-0	3
BTCSE DED33	MOOCS3	40	60	100	3-0-0	3
Departmental Elective –IV						
BTCSE DED41	Multi-agent Intelligent Systems	40	60	100	3-0-0	3
BTCSE DED42	Big Data Analytics	40	60	100	3-0-0	3

BTCSE DED43	Introduction to Blockchain Technology	40	60	100	3-0-0	3
Departmental Elective –V						
BTCSE DED51	Data Science	40	60	100	3-0-0	3
BTCSE DED52	Bioinformatics	40	60	100	3-0-0	3
BTCSE DED53	Digital Communication	40	60	100	3-0-0	3
Departmental Elective –VI						
BTCSE DED61	Neural Networks and Deep Learning	40	60	100	3-0-0	3
BTCSE DED62	Cryptography and Network Security	40	60	100	3-0-0	3
BTCSE DED63	Network Programming	40	60	100	3-0-0	3
Applications						
Departmental Elective –I						
BTCSE DEA11	Digital Image Processing	40	60	100	3-0-0	3
BTCSE DEA12	MOOCS1	40	60	100	3-0-0	3
BTCSE DEA13	Optimization Techniques	40	60	100	3-0-0	3
Departmental Elective –II						
BTCSE DEA21	Human Computer Interaction	40	60	100	3-0-0	3

BTCSE DEA22	Computer Graphics and Visualization	40	60	100	3-0-0	3
BTCSE DEA23	MOOCS2	40	60	100	3-0-0	3
Departmental Elective –III						
BTCSE DEA31	Mobile Computing	40	60	100	3-0-0	3
BTCSE DEA32	Web and Internet Technology	40	60	100	3-0-0	3
BTCSE DEA33	MOOCS3	40	60	100	3-0-0	3
Departmental Elective –IV						
BTCSE DEA41	Embedded Computing Systems	40	60	100	3-0-0	3
BTCSE DEA42	Electronic Design Automation	40	60	100	3-0-0	3
BTCSE DEA43	Multimedia Computing	40	60	100	3-0-0	3
Departmental Elective –V						
BTCSE DEA51	Computer Vision	40	60	100	3-0-0	3
BTCSE DEA52	Human Computer Interface	40	60	100	3-0-0	3
BTCSE DEA53	Web Service and Service Oriented Architecture	40	60	100	3-0-0	3
Departmental Elective –VI						
BTCSE DEA61	Cloud Computing	40	60	100	3-0-0	3
BTCSE DEA62	Robotics	40	60	100	3-0-0	3
BTCSE DEA63	Android based App development	40	60	100	3-0-0	3

Open Electives

Paper Code	Title of the Paper	Marks			L-T-P	Credits
		Internal Assessment	Semester Exam	Total		
Open Elective – I						
BTCSE OE11	ICT for Development	40	60	100	3-0-0	3
BTCSE OE12	Soft Skills and Interpersonal Communication	40	60	100	3-0-0	3
BTCSE OE13	Cyber Law and Ethics	40	60	100	3-0-0	3
Open Elective – II						
BTCSE OE21	History of Science and Engineering	40	60	100	3-0-0	3
BTCSE OE22	Sustainable Development	40	60	100	3-0-0	3
BTCSE OE23	Ethical Hacking	40	60	100	3-0-0	3
Open Elective – III						
BTCSE OE31	Data Warehousing and Data Mining	40	60	100	3-0-0	3
BTCSE OE32	Enterprise Re-source and Plan-ning	40	60	100	3-0-0	3
BTCSE OE33	Rural Technology & Community Development	40	60	100	3-0-0	3

Open Elective – IV						
BTCSE OE41	Green Computing	40	60	100	3-0-0	3
BTCSE OE42	Customer Relationship Management	40	60	100	3-0-0	3
BTCSE OE43	Infrastructure Systems Planning	40	60	100	3-0-0	3

4. MODE OF CURRICULUM DELIVERY

Mode of curriculum delivery includes classroom teaching, assignments, test, lab work, presentations, participation in relevant events and regularity.

5. THE GRADING SYSTEM

As per University Rule

6. CALCULATION OF SGPA AND CGPA OF A STUDENT IN A SEMESTER

As per University Rule

7. ADMISSION

A candidate, aspiring for admission to **B. Tech. (CSE) Programme**, shall have to apply in the prescribed application form that is complete in all respect, on or before the last date of submission.

NOTE:

a. Different procedure may be adapted for admission of foreign/NRI/Industry-sponsored candidates, who apply for admission in the prescribed form and fulfill the eligibility requirements.

a. The admission committee, duly constituted for purpose, would prepare a merit list on the basis of the selection criteria.

c. Admission committee shall display/publish the list of candidates that are declared eligible for admission, after the due approval of the competent authority.

d. Eligible candidates shall have to complete the prescribed formalities, for completion of admission, within the stipulated period of time; otherwise they will forfeit the right to admission.

8. ATTENDANCE

a. All students are supposed to attend every lecture and practical classes. However, the attendance requirement for appearing in the examination shall be a minimum of 75% of the classes held.

b. Each one-period teaching shall account for one attendance unit.

c. The concerned teacher will take a roll call in every scheduled class, maintains and consolidate the attendance record, which would be submitted to the Head of the Department at the conclusion of the semester.

d. Attendance on account of participation (with prior permission from the head of the department) in the co-curricular/extra-curricular activities can be granted by the Dean on receipt of certificates or recommendations of the respective activity issued by the Head of the Department.

e. Attendance records displayed on Notice Board from time to time, in respect of short attendance, shall be deemed to be a proper notification and no individual notice shall be sent to the students/local guardian.

f. In case a student is found to be continuously absent from the classes without information for a period of 30 days, the concerned teacher shall report it to the Head of the Department.

g. Head of the department may recommend for striking off the name of a student from rolls, after ensuring '**one month continuous absence**', from all the concerned teachers.

h. A student, whose name has been struck off on account of long absence, may apply to the Dean for readmission within 15 days of the notice of striking off the name. The readmission shall be effected on payments of prescribed readmission fees.

i. A student with less than 75% attendance, in aggregate shall not be allowed to appear in the semester examination. The Head of the Department shall recommend all such cases to the Dean of the faculty.

j. The Dean, on the recommendation of the Head of the Department, may consider the relaxation of attendance up to 10% on account of sickness and /or any other valid reason. No application for

relaxation of attendance (duly certified by a Registered Medical Practitioner/Public hospital or a competent authority) will be entertained after 15 days from the recovery from illness etc.

k. A student detained on account of short attendance will start afresh in the same class in the next academic year on payment of current fees except enrollment fee, identity card fee and security deposits etc.

9. INTERNAL ASSESSMENT

a. Internal assessment, to be made by concerned teachers, will be based on unit tests, quizzes, presentation, programming test, demonstrations and assignments.

b. There will be two (2) Internal Assessment (Unit Tests) with a total of 30 marks (each 15 marks). Other modes of assessment shall account for remaining 10 marks. (Assignments, Attendance, etc)

c. Dates for minor test will be announced at the beginning of the semester, by the examination coordinator.

d. The teacher concerned shall maintain a regular record of the marks obtained by students in minor tests and display the same in due course.

e. The concerned teachers shall submit the compiled internal assessment marks to the Head of the Department, on the conclusion of teaching of the current semester.

f. The Head shall display a copy of the compiled sheet, of internal assessment marks of all the papers, before forwarding it to the Controller of Examination, i.e. at the conclusion of the semester.

a. A promoted candidate, who has to reappear in the examination of a paper, will retain internal assessment marks.

b. In the case of re-admission, the candidates shall have to go through the internal assessment process afresh and shall retain nothing of the previous year.

10. SEMESTER EXAMINATIONS

Prescriptions for conducting semester examinations of theory and lab papers, those shall be conducted after the conclusion of each of the semesters, are presented in the following table:

S.N.	Classification	Theory	Lab
1.	Mode	Written Only	Written, Demo, Programming and viva-voce etc.
2.	Duration	2 Hours and 30 Minutes	3 Hours
3.	Total Marks	60 (Sixty Only)	60 (Sixty Only)

11. DISSERTATION

a. Each student of the final semester will have to carry out a project under the guidance of one or two faculty members.

b. There shall be a mid-term evaluation of the progress and the internal supervisors.

c. All the candidates shall submit ***Two (02***) hard copies of the project report that are duly approved and signed by internal as well as external (if applicable) supervisors.

d. An external examiner, appointed for the purpose, shall evaluate the project report.

e. Head of the department shall forward the compiled total marks (awarded in internal assessment, project Report and Viva-voce Examination), in the project-semester of each of the candidate, to the Controller of Examination.

12. EXAMINATION

a. The performance of a student in a semester shall be evaluated through continuous class assessment and end semester examination. The continuous assessment shall be based on class tests, assignments/ tutorials, quizzes/ viva voce and attendance. The end semester examination shall be comprised of written papers, practical and viva voce, inspection of certified course work in classes and laboratories, project work, design reports or by means of any combination of these methods.

b. The marks obtained in a subject shall consist of marks allotted in end semester theory paper, practical examination and sessional work.

c. The minimum pass marks in each subject including sessional marks (Theory, Practical or Project etc.) shall be 50%.

13. PROMOTION SCHEME

a. A student will be required to clear minimum **40% of his/her papers** (including Labs; excluding non-credit papers) in a semester/annual examination to be eligible **for promotion to the next semester/year**. A student may appear in the supplementary examination after each semester/annual examination and can have a choice to appear in the backlog papers in the supplementary examination or in the subsequent regular semester/annual examination with a prescribed fee. A students detained due to shortage of attendance will repeat his/her paper in the subsequent semester concerned (even/odd).

b. A **detained**Student is not allowed to re-appear in the internal assessment (Unit test). His/her old internal assessment marks will remain same.

A student who cleared all the papers of a semester/annual examination of a programme/course will be eligible for improvement examination as per university rule.

After having passed all the EIGHT/ SIX semesters, the students shall be eligible for the award of B. Tech. Computer Science & Engineering (CSE) degree of JAMIA HAMDARD.

14. CLASSIFICATION OF SUCCESSFUL CANDIDATES

The result of successful candidates, who fulfil the criteria for the award of **B. Tech. Computer Science & Engineering (CSE)**, shall be classified at the end of last semester, on the basis of his/her final CGPA (to be calculated as per university rule).

15. DETAILED SYLLABUS

Name of the Academic Program: -B. Tech (CSE)
Course Code: BTCSE-101
Title of the Course: Applied Physics-I
L-T-P: 3-1-0
Credits: - 04
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this Course, the students should be able to:

CO-1 Explain the conduction mechanism of semiconductors. (Cognitive level: Understand)
CO-2 Identify the important differences in the operation of ordinary light and laser light. (Cognitive level: Analyze)
CO-3 Specify how optical fibers can be used for communication.(Cognitive level: Apply)
CO-4 Apply the phenomena of interference and diffraction to everyday optical observations. (Cognitive level: Apply)
CO-5 Demonstrate a familiarity with some of the extraordinary properties of supercondtors.(Cognitive level: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	-	-	-	-	2	-	-	1	-	-
CO2	2	3	2	3	1	-	-	1	-	-	-	-	1	-	3
CO3	3	2	2	2	3	1	2	-	-	1	-	2	-	2	-
CO4	3	2	1	2	2	-	-	-	1	-	-	2	-	-	2
CO5	2	2	2	2	1	-	-	-	-	-	2	-	-	2	-

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

UNIT 1: Semiconductor Physics **10 Hours**

Energy bands in solids, Fermi level and Fermi distribution function, Intrinsic and extrinsic semiconductors, P-N junction, Forward and reverse bias, V-I characteristics, Mobility of electrons and holes, Drift velocity, Electrical conductivity, resistivity, Zener diode.

UNIT 2: Lasers **10 Hours**

Einstein's theory of matter radiation interaction and A and B coefficients, amplification of light by population inversion, different types of lasers: He-Ne, Ruby, Properties of laser beams: monochroma-

ticity, coherence, directionality and brightness, applications of lasers in science, engineering and medicine.

UNIT 3: Fiber Optics **10 Hours**

Numerical aperture, step index and graded index fibers, attenuation and dispersion mechanism in optical fibers (Qualitative only), applications of optical fibers, optical communication (Block diagram only).

UNIT4: Wave Optics **10 Hours**

Huygens' Principle, superposition of waves and interference of light by wave front splitting and amplitude splitting, Young's double slit experiment, Newton's rings, Fraunhofer diffraction from a single slit and N slit, Diffraction gratings, dispersive and resolving power of grating.

UNIT5: Superconductivity **8 Hours**

Introduction, Meissner effect, Type I and Type II superconductors, BCS Theory (Qualitative only), London's equations, applications of superconductors.

Reference Books:

1. B.G. Streetman, "Solid State Electronic Devices", Prentice Hall of India, 1995.
2. O. Svelto, "Principles of Lasers", Springer Science & Business Media, 2010.
3. Ghatak, "Optics", McGraw Hill Education, 2012.

Teaching-Learning Strategies in brief:

1. Encourage participation of students in learning.
2. Connect the subject matter with the student's everyday life.
3. Encourage the spirit of questioning by the students.
4. Arrange student friendly study material and other learning resources.
5. Create friendly environment conducive for learning.

Assessment methods and weightages in brief:

1. Two sessional examinations.
2. Assignments.
3. Oral quizzes in the class.
4. End semester examination.
5. Internal Assessment: 25 Marks, End Semester Examination :75 Marks &Total Marks: 100.

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE-102
Title of the Course: Mathematics-I
L-T-P: 3-1-0
Credits: 04
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this Course, the students should be able to:

CO-1 Apply the concept of curvature , evaluate the definite integral by using Beta and Gamma function and calculate the surface area and volume of solid revolutions by the help of definite integral.(Cognitive Level: Understand)
CO-2 Verify Rolles Theorem and mean value theorem for the function defined in a closed interval, find an infinite expansion of a function and calculate the value of indeterminate forms.(Cognitive Level: Apply)
CO-3 Discuss the nature of sequence and series and find the infinite series in terms of $\sin\theta$ and $\cos\theta$ of any continuous or discontinuous function in a bounded interval . (Cognitive Level: Evaluate)
CO-4 Use the concept of function of several variables analyse the nature of the continuity and differentiability of function of two variable and find the maxima and minima of the function in R^2.(Cognitive Level: Analyze)
CO-5 Find the rank and inverse of the matrix, find the eigen value and the eigen-vector of a square matrix and solve system of homogenous and non-homogenous equations containing m equataions and n variables.(Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	1	1	1	1	1	1	1	2	1	3
CO2	3	2	3		2	-	-	-	1	1	1	1	2	1	3
CO3	3	2	3	2	2	1	1	-	1	-	1	1	2	1	3
CO4	3	3	2		2	-	1	1	1	1	1	1	2	1	3
CO5	3	3	3	2	2	1	-	-	1	-	-	1	2	1	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

Unit – I: **Calculus-I** **10 Hours**

Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Unit – II: Calculus-II **10 Hours**

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.

Unit – III: **Sequences and series** **10 Hours**

Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit – IV: **Multivariable Calculus** **10 Hours**

Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence

Unit – V: **Matrices** **8 Hours**

Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
6. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
7. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
8. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE-103
Title of the Course: Basic Electrical Engineering
L-T-P: 3-1-0
Credits: - 04
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcomes

CO 1 To comprehend the application of different theorems of electrical circuit.(Cognitive Level: Apply)
CO 2 To analyze the single-phase ac circuits. (Cognitive Level: Evaluate)
CO 3 To understand and formulate basic electric and magnetic circuits.(Cognitive Level: Analyze)
CO4 To examine the working principles of electrical machines and power converters. (Cognitive Level: Evaluate)
CO5 To evaluate the components of low voltage electrical installations. (Cognitive Level: Apply)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	1	2	1	1			2		2	1	2	1
CO2	2	2	3	2	2	2	2	2		2	1	2		2	2
CO3	2	2	3	2	3	2	2	2		3		2		2	2
CO4	1	3	2	2	2	2	2	2		2		2		2	2
CO5	2	2	3	2	2	2	2		1	3	1	2	2	2	2

Detailed Syllabus

UNIT 1: DC Circuits **10 Hours**

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

UNIT 2: AC Circuits **10 Hours**

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. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT 3: Transformers **10 Hours**

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT 4: Electrical Machines **10 Hours**

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

UNIT 5: Power Converters **8 Hours**

DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation. **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.

Suggested Text / Reference Books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
4. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
5. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: -B.Tech CSE

Course Code: BTCSE104

Title of the Course: Engineering Graphics and Design

L-T-P: - 1-0-2. **Credits**: - 3

Course Outcome

CO-1 Acquire knowledge of basic principles of Engineering graphics, lettering, dimensioning, sketching, and use of drafting equipment.(Cognitive Level: Remember)

CO-2 Need for scaling the dimension of an object, different types of scaling and scale (plaindigonal and vernier scales).(Cognitive Level: Apply)

CO-3 Create geometric constructions; drawing parallel and perpendicular lines, and to construct engineering curves like ellipse, parabola, hyperbola, involute and cycloidal.(Cognitive Level: Evaluate)

CO-4 Gain knowledge on types of projections and draw Orthographic projections of Lines, Planes, Solids, and Section of Solids.(Cognitive Level: Analyze)

CO-5 Construct isometric scale, isometric projections and views and Conversion of orthographic views to isometric views and vice versa.(Cognitive Level: Create)

CO-6 Create 2-D computer drawing: setting up working space (units, grids etc.), creating and editing 2-D geometries(Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	1	2	1	1			2		2	1	2	1
CO2	2	2	3	2	2	2	2	2		2	1	2		2	2
CO3	2	2	3	2	3	2	2	2		3		2		2	2
CO4	1	3	2	2	2	2	2	2		2		2		2	2
CO5	2	2	3	2	2	2	2		1	3	1	2	2	2	2
CO6	2	2	3	2	2	2	2		1	3		2		2	2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus

UNIT 1: Introduction to Engineering Drawing **10 Hours**

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;

UNIT 2: Orthographic Projections **8 Hours**

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes; **Projections of Regular Solids** covering, those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

UNIT 3: Sections and Sectional Views of Right Angular Solids 8 Hours

Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

UNIT 4: Isometric Projections covering, 10 Hours

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions; **Overview of Computer Graphics** covering, listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];

UNIT 5: Customization& CAD Drawing 6 Hours

consisting of set up of the drawing page and the printer, including scale settings, setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

Reference Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B.Tech. (CSE)

Course Code: BTCSE 105 Title of the Course: Applied Physics Lab-I

L-T-P: 0-0-4
Credits: 2
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Able to develop the experimental skills and thinking capabilities. (Cognitive level: create).

CO2: Able to understand different phenomenon related to optics through experimentation (Cognitive level: understand).

CO3: Able to understand the theoretical concepts of optics through experimentation. (Cognitive level: understand).

CO4: Able to differentiate harmonic oscillations and waves and apply the knowledge in mechanical and electrical systems (Cognitive level: understand).

CO5: Able to apply the experimental knowledge in the real life (Cognitive level: apply).

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	1	-	-	-	-	1	1	2	1	2	1	1	1	2
CO2	-	1	3	-	1	-	2	1	-	1	2	1	2	2	2
CO3	1	1	3	1	-	1	-	2	1	2	-	1	3	2	3
CO4	-	1	-	-	1	-	1	-	-	-	1	-	1	1	2
CO5	1	-	3	-	-	1	1	1	1	2	-	1	1	2	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level' mapping, 2 for 'Medium-level' mapping, 1 for 'Low'-level' mapping.

List of experiments

1. To determine wavelength ($\boldsymbol{\lambda}$) of sodium light by measuring the diameters of Newton's Rings.

2. To determine wavelength ($\boldsymbol{\lambda}$) of any three lines of mercury light by Diffraction Grating.

3. To determine frequency of AC mains using sonometer.

4. To determine frequency of AC mains by Melde's Experiment.

5. To determine g using Bar Pendulum.

6. To determine g at a particular location using Kater's Pendulum.

7. To determine spring constant by using a) Static Method b) Dynamic Method.

8. To determine the moment of inertia of a flywheel about its own axis of rotation.

9. To find the relationship between potential difference across a capacitor and time during it's charging and discharging using metronome (time-ticker).

10. To determine the wavelength of Laser in diffraction grating.

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B.Tech (CSE)

Course Code: **BTCSE 106** **Title of the Course: Basic Electrical Engg. Lab**
L-T-P: 0-0-2

Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Understand basic components of electric circuits. (Cognitive level: Understand)

CO2: Able to apply Kirchoff laws. (Cognitive level: Create)

CO3: Understand theorems and apply it to the electric circuits. (Cognitive level: Understand)

CO4: Analyze RLC circuits. (Cognitive level: Analyze)

CO5: Understand and apply RLC circuit for finding resonant frequency. (Cognitive level: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	P S O 1	PS O2	PS O3
CO1	**1**	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**1**	**2**	**1**	**1**	**1**	
CO2	**-**	**3**	**3**	**-**	**1**	**-**	**2**	**1**	**-**	**1**	**2**	**1**	**2**	**2**	
CO3	**3**	**1**	**3**	**1**	**-**	**1**	**-**	**2**	**1**		**-**	**1**			
CO4	**-**	**1**	**-**	**-**	**1**	**-**	**1**	**-**	**-**	**-**	**1**	**-**	**1**	**1**	**2**
CO5	**1**	**-**	**3**	**-**	**-**	**1**	**1**	**1**	**1**	**2**	**-**	**1**	**1**		

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

List of Experiments

1. Study of different instruments in basic electrical lab.

2. Verification of Ohm's Law.

3. Verification of KCL.

4. Verification of KVL.

5. Verification of Superposition Theorem.

6. Verification of Thevenin's Theorem.

7. Verification of Norton's Theorem.

8. Verification of Maximum Power Transfer Theorem.

9. To analyse RLC circuit.

10. To find Resonance Frequency in an RLC circuit.

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B.Tech. (CSE)
Course Code: BTCSE 107 Title of the Course: Basic Engineering Graphics and Design
L-T-P: 0-0-2
Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Need for scaling the dimension of an object, different types of scaling and scale (plain diagonal and vernier scales).
CO2: Create geometric constructions; drawing parallel and perpendicular lines, and to construct engineering curves like ellipse, parabola, hyperbola, involute and cycloidal.
CO3: Gain knowledge on types of projections and draw Orthographic projections of Lines, Planes, Solids, and Section of Solids.
CO4: Construct isometric scale, isometric projections and views and Conversion of orthographic views to isometric views and vice versa.
CO5: Create 2-D and 3-D computer drawing: setting up working space (units, grids etc.), creating and editing 2-D geometries, use industry-standard Computer Aided Design (CAD) software to model solid objects proceeding from basic sketching techniques to the creation of solid features through the use of extrusions, cuts, rotations, patterns and sweeps.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3		1	1				1		1	1		1
CO2	1	2	3	2	1					2		1		1	1
CO3	1	2	3	2	3	1		1		3	1	1		1	1
CO4	1	3	2	2	2		1			2		1	1		1
CO5	1	2	3	1	3				1	3		1	1	1	1

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

List of experiments

S.No.	List of Assignments
1.	Lettering
2.	Dimensioning Practice
3.	Engineering Scale: - Plain Diagonal & Vernier Scale
4.	Engineering Curve: - Involute, Conic Section, Cycloid, Hypocycloid and Epicycloids
5.	Projection of point & Projection of Line
6.	Projection of Plane
7.	Projection of Solid & Section of Solid

8.	Isometric Projection of Plane
9	Isometric Projection of Solid
10	CAD Drawing: - 2D and 3D

Teaching-Learning Strategies in brief

Engineering graphics subject is full drawing-oriented subject. First fundamentals of different topics of engineering graphic are delivered and then explain the procedure of constructions step by steps. Later on, assignment issued to check the understanding. I explain the construction of drawing on both ways Manual drawing as well as on CAD software (Autocad and ProE) in lecturesI Provide study material, sample question and ppt. I always encourage students to raise their doubts and questions and create friendly environment for them.

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Assessment methods and weightages in brief (4 to 5 sentences)

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1. By conducting quizzes.
2. By conducting viva.
3. By taking semester examination.
4. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B. Tech CSE

Course Code: BTCSE 108

Title of the Course: Essence of Indian Traditional knowledge

L-T-P: 2-0-0

Credits: 02

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcomes:

After completing this Course, the students should be able to:

CO1. Identify the concept of Traditional knowledge and its importance. (Cognitive Level: Remember)

CO2. Explain the need for and importance of protecting traditional knowledge. (Cognitive Level: Apply)

CO3 Illustrate the various enactments related to the protection of traditional knowledge. (Cognitive Level: Evaluate)

CO4. Interpret the concepts of Intellectual property to protect the traditional knowledge. (Cognitive Level: Analyze)

CO5. Explain the importance of Traditional knowledge in Agriculture and Medicine.(Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	1			2		1	1		3	1	2
CO2	3	3	3	2	2	1						1	3	1	2
CO3	3	2	3	2	1	1	2				2		3	1	2
CO4	3	3	3	2	1		1		2			1	3	1	2
CO5	3	3	2	2	2								3	1	2

Detailed Syllabus:

UNIT 1 **8 Hours**

Introduction to Elements of Indian History: What is history? ; History Sources-Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography; Introduction to sociological concepts-structure, system, organization, social institutions, Culture social stratification (caste, class, gender, power).State & civil society; (7 Lectures)

UNIT 2: **10 Hours**

Indian history & periodization; evolution of urbanization process: first, second &third phase of urbanization; Evolution of polity; early states to empires; Understanding social structures- feudalism debate; Understanding social structure and social processes: Perspectives of Marx, Weber & Durkheim;

UNIT 3 : **8 Hours**

From Feudalism to colonialism-the coming of British; Modernity & struggle for independence; Political economy of Indian society. Industrial, Urban, Agrarian and Tribal society; Caste, Class, Ethnicity and Gender; Ecology and Environment;

UNIT 4: **8 Hours**

Issues & concerns in post-colonial India (up to 1991); Issues & concerns in postcolonial India 2nd phase (LPG decade post 1991) ,

UNIT 5 : **8 Hours**

Social change in contemporary India: Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, Changing nature of work and organization

Reference Books:

- History
  1. Desai, A.R. (2005), Social Background of Indian Nationalism, Popular Prakashan
  2. Guha, Ramachandra (2007), India After Gandhi, Pan Macmillan
  3. Thapar, Romila (2002), Early India, Penguin
  4. Sharma R.S.(1965), Indian Feudalism, Macmillan
  5. Deshpande, Satish (2002), Contemporary India: A Sociological View, Viking
  6. Gadgil, Madhav&RamachandraGuha(1993), This Fissured Land: An Ecological History of India, OU Press
- Sociology:
  1. Giddens, A (2009), Sociology, Polity, 6th edn.
  2. Haralambos M, RM Heald, M Holborn (2000), Sociology, Collins
  3. Xaxa, V (2008), State, Society and Tribes Pearson
  4. Chandoke, Neera& Praveen Priyadarshi (2009), Contemporary India: Economy, Society and Politics, Pearson
  5. Oommen,T.K.(ed.) (1997), Citizenship and National Identity: From Colonialism to Globalization, Sage.
  6. Mohanty, M (ed.) (2004), Class, Caste & Gender- Volume 5, Sage
  7. Dhanagare, D.N. , Themes and Perspectives in Indian Sociology, Rawat
  8. Ramaswamy, E.A. and Ramaswamy,U.(1981), Industry and Labour, OU Press

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightage in brief

1. By taking two sessional examinations.
2. By giving assignments.

3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: -B. Tech (CSE)

Course Code: BTCSE-201

Title of the Course: Applied Physics-II
L-T-P: 3-1-0
Credits: - 04
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this Course, the students should be able to:

CO 1: Apply basic physical principles to explain the functioning of some semiconductor devices. (Cognitive level: Apply)
CO 2:Apply Maxwell theory underlying the electric and magnetic processes to the propagation of electromagnetic waves. (Cognitive level: Apply)
CO 3:Analyze the inadequacy of classicalmechanics and beauty of the quantum ideas.(Cognitive level: Analyze)
CO 4:Apply the Newtonian mechanics principles to a few mechanical oscillatory systems.(Cognitive level: Apply)
CO 5:Understand the Physics behind the working of X- rays.(Cognitive level: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	-	-	-	-	2	-	-	1	-	-
CO2	2	3	2	3	1	-	-	1	-	-	-	-	1	-	3
CO3	3	2	2	2	3	1	2	-	-	1	-	2	-	2	-
CO4	3	2	1	2	2	-	-	-	1	-	-	2	-	-	2
CO5	2	2	2	2	1	-	-	-	-	-	2	-	-	2	-

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

UNIT 1: Semiconductor Materials **10 Hours**

Semiconductors materials of interest for optoelectronic devices, LEDs: device structure, materials, characteristics and figures of merit, Semiconductor photodetectors- P-N junction, Avalanche and Zener breakdown: structures, materials, working principle and characteristics, Noise limits on performance, Solar cells.

UNIT 2: Electromagnetic Theory **10 Hours**

Motion of charged particles in crossed electric and magnetic fields, Velocity selector, Gauss law, continuity equation, Inconsistency in Ampere's law, Maxwell's equations (differential and integral forms), Poynting theorem and Poynting vector, Propagation of plane electromagnetic waves in conducting and non-conducting medium.

UNIT 3: Quantum Mechanics **10 Hours**

Introduction to Quantum mechanics, wave nature of particles, Time-dependent and time-independent Schrodinger equation for wave function, expectation values, Wave-packets, uncertainty Principle, Solution of stationary state Schrodinger equation for particle in a box problem, Single step barrier, tunnelling effect.

UNIT 4: Mechanical Systems **8 Hours**

Newton's laws, Conservative and non-conservative forces, Concept of potential energy, Work energy theorem, Periodic and oscillatory motion, Simple harmonic motion, Time period, Frequency, Phase and phase constant, Energy in simple harmonic motion, Damped and forced oscillations.

UNIT 5: X-Rays **10 Hours**

Crystalline and amorphous solids, Bragg's law, Historical background: Discovery of X-rays, Production of X-rays, Moseley's law, Properties of X-rays, Continuous and characteristic X-rays, Soft and hard X-rays, Applications.

Reference Books:

1. Arthur Beiser, "Concepts of Modern Physics".
2. B.G. Streetman, "Solid State Electronic Devices", Prentice Hall of India, 1995.
3. David Griffiths, "Introduction to Electrodynamics".
4. R. Robinett, "Quantum Mechanics," OUP Oxford, 2006.

Teaching-Learning Strategies in brief:

1. Encourage participation of students in learning.
2. Connect the subject matter with the student's everyday life.
3. Encourage the spirit of questioning by the students.
4. Arrange student friendly study material and other learning resources.
5. Create friendly environment conducive for learning.

Assessment methods and weightages in brief:

1. Two sessional examinations.
2. Assignments.
3. Oral quizzes in the class.
4. End semester examination.
5. Internal Assessment: 25 Marks, End Semester Examination :75 Marks &Total Marks: 100.

Name of the Academic Program: B. Tech. (CSE)

Course Code: BTCSE-202
Title of the Course: Mathematics-II
L-T-P: 3-1-0
Credits: 04
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this Course, the students should be able to:

CO-1 Discuss the problems of basic Probability and probability distribution of discrete random variables.(Cognitive Level: Understand)
CO-2 Discrible the probability distribution of continuous random vriables and apply to solve problems.(Cognitive Level: Remember)
CO-3 Find Bivariate Distributions and distribution of some and quotients.(Cognitive Level: Evaluate)
CO-4 Solve the problems on Measures of central tendency and some others probabolitiy distributin like, Binomial and Normal Distributions. (Cognitive Level: Analyze)
CO-5 Use the Application of Statistics like, Curve fitting and diffrent sample test of single prortions. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	-	-	-	-	2	-	-	1	-	-
CO2	2	3	2	3	1	-	-	1	-	-	-	-	1	-	3
CO3	3	2	2	2	3	1	2	-	-	1	-	2	-	2	-
CO4	3	2	1	2	2	-	-	-	1	-	-	2	-	-	2
CO5	2	2	2	2	1	-	-	-	-	-	2	-	-	2	-

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.
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Detailed Syllabus:

Unit – I: Basic Probability **10 Hours**

Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality.
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Unit – II: Continuous Probability Distributions **10 Hours**

Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities.

Unit – III: Bivariate Distributions **10 Hours**

Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

Unit – IV: Basic Statistics **10 Hours**

Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation

Unit – V: Applied Statistics **8 Hours**

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations. Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B. Tech (CSE)
Course Code: BTCSE-203
Title of the Course: Programming for Problem Solving
L-T-P: 3-1-0
Credits: 04
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this Course, the students should be able to:

CO1: Develop simple algorithms for arithmetic and logical problems.(Cognitive Level: Understand)
CO2: Translate the algorithms to programs & execution (in C language). (Cognitive Level: Apply)
CO3: Implement conditional branching, iteration and recursion.(Cognitive Level: Evaluate)
CO4: Decompose a problem into functions and synthesize a complete program using divide and conquer approach.(Cognitive Level: Analyze)
CO5: Use arrays, pointers and structures to develop algorithms and programs.(Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	1		2			1	2	1	3	3
CO2	3	2	2	3	3	1	1					2	2	2	3
CO3	3	3	3	2	1			1			2	2	2	2	1
CO4	3	2	3	2	2	1	2		2	3		2		2	2
CO5	1		1							2		2		2	2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

Unit 1: **10 Hours**

Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.): Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/ Pseudo-code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code

Unit 2: **10 Hours**

Arithmetic expressions and precedence, Conditional Branching, Writing and evaluation of conditionals and consequent branching**,** Iteration and loops

Unit 3: **10 Hours**

Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required), Arrays: Arrays (1-D, 2-D), Character arrays and Strings

Unit 4 : **10 Hours**

Function: Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference, Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

Unit 5 : **8 Hours**

Structure: Structures, Defining structures and Array of Structures, Pointers: Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation), File handling (only if time is available, otherwise should be done as part of the Laboratory)

Reference Books

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
3. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B.Tech CSE

Course Code: BTCSE 204
Title of the Course: Workshop/Manufacturing Practices
L-T-P: - 1-0-2.
Credits: - 3

Course Outcomes

CO1. Understand the appropriate tools, materials, instruments required for specific operations in work-shop.(Cognitive Level: Apply)
CO2. Apply techniques to perform basic operations with hand tools and power tools such as centre lathe machine, drilling machine using given job drawing.(Cognitive Level: Evaluate)
CO3. Understand the figures of the hand tools used in fitting, carpentry, foundry, welding shop and machine tools such as lathe machine and drilling machine.(Cognitive Level: Analyze)
CO4. Understand a report related to hand tools and machine tools description referring to library books and laboratory manuals.(Cognitive Level: Evaluate)
CO5. Understand report of procedures followed for a given task in fitting, carpentry, foundry, sheet metals, welding and machine shops. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3			2		2			1			2		2	
CO2	2		3		1		3				1	2	3		1
CO3	3	1						2				2			
CO4	3		1			3			2			2	1		3
CO5	2			1					3	2		2		1	

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus

UNIT-1 **10 Hours**
Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods

UNIT-2 **10 Hours**
CNC machining, additive manufacturing,fitting operations power tools

UNIT-3 **8 Hours**
Electrical, Electronics and carpentry

UNIT-4 **8 Hours**
Plastic molding, glass cutting**and**metal casting

UNIT-5 **8 Hours**
Welding (arc welding & gas welding), brazing

Suggested Text/Reference Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology",4th edition, Pearson Education India Edition, 2002.
3. Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology – I" Pearson Education, 2008.
4. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
5. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.

Teaching-Learning Strategies in brief

1. Review the theory and technique briefly before the students commence the lab.
2. Corelate the relation between the lab to the lecture and to real world applications.
3. Are eager to help and answer questions.
4. Walk around and check with students to make sure that they are progressively understanding.
5. Enquire questions that make students inclined to think more intensely about what they are doing and why

Assessment methods and weightages in brief

1. Theory Assessment is based on performance in two internal
2. Lab assessment is based on performance in lab work.
3. Assessment is also based on lab file work.
4. Performance in Semester exam

Internal assessment (25 Marks) & Semester Examination (75 Marks)
Total Marks-100.

Name of the Academic Program: - B.Tech. (CSE)

Course Code: BTCSE 205
Title of the Course: English Language
L-T-P: 2-0-0
Credits: 02

COURSE OUTCOMES (COs)

After completing this course, the students should be able to:

CO1: To develop competence in communication skills related to the production & presentation of messages in multiple formats & understand the importance of body language. (Cognitive Level: Remember)
CO2: To develop the writing skills of the students so that they are capable of communicating efficiently. (Cognitive Level: Apply)
CO 3: To familiarize students with the basics of the English language and help them to learn to identify language structures for correct English usage. (Cognitive Level: Evaluate)
CO4: To familiarize students with the basics of the English language and help them to learn to identify language structures for correct English usage. (Cognitive Level: Analyze)
CO5: To enhance vocabulary skills and make students fluent, thereby improving receptive and expressive skills. (Cognitive Level: Create)

Mapping of Course Outcome (Cos) with Program Outcomes (POs) & Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	-	-	-	-	2	-	-	1	-	-
CO2	2	3	2	3	1	-	-	1	-	-	-	-	1	-	3
CO3	3	2	2	2	3	1	2	-	-	1	-	2	-	2	-
CO4	3	2	1	2	2	-	-	-	1	-	-	2	-	-	2
CO5	2	2	2	2	1	-	-	-	-	-	2	-	-	2	-

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level' mapping, 2 for 'Medium-level' mapping, 1 for 'Low'-level' mapping.

Detailed Syllabus:

Unit 1: Vocabulary Building **6 Hours**

The concept of word formation, root words from foreign languages and their use in English with prefixes and suffixes from foreign languages in English to form derivatives. Usage of synonyms, antonyms abbreviations and one-word substitution.

Unit- 2: Basic Writing Skills: 6 Hours

Sentence structure. Use of phrases and clauses in sentences, importance of proper punctuation, creating coherence, organizing principles of paragraphs in documents, techniques for writing precisely and coherently.

Unit – 3: Identifying Common Errors in Writing 8 Hours

Subject-verb agreement, noun-pronoun agreement, misplaced modifiers, articles, preposition, redundancies, ambiguity, cliches and gender-neutral words

Unit- 4: Nature and Style of Sensible Writing: 6 Hours

Types of writing, describing, defining, classifying, providing examples or evidence to support cohesion, writing introduction, discussion and conclusion.

Unit -5: Writing Practices & Oral Communication: 8 Hours

Comprehension, Essay, Resume, Cover Letter, Note-Making and Precis writing.

Reference Books:

1. Adair, John. Effective Communication. London: Pan Macmillan Ltd., 2003.
2. Hasson, Gill. Brilliant Communication Skills. Great Britain: Pearson. Education, 2012.
3. Raman, Meenakshi & Sangeeta Sharma. Technical Communication: Principles and Practice, 2013
4. Practical English Usage, Michael Swan
5. Exercises in Spoken English, Oxford University Press

Teaching-Learning Strategies in brief:

1. Ability to handle the interview process confidently
2. Communicate fluently and sustain comprehension of an extended discourse.
3. Demonstrate ability to interpret texts and observe the rules of good writing.
4. To empower students to carry out day to day communication at the workplace by adequate understanding of various types of communication to facilitate efficient interpersonal communication.
5. Students will be able to navigate cross cultural encounters in a global economy. Facilitate students to develop learning to construct and deliver messages that incorporate the appropriate use of organizing content, language, vocabulary, kinesics, eye contact, appearance, visual aids, and time constraints

Assessment methods and weightages in brief:

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B.Tech. (CSE)

Course Code: BTCSE 206 Title of the Course: Applied Physics Lab-II

L-T-P: 0-0-4
Credits: 2
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Able to understand the standard value and characteristics of different experiment (Cognitive level: understand).

CO2: Able to compare the value of Plank's constant through different LED (Cognitive level: compare).

CO3: Able to perform experiment related to semiconductor devices (Cognitive level: understand).

CO4: Able to understand characteristics of voltage and current through different potentiometer. (Cognitive level: understand).

CO5: Once the students perform the experiments they can apply the knowledge in the real life (Cognitive level: understand).

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	1	-	-	-	-	1	1	2	1	2	1	1	1	2
CO2	-	1	3	-	1	-	2	1	-	1	2	1	2	2	2
CO3	1	1	3	1	-	1	-	2	1	2	-	1	3	2	3
CO4	-	1	-	-	1	-	1	-	-	-	1	-	1	1	2
CO5	1	-	3	-	-	1	1	1	1	2	-	1	1	2	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level' mapping, 2 for 'Medium-level' mapping, 1 for 'Low'-level' mapping.

List of experiments

1. To determine the value of specific charge e/m of an electron by Thomson Method
2. To determine the value of Plank's constant using Light Emitting Diode (LED).
3. Draw the V-I characteristic for Light Emitting Diode (LED) and determine the value of Plank's constant.
4. Determination of Plank's Constant by plotting a curve between Threshold voltage and wavelength

of LED.

5. To determine the value of Plank's constant using photo cell.

6. Calibration of Voltmeter using (a) DC potentiometer (b) Crompton DC potentiometer.

7. Calibration of Ammeter using (a) DC potentiometer (b) Crompton DC potentiometer.

8. To Study of various Lissajous Pattern.

9. To determine and find the value of voltage and frequency using Lissajous Pattern.

10. To determine the thermal conductivity of bad conductors such as card board, glass etc.

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.

Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B.Tech. (CSE)

Course Code: BTCSE-207
Title of the Course: Programming for Problem Solving Lab
L-T-P: 0-0-4 **Credits**: 02
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this Course, the students will learn:

CO 1 :ToworkwithanIDEtocreate,edit,compile,runand debugprograms (Cognitive Level : Apply)

CO 2 :Toanalyzethevariousstepsinprogramdevelopment. (Cognitive Level: Analyze)

CO 3:Developprogramstosolvebasicproblems byunderstandingbasicconceptsinClike operators,controlstatements etc. (Cognitive Level : Create)

CO 4 :Todevelopmodular, reusableandreadableCProgramsusingtheconceptslikefunctions,arrays etc.(Cognitive Level: Create)

CO 5: ToWriteprogramsusingtheDynamicMemoryAllocationconcept.(Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2	2	2	1	-	-	-	-	3	3	2	2
CO2	3	2	3	2	2	-	2	-	-	1	-	3	2	2	1
CO3	3	3	3	3	1	2	-	-	1	-	-	3	3	2	2
CO4	3	3	3	2	1	3	1	2	1	-	3	3	3	2	3
CO5	3	3	3	2	2	2	-	2	1	1	-	3	2	3	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

List of Programs

1. WriteprogramthatdeclaresClassawardedforagivenpercentageofmarks,wheremark<40%=Failed,40%to<60%=Secondclass,60%to<70%=Firstclass,>=70%=Distinction.Readpercentagefromstandardinput.

2. 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 +,-,*, /, %anduseSwitchStatement)
3. WriteaCprogramthatusesfunctionstoperformthefollowing:
   i. AdditionofTwoMatrices

ii.MultiplicationofTwoMatrices

iii.

iii.Transposeofamatrixwithmemorydynamicallyallocatedforthenewmatrixasrowandcolumnc ountsmaynotbesame.

4. Writea Cprogramto displaythe contentsofa filetostandardoutputdevice.
5. WriteaCprogramthatdoesthefollowing:
6. It should first create a binary file and store 10 integers, where the file name and 10valuesaregiveninthecommandline.(hint:convertthestringsusingatoifunction)Now the program asks for an index and a value from the user and the value at thatindexshouldbe-changedto thenewvalueinthefile.(hint:usefseekfunction)
7. WriteaCprogramthatdoesthefollowing:
   It should first create a binary file and store 10 integers, where the file name and 10valuesaregiveninthecommandline.(hint:convertthestringsusingatoifunction)Now the program asks for an index and a value from the user and the value at thatindexshouldbe-changedto thenewvalueinthefile.(hint:usefseekfunction)
   Theprogramshould thenread all10valuesandprint themback.
8. Writea Cprogramtomergetwofilesintoathird-file(i.e.,thecontentsofthefirstfilefollowedbythose ofthe secondare putinthethirdfile).
9. Write a C program to determine if the given string is a palindrome or not (Spelledsame in both directions with or without a meaning like madam, civic, noon, abcba,etc.)
10. WriteaCprogramtoconstructapyramidofnumbersas follows:

*	1	1	*
**	23	22	**
***	456	333	***
		4444	**
			*

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. Internal Viva-voce
2. External Viva-voce / Semester Examination
3. Class tests.
4. Quiz
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100

SuggestedReferenceBooksforsolvingtheproblems:

i. ByronGottfried,Schaum'sOutlineofProgrammingwithC,McGraw-Hill
ii. B.A.ForouzanandR.F.GilbergCProgrammingandDataStructures,CengageLearning,

(3rd Edition)

iii. BrianW.KernighanandDennisM.Ritchie,TheCProgrammingLanguage,Prentice

iv. HallofIndia

v. R.G.Dromey, HowtosolveitbyComputer,Pearson(16th Impression)

vi. ProgramminginC,StephenG.Kochan, FourthEdition,PearsonEducation.

vii. HerbertSchildt,C:TheCompleteReference,McGrawHill,4th Edition

Program: B.Tech. (CSE)

Course Code: BTCSE 208 Title of the Course: Workshop/Manufacturing Practices Lab

L-T-P: 0-0-2
Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Understand the appropriate tools, materials, instruments required for specific operations in workshop.

CO2: Apply techniques to perform basic operations with hand tools and power tools such as centre lathe machine, drilling machine using given job drawing

CO3: Able to make different joints, fits and rectangular Tray in carpentry, welding, fitting and sheet metal shops.

CO4: Able to prepare sand mold using the single and split piece pattern.

CO5: Able to control lamp for different configuration.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	3			2	2	3	2	2	3	3	2	3	1		1
CO 2	2	2	3	2	2	2	2	3	3	3	2	3		2	1
CO 3	3	2	3	2	1	2	2	3	2	3	1	3	1	1	1
CO 4	2	2	3	2	2	3	2	3	2	3	2	3		2	
CO 5	2	2	3	2	2	3	1	3	2	3	2	3	2		1

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.
Mapping with PSOs, where applicable.

EXPT.NO	Shop	Aim
1 DOVETAILLAPJOINT	CARPENTRY	To make a dovetail lap joint.

2 CROSS HALFLAPJOINT		to make a cross half lap joint.
3 SQUARECUTTING	**Fitting**	To make a Square fit from the given mid steel pieces
4 MOULD FOR A SOLID	**Foundry**	To prepare a sand mold, using the given single piece pattern.
5 RECTANGULAR TRAY	**Sheet Metal**	To make a rectangular Tray as per required dimensions
6 BUTTJOINT	WELDING	To make a Butt joint using the given two M.S pieces by arc welding.
7 LAPJOINT		To make a Lap joint, using the given two M.S pieces and by arc welding.
8	HOUSE (ELECTRICAL)WIRING	To control one lamp by a one switch with provision for plug socket with switch control.
9		To control two lamps by a one switch with provision for plug socket with switch control.
10		To control two lamps by two independent switches located at two different places.

Teaching-Learning Strategies in brief

1. Review the theory and technique briefly before the students commence the lab.

2. Corelate the relation between the lab to the lecture and to real world applications.
3. Are eager to help and answer questions.
4. Walk around and check with students to make sure that they are progressively understanding.
5. Enquire questions that make students inclined to think more intensely about what they are doing and why

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Assessment methods and weightages in brief (4 to 5 sentences)

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Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.

Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B.Tech. (CSE)

Course Code: BTCSE 209 Title of the Course: English Language Lab

L-T-P: 0-0-2
Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: To expose the students to a variety of self-instructional learner-friendly modes of language learning. (Cognitive level: understand).

CO2: To enable them to learn better pronunciation through stress on word accent, Intonation and rhythm and to increase vocabulary. (Cognitive level: create).

CO3: To train them to use language effectively to face interviews, group discussions, and public speaking. (Cognitive level: create).

CO4: To train them to give positive feedback in various situations, to use appropriate body language and avoid barriers to effective communication. (Cognitive level: understand).

CO5: To acquaint them with the uses of resume /CV preparation, report writing, format making etc. and to improve writing skills (Cognitive level: create).

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	2	2	2	2	3	1	1	3	2	2	2	2	2	2
CO2	2	1	3	2	1	2	2	3	2	2	2	2	2	2	2
CO3	1	2	3	1	2	1	3	2	1	2	1	2	3	2	3
CO4	3	1	2	2	1	2	3	3	2	3	3	2	2	1	2
CO5	1	2	3	3	3	1	1	1	1	2	2	3	2	2	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level' mapping, 2 for 'Medium-level' mapping, and 1 for 'Low'-level' mapping.

List of experiments

1. Experiment 1: Listening Skills • The student should be able to listen to s text read aloud at normal speed with a focus on intonation. • After listening the student can fill in blanks, choose a suitable title, make a summary, supply required information and be able to answer comprehension questions from the passage read aloud.

2. Experiment 2: Speaking Skill • Reading aloud dialogues, texts, poems, and speeches focusing on intonation. • Self-introduction • Role plays on any two situations. • Telephonic Conversations.
3. Experiment 3: Personality Development • Initiation • Physical Appearance • Audience Purpose.
4. Experiment 4: Interpersonal Skills • Appropriate use of non-verbal skills in face-to-face communication i.e. Viva –interviews, GDs and public speaking, extempore
5. Experiment 5: Presenting in GD, Seminars and Conferences. • Leadership Quality • Time Management • Achieving the target
6. Experiment 6: Activities on Interpersonal Communication and Building Vocabulary i.e Role of Body Language in Communication
7. Experiment 7: Activities on Reading Comprehension
8. Experiment 8: Activities on Writing Skills i.e Resume, Cover Letter, E-mails
9. Experiment 9: Technical Report Writing i.e Reports, notice, memorandum, Minutes of meeting
10. Experiment 10: Activities on Group Discussion and Interview Skills

Teaching-Learning Strategies in brief :

1. Build a positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage the students to ask more & more questions.
4. Motivate the students to develop critical & strategic thinking.

Assessment methods and weightages in brief :

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) & Total Marks-100.

Name of the Academic Program: - B.Tech. (CSE)

Course Code: BTCSE 210

Title of the Course: Basic Engineering Mechanics

L-T-P:- 2-1-0

Credits:- 3

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1 Draw Free body, resultant force and moment calculation and determine the equilibrium of a particle in using principle of mechanics. (Cognitive Level: Remember)
CO-2 Compute the equilibrium of rigid bodies in two dimensions. (Cognitive Level: Apply)
CO-3 Determine the reaction force by applying laws of friction and the motion parameters of rigid body. (Cognitive Level: Evaluate)
CO-4 Find the centroid, first and second moment of area. (Cognitive Level: Analyze)
CO-5 Analysis the pin jointed frame (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	1		1		1	1	2	2	1		1
CO2	3	3	3	2		1		2		1	2	2		2	1
CO3	2	2	3	2			3		3	1	2	2	1		3
CO4	2	3	2	2		2				1	2	2		1	
CO5	3	3	3	2				1	3	1	2	2	1		1

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Unit 1: 8 Hours

Statics: Free body diagrams with examples on modeling of typical supports and joints; Condition for equilibrium in three- and two- dimensions**,** Fundamentals of Statics , Force, Moment, Couple, Principle of Transmissibility, Varignon's Theorem, Resolution of Forces, Concurrent and Non-concurrent Force

Unit 2: 8 Hours

Friction: Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, friction of flat pivot and collared thrustbearings, Belt drive- derivation of equation. $T_1/T_2 = e^{\mu\theta}$ and its application

Unit 3: 8 Hours

Structure: Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis ofperfect plane trusses by the method of joints, method of section.

Unit 4: **8 Hours**

Distributed Force: Determination of center of gravity, center of mass and Centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment ofinertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, polar moment of inertia.

Unit 5: **10 Hours**

Kinematics of Particles: Rectilinear motion, plane curvilinear motion-rectangular coordinates,normal and tangential component.

Kinetics of Particles: Equation of motion, rectilinear motion and curvilinear motion, work energy equation, conservation of energy, impulse and momentum conservation of momentum, impact of bodies, co-efficient of restitution, loss of energy during impact.

Kinematics of Rigid Bodies: Concept of rigid body, type of rigid body motion, absolute motion, introduction to relative velocity, relative acceleration (Corioli's component excluded) and instantaneous center of velocity

Kinetics of Rigid Bodies: Equation of motion, translatory motion and fixed axis rotation, application of work energy principles to rigid bodies conservation of energy.

REFERENCE BOOKS:

1. An Introduction to the Mechanics of Solids, 2nd ed. with SI Units — SH Crandall, NC
2. Dahl & TJ Lardner
3. Engineering Mechanics: Statics, 7th ed. — JL Meriam
4. Engineering Mechanics of Solids — EP Popov
5. Beer & Johnston, "Engg Mechanics", TMH
6. A.K.Tayal, "Engg Mechanics", Umesh Publications
7. S. S Bhavikatti, Engg Mechanics"

Teaching-Learning Strategies in brief

First fundamentals of different topics of engineering mechanics are delivered and then explain the procedure for solving complex problem of the subject, assignment issued to check the understanding. I Provide study material, sample question and ppt. I always encourage students to raise their doubts and questions and create friendly environment for them.

Assessment methods and weightages in brief (4 to 5 sentences)

1. Theory Assessment is based on performance in two internal
2. Assignment issued for assessment the performance.
3. Surprise test conducted
4. Performance in Semester exam

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE 211
Title of the Course: Environmental Sciences
L-T-P: 2-0-0
Credits: 02

Course Outcomes:

CO1. Gaining in-depth knowledge on natural processes that sustain life and govern economy. (Cognitive Level: Understand)
CO2. Predicting the consequences of human actions on the web of life, global economy and quality of human life. (Cognitive Level: Remember)
CO3. Developing critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development. (Cognitive Level: Evaluate)
CO4. Acquiring values and attitudes towards understanding complex environmentaleconomic-social challenges and participating actively in solving current environmental problems and preventing the future ones. (Cognitive Level: Analyze)
CO5. Adopting sustainability as a practice in life, society, and industry(Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	-	-	-	-	2	-	-	1	-	-
CO2	2	3	2	3	1	-	-	1	-	-	-	-	1	-	3
CO3	3	2	2	2	3	1	2	-	-	1	-	2	-	2	-
CO4	3	2	1	2	2	-	-	-	1	-	-	2	-	-	2
CO5	2	2	2	2	1	-	-	-	-	-	2	-	-	2	-

Detailed Syllabus:

UNIT 1: 8 Hours
Concepts of Environmental Sciences covering, Environment, Levels of organizations in environment, Structure and functions in an ecosystem; Biosphere, its Origin and distribution on land, in water and in air, Broad nature of chemical composition of plants and animals;

UNIT 2: 8 Hours
Natural Resources covering Renewable and Non-renewable Resources, Forests, water, minerals, Food and land (with example of one case study); Energy, Growing energy needs, energy sources (conventional and alternative);

UNIT 3: 8 Hours
Biodiversity and its conservation covering, Biodiversity at global, national and local levels; India as a mega-diversity nation; Threats to biodiversity (biotic, abiotic stresses), and strategies for conservation; Environmental Pollution covering, Types of pollution- Air, water (including urban, rural, ma-

rine), soil, noise, thermal, nuclear; Pollution prevention; Management of pollution- Rural/Urban/Industrial waste management [with case study of any one type, e.g., power (thermal/nuclear), fertilizer, tannin, leather, chemical, sugar], Solid/Liquid waste management, disaster management;

UNIT 4: 8 Hours

Environmental Biotechnology covering, Biotechnology for environmental protection- Biological indicators, bio-sensors; Remedial measures- Bio-remediation, phyto remediation, bio-pesticides, bio-fertilizers; Bio-reactors- Design and application. Social Issues and Environment covering, Problems relating to urban environment- Population pressure, water scarcity, industrialization; remedial measures; Climate change- Reasons, effects (global warming, ozone layer depletion, acid rain) with one case study; Legal issues- Environmental legislation (Acts and issues involved),Environmental ethics;

UNIT 5 10 Hours

Environmental Monitoring covering, Monitoring- Identification of environmental problem, tools for monitoring (remote sensing, GIS); Sampling strategies- Air, water, soil sampling techniques, Laboratory Work including Practical and Field Work covering, Plotting of bio-geographical zones and expanse of territorial waters on the map of India; Identification ofbiological resources (plants, animals, birds) at a specific location; Determination of (i) pH value, (ii) water holding capacity and (iii) electrical conductivity of different types of soils; Determination of energy content of plants by bomb calorimeter; Measurement and classification of noise pollution; Determination of particulate matter from an industrial area by high volume sampler; Determination of ico-chemical parameters (pH, alkalinity, acidity, salinity, COD, BOD) of tap water, well water, rural water supply industrial effluent and seawater & potability issues; Demonstration of Remote Sensing and GIS methods; Industrial visit for environmental biotechnology processes (e.g., any one of the fermentation, tissue culture, pharmaceutical industries).

REFERNECE BOOKS:

1. S. M. Khopkar, “Environmental Pollution Monitoring & Control”, New Age
2. T. G. Spiro, W. M. Stigliani, “Chemistry of Environment”, PHI
3. A.K. Das, “Textbook on Medical Aspects of Bioinorganic Chemistry”, CBS
4. Nelson Cox and Lehninger, “Biochemistry”

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program : B.Tech.(CSE)

Course Code: BTCSE 301
Title of the Course:Software Engineering
L-T-P: 3-1-0

Credits: 4

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1. Analyze the need of Software Process Management. Compare different process Models for Software Development.(Cognitive Level: Understand)

CO-2. To provide the idea of decomposing the given problem into Analysis, Desing, Implementation, Testing and Maintenance phases. (Cognitive Level: Apply)

CO-3. To provide an idea of using various process models in the software industry according to given circumstances. (Cognitive Level: Evaluate)

CO-4. To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.(Cognitive Level: Analyze)

CO-5. To know various processes used in all the phases of the product.(Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3												1	
CO2	2		1			2		2		3		2			3
CO3					3		1				1		1		
CO4	1	3		2		1			3			1			3
CO5				3							2			2	

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

Unit 1.Introduction, Software Model and Process: 10 Hours

Software Crisis, Need and Definition of Software Engineering, Software Myths, Process Model: Waterfall Model, V-Model, Incremental Model, Evolutionary Model,

Unit 2.Requirement Engineering: 10 Hours

Inception, Elicitation, Elaboration, Negotiation, Specification, Validation, Requirements, Analysis & Model: Domain Analysis, Data Flow Modeling, Class-based Modeling, CRC Modeling.

Unit 3.Software Design Concepts: 10 Hours

Abstraction, Modularity, Cohesion, Coupling, Software Design: Architectural Design, Data Design: Entity Relationship Design, User Interface Design, Object Oriented Design, Web Application Design: Aesthetic Design, Content Design, Navigation Design

Unit 4.Testing and Quality: 10 Hours

Software Testing, Verification and Validation, Test Strategy: Unit Testing, Integration Testing, System Testing, User Acceptance Testing: Alpha & Beta Testing, Internal and External View of Testing: White Box Testing, Black Box Testing, Quality Concepts, Garvin's Quality Dimension, McCall's Quality Factors, ISO 9126 Quality Factors

Unit 5.Maintenance and Software Metrics: 10 Hours

Maintenance: Corrective, Perfective, Adaptive, Metrics: Size Oriented Metrics, Function Point Metrics, CK Metrics suite, Introduction to Risk Management

Reference Books:

1. R. S. Pressman, "Software Engineering – A practitioner's approach", 7th Edition, McGraw Hill Int. Ed., 1992.
2. K. K. Agarwal and Yogesh Singh, Software Engineering, New Age
3. P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.
4. Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, 1996.
5. James Peter, W Pedrycz, "Software Engineering", John Wiley & Sons

Teaching-Learning Strategies

1. Build positive and peaceful environment in the classroom.
2. Provide testing pathway for the knowledge of the subject.
3. Provide subject materials to develop and explore different perspectives.
4. Encourage students for reasoning when solving problems.
5. Motivate the students to develop learning and thinking process.

Assessment methods and weightages in brief (4 to 5 sentences)

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE-302

Title of the Course: Chemistry.

L-T-P :3-1-0

Credits :4

COURSE OUTCOMES (COs)

CO-1Analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.(Cognitive Level: Analyse)
CO-2Rationalize bulk properties and processes using thermodynamic considerations.(Cognitive Level: Evaluate)
CO-3Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques (Cognitive Level: apply)
CO-4Rationalize periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.(Cognitive Level: analyse and evaluate)
CO-5List major chemical reactions that are used in the synthesis of molecules.(Cognitive Level: apply and create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		1	3		2		2	1	1	2	2	1		2
CO2		1		3	2	2	1				2	2		3	2
CO3	1		2	3		2		1		1	2	2	2		2
CO4		1		3	1	2	2	1	2		2	2		3	2
CO5	2		3	3		2				1	2	2	3		2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

Unit 1: 10 Hours

Atomic and molecular structure , Schrodinger equation, Particle in a box solutions and their applications for conjugated molecules and nano-particles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations, Molecular orbitals of diatomic molecules and plots of the multicenter orbitals, Equations for atomic and molecular orbitals, Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity, Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties, Band structure of solids and the role of doping on band structures

UNIT 2: 10 Hours

Spectroscopic techniques and applications Principles of spectroscopy and selection rules, Electronic spectroscopy, Fluorescence and its applications in medicine, Vibrational and rotational spectroscopy of diatomic molecules, Applications, Nuclear magnetic resonance and magnetic resonance imaging, surface characterization techniques, Diffraction and scattering

UNIT 3: 10 Hours

Intermolecular forces and potential energy surfaces Ionic, dipolar and van Der Waals interactions, Equations of state of real gases and critical phenomena, Potential energy surfaces of H3, H2F and HCN and trajectories on these surfaces. Organic reactions and synthesis of a drug molecule : Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings, Synthesis of a commonly used drug molecule

UNIT 4: 10 Hours

Use of free energy in chemical equilibria and Periodic properties Thermodynamic functions: energy, entropy and free energy, Estimations of entropy and free energies. Free energy and emf, Cell potentials, the Nernst equation and applications, Acid base, oxidation reduction and solubility equilibria, Water chemistry. Corrosion, Use of free energy considerations in metallurgy through Ellingham diagrams

UNIT 5: 8 Hours

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries Stereochemistry : Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds (Number of Units may be decided by the School/Department/Centre)

Reference Books:

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, byM. J. SienkoandR. A. Plane
3. Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4. Physical Chemistry, by P. W. Atkins
5. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore,

Teaching-Learning Strategies in brief

1. Learning through discussion among the peer group
2. Learning throughCase Studies
3. Open ended questions by teacher
4. Open ended questions from student

Assessment methods and weightages in brief

A variety of assessment methods that are appropriate to the subject areaand a programme of study have been used to assess progress towards the courselearning outcomes. Priority has been accorded to formative assessment. Progress towardsachievement of learning outcomes have been assessed using the following:

time-constrainedexaminations; problem based assignmentsindividual project report (case-study reports); oral presentations, including seminarpresentation; viva voce interviews etc.

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE 303
Title of the Course: Data Structure & Algorithms
L-T-P : 3-1-0
Credits : 4
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completion of this course, the students should be able to:
Course outcomes

CO-1: Demonstrate understanding of major datastructures.(Cognitive level: Understand, Remember)
CO-2: Implement various searching algorithms (Cognitive level: Apply)
CO-3: Implement various sorting algorithms (Cognitive level: Apply)
CO-4: Demonstrate understanding of non-linear data structures and implement them (cognitive level: Create, understand)
CO-5: Analyse non-linear data structures for various operations i.e. Creation, insertion, deletion, searching(Cognitive level: Analyse, Evaluate)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	2	1	1	2	-	-	-	-	1	3	3	2	3
CO2	2	2	2	2	1	3	-	-	2	-	-	3	3	3	3
CO3	2	2	2	2	1	3	1	-	-	-	-	3	3	3	3
CO4	1	1	1	2	1	3	-	1	-	-	1	2	3	2	2
CO5	1	1	1	2	1	3	-	-	-	3	-	2	3	2	3

Detailed Syllabus

UNIT 1: 10 Hours
Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off.
Searching: Linear Search and Binary Search Techniques and their complexity analysis.

UNIT 2: 10 Hours
Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation– corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

UNIT 3: 9 Hours
Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and

Queue, Header nodes, doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.
Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

UNIT 4: 10 Hours
Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.

UNIT 5: 8 Hours
Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

Reference books:

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.
2. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
3. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education.

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning by doing
2. Open ended questions by teacher
3. Open ended questions from students
4. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief (4 to 5 sentences)

1. problem based assignments;
2. practical assignment laboratory reports;
3. observation of practical skills;
4. time-constrained examinations;
5. closed-book and open-book tests;

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE 304
Title of the Course: Analog and Digital Electronics
L-T-P : 3-1-0
Credits : 4
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs):

CO1: Understand the fundamental concepts and techniques used in digital electronics, and Number conversions, Error correction and detection, Digital logic families.(Cognitive Level: Remember)
CO2: Simplify Boolean function using Boolean algebraic rules and able to minimize Boolean expressions by applying K-Map method and Tabulation Method with "don't care" conditions and laws. (Cognitive Level: Apply)
CO3: To analyse and design various combinational logic circuits.(Cognitive Level: Evaluate)
CO4: Analyse basic functionalities of Latches and Flip-Flops; design of Sequential logic circuits.(Cognitive Level: Analyze)
CO5: Have a understanding of the fundamental concepts about various terms and circuits of A/D and D/A converters(Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	2	1	1	2	-	-	-	-	1	3	3	2	3
CO2	2	2	2	2	1	3	-	-	2	-	-	3	3	3	3
CO3	2	2	2	2	1	3	1	-	-	-	-	3	3	3	3
CO4	1	1	1	2	1	3	-	1	-	-	1	2	3	2	2
CO5	1	1	1	2	1	3	-	-	-	3	-	2	3	2	3

UNIT 1: Fundamentals of Digital Systems and logic families 10 Hours

Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital ICs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic

UNIT 2: Combinational Digital Circuits) 10 Hours

Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions, Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry lookahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

UNIT 3: Sequential circuits and systems **10 Hours**

A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T and D types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

UNIT 4: A/D and D/A Converter **10 Hours**

Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/Dc converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs

UNIT 5: Semiconductor memories and Programmable logic devices. **10 Hours**

Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory (RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

Reference books:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
3. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

Teaching-Learning Strategies

1. Learning by doing
2. Learning through discussion among the peer group
3. Open ended questions by teacher
4. Open ended questions from students
5. Reflective Learning

Assessment methods and weightages

1. time-constrained examinations
2. closed-book tests
3. problem based assignments
4. practical assignments and
5. viva voce interviews

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE 305
Title of the Course:IT Workshop (Sci Lab/MATLAB)
L-T-P: 1-0-0
Credits: 1

COURSE OUTCOMES (COs):

CO1: Demonstrate programming in Scilab/MATLAB.(Cognitive Level: Understand)
CO2: Apply simulation for the verification of mathematical functions. (Cognitive Level: Apply)
CO3: Utilize main features of the MATLAB program development environment to enable their usage in the higher learning. (Cognitive Level: Evaluate)
CO4: Develop simple mathematical functions/equations in Scilab. (Cognitive Level: Analyze)
CO5: Synthesize simple mathematical functions and operations using plots/display in Scilab. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	3	-	-	2	2	1	2	1	2	1	3	2	1
CO2	1	2	3	1	-	2	2	1	2	1	2	1	3	2	1
CO3	-	2	3	-	1	2	2	1	2	1	2	1	3	2	1
CO4	1	2	3	1	-	2	2	1	2	1	2	1	3	2	1
CO5	-	2	3	-	-	2	2	1	2	1	2	1	3	2	1

Detailed Syllabus:

UNIT 1: Introduction **9 Hours**
Basic features, Starting MATLAB, Quitting MATLAB, Creating MATLAB, Overwriting, Error, Making, Controlling the hierarchy of operations, Controlling the appearance of floating point, keeping track of your work, Entering multiple statements per line

UNIT 2: Mathematical functions **8 Hours**
Basics, Adding titles, axis labels, and annotations, Multiple data sets in one, Matrix, vector, Colon, Array operations and Linear equations, Matrix arithmetic operations, Array arithmetic operations, Solving linear equations, Matrix inverse

UNIT 3: Introduction to programming inMATLAB **8 Hours**
M-File Scripts, M-File, Anatomy of a M-File function, Input and output arguments, Input to a script file, Output commands, Control flow and operators: ‘‘if...end’’, Relational and logical, The ‘‘for...end’’ ,The ‘‘while...end’’ loop , Saving output to a , Debugging M-files

UNIT 4:SciLab Introduction **8 Hours**
Installing, help, Mailing lists, wiki and bug, Getting help from Scilab demonstrations and macros , editor ,Docking , Using , Batch processing , Creating real, Variable , Comments and continuation ,Elementary mathematical functions ,Pre-defined mathematical variables ,Booleans , Complex

numbers, Integers , Floating point integers , ans variable , Strings , Dynamic type of variables ,matrix , The colon ":" operator , The dollar "$" operator

UNIT 5: SciLab Programming **8 Hours**

Looping and branching, if statement, select statement, for statement, while statement, break and continue, Functions, Plotting, Export

Reference Books:

1. Introduction to MATLAB, 4e, Delores M. Etter, Pearson Education Inc, 2018
2. Essentials of MATLAB Programming, 3e, Stephen J. Chapman, Cengage Learning, 2018
3. Scilab, from theory to practice, Scilab: I. Fundamentals, Perrine Mathieu, Philippe Roux, 2016, ISBN: 978-2-8227-0293-5
4. Scilab by example, Dr. M. Affouf, 2012, ISBN: 978-1479203444

Teaching-Learning Strategies in brief:

1. Provide visuals, illustrations, explanations etc.
2. Provide testing pathway for the knowledge of the subject.
3. Provide subject materials to develop and explore different perspectives.
4. Encourage students for reasoning when solving problems.
5. Motivate the students to develop learning and thinking process.

Assessment methods and weightages in brief:

1. Two sessional tests
2. Assignments for each unit
3. Questions during class
4. Semester examination
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE 306
Title of the Course: Humanities – I
L-T-P: 3-0-0
Credits: 03

COURSE OUTCOMES (COs)

CO1: To develop the skills of the students in preparing job search artefacts and negotiating their use in GDs and interviews.(Cognitive Level: Remember)
CO2: To emphasize the essential aspects of effective written communication necessary for professional success. (Cognitive Level: Apply)
CO3: To enable the students to adopt strategies for effective reading and writing skills. (Cognitive Level: Evaluate)
CO4: To enable students to learn the dynamics of social communication and to demonstrate the ability to learn the nuances of informal communication. (Cognitive Level: Analyze)
CO5: To empower students to carry out day to day communication at the workplace by adequate understanding of various types of communication to facilitate efficient interpersonal communication.(Cognitive Level: Create)

Mapping of Course Outcome (Cos) with Program Outcomes (POs) & Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1					2		2		2	2				1	2
CO2	1		2					2							
CO3				1		2		3			3	2	1		
CO4		2			3		3		1						
CO5	1	2						2			2			2	

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level' mapping, 2 for 'Medium-level' mapping, 1 for 'Low'-level' mapping.

Detailed Syllabus:

Unit-1: Information Design and Development **8 Hours**

Different kinds of technical documents, information of development life cycle, organization structures, factors affecting information and document design, strategies for organisation, information design and writing for print and online media.

Unit-2: Technical Writing, Grammar and Editing **8 Hours**

Collaborative writing, creating indexes, technical writing style and language, basic grammar, the study of advanced grammar, editing strategies to achieve appropriate technical style, introduction to

advanced technical communication, managing technical communication projects, localization, writing drafts and revising.

Unit- 3: Self-Development &Assessment **8 Hours**

Self-Awareness, self-esteem, Emotional Intelligence, Decision-making, Creativity, Time management, Goals settings, career planning, perception and attitude, values and beliefs, rapid reading, self-confidence.

Unit- 4: Communication and Technical Writing **8 Hours**

Importance of talk in a team, conflict management, communication in terms, group discussions, Structuring the GD, Interviews, techniques of interviewing, preparing for an interview, kinds of questions expected at interviews, public speaking, writing reports, project proposals, brochures, minutes of meetings, event report, personality development.

Unit- 5: Ethics **8 Hours**

Email etiquettes, social etiquettes, cubicle etiquettes, restaurant etiquettes, telephone etiquettes, Engineering ethics, work cultures, Interview etiquettes, meeting etiquettes, mental agility, responsibility of an engineer, personal memory.

Reference Books:

1. Adair, John. Effective Communication. London: Pan Macmillan Ltd., 2003.
2. Hasson, Gill. Brilliant Communication Skills. Great Britain: Pearson. Education, 2012.
3. Raman, Meenakshi & Sangeeta Sharma. Technical Communication: Principles and Practice, 2013
4. HBR Guide to Better Business Writing by Bryan A. Garner
5. Business Writing: What Works, What Won't by Wilma Davidson

Teaching-Learning Strategies in brief:

1. Openness to experience: curious and innovative vs. cautious and consistent
2. Conscientiousness: goal-driven and detail-oriented vs. casual and careless
3. Extraversion: outgoing and enthusiastic vs. solitary and guarded
4. Agreeableness: cooperative and flexible vs. defiant and stubborn
5. Neuroticism: anxious and volatile vs. confident and stable

Assessment methods and weightage in brief:

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B. Tech. (Computer Science and Engineering)

Course Code: BTCSE 307 Title of the Course: Software Engineering Lab

L-T-P: 0-0-2
Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Able to understand and describe basic concept of UML, design, implementation of test cases and OOP (Cognitive level: understand).

CO2: Able to analyze how to develop software requirements specifications for a given problem. (Cognitive level: analyze).

CO3: Able to build ERD, DFD models and Class Diagram. (Cognitive level: create).

CO4: Able to implement and deploy the software system (Cognitive level: apply).

CO5: Able to perform tests on software system (Cognitive level: evaluate).

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	1	3	3	-	-	1	1	2	1	1	1	1	1	2
CO2	-	1	3	3	1	2	2	3	-	2	2	2	2	2	2
CO3	1	1	3	1	-	2	-	2	1	2	2	2	3	2	3
CO4	2	1	-	-	1	-	1	-	-	-	1	-	1	1	2
CO5	2	-	2	-	-	1	2	1	2	-	-	3	1	2	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level' mapping, 2 for 'Medium-level' mapping, 1 for 'Low'-level' mapping.

List of experiments

1. Write down the problem statement for a suggested system of relevance.

2. Do requirement analysis and develop Software Requirement Specification Sheet (SRS) for suggested system

3. Draw Entity Relationship Diagram (ERD) for the real project or system.

3. To perform the function-oriented diagram, draw Data Flow Diagram (DFD) Level 0, Level 1, Level 2 of suggested system.

4. To perform the user's view analysis for the suggested system: Draw Use case diagram

5. To draw the structural view diagram for the system: Draw Class diagram, Object diagram.

6. To perform the implementation view diagram: Component diagram for the system

7. To perform the environmental view diagram: Deployment diagram for the system.

8.To perform various testing using the testing tool unit testing, integration testing for a sample code of the suggested system.

10. To Prepare time line chart/Gantt Chart/PERT Chart for selected software project.

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B.Tech. (Computer Science and Engineering)

Course Code: BTCSE 308 Title of the Course: Data Structure and Algorithm Lab

L-T-P: 0-0-4
Credits: 2
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

At the end of this lab session, the student will be able to

CO1: Differentiate between various searching and sorting techniques. ·(Cognitive level: Understand,Analyze).
CO2: Analyze the time and space efficiency of the data structures.
CO3: Implement Single, Double, Circular linked lists and their applications. (Cognitive level: Apply).
CO4: Implement the stack, Queue (Linked and Array Implementation) and their applications. (Cognitive level: Apply)
CO5: Practical knowledge on Trees and Graph data structure and their applications. (Cognitive level: Apply).

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	-	3	3	3	-	3	-	-	1	1	2	3	3	3	3
CO2	-	3	3	3	-	3	-	-	1	1	2	3	3	3	3
CO3	-	3	3	3	-	3	1	-	1	2	2	2	3	2	3
CO4	-	2	3	3	-	3	1	-	1	1	2	2	3	3	2
CO5	-	2	3	3	-	3	1	-	1	2	2	2	3	3	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level' mapping, 2 for 'Medium-level' mapping, 1 for 'Low'-level' mapping.

List of experiments

1. Linear Search and Binary search on N - sized integer array.
2. Bubble sort, Selection sort, Insertion sort, Quick sort on N - sized integer array.
3. Menu - driven program for Static implementation of Stack.
4. Conversion from Infix expression to Postfix expression using Stack.
5. Menu-driven program for Static implementation of Queue, Circular queue (all operations).
6. Single Linked List, Double Linked List, Singular Circular Linked List.
7. Linked Implementation of Stack data structure.

8. Linked Implementation of Queue data structure.
9. Implementation of Tree data structure and traversal techniques.
10. Implementation of Graph data structure and traversal techniques (BFS, DFS)

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B.Tech. (Computer Science & Engineering)

Course Code: BTCSE 309 Title of the Course: Analog & Digital Electronics Lab

L-T-P: 0-0-2
Credits: 1
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: To study and analyze different types of diodes and their characteristic in context of semiconductor physics. (Cognitive level: Analyze)

CO2: To understand various analog electronics devices and observe their working in various conditions.(Cognitive level: Understand)

CO3: To apply the characteristic knowledge of Junction behavior in the construction of Bipolar Junction Transistor and evaluate different types of working of transistors in various configurations. (Cognitive level: Evaluate)

CO4: To study and analyze different types of Logic gates and their truth table.(Cognitive level: Analyze)

CO5: To understand various types of digital devices and their practical working knowledge.(Cognitive level: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	1	1	-	-	1	2	1	-	2	2	1	1	1	1
CO2	-	1	2	-	1	-	-	-	1	2	3	1	1	2	1
CO3	2	-	2	1	-	1	2	1	-	1	1	1	2	2	1
CO4	-	1	-	-	1	-	-	-	2	-	-	1	1	3	2
CO5	1	1	3	1	2	1	1	1	1	1	1	2	2	1	1

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level' mapping, 2 for 'Medium-level' mapping, 1 for 'Low'-level' mapping.

List of experiments

1. Study Forward and Reverse VI characteristics of Silicon Diode, and Zener diode and plot the respective graph.
2. To study the characteristics of PNP transistor in common base configuration and evaluate its Input resistance, Output resistance, and Current gain

3. To study the characteristics of NPN transistor in common base configuration and evaluate its Input resistance, Output resistance, and Current gain
4. Verify the output of half wave rectifier and full wave rectifier with the help of experimental kit and calculate their ripple factor and efficiency.
5. Verify the operation of Hartley and Colpitt oscillators with the help of Experimental Kit
6. Study of Zener Diode as a voltage regulator, when input voltage, V_{in} is fixed while load resistance R_L is variable and vice versa
7. To study and Verify different types of logic gates and their truth table
8. To realize half and full adder and subtractor respectively using X-OR & basic gates and only NAND gates
9. To verify truth table of MUX and DEMUX using NAND gates
10. To verify the truth table of one bit and two bit comparators using logic gates

Teaching-Learning Strategies in brief

1. Encourage students to develop a practical based knowledge
2. To build the purpose of generating something in lab making it inherent part of their engineering education system.
3. To provide students with a platform where they can understand various intricate observations which are difficult to provide in otherwise theory based classroom atmosphere
4. Encourage to the students to implement the practical knowledge into projects

Assessment methods and weightages in brief

1. By conducting quiz based on experiments
2. By conducting viva.
3. By taking semester examination.
4. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE 310
Title of the Course: IT Workshop (Sci Lab/MATLAB) Lab
L-T-P: 0-0-4
Credits: 2
After completion of this course, the students should be able to:

CO1: Able to install MATLAB and get familiar with the environment. (Cognitive Level: Understand)
CO2: Create and manipulate Vectors and Matrices in MATLAB. (Cognitive Level: Create)
CO3: Utilize inbuilt features of MATLAB to manipulate Strings. (Cognitive Level: Apply)
CO4: Able toinstall Scilab and manipulate Vectors and Matrices. (Cognitive Level: Understand)
CO5: Synthesize simple mathematical functions and create plots in Scilab. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	-	2	3	-	-	1	2	1	1	-	1	1	3	2	1
CO 2	1	2	3	-	-	3	2	1	1	-	1	1	3	2	1
CO 3	1	2	3	-	-	3	2	1	1	-	1	1	3	2	1
CO 4	-	2	3	-	-	1	2	1	1	-	1	1	3	2	1
CO 5	1	2	3	-	-	3	2	1	1	-	1	1	3	2	1

List of Experiments:
1. Installation of GNU Octave
2. Using Variables in GNU Octave
3. Create and Manipulate Vectors in GNU Octave
4. Create and Manipulate Matrices in GNU Octave
5. Manipulate Strings in GNU Octave
6. Installation of Scilab
7. Starting Programming with Scilab
8. Create and Manipulate Vectors and Matrices in Scilab
9. Implement Arithmetic Functions in Scilab
10. Create Plots in Scilab

Teaching-Learning Strategies in brief
5. Build positive environment in the Lab.
6. Provide concrete basic and advanced knowledge of the subject.
7. Encourage to the students to ask more & more questions.
8. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief
6. By giving assignments.
7. By conducting quizzes.
8. By conducting viva.

9. By taking semester examination.
10. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Programme:B.Tech. (CSE)

Course Code: BTCSE 311
Title of the Course: Mathematics III
L-T-P:3-1-0(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Credits: 04

Course Outcomes

After completing this Course, the students should be able to

CO-1 Understand various concepts of probability involving probability space and thus will be able to measure degree of certainty and uncertainty of the occurance of an event. (Cognitive Level: Understand)
CO-2 Able to understand and solve examples based on discrete random variables and continuous random variables. (Cognitive Level: Remember)
CO-3. Analyse and solve examples related to distributions in probability . (Cognitive Level: Evaluate)
CO-4. Solve examples consisting of random sequences , modes of covergence and similar topics. (Cognitive Level: Analyze)
CO-5. Undertand the concept of random process and solve problems related to random processes. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1					2		2		2	2				1	2
CO2	1		2					2							
CO3				1		2		3			3	2	1		
CO4		2			3		3		1						
CO5	1	2						2			2			2	

Each Course Outcome (CO) is mapped with one or more Program Outcomes (POs). '3' is for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

UNIT I: Concepts of Probability Theory **10 Hours**
Probability space; Conditional probability and Bayes theorem; Combinatorial probability and sampling models.

UNIT II: Random variables **10 Hours**
Discrete random variables,Probability mass function, probability distribution function, example random variables and distributions; Continuous random variables, probability density function, probability distribution function

UNIT III: Distributions **10 Hours**

Joint distributions, functions of random variables, moments of random variables; Conditional distribution, densities and moments; Characteristic functions of a random variable; Markov, Chebyshev and Chernoff bounds;

UNIT IV: Random Sequences **10 Hours**

Random sequences and modes of convergence (everywhere, almost everywhere, probability, Distribution and mean square); Limit theorems; Strong and weak laws of large numbers, centralLimit theorem.

UNIT V Random process **10 Hours**

Stationary processes,Mean and covariance functions, Ergodicity,Transmission of random process, Power spectral density.

Text/Reference Books:

1. H. Stark and J. Woods, ``Probability and Random Processes with Applications to Signal Processing," Third Edition, Pearson Education
2. A.Papoulis and S. Unnikrishnan Pillai, ``Probability, Random Variables and Stochastic Processes," Fourth Edition, McGraw Hill.
3. K. L. Chung, Introduction to Probability Theory with Stochastic Processes, Springer International
4. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability, UBS Publishers,

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Programme:B.Tech CSE

Course Code: BTCSE 401
Title of the Course: Discrete Mathematics
L-T-P:3-1-0(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Credits:- 04

COURSE OUTCOMES (COs)

CO-1 Understand basics of set theory,different types of sets, operations, relationship between two objects,functions , types of function and related topics.(Cognitive Level: Understand)
CO-2 Understand and solve examples based on countings along with permutations and combinations.(Cognitive Level: Apply)
CO-3. Analyse and understand logical concepts that are useful in computer science . (Cognitive Level: Evaluate)
CO-4. Understand various algebraic structures such as groups,ring and field which will be helpful in relating unrelated concepts in terms of algebraic structures.(Cognitive Level: Analyze)
CO-5. Understand graph theory which have wide application in mathematical situations.(Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2				3		1			2		2	1		1
CO2				1	2				3						1
CO3			2					2	2			3			
CO4				1		2	1				2		1		1
CO5		2			2	2					2			2	

Each Course Outcome (CO) is mapped with one or more Program Outcomes (POs). '3' is for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

UNIT 1:Sets, Relation and Function **10 Hours**
Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.
Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

UNIT 2:Basic Counting Techniques **10 Hours**

Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination.

UNIT 3:PropositionalLogic **10 Hours**

Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers.
Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

UNIT 4:Algebraic Structures and Morphism **10 Hours**

Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free And Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form

UNIT 5:Graphs and Trees **8 Hours**

Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Coloring, Coloring maps and Planar Graphs, Coloring Vertices, Coloring Edges, List Coloring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.

Reference books:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and Its Application to Computer Science", TMG Edition, Tata McGraw-Hill
2. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
3. Discrete Mathematics, Tata McGraw - Hill
4. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
5. Susanna S. Epp, Discrete Mathematics with Applications, 4th edition, Wadsworth Publishing Co. Inc.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.

5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Programme :B.Tech (CSE)

Course Code: BTCSE 402
Title of the Course:Computer Organization and Architecture
L-T-P:3-1-0(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Credits:- 04

Course Outcomes:

CO1. Understand the theory and architecture of central processing unit and analyze some of the design issues in terms of speed, technology, cost, performance.(Cognitive Level: Apply)
CO2. Understand the addressing modes, instruction formats and program control statements. (Cognitive Level: Evaluate)
CO3. Use of appropriate tools to design verify and test the CPU architecture. (Cognitive Level: Analyze)
CO4. Learn the concepts of parallel processing, pipelining and inter-processorcommunication and analyze the performance of commercially available computers. (Cognitive Level: Evaluate)
CO5. To identify and compare different methods for computer I/Oand memory organization. (Cognitive Level: Apply)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	3	2	1	3	2	1	3	2	1	3	3	1
CO2	1	2	3	3	2	1	3	2	1	3	2	1	3	3	1
CO3	1	2	3	3	2	1	3	2	1	3	2	1	3	3	1
CO4	1	2	3	3	2	1	3	2	1	3	2	1	3	3	1
CO5	1	2	3	3	2	1	3	2	1	3	2	1	3	3	1

Unit-I **10 Hours**

BASIC FUNCTIONAL BLOCKS OF A COMPUTER AND ITS REPRESENTATION: Functional units, Basic operational concepts, Bus structures, Performance and metrics, Instructions and instruction sequencing, Hardware–Software Interface, Instruction set architecture, Addressing modes, RISC, CISC, ALU design, Fixed point and floating point operations, Case study of a CPU (Intel Atom Board)

Unit-II **10 Hours**

CPU CONTROL UNIT DESIGN: Execution of a complete instruction, Multiple bus organization, Hardwired control, Micro programmed control, Computer arithmetic, Integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication - shift-and-add, Booth multiplier etc.

Unit-III **10 Hours**

PIPELINE: Basic concepts, Data hazards, Instruction hazards, Influence on instruction sets, Data path and control considerations, Performance considerations, Exception handling. Case Study of Intel Atom Board.

Unit-IV **10 Hours**

MEMORY SYSTEM DESIGN: Basic concepts, Semiconductor RAM – ROM, Speed, Size and cost, Cache memories, Improving cache performance, Virtual memory, Memory management requirements, Associative memories, Secondary storage devices. Case study of Intel Atom Board.

Unit-V **8 Hours**

I/O ORGANIZATION: Accessing I/O devices, Programmed Input/Output, Interrupts, Direct Memory Access, Buses, Interface circuits, Standard I/O Interfaces (PCI, SCSI, USB), I/O devices and processors.

Reference Books

1. John P. Hayes, Computer Architecture and Organization, MGH, 1998.
2. William Stallings, Computer Organization and Architecture: Designing for Performance, Pearson Education, 2010.
3. M. Morris Mano, Computer System Architecture, 2nd Edition, PHI.
4. David A. Patterson and John L. Hennessy, *Computer Organization and Design: The Hardware/Software Interface*, Elsevier, 2012.
5. Carl Hamachar, ZvoncoVranesic and SafwatZaky, *Computer Organization*, MGH, 1990.
6. Vincent P. Heuring and Harry F. Jordan, *Computer Systems Design and Architecture*, 2nd Edition, Pearson Education, 1996.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program :B.Tech (CSE)

Course Code: BTCSE 403
Title of the Course:Operating Systems
L-T-P: 3-1-0
Credits: 4

Course Outcomes:

After completion of this course, the students should be able to:

CO-1: Create processes and threads. (Cognitive Level: Remember)
CO-2: Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.(Cognitive Level: Apply)
CO-3: For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.(Cognitive Level: Evaluate)
CO-4: Design and implement file management system. (Cognitive Level: Analyze)
CO-5: For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.(Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	3	3	2	2	3	2	1	3	2	1	3	2	1
CO2	1	2	3	3	1	2	3	2	1	3	2	1	3	2	1
CO3	-	1	3	3	2	2	3	2	1	3	2	1	3	2	1
CO4	2	2	3	3	1	2	3	1	1	3	2	1	3	2	1
CO5	-	2	3	3	2	2	3	2	1	3	2	1	3	2	1

Detailed Syllabus:

UNIT 1: 10 Hours

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching

Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads,

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling Criteria: CPU utilization, Throughput, Turn-around Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and non-pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

UNIT 2: **10 Hours**

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's &Writer Problem, Dinning Philosopher Problem etc.

UNIT 3: **10 Hours**

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

UNIT 4: **10 Hours**

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation –Fixedandvariablepartition– InternalandExternalfragmentationandCompaction; Paging: Principle of operation – Page allocation– Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory–Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/ Dirty bit–Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO),Second Chance (SC), Not Recently used (NRU) and Least Recently used (LRU).

UNIT 5: **10 Hours**

I/O Hardware: I/O devices, Device controllers, direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods(contiguous, linked, indexed),Free-space management(bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks

Reference books:

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.
3. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing

Teaching-Learning Strategies in brief:

1. Provide visuals, illustrations, explanations etc.
2. Provide testing pathway for the knowledge of the subject.
3. Provide subject materials to develop and explore different perspectives.
4. Encourage students for reasoning when solving problems.

Assessment methods and weightages in brief:

1. Two sessional tests
2. Assignments for each unit
3. Semester examination
4. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program : B.Tech.(CSE)

Course Code: BTCSE 404
Title of the Course: DESIGN AND ANALYSIS OF ALGORITHMS
L-T-P3-1-0
Credits4
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1: Demonstrate understanding of major algorithms and data structures.(Cognitive level: Understand)
CO-2: Apply important algorithmic design paradigms(Divide & Conquer, Greedy, Dynamic, Backtracking) and methods of analysis.(Cognitive level: Apply)
CO-3: Analyze the asymptotic performance of algorithms. (cognitive level: Analyse)
CO-4: Write rigorous correctness proofs for algorithms. (cognitive level: Apply)
CO-5: Design efficient algorithms without any error in common engineering design situations. (cognitive level: create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	-	3	3	1	3	3	1	3	3	3	1
CO2	2	2	2	2	1	3	3	1	3	3	1	3	3	3	1
CO3	2	1	1	2	-	3	2	1	3	2	1	2	3	2	1
CO4	2	1	-	2	-	3	2	1	3	2	1	2	3	2	1
CO5	3	3	1	3	1	3	3	2	3	3	2	3	3	3	2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs).
'3' in the box for 'High-levelmapping, 2 for 'Medium-level mapping,1 for 'Low'-levelmapping.

Detailed Syllabus

UNIT - 1: **10 Hours**
Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average, and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

UNIT - 2: **10 Hours**
Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming, Branch-and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving, Bin Packing, Knap Sack, TSP. Heuristics – characteristics and their application domains.

UNIT – 3: **10 Hours**

Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

UNIT - 4: **10 Hours**

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems, and Reduction techniques.

UNIT - 5: **10 Hours**

Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P Space.

Reference books:

1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
2. Fundamentals of Algorithms – E. Horowitz et al.
3. AlgorithmDesign,1STEdition,JonKleinbergand ÉvaTardos, Pearson.
4. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.
5. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

Teaching-Learning Strategies in brief

1. Learning by doing
2. Open ended questions by teacher
3. Open ended questions from students
4. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief

1. problem based assignments;
2. practical assignment laboratory reports;
3. observation of practical skills;
4. time-constrained examinations;
5. closed-book and open-book tests;

Name of the Academic Program B. Tech (CSE)

Course Code: BTCSE 405
Title of the Course: Object Oriented Programming
L-T-P: 3-1-0
Credits :4

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO1. Understand basics of OOP concepts like object, class and how they are used in a program.(Cognitive Level: Remember)
CO2. Design simple abstract data types and its implementations, usingabstraction functions to document them.(Cognitive Level: Apply)
CO3. Recognize features of object-oriented design such as encapsulation,polymorphism, (Cognitive Level: Evaluate)
inheritance, and composition of systems based on objectidentity to apply it in industrial application.
CO4. Name and apply some common object-oriented design patterns and giveexamples of their use.(Cognitive Level: Analyze)
CO5. Design applications with an event-driven graphical user interface.(Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	1	1	2	1	1	2	1	1	2	3	2	2
CO2	3	3	3	1	1	3	1	1	3	1	1	3	2	2	2
CO3	3	2	3	2	2	3	2	2	3	2	2	3	2	2	2
CO4	2	3	3	2	2	3	2	2	3	2	2	3	2	2	3
CO5	2	2	2	1	1	2	1	1	2	1	1	2	3	2	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

Unit I - Introduction **10 Hours**
Introductory Concepts of Object, class, data and member function. Definition and declaration in JAVA/C++.

Unit - II: Abstract Date Types **10 Hours**
ADT: Abstract Data Types and their Specifications, implement an ADT: Concrete State Space, Concrete Invariant, Abstraction function,Implementing Operations, illustration by the Text examples.

Unit-III: Features of Object-Oriented Programming **10 Hours**
Features of Object-Oriented Programming: Encapsulation, Object Identity, Polymorphism - but not inheritance.

Unit - IV: Object Oriented Design **10 Hours**

Inheritance in OO design: Design Patterns, Introduction and Classification. The Iterator Pattern: Model-View-Controller Pattern, Commands as Methods and as Objects, Implementing OO Language Features, Memory Management.

Unit - V: Generic Types **10 Hours**

Generic types and collections: GUIS, Graphical Programming with Scala and Swing, The Software Development Process

Reference books

1. Barbara Liskov, Program Development in Java, Addison-Wesley, 2001.
2. Balaguruswamy E. Programming with Java-A Primer. McGraw-Hill Professionals; 2014 Jun
3.Balagurusamy E. Object-Oriented Programming with C++, 7e. McGraw-Hill Education; 2001.

Teaching-Learning Strategies in brief

1. Learning by doing
2. Open ended questions by teacher
3. Open ended questions from students
4. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief

1. problem based assignments;
2. practical assignment laboratory reports;
3. observation of practical skills;
4. time-constrained examinations;
5. closed-book and open-book tests;

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE 406
Title of the Course: Computer Organisation and Architecture Lab
L-T-P:- 0-0-4
Credit:-2

COURSE OUTCOMES

After completion of this course, the students should be able to:

CO1: Understand the basics of organization of computer components and basics of assembly level language programming.
CO2: Design and simulate Ripple carry adder and Look ahead carry adder.
CO3: Understand Addressing modes, instruction types and formats of 8085 microprocessor.
CO4: Analyze the Instruction Set Architecture(ISA)of 8085 microprocessor.
CO5: Design processing unit using the concepts of ALU and Control logic design

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	3	2	-	-	1	-	-	1	-	1	3	3	3	2
CO2	-	2	3	2	1	3	-	1	1	-	1	3	3	2	2
CO3	-	3	3	1	1	2	-	-	1	1	1	2	3	3	3
CO4	-	3	2	-	-	1	-	1	1	-	1	2	3	3	2
CO5	-	3	3	1	-	2	-	1	1	1	1	3	3	3	2

List of Experiments:

1. Design and simulation of **Ripple Carry Adder** on Vitual Lab.
2. Design and simulate **Carry Look ahead adder** on Virtual Lab.
3. a) Design 1 – bit ALU a) using gates b) using component from palette.
   b) Design 4- bit ALU using 1-bit ALU
   c) Design 16- bit ALU using 4-bit ALU.
4. Write an Assembly Language program for 8085 microprocessor for addition of two 8-bit numbers using **Immediate** addressing mode.
5. Write an Assembly Language program for 8085 microprocessor for addition of two 8-bit numbers using **Direct** addressing mode.
6. Write an Assembly Language program for 8085 microprocessor for addition of two 8-bit numbers using **Indirect** addressing mode.
7. Write an Assembly Language program for 8085 microprocessor for finding **1's and 2's complement of an 8-bit number.**
8. Write an Assembly Language program for 8085 microprocessor for **addition and subtraction of two 16-bit numbers .**
9. Write an Assembly Language program for 8085 microprocessor for**multiplcation of two 8-bit numbers through successive addition.**

10. Write an Assembly Language program for 8085 microprocessor for**finding the largest among N 8-bit numbers stored in contiguous memory location.**

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE 407
Title of the Course: Design and Analysis of Algorithms Lab

L-T-P:- 0-0-4
Credit: 2

COURSE OUTCOMES

After completion of this course, the students should be able to:

CO1 Identify appropriate data structure as applied to specific problem domain and examine computational complexities.
CO2 Illustrate Dynamic programming strategies and Greedy strategies.
CO3 Determine and Distinguish the concept of Advance data structures.
CO4 Examine various graph algorithms and their complexities.
CO5 Outline the basic concepts of computational complexities.

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	3	2	-	-	1	-	-	1	-	1	3	3	3	2
CO2	1	2	3	2	1	3	-	1	1	-	1	3	3	2	2
CO3	-	3	3	1	1	2	-	-	1	1	1	2	3	3	3
CO4	1	3	2	-	-	1	-	1	1	-	1	2	3	3	2
CO5	-	3	3	1	-	2	-	1	1	1	1	3	3	3	2

List of Experiments:

1. Write a program to perform the analysis of insertion sort.
2. Write a program to perform the analysis of binary search.
3. Write a program to perform the analysis of merge sort.
4. Write a program to show the working of fractional knapsack problem.
5. Write a program to show the working of 0/1 Knapsack problem.
6. Write a program to show the working of breadth first search
7. Write a program to show the working of depth first search.
8. Write a program to find minimum spanning tree using kruskal's algorithm.
9. Write a program to find minimum spanning tree using prim's algorithm.
10. Write a program to show the working of randomised quicksort.

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.

2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B.Tech (Computer Science and Engineering)
Course Code:BTCSE-408 **Title of the Course:** Object Oriented ProgrammingLab

L-T-P: 0-0-4
Credits: 2
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Able to understand the concept of classand objects (Cognitive level: understand).

CO2: Able to implement various forms of inheritance(Cognitive level: Apply).

CO3: Able to understand and use the generic functions and generic classes (Cognitive level: Analyze).

CO4. Able to implement the java packages (Cognitive level: Apply)

CO5: Able to implement an ArrayList in Java (Cognitive level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	3	2	3	2	2	1	1	1	1		1	2	3	1	2
CO2	2		3	2	2		1	2		1	1	2	2	2	3
CO3	3		3	2	1		1						2	3	1
CO4	3		3	3	1		2						2	1	2
CO5	3		3	2	2	1	1	2			1	1	2	2	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level' mapping, 2 for 'Medium-level' mapping, 1 for 'Low'-level' mapping.

List of experiments

1. Write a C++/Java program to implement a class **Student** to display names, roll numbers, and grades of three students who have appeared in the examination. Create an array of class objects. Read and display the contents of the array.

2. Consider the following four classes: **Student, Marks, Sports, and Result**. **Marks** derived from **Student** by single level inheritance. **Result** is derived from both **Marks** and **Sports** by multiple inheritance. Write a C++ program to demonstrate the concept of **hybrid inheritance** as per the above conditions.

3. Given that an EMPLOYEE class contains following members:
data members: Employee number, Employee name, Basic, DA, IT, and Net Salary. Write a C++/Java program to read the data of N employee and compute Net salary of each employee. (DA=50% of Basic and Income Tax (IT) =25% of the Net salary).

4. Create a class **Book** with data members book no, book name and member function getdata() andputdata(). Create a class **Author** with data members author name, publisher and membersget-data() and showdata(). Create an another class **Detail** with data members no of pages and year of publication. Derive **Detail** from **Book** and **Publisher.** Display all the information by using the array of objects of class **Detail**.

5. Create a class **Shape**with the following members:
Data members: length, breadth, height
Member functions: vol, comparison
Create two objects of **Shape** named **S1** and **S2**. Compare these objects by using ***this pointer***. Kindly assign the values to the data members through the constructor.

6. Write a C++ program to demonstrate the following concepts:
   (i) Binary operator overloading by using + and – operators
   (ii) Unary operator overloading by using - operator

7. Write a C++ program to access the overridden function of the derive class by using the pointer of the base class.

8. Write a C++ program to demonstrate the following concepts:
   (i) Generic function/function template
   (ii) Generic class/class template

9. Let assume, there is a package named **pack** which has two sub-packages named **pack1** and **pack2** respectively. There are two class files first.java and second.java in **pack1** package and **pack2** package also contain two class files named second.java, and fourth.java. Write a Java program to illustrate how the members of classes first, second, and third can be accessed in class fourth.

10. Write a Java program to implement an ArrayList**AL** for five elements. All the elements should be Integer/String type. Perform the following operations on **Arr**:

   (i) Traversing
   (ii) Sorting in ascending order
   (iii) Sorting in descending order
   (iv) Searching of an element
   (v) Addition of two or more duplicate elements

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B. Tech.(CSE)

Course Code: BTCSE 409
Title of the Course: Disaster Management
L-T-P: 3-0-0
Credits: 3
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcomes

CO1. Explain disaster management theory. (Cognitive Level: Understand)
CO2. Compare hazards, disasters and associated natural phenomena and their interrelationships, causes and their effects. (Cognitive Level: Remember)
CO3. Compare anthropogenic hazards, disasters and associated activities and their interrelationships of the sub-systems. (Cognitive Level: Evaluate)
CO4. Apply knowledge about existing global frameworks and existing agreements and role of community in successful Disaster Risk Reduction. (Cognitive Level: Analyze)
CO5. Evaluate DM study including data search, analysis and presentation as a case study. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)Course Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	2	1	1	1	1	1	1	1	2	2
CO2	2	2	1	2	2	2	2	1	1	1	2	2	1	1	3
CO3	2	2	2	2	2	2	2	1	2	1	2	2	1	2	2
CO4	2	2	3	2	2	3	3	2	2	2	2	2	2	2	2
CO5	3	3	2	3	2	3	3	1	2	2	2	2	3	2	3

Each Course Outcome (CO) is mapped with one or more Program Outcomes (POs); where in '3' denotes 'High-level' mapping, 2 denotes 'Medium-level' mapping, and 1 denotes 'Low'-level' mapping.

Detailed Syllabus:

Unit I: Definition and types of disaster 10Hours
Hazards and Disasters, Risk and Vulnerability in Disasters, Natural and Man-made disasters, earthquakes, floods drought, landside, land subsidence, cyclones, volcanoes, tsunami, avalanches, global climate extremes. Man-made disasters: Terrorism, gas and radiations leaks, toxic waste disposal, oil spills, forest fires.

Unit II: Study of Important disasters 10 Hours
Earthquakes and its types, magnitude and intensity, seismic zones of India, major fault systems of India plate, flood types and its management, drought types and its management, landside and its man-

agements case studies of disasters in Sikkim (eg) Earthquakes, Landside. Social Economics and Environmental impact of disasters.

Unit III: Mitigation and Management techniques of Disaster 10 Hours

Basic principles of disasters management, Disaster Management cycle, Disaster management policy, National and State Bodies for Disaster Management, Early Warming Systems, Building design and construction in highly seismic zones, retrofitting of buildings.

Unit IV: Training, awareness program and project on disaster management 10Hours

Training and drills for disaster preparedness, Awareness generation program, Usages of GIS and Remote sensing techniques in disaster management, Mini project on disaster risk assessment and preparedness for disasters with reference to disasters in Sikkim and its surrounding areas.

Unit V: Case study 8 Hours

Real life case study of natural disasters in India and in world.

Reference Books

1. Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012)
2. Damon, P. Copola, (2006) Introduction to International Disaster Management, Butterworth Heineman.
3. Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.
4. Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.
5. Modh S. (2010) Managing Natural Disasters, Mac Millan publishers India LTD.

Teaching-Learning Strategies in brief:

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages:

1. Two sessional examinations.
2. Assignments.
3. Class tests.
4. Semester examination.

Name of the Academic Program: B. Tech. (CSE)

Course Code: BTCSE 501
Title of the Course: System Software
L-T-P: 3-1-0
Credits: 4
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcomes (CO):

CO 1. To understand the relationship between system software and machine architecture.(Cognitive Level: Understand)
CO 2. To understand the processing of an HLL program for execution on a computer. (Cognitive Level: Apply)
CO 3. To understand the process of scanning and parsing. (Cognitive Level: Evaluate)
CO 4. To know the design and implementation of assemblers, macro processor, linker and compiler. (Cognitive Level: Analyze)
CO 5. To have an understanding of loader, system software tools. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)Course Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	1	1	2	1	1	2	1	1	2	3	2	2
CO2	3	3	3	1	1	3	1	1	3	1	1	3	2	2	2
CO3	3	2	3	2	2	3	2	2	3	2	2	3	2	2	2
CO4	2	3	3	2	2	3	2	2	3	2	2	3	2	2	3
CO5	2	2	2	1	1	2	1	1	2	1	1	2	3	2	3

UNIT 1 **10 Hours**

Introduction to System Software and software tools : Language Processors: Introduction, Language Processing Activities, Fundamentals of Language Processing & Language, Specification, Language Processor Development Tools.
Data Structures for Language Processing: Search Data structures, Allocation Data Structures.
Software Tools: Software Tools for Program Development, Editors, Debug Monitors, Programming Environments, User Interfaces.

UNIT 2 **10 Hours**

Assemblers: Elements of Assembly Language Programming, A Simple Assembly Scheme, Pass Structure of Assemblers, Design of a Two Pass Assembler, A single pass Assembler for IBM PC.

UNIT 3 **10 Hours**

Macros and Macro Processors: Macro Definition and Call, Macro Expansion, Nested Macro Calls, Advanced Macro Facilities, Design of a Macro Preprocessor.

UNIT 4 **10 Hours**

Interpreters and Introduction of Compilers: Interpreters: Use and overview of interpreters, Pure and impure interpreters., Phases of the Compiler, Introduction of scanning and parsing, Aspects of compilation

UNIT 5 **10 Hours**

Linkers and Loaders: Introduction to linkers, , Relocation and Linking Concepts, Design of a Linker, Self-Relocating Programs, A Linker for MS-DOS, Linking for Overlays and Loaders

Reference books:

1. Leland L. Beck, "System Software – An Introduction to Systems Programming", 3rd
2. Edition, Pearson Education Asia, 2000.
3. Santanu Chattopadhyay, "System Software", Prentice-Hall India, 2007
4. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, "Compilers: Principles, Techniques, and Tools",2nd Edition, Pearson Education Asia
5. D. M. Dhamdhere, "Systems Programming and Operating Systems", Second Revised Edition, Tata McGraw-Hill, 1999.

Teaching-Learning Strategies in brief:

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages:

1. Two sessional examinations.
2. Assignments.
3. Class tests.
4. Semester examination.

Name of the Academic Program: B. Tech. (CSE)

Course Code: BTCSE 502
Title of the Course: Database Management Systems
L-T-P: 3-1-0

Credits: 4

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1. To have a broad understanding of database concepts and database management system software. (Cognitive Level: Apply)
CO-2. To have a high-level understanding of major DBMS components and their function(Cognitive Level: Evaluate)
CO-3. Ability to model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model. (Cognitive Level: Analyze)
CO-4. Design SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS.(Cognitive Level: Evaluate)
CO-5. Derive a program for data-intensive application using DBMS APIs. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			3				2	2					1		
CO2	3	2			1		2	2		1		2			2
CO3		2		2			3	3	3		1			2	
CO4		3		2		3	2	2				1	1		
CO5	1			3			2	2		2				1	

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-levelmapping.

Detailed Syllabus:

Unit 1. Database System Architecture **10 Hours**

Database System Architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML), Data Models: Entity-Relationship Model, Network Model, Relational and Object-Oriented Data Models, Integrity Constraints, Data Manipulation Operations.

Unit 2. Relational Query Languages **10 Hours**

Relational Query Languages: Relational Algebra, Tuple and Domain Relational Calculus, SQL3: DDL and DML Constructs, Open Source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL Server, Relational Database Design: Domain and Data Dependency, Armstrong's Axioms, Normal Forms, Dependency Preservation, Lossless Design, Query Processing and Optimization: Evaluation of Relational Algebra Expressions, Query Equivalence, Join Strategies, Query Optimization Algorithms.

Unit 3. Transaction Processing 10 Hours Transaction Processing: Concurrency Control, ACID Property, Serializability: Serializability of Scheduling, Locking and Timestamp Based Schedulers, Multi-version and Optimistic Concurrency Control schemes, Database Recovery.

Unit 4. Storage and Security of Database 10 Hours
Storage Strategies: Indices, B-trees, Hashing. Database Security: Authentication, Authorization and Access Control, Security Models: DAC, MAC and RBAC Models, Intrusion detection: SQL injection.

Unit 5. Advanced Topics 8 Hours
Advanced Topics: Object Oriented and Object Relational Databases, Logical Databases, Web databases, Distributed databases, Data warehousing and Data Mining.

Text Books:

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.
2. "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.

Reference Books:

1. "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education.
2. "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley.

Teaching-Learning Strategies

1. Build positive and peaceful environment in the classroom.
2. Provide testing pathway for the knowledge of the subject.
3. Provide subject materials to develop and explore different perspectives.
4. Encourage students for reasoning when solving problems.
5. Motivate the students to develop learning and thinking process.

Assessment methods and weightages in brief (4 to 5 sentences)

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B.Tech (CSE)

Course Code: BTCSE 503
Title of the Course: Formal Language & Automata Theory
L-T-P: 3-1-0

Credits: **04**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO1: Understand formal notation for strings, languages and machines.(Cognitive Level: Remember)
CO2: Design finite automata to accept a set of strings of a language. (Cognitive Level: Apply)
CO3: Design context free grammars to generate strings of context free language. (Cognitive Level: Evaluate)
CO4: Determine equivalence of languages accepted by Push down Automata and languages generated by context free grammars. (Cognitive Level: Analyze)
CO5: Write the hierarchy of formal languages, grammars and machines. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	1	1	2	1	1	2	1	1	2	3	2	2
CO2	3	3	3	1	1	3	1	1	3	1	1	3	2	2	2
CO3	3	2	3	2	2	3	2	2	3	2	2	3	2	2	2
CO4	2	3	3	2	2	3	2	2	3	2	2	3	2	2	3
CO5	2	2	2	1	1	2	1	1	2	1	1	2	3	2	3

Detailed Syllabus

Unit – I: Introduction to Regular Language and Grammar **10 Hours**

Introduction: Alphabet, Languages and Grammars, Productions and Derivation: Chomsky Hierarchy of Languages, Regular Languages and Finite Automata: Regular Expressions and Languages: Deterministic Finite Automata (DFA) and Equivalence with Regular Expressions, Nondeterministic Finite Automata (NFA) and Equivalence with DFA, Regular Grammars and Equivalence with Finite Automata, Properties of Regular Languages: Pumping Lemma for Regular Languages, Minimization of Finite Automata.

Unit – II: Context-free Grammar and Languages **10 Hours**

Context-free Languages and Pushdown Automata: Context-free grammars (CFG) and Languages (CFL), Chomsky and Greibach Normal Forms, Nondeterministic Pushdown Automata (PDA) and Equivalence with CFG, Parse Trees, Ambiguity in CFG, Pumping lemma for Context-free Languages, Deterministic Pushdown Automata, Closure Properties of CFLs.

Unit – III: Context-Sensitive Languages **10 Hours**

Context-Sensitive Languages: Context-Sensitive Grammars (CSG) and languages, linear bounded automata and equivalence with CSG.

Unit – IV: Turing Machines **10 Hours**

Turing Machines: The Basic Model for Turing Machines (TM), Turing-Recognizable (Recursively Enumerable) and Turing-Decidable (Recursive) Languages and their Closure Properties, Variants of Turing Machines, Nondeterministic TMs and Equivalence with Deterministic TMs, Unrestricted Grammars and Equivalence with Turing Machines, TMs as Enumerators.

Unit – V: Un-Decidability **8 Hours**

Un-Decidability: Church-Turing Thesis, Universal Turing Machine, Universal and Diagonalization Languages, Reduction between Languages and Rice s theorem, Un-decidable Problems about Languages.

Text Books:

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.
2. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia.

Reference Books

1. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.
2. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing.
3. John Martin, Introduction to Languages and the Theory of Computation, Tata McGraw Hill.

Teaching-Learning Strategies

1. Build positive and peaceful environment in the classroom.
2. Provide testing pathway for the knowledge of the subject.
3. Provide subject materials to develop and explore different perspectives.
4. Encourage students for reasoning when solving problems.
5. Motivate the students to develop learning and thinking process.

Assessment methods and weightages in brief (4 to 5 sentences)

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE 504

Title of the Course: Java Programming

L-T-P: 3-1-0

Credits: **04**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcomes:

CO1 .Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP like encapsulation,Inheritance and Polymorphism. (Cognitive Level: Remember)
CO2 . Design and develop java programs, analyze, and interpret object oriented data and report results.(Cognitive Level: Apply)
CO3. Design an object oriented system, AWT components and multithreaded processes as per needs and specifications.(Cognitive Level: Evaluate)
CO4. Participate and succeed in competitive examinations like GATE, Engineering services, recruitment interviews etc.(Cognitive Level: Analyze)
CO5. Plan their career in java based technologies like HADOOP etc. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	1		1	3		2		2	1	1	2	2	1		2
CO2		1		3	2	2	1				2	2		3	2
CO3	1		2	3		2		1		1	2	2	2		2
CO4		1		3	1	2	2	1	2		2	2		3	2
CO5	2		3	3		2				1	2	2	3		2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3 ' in the box for 'High-level' mapping, 2 for 'Medium-level' mapping, 1 for 'Low'-level' mapping.

Detailed Syllabus

Unit 1: 8 Hours

JVM architecture, Data types, Variables, Scope and life time of variables, arrays, operators, control statements, type conversion and casting, simple java program, constructors, methods, Static block, Static Data.

UNIT - II 8 Hours

Types of inheritance, Member access rules, Usage of this and Super key word, Method Overloading, Method overriding, Abstract classes, Dynamic method dispatch, Usage of final keyword.

Access protection, importing packages, Defining and Implementing interfaces, and Extending interfaces. I / O STREAMS: Concepts of streams, Stream classes- Byte and Character stream, Reading console Input and Writing Console output, File Handling.

UNIT - III **8 Hours**

Exception types, Usage of Try, Catch, Throw, Throws and Finally keywords, Built-in Exceptions, Creating own Exception classes.MULTI THREADING: Concepts ofThread, Thread life cycle, creating threads using Thread class and Runnable interface, Synchronization, Thread priorities, Inter Thread communication.

UNIT - IV **8 Hours**

Check Box, Check Box Group, Choice, List Box, Panels – Scroll Pane, Menu, Scroll Bar. Working with Frame class, Colour, Fonts and layout managers. EVENT HANDLING: Events, Event sources, Event Listeners, Event Delegation Model (EDM)

UNIT - V **8 Hours**

Hierarchy of swing components. Containers, Top level containers - JFrame, JWindow, JDialog, JPanel, JButton, JToggleButton, JCheckBox, JRadioButton, JLabel,JTextField, JTextArea, JList, JComboBox, JScrollPane.APPLETS: Life cycle of an Applet, Differences between Applets and Applications, Developing applets, simple applet.

REFERENCE BOOKS:

1. Head First Java, O'rielly publications
2. Herbert schildt (2010), The complete reference, 7th edition, Tata Mc graw Hill, New Delhi
3. T. Budd (2009), An Introduction to Object Oriented Programming, 3rd edition, PearsonEducation, India.
4. J. Nino, F. A. Hosch (2002), An Introduction to programming and OO design using Java, John Wiley & sons, New Jersey.
5. Y. Daniel Liang (2010), Introduction to Java programming, 7th edition, Pearson education,India.

Teaching-Learning Strategies

1. Build positive and peaceful environment in the classroom.
2. Provide testing pathway for the knowledge of the subject.
3. Provide subject materials to develop and explore different perspectives.
4. Encourage students for reasoning when solving problems.
5. Motivate the students to develop learning and thinking process.

Assessment methods and weightages in brief (4 to 5 sentences)

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B. Tech. (CSE)

Course Code: BTCSE 505
Title of the Course: Humanities II (Professional Practice, Law & Ethics)
L-T-P: 3-0-0
Credits: 3
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcomes (CO) :

CO 1 : Students will remember to create an awareness on Engineering Ethics and Human Values.(Cognitive Level: Understand)
CO 2 : To understand instil Moral and Social Values and Loyalty and to appreciate the rights of others. (Cognitive Level: Remember)
CO 3 : To apply knowledge on global development on governance (Cognitive Level: Evaluate)
CO 4 : To analyse knowledge on risk management, compliances, ethics and sustainability aspects (Cognitive Level: Analyze)
CO 5 : To evaluate and create best governance practices followed worldwide (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3		2	2	1	1	1	3	3	3
CO2	3	3	3	3	3	3	2	2	2	2	1	1	3	3	3
CO3	3	3	3	3	3	3			2	1		1		3	3
CO4	3	3	3	3	3	3	2	2			1	1	3		3
CO5	3	3	3	3	3	3	2	2	1			2	3	3	

Detailed Syllabus

UNIT I HUMAN VALUES **8 Hours**

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II ENGINEERING ETHICS **8 Hours**

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories, Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS **8 Hours**

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

UNIT IV GLOBAL ISSUES **8 Hours**

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility

UNIT V Ethics & Business: **8 Hours**

Ethics, Business Ethics, Organization Structure and Ethics, Addressing Ethical Dilemmas, Code of Ethics, Indian Ethos, Designing Code of Conduct, Policies, Fair practices and frameworks. Sustainability: Corporate Social Responsibility, Corporate Sustainability Reporting Framework, Legal Framework, Conventions, Treaties on Environmental and Social Aspects, Triple Bottom Line, Principle of Absolute Liability - Case Studies, Indian and contemporary Laws relating to Anti-bribery, Case Studies & Practical Aspects

TEXTBOOKS AND REFERENCES:

1. Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi, 2003.

2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

TEACHING - LEARNING STRATEGIES

1. Blended Learning
3. Brainstorming
4. Case Study
5. Computer Aided Presentation
6. Computer Labs/Laptop Instruction
7. Demonstration
8. Direct Instruction
9. Discovery Learning

Assessment methods and weightages in brief

1. Internal Assessment: 25
2. Semester Exam: 75

   Assessments through Sessional, Assignments, Quizzes etc.

Program: B. Tech. (Computer Science and Engineering)
Course Code: BTCSE 507

Title of the Course: Database Management Systems Lab
L-T-P: 0-0-2
Credits: 2
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO1. To identify and apply the scope and need of DBMS (Cognitive level : Apply)
CO2. To develop ability to understand various algorithms based on DBMS. (Cognitive level : Understand)
CO3. To apply the best coding effectively practices and to identify and use the language specific feature available us a library function. (Cognitive level : Apply)
CO4. To understand the design of DBMS applications based on Object Oriented Programming Principles. (Cognitive level : Create)
CO5.To learn why unit testing is part of developer role and apply it in DBMS (Cognitive level : Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	PSO1	PSO2	PSO3
CO1				1	2		3			1		1		1
CO2			3			1	2	2			1		3	
CO3	3	2			2			1	2	1		3	2	1
CO4			3			2			3				1	3
CO5	2	1			2		3				1	1	2	2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping

List of Experiments

Experiment 1: Create location, department, job_grade, and employee tables with the given columns.
Experiment 2: Alter employee table to add job_grade column which is of varchar2 data type.
Experiment 3: Alter employee table to make job_grade a foreign key to job_grade table, manager_id a foreign key to department table(head), department_id a foreign key to department table.
Experiment 4: Create a dummy table called my_employee with the same definition as employee table and then drop the table.
Experiment 5: Insert data into location, department, job_grade& employee tables.
Experiment 6: Give a list of all employees (names as first_name, last_name) who belong to one department_id.

Experiment 7: Select employee last_names from employee table who belong to a certain department_id and have a salary greater than 5000.

Experiment 8: Select employee last_name with first letter in capital, all smalls and all capitals from employee table for all employees.
Experiment 9: Select employee last_name, join_date, and the number of days he/she has been working in the firm as of today.
Experiment 10: Select employee last_name of all employees whose salary is greater than the salary of employee with id = 100.
Experiment 11: Select all employees whose salary is greater than the salaries of both employees with ids 100 & 200.
Experiment 12: Select employee lastname and the corresponding department_name for all employees in employees table.
Experiment 13: Select the average salary of all employees in department with department_id = 1.
Experiment 14: Give a list of all employees who earn a salary greater than 10000 or work in job grade MANAGER.

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B. Tech. (Computer Science and Engineering)
Course Code: BTCSE 508

Title of the Course: Java Programming Lab
L-T-P: 0-0-2
Credits: 2
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO1. To identify and apply the scope and need of Java Programming (Cognitive level : Apply)
CO2. To develop ability to understand various algorithms based on Java Programming. (Cognitive level : Understand)
CO3. To apply the best coding effectively practices and to identify and use the language specific feature available us a library function. (Cognitive level : Apply)
CO4. To understand the design of Java applications based on Object Oriented Programming Principles. (Cognitive level : Create)
CO5.To learn why unit testing is part of developer role and apply it in java (Cognitive level : Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO12	PSO1	PSO2	PSO3
CO1					2		3			1		1		1
CO2			3			1	2	2			1		3	
CO3	3	2			2			1	2	1		3	2	1
CO4			3			2			3				1	3
CO5	2	1			2		3				1	1	2	2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

List of experiments

Q1. Write a program to implement final keyword in a class or a method.

Q2. Write a program to compare two strings by using equals() method .

Q 3. Write a program to to use toString() method.

Q 4. Write a program to implement the concept of multiple inheritance.

Q 5. Write a program to implement the concept of Abstract keyword within a class or method.

Q 6. Write a program of Interface and implement it on a child class.

Q 7. Write a program using Abstract class, Concrete classs and Super class.

Q 8. Write a program to make the object and class. Also use getter setter in it.

Q 9.Write a program to implement the concept of constructor with parameterise and default constructor.

Q 10. Write a program to implement OverRiding in java.

Q 11. Write a program to Overloading the Constructor in java.

Q 12. Write a program to implement the This() as well as Super() method.

Q 13. Write a program to follow the concept of Pure Dynamic Binding or Dynamic Method Dispatching.

Q 14. Write a program to implement the concept of Public and Private within some Methods and Classes.

Q 15. Write a program to create a class of "Shape,Triangle, Circle, and rectangle" then inherit all the property of "Triangle, Circle, and rectangle" in Shape Class and Execute in Main class to find their AREA and Radius of circle.

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B. Tech CSE

Course Code: BTCSE509

Title of the Course: Constitution of India

L-T-P: 2-0-0

Credits: 00

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcomes:

After completing this Course, the students should be able to

CO1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.(Cognitive Level: Understand)
CO2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.(Cognitive Level: Apply)
CO3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution. (Cognitive Level: Evaluate)
CO4. Discuss the passage of the Hindu Code Bill of 1956(Cognitive Level: Analyze)
CO5. Understand the role of Election Commission of India.(Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	1		2		2	1	1		3	1	2
CO2	3	3	3	2	2	2	2	1				2	3	1	2
CO3	3	2	3	2	1		2		1		1		3	1	2
CO4	3	3	3	2	1	1	2	2	1	2		1	3	1	2
CO5	3	3	2	2	2		2				1		3	1	2

Detailed Syllabus:

UNIT I: History of Making of the Indian Constitution: 8 Hours
History, Drafting Committee, (Composition & Working), Philosophy of the Indian Constitution: Preamble, Salient Features

UNIT II: Contours of Constitutional Rights & Duties: 8 Hours
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 III: Organs of Governance: **8 Hours**

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 IV: Local Administration: **8 Hours**

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT V: Election Commission: **8 Hours**

Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Reference Books:

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

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program:B.Tech. CSE

Course Code:BTCSE 602

Title of the Course: Compiler Design

L-T-P: 3-1-0

Credits: 4

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1: Evaluate the basic concepts of formal languages and their application to Compiler Design.(Cognitive level: Analyse)
CO-2: Develop a familiarity with fundamental principles of compiler design.
(Cognitive level: Understand)
CO-3: Demonstrate the process of translating a high-level language to executable code.
(Cognitive level: Apply)
CO-4: Analyze different parsing techniques and algorithms. (Cognitive level: Analyse)
CO-5: Generate intermediate code for statements in the high-level languages. (Cognitive level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program SpecificOutcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3				2	2		2	2		2	2	2	
CO2	2	2		2		2			2			2	2		
CO3	2		2	2	3	3	3		3	3		3	3	3	
CO4				3	2		2	2		2	2			2	2
CO5		2			2	2		2	2		2	2	2		2

Detailed Syllabus:

UNIT 1: 8 Hours
Introduction: Phases of compilation and overview, Lexical Analysis (scanner): Regular languages, finite automata, regular expressions, from regular expressions to finite automata, scanner generator (lex, flex)

UNIT 2: 8 Hours
Syntax Analysis (Parser): Context-free languages and grammars, push-down automata, LL(1) grammars and top-down parsing, operator grammars, LR(O), SLR(1), LR(1), LALR(1) grammars and bottom-up parsing, ambiguity and LR parsing, LALR(1) parser generator (YAAC, bison)

UNIT 3: 8 Hours

Semantic Analysis: Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree

UNIT 4: **8 Hours**

Symbol Table: Its structure, symbol attributes and management, Run-time environment: Procedure activation, parameter passing, value return, memory allocation, and Scope, Intermediate Code Generation: Translation of different language features, different types of intermediate forms. Code Improvement(optimization): Analysis: control-flow, data-flow dependence etc.; Code improvement local optimization, global optimization, loop optimization, peep-hole optimization etc. Architecture dependent code improvement: instruction scheduling (for pipeline), loop optimization (for cache memory) etc. Register allocation and target code generation

UNIT 5: **8 Hours**

Advanced topics: Type systems, data abstraction, compilation of Object-Oriented features and non-imperative programming languages

Reference Books:

1. AllenI.Holub,CompilerDesigninC,PHI,2003.
2. N.FischerandR. J. LeBlanc, CraftingacompilerwithC, BenjaminCummings,2003.
3. J.P.Bennet,IntroductiontoCompilerTechniques,2nd Edition, TMH, 2003.
4. Henk Alblas and Albert Nymeyer, Practice and Principles of Compiler Building with C,PHI,2001.

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning by doing
2. Learning through discussion among the peer group
3. Open ended questions by teacher
4. Open ended questions from students
5. Reflective Learning
6. Provide relevant study material

Assessment methods and weightages in brief:

1. time-constrained examinations
2. closed-book class tests
3. problem based assignments
4. sessional examinations
5. semester examination
6. practical assignments
7. viva voce
8. Total Marks-100 - Internal assessment (25 Marks) andSemester Examination (75 Marks)

Name of the Academic Program: B.Tech(CSE)

Course Code: BTCSE 603
Title of the Course: Computer Networks
L-T-P: 3-1-0
Credits: **04**
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1: Understand the concepts of data communication andnetworks,TCP/IP and OSI reference models.(Cognitive Level: Apply)
CO-2: Analyze, specify and design the topological and routing strategies for an IP based networking infrastructure. (Cognitive Level: Evaluate)
CO-3: Demonstrate the working of existing protocols and identify deficiencies in existing protocols, and formulate newand better protocols.(Cognitive Level: Analyze)
CO-4: Develop network programming for a given problem.(Cognitive Level: Evaluate)
CO-5:Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	1	-	-	1	-	-	1	1	1	-	-
CO2	-	3	2	2	3	2	2	3	2	2	-	1	1	2	3
CO3	1	-	3	3	-	3	3	-	3	3	1	1	1	2	2
CO4	-	-	3	3	-	3	3	-	3	3	-	1	-1	3	2
CO5	2	1	-	1	1	-	1	1	-	1	1	2	1	1	1

Detailed Syllabus:

UNIT 1: **10 Hours**
Data communication Components: Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

UNIT 2: **10 Hours**
Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggy backing, Random Access, Multiple access protocols - Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA

UNIT 3: **10 Hours**

Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

UNIT 4: 10 Hours

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT 5: 10 Hours

Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography

Reference books

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw-Hill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.
3. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
4. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.
5. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America.

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning by doing
2. Learning through discussion among the peer group
3. Open ended questions by teacher
4. Open ended questions from students
5. Reflective Learning
6. Provide relevant study material

Assessment methods and weightages in brief:

1. time-constrained examinations
2. closed-book class tests
3. problem based assignments
4. sessional examinations
5. semester examination
6. practical assignments
7. viva voce
8. Total Marks-100 - Internal assessment (25 Marks) and Semester Examination (75 Marks)

Name of the Academic Program: B. Tech CSE

Course Code: BTCSE 604
Title of the Course: Compiler Design Lab
L-T-P: 0-0-4
Credits: 2
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1: Tounderstand the practical approaches of how a compiler works. (Cognitive level: Analyse)
CO-2: To implement the techniques of Lexical Analysis and Syntax Analysis. (Cognitive level: Apply)
CO-3: Develop programs for top down and bottom-up parsing. (Cognitive level: Create)
CO-4: To generate the intermediate code. (Cognitive level: Create)
CO-5: To implement Code Optimization techniques. (Cognitive level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO 1	3	1	1	3	3		1	2	3	3	3	1		1	2
CO 2	3	3	3	3	3	2		2	3	3	2	1			2
CO 3	3	3	3	3	3	2		2	3	3	3	1	1		2
CO 4	3	2	3	3	3			2	3	3	2	1			2
CO 5	3		1	3	2			2	3	3	3	3			2

List of Experiment:

1. Write a program to check whether a string belongs to the grammar or not.
2. Write a program to generate a parse tree.
3. Write a program to remove left recursion from a given grammar.
4. Write a program to remove left factoring from a given grammar.
5. Write a program to find the FIRST of non-terminals.
6. Write a program to compute the FOLLOW of non-terminals.
7. Write a program to check whether a string satisfies the condition for ab*.
8. Write a program to implement Operator precedence parsing.
9. Write a program to check whether a string belongs to the grammar aa*.
10. Write a program to perform constant propagation.

Teaching-Learning Strategies

1. Build positive and peaceful environment in the laboratory.
2. Provide subject materials to develop and explore different perspectives.
3. Encourage students to implement and analyse concepts of compiler design.
4. Motivate the students to develop learning and thinking process.

Assessment methods and weightages

1. By taking Internal viva-voce.
2. By taking External viva-voce semester examination.
3. Internal assessments (25 Marks), Semester Examination (75 Marks) and Total Marks =100

Program: B.Tech. (CSE)

Course Code: BTCSE 605 Title of the Course: Computer Networks Lab

L-T-P: 0-0-2
Credits: 2
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Able to design and implement Basic Network Topology. (Cognitive level: understand).

CO2: Learn and use the software CISCO Packet Tracer. (Cognitive level: understand).

CO3: Able to Configure different network algorithms using Cisco Packet Tracer. (Cognitive level: create).

CO4: Able to write and implement Algorithms for error detection. (Cognitive level: understand).

CO5: To implement different LAN and WAN using Graph data structures . (Cognitive level: create).

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

and Program Specific Outcomes (PSOs)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O2	PS O3
CO1	1	3	-	-	1	-	1	1	2	1	2	1	1	2	1
CO2	-	1	3	-	1	2	-	1	-	1	2	2	3	2	2
CO3	1	1	3	1	-	1	-	2	1	2	-	1	3	2	3
CO4	-	1	-	-	2	-	1	-	-	-	1	-	1	1	2
CO5	2	-	3	-	-	1	3	1	1	2	-	1	1	2	2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write ‘3’ in the box for ‘High-level’mapping, 2 for ‘Medium-level’mapping, 1 for ‘Low’-level’mapping.

List of experiments

1. Tostudy Network devices and cables used for communication in detail
2. Implementation of Error detection method - even and odd parity
3. To studynetworkIPAddressingfor data transmission.
4. To implement Basics of Network Simulation and Protocols
5. To Simulate a Local Area Network

6. To Measure Network Performance

7. To Simulate a Wi-Fi Network

8. Design TCP/UDP client and server application to transfer file

9. To implementrouting algorithms - Dijkstra's algorithm

10. Working on Network Protocol Analyzer Tool (Ethereal/Wireshark)

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide concrete basic and advanced knowledge of the subject.
3. Encourage to the students to ask more & more questions.
4. Motivate to the students to develop critical & strategic thinking.

Assessment methods and weightages in brief

1. By giving assignments.
2. By conducting quizzes.
3. By conducting viva.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE 702
Title of the Course: Advanced Java
L-T-P: 3-1-0
Credits: **04**
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcomes:

CO1: Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP like encapsulation,Inheritance and Polymorphism. (Cognitive Level: Remember)
CO2 :Design and develop java programs, analyze, and interpret object oriented data and report results.(Cognitive Level: Apply)
CO3 :Design an object oriented system, AWT components and multithreaded processes as per needs and specifications.(Cognitive Level: Evaluate)
CO4 :Participate and succeed in competitive examinations like GATE, Engineering services, recruitment interviews etc.(Cognitive Level: Analyze)
CO5 :Plan their career in java based technologies like HADOOP etc (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	1		1	3		2		2	1	1	2	2	1		2
CO2		1		3	2	2	1				2	2		3	2
CO3	1		2	3		2		1		1	2	2	2		2
CO4		1		3	1	2	2	1	2		2	2		3	2
CO5	2		3	3		2				1	2	2	3		2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3 'in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus
Unit 1: 8 Hours
JAVA BASICS: Review of Object oriented concepts, History of Java, Java buzzwords, JVM architecture, Data types, Variables, Scope and life time of variables, arrays, operators, control statements, type conversion and casting, simple java program, constructors, methods, Static block, Static Data, Static Method String and String Buffer Classes, Using Java API Document.

UNIT - II 8 Hours
INHERITANCE AND POLYMORPHISM: Basic concepts, Types of inheritance, Member access rules, Usage of this and Super key word, Method Overloading, Method overriding, Abstract classes, Dynamic method dispatch, Usage of final keyword.
PACKAGES AND INTERFACES: Defining package, Access protection, importing packages, Defining and Implementing interfaces, and Extending interfaces. I / O STREAMS: Concepts of streams,

Stream classes- Byte and Character stream, Reading console Input and Writing Console output, File Handling.

UNIT - III **8 Hours**

EXCEPTION HANDLING: Exception types, Usage of Try, Catch, Throw, Throws and Finally key-words, Built-in Exceptions, Creating own Exception classes.MULTI THREADING: Concepts ofThread, Thread life cycle, creating threads using Thread class and Runnable interface, Synchronization, Thread priorities, Inter Thread communication.

UNIT - IV **8 Hours**

AWT CONTROLS: The AWT class hierarchy, user interface components- Labels, Button, Text Components, Check Box, Check Box Group, Choice, List Box, Panels – Scroll Pane, Menu, Scroll Bar. Working with Frame class, Colour, Fonts and layout managers. EVENT HANDLING: Events, Event sources, Event Listeners, Event Delegation Model (EDM), Handling Mouse and Keyboard Events, Adapter classes, Inner classes.

UNIT - V **8 Hours**

SWINGS: Introduction to Swings, Hierarchy of swing components. Containers, Top level containers - JFrame, JWindow, JDialog, JPanel, JButton, JToggleButton, JCheckBox, JRadioButton, JLabel,JTextField, JTextArea, JList, JComboBox, JScrollPane.APPLETS: Life cycle of an Applet, Differences between Applets and Applications, Developing applets, simple applet.

REFERENCE BOOKS:

1. Head First Java, O'rielly publications
2. Herbert schildt (2010), The complete reference, 7th edition, Tata Mc graw Hill, New Delhi
3. T. Budd (2009), An Introduction to Object Oriented Programming, 3rd edition, PearsonEducation, India.
4. J. Nino, F. A. Hosch (2002), An Introduction to programming and OO design using Java, John Wiley & sons, New Jersey.
5. Y. Daniel Liang (2010), Introduction to Java programming, 7th edition, Pearson education,India.

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning by doing
2. Learning through discussion among the peer group
3. Open ended questions by teacher
4. Open ended questions from students
5. Reflective Learning
6. Provide relevant study material

Assessment methods and weightages in brief:

1. time-constrained examinations
2. closed-book class tests
3. problem based assignments
4. sessional examinations
5. semester examination
6. practical assignments

7. Total Marks-100 - Internal assessment (25 Marks) and Semester Examination (75 Marks)

Name of the Academic Program: B.Tech(CSE)

Course Code: BTCSE 704
Title of the Course: Advanced DBMS
L-T-P: 3-1-0
Credits: **04**
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcomes:

CO1: The objective of the course is to make students remember database management systems, with an emphasis on how to organize, maintain and retrieve efficiently and effectively.(Cognitive Level: Remember)
CO2: Help students understand the fundamental elements of relational database management systems, Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL. (Cognitive Level: Apply)
CO3: Apply designing of ER-models to represent simple database application scenarios, Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data. (Cognitive Level: Evaluate)
CO4: Analyse the database design by normalization. (Cognitive Level: Analyze)
CO5: Evaluate and create basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3		2	2	1	1	1	3	3	3
CO2	3	3	3	3	3	3	2	2	2	2	1	1	3	3	3
CO3	3	3	3	3	3	3			2	1		1		3	3
CO4	3	3	3	3	3	3	2	2			1	1	3		3
CO5	3	3	3	3	3	3	2	2	1			2	3	3	

Unit-I **10 Hours**
OVERVIEW: PL/SQL, Introduction to PL/SQL, Declare, begin statements, Variables, Control Structure, PL/SQL Transactions, Savepoint, Cursor, PL/SQL Database Objects, Procedures, Functions, Packages, Triggers. Programmatic SQL, Embedded SQL, Dynamic SQL, and ODBC Standard.

Unit-II **10 Hours**
TRANSACTION PROCESSING AND CONCURRENCY CONTROL: Definition of Transaction and ACID properties. Transaction Processing - Transaction-processing monitors, transactional workflows, main-memory databases, real-time transaction systems, long-duration transactions, transaction management in multi-databases. Concurrency Control – Locks, Optimistic Concurrency Control (Backward and Forward validations), Timestamping Concurrency Control.

Unit-III **10 Hours**

OBJECT-BASED DATABASES: Object-based databases – Complex data types, structured types and inheritance in SQL, table inheritance, array and multiset types in SQL, object identity and reference types in SQL, implementing O-R features.

Unit-IV **10 Hours**

OVERVIEW OF STORAGE AND INDEXING: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing Storing data: Disks and Files: -The Memory Hierarchy – Redundant Arrays of Independent Disks. Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM) B+ Trees: A Dynamic Index Structure, Search, Insert, Delete. Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendable vs. Linear Hashing.

Unit-V **8 Hours**

DATABASE SECURITY: Security and integrity threats, Defense mechanisms, Statistical database auditing & control. Security issue based on granting/revoking of privileges, Introduction to statistical database security. PL/SQL Security – Locks – Implicit locking, types and levels of locks, explicit locking, Exception Handlers.

REFERENCE BOOKS

1. P. K. Das Gupta, *Database Management System Oracle SQL and PL/SQL*, PHI.
2. Peter Rob & Carlos Coronel, *Database System Concepts*, Cengage Learning, 2008.
3. Raghu Ramakrishnan & Johannes Gehrke, *Data base Management Systems*, TMH
4. A. Silberschatz, H.F. Korth, S. Sudarshan, *Data base System Concepts*, McGraw hill
5. RamezElmasri, Shamkant&B.Navathe, *Fundamentals of Database Systems,* 5th edition, Pearson Education, 2008.

Teaching-Learning Strategies in brief

1. BLENDED LEARNING
2. BRAINSTORMING
3. CASE STUDY
4. COMPUTER AIDED PRESENTATION
5. COMPUTER LABS/LAPTOP INSTRUCTION
6. DEMONSTRATION
7. DIRECT INSTRUCTION

Assessment methods and weightages in brief

1. Internal Assessment: 25
2. Semester Exam: 75 - Assessments through Sessional, Assignments, Quizzes etc.

Name of the Academic Program B. Tech (CSE)

Course Code: BTCSE DET13
Title of the Course: Advanced Algorithms
L-T-P: 3-0-0
Credits :3
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1: Analyze the asymptotic performance of algorithms.(Cognitive level: Analyse)
CO-2: Design and apply Graph Algorithms (Cognitive level: Apply)
CO-3: Evaluate different approaches of Number -Theoretic Algorithms (Cognitive level: Understand)
CO-4: Design and apply String-Matching Algorithms (Cognitive level: Apply)
CO-5: Demonstrate a familiarity with Probabilistic and Randomized Algorithms (Cognitive level: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	3	1	2	1	3	1	2	1	1	3	2	1
CO2	1	3	2	3	1	3	2	3	1	3	2	1	3	3	2
CO3	1	3	2	3	1	3	2	3	1	3	2	1	3	2	1
CO4	1	3	2	3	1	3	2	3	1	3	2	1	3	3	1
CO5	1	2	2	3	1	2	2	3	1	2	2	1	3	3	1

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

Unit – I: Review of Analysis Techniques **8 Hours**
Growth of Functions: Asymptotic notations, Standard notations and common functions, Recurrences and Solution of Recurrence equations: The substitution method, The recurrence, Tree method, The master method: Amortized Analysis, Aggregate, Accounting and Potential Methods.

Unit – II:Graph Algorithms **8 Hours**
Bellman - Ford Algorithm: Single source shortest paths in a DAG, Johnson's Algorithm for sparse graphs: Flow networks and Ford-Fulkerson method: Maximum bipartite matching. Polynomials and the FFT: Representation of polynomials, The DFT and FFT, Efficient implementation of FFT.

Unit – III:Number -Theoretic Algorithms **8 Hours**

Elementary notions: GCD, Modular Arithmetic, Solving modular linear equations: The Chinese remainder theorem: Powers of an element, RSA cryptosystem, Primality testing, Integer factorization.

Unit – IV:String-Matching Algorithms **8 Hours**

Naïve string Matching: Rabin - Karp algorithm: String matching with finite automata: Knuth-Morris-Pratt algorithm: Boyer – Moore algorithms.

Unit – V: Probabilistic and Randomized Algorithms **8 Hours**

Probabilistic algorithms: Randomizing deterministic algorithms, Monte Carlo and Las Vegas algorithms, Probabilistic numeric algorithms.

Reference Book:

1. T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd Edition, Prentice-Hall of India, 2010.
2. Kenneth A. Berman, Jerome L. Paul: Algorithms, Cengage Learning, 2002.
3. Ellis Horowitz, Sartaj Sahni, S.Rajasekharan: Fundamentals of Computer Algorithms, 2nd Edition, Universities press, 2007.

Teaching-Learning Strategies in brief

1. Learning by doing
2. Open ended questions by teacher
3. Open ended questions from students
4. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief

1. problem based assignments;
2. practical assignment laboratory reports;
3. observation of practical skills;
4. time-constrained examinations;

Name of the Academic Program B. Tech (CSE)

Course Code: BTCSE DET21
Title of the Course: Parallel and Distributed Algorithms
L-T-P: 3-0-0
Credits :3

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1: Demonstrate a familiarity with the abstraction, details and concepts of parallel and distributed computing systems. (Cognitive level: Understand)
CO-2: Identify performance and flexibility issues related to systems design decisions. (cognitive level: Analyze)
CO-3: Develop and implement Sorting, Graph Algorithms, Dense Matrix Algorithms and Agreement Protocols (Cognitive level: Create, Apply)
CO-4: Demonstrate understanding of Failure Recovery, Fault Tolerance, Distributed Resource Management (Cognitive level: Understand)
CO-5: Implement Programming Using the Message Passing Paradigm, Transactions and Concurrency Control (Cognitive level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	2	1	1	2	1	1	2	1	2	3	3	1
CO2	3	3	2	3	2	2	3	2	2	3	2	2	3	3	2
CO3	3	3	2	3	2	2	3	2	2	3	2	2	3	3	3
CO4	2	1	1	2	1	1	2	1	1	2	1	2	3	2	1
CO5	3	3	2	3	2	2	3	2	2	3	2	2	3	3	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.
Mapping with PSOs, where applicable.

Detailed Syllabus:

Unit – I:Characterization of Parallel and Distributed Systems 8 Hours
Parallel Programming Platforms: Implicit Parallelism, Trends in Microprocessor Architectures: Limitations of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs in Parallel Machines Routing Mechanisms

for Interconnection Networks, Impact of Process-Processor Mapping and Mapping Techniques Introduction, Examples of distributed Systems: Resource sharing and the Web Challenges, Architectural models, Limitation of Distributed system: absence of global clock, shared memory, Logical clocks: Lamport's& vectors logical clocks. Concepts in Message Passing Systems: causal order, total order, total causal order, Techniques for Message Ordering: Causal ordering of messages, global state, termination detection.

Unit – II: Principles of Parallel Algorithm Design algorithms &Distributed Mutual Exclusion and Deadlock 8 Hours

Decomposition Techniques: Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing, Methods for Containing Interaction Overheads, Parallel Algorithm Models, Classification of distributed mutual exclusion: requirement of mutual exclusion theorem, Token based and non-token based algorithms, performance metric for distributed mutual exclusion algorithms, Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

Unit – III: Dense Matrix AlgorithmsAgreement Protocols & Distributed Resource Management 8 Hours

Matrix-Vector Multiplication, Matrix-Matrix Multiplication, Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system, Distributed Resource Management: Issues in distributed File Systems, Mechanism for building distributed file systems, Design issues in Distributed Shared Memory, Algorithm for Implementation of Distributed Shared Memory.

Unit – IV: Sorting, Graph Algorithms Failure Recovery and Fault Tolerance 8 Hours

Sorting: Issues in Sorting on Parallel Computers, Sorting Networks, Bubble Sort and its Variants, Quick sort, Graph Algorithms: Definitions and Representation, Minimum Spanning Tree: Prim's Algorithm, Single-Source Shortest Paths: Dijkstra's Algorithm, All-Pairs Shortest Paths, Failure Recovery in Distributed Systems: Concepts in Backward and Forward recovery, Recovery in Concurrent systems, Obtaining consistent Checkpoints, Recovery in Distributed Database Systems, Fault Tolerance: Issues in Fault Tolerance, Commit Protocols, Voting protocols, Dynamic voting protocols.

Unit – V: Programming Using the Message Passing Paradigm, Transactions and Concurrency Control 8 Hours

Unsolvable Principles of Message-Passing Programming: The Building Blocks: Send and Receive Operations MPI, Message Passing Interface, Topologies and Embedding, Overlapping Communication with Computation, Collective Communication and Computation Operations, Groups and Communicators, Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control, Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

Reference book:

1. Parallel Programming in C with MPI and OpenMP by M.J. Quinn, McGraw-Hill Science/Engineering/Math, 1 st edition, 2003, ISBN: 0072822562.
2. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Education.
3. Tenanuanbaum, Steen," Distributed Systems", PHI.
4. Distributed Operating Systems: Concepts And Design By Pradeep K. Sinha Eastern Economy Edition.

Teaching-Learning Strategies in brief

1. Open ended questions by teacher
2. Open ended questions from students
3. Preparation of question bank by students at various cognitive level

Assessment methods and weightages in brief (4 to 5 sentences)

1. Problem based assignments.
2. Practical assignment laboratory reports.
3. Observation of practical skills.
4. Time-constrained examinations.

Name of the Academic Program B. Tech (CSE)

Course Code: BTCSE DET22
Title of the Course: Computational Complexity
L-T-P: 3-0-0
Credits: - 03
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this Course, the students should be able to:

- **CO1** Demonstrate a familiarity with major algorithms and algorithmic techniques (brutal force techniques, greedy techniques, divide-and-conquer and dynamic programming, randomized algorithms).(Cognitive Level: Understand)
- **CO2** Apply the knowledge of big-O, Omega, and Theta notation to describe the amount of work done by an algorithm, and apply them to provide tight bounds on algorithmic complexity. (Cognitive Level: Remember)
- **CO3** Apply and evaluate computational efficiency that influence the choice of algorithms, such as programming time, maintainability, and the use of application specific patterns in the input data. (Cognitive Level: Evaluate)
- **CO4** Design new algorithms for specific applications, using the algorithms and algorithmic techniques presented. (Cognitive Level: Analyze)
- **CO5** Design Finite State Machine, Pushdown Automata, and Turing Machine.Explain the Decidability or Un-decidability of various problems. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	1	-	1	-	1	1	1	1	3	3	3
CO2	3	3	3	2	1	1	2	-	1	1	1	2	3	3	3
CO3	3	3	3	3	1	1	2	-	1	2	1	2	3	3	3
CO4	3	3	3	3	1	2	2	-	1	2	1	2	3	3	3
CO5	3	3	3	3	1	2	2	-	1	2	1	2	3	3	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

Unit – I: Introduction to Computational Complexity **8 Hours**
Introduction: Easy and hard problems, Algorithms and complexity, Turing machines: Models of computation, Multi-tape deterministic and non-deterministic Turing machines, Decision problems.

Unit – II:The Halting Problem and Undecidable Languages **8 Hours**

The Halting Problem and Undecidable Languages: Counting and diagonalization, Tape reduction, Universal Turing machine, Undecidability of halting, Reductions, Rice's theorem, Deterministic Complexity Classes: DTIME[t], Linear Speed-up Theorem, P Time, Polynomial reducibility, Polytime algorithms: 2-satisfiability, 2-colourability.

Unit – III:NP and NP-completeness 8 Hours

NP and NP-completeness: Non-deterministic Turing machines, NTIME[t], NP, Polynomial time verification, NP-completeness, Cook-Levin Theorem, Polynomial transformations: 3- satisfiability, clique, colourability, Hamilton cycle, partition problems, Pseudo-polynomial time, Strong NP-completeness, Knapsack, NP-hardness.

Unit – IV: Space complexity and hierarchy theorems 8 Hours

Space complexity and hierarchy theorems: DSPACE[s], Linear Space Compression Theorem, PSPACE, NPSPACE. PSPACE = NPSPACE, PSPACE-completeness, Quantified Boolean Formula problem is PSPACE-complete, L, NL and NL- completeness, NL=coNL. Hierarchy theorems.

Unit – V: Randomized ComplexityOptimization and approximation 8 Hours

Randomized Complexity: The classes BPP, RP, ZPP, Interactive proof systems: IP = PSPACE, Optimization and approximation: Combinatorial optimization problems, Relative error, Bin-packing problem, Polynomial and fully polynomial approximation schemes, Vertex cover, traveling salesman problem, minimum partition.

Reference book:

1. Anany V. Levitin, Introduction to the Design and Analysis of Algorithms, Addison Wesley.
2. T. H. Cormen, C. E. Leiserson, R. L. Rivest and C. Stein, Introduction to Algorithms, MIT Press.
3. Walter Savitch, JAVA, An introduction to Computer Science & Programming, Prentice Hall (if necessary, additional information about programming in Java).

Teaching-Learning Strategies in brief

1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Providing LMS to access study materials across various devices.
4. Encourage the students to ask more & more questions.
5. Motivate the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Sessional examination (2 Nos.)
2. Assignments.
3. Class tests
4. Semester examination
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B.Tech (CSE)

Course Code: BTCSE DET31
Subject:Queuing Theory and Modeling
L-T-P: 3-0-0

Credits: **03**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this Course, the students should be able to

CO1: Understand the fundamental concepts of probability and acquire knowledge of standard distributions which can describe real life phenomena.(Cognitive Level: Understand)
CO2: Identify various distribution functions and acquire skills in handling situations involving more than one variable.(Cognitive Level: Apply)
CO3: Analyze the various classifications of Random Processes and characterize phenomena which evolve with respect to time in a probabilistic manner.(Cognitive Level: Evaluate)
CO4: Understand the basic characteristic features of a queuing system and acquire skills in analyzing queuing models.(Cognitive Level: Analyze)
CO5: Analyze a network of queues with Poisson external arrivals, exponential service requirements and independent routing. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	2	2	3	2	2	2	1	3	2	2
CO2	2	3	3	2	2	2	3	2	2	2	3	2	2	2	2
CO3	3	3	3	3	1	3	3	3	1	3	3	2	2	2	2
CO4	3	3	2	3	2	2	2	3	2	2	2	1	2	2	3
CO5	2	2	3	2	2	2	3	2	2	2	3	2	3	2	3

Detailed Syllabus

Unit – I RANDOM VARIABLES AND DISTRIBUTIONS 8 Hours

Discrete and continuous random variables –Functions of a random variable–Moments – Moment generating functions – Binomial Poisson, Geometric, Uniform, Exponential, and Normal distributions.

Unit – II TWO - DIMENSIONAL RANDOM VARIABLES 8 Hours

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables –Central limit theorem.

Unit – III RANDOM PROCESSES 8 Hours

Classification – Stationary process – Ergodic process – Markov process – Poisson process – Discrete parameter Markov chain – Classification of state of a Markov Chain – Chapman Kolmogorov equations.

Unit – IV QUEUEING MODELS 8 Hours

Markovian queues – Birth and Death processes – Single and multiple server queueing models – Little‟s formula - Queues with finite waiting rooms – Queues with impatient customers: Balking and reneging.

Unit – IV TWO - QUEUEING MODELS 8 Hours

Finite source models - M/G/1 queue – PollaczekKhinchin formula - M/D/1 and M/EK/1 as special cases – Series queues – Open Jackson networks.

REFERENCES :

1. Trivedi.K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", 2nd Edition, John Wiley and Sons, 2016.
2. Hwei Hsu, "Schaum‟s Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill Edition, New Delhi, 2014.
3. Robertazzi, "Computer Networks and Systems: Queueing Theory and Performance Evaluation", , 3rd Edition, Springer, 2012.
4. Yates. R.D. and Goodman. D. J., "Probability and Stochastic Processes", 2nd Edition, Wiley India Pvt. Ltd., Bangalore, 2012.
5. Taha. H.A., "Operations Research", 8th Edition, Pearson Education, Asia, 2010

Teaching-Learning Strategies in brief

1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Providing LMS to access study materials across various devices.
4. Encourage the students to ask more & more questions.
5. Motivate the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Sessional examination (2 Nos.)
2. Assignments.
3. Class tests
4. Semester examination
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program B. Tech (CSE)

Course Code: BTCSE DET32
Title of the Course: Computational Number Theory
L-T-P: 3-0-0
Credits: - 03
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this Course, the students should be able to:
CO-1 Understand basics of number theory and its application in cryptography.(Cognitive Level: Apply)
CO-2 Apply skills for writing programs for cryptography algorithms.(Cognitive Level: Evaluate)
CO-3 Develop and design many techniques to real-world problems.(Cognitive Level: Analyze)
CO-4 Use and analysis computational problems from Algebra and Number Theory.(Cognitive Level: Evaluate)
CO-5 Create and apply modern tools in wide area of given set of problems. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	3	3	2	3	2	3
CO2	3	3	1	3	3	1	3	1	3	3	1	2	3	3	3
CO3	3	2	3	3	2	2	2	3	3	2	2	2	2	2	3
CO4	3	3	2	3	2	1	3	2	3	2	1	3	3	2	1
CO5	3	2	2	2	3	2	2	2	2	3	2	3	2	3	2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

Unit – I: Basic Number Theory **8 Hours**
Divisibility, Arithmetic addition, subtraction, multiplication, Primes and Greatest common divisors, Euclidean algorithm,Fundamental theorem of arithmetic and Modular arithmetic,

Unit – II:Congruences **8 Hours**
Equivalence relations, Definition, and basic properties of congruences, Chinese remainder theorem, Euler's theorem, Wilson'stheorem, modulo powers of prime, Fermat's little theorem, Fermat's Last Theorem, Quadratic Residues and Quadratic Reciprocity Law.

Unit – III:Primality Testing Algorithms **8 Hours**
Primality test, Fermat test, Miller-Rabin test, Solovay-Strassen test, AKS test.

Unit – IV:Integer Factoring Algorithms **8 Hours**
Trial division, Pollard rho method, p-1 method, CFRAC method, quadratic sieve method.

Unit – V:Applications **8 Hours**
Affine ciphers, Hill ciphers, public key cryptography, RSA encryption and decryption, Algebraic coding theory.

Reference Books:

1. Victor Shoup, A Computational Introduction to Number Theory and Algebra, Cambridge University Press.
2. David M. Burton, Elementary number theory, Tata McGraw Hill Edition.

Teaching-Learning Strategies in brief:
1. Build positive and peaceful environment in the classroom.
2. Provide testing pathwayfor the knowledge of the subject.
3. Provide subject materialsto develop and explore different perspectives.
4. Encourage students for reasoning when solving problems.
5. Motivatethe students to develop learning and thinking process.

Assessment methods and weightages in brief:
1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program B. Tech (CSE)

Course Code: BTCSE DET41

Title of the Course: Information Theory and Coding

L-T-P: 3-0-0 **Credits**: 3

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1: Understand the concept of information and entropy and applications of information theory. (Cognitive level: Analyse)
CO-2: Measure information in terms of probability and entropy. (Cognitive level: Apply)
CO-3: Apply Shannon's theorem for coding.(Cognitive level: Apply)
CO-4: Calculatechannel capacity.(Cognitive level: Apply)
CO-5: Apply coding and error correcting techniques.(Cognitive level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3						2					2	2	
CO2	3	2	3					2					2		
CO3	3		2					3					3	3	
CO4	3	2	3	3	3	3			3	3	3	3		2	2
CO5	3				3			2					2		2

Detailed Syllabus:

Unit – I **8 Hours**

INFORMATION MEASURE AND ENTROPY: Introduction, Measure of information, Average information content of symbols in long independent Sequences, Average information content of symbols in long dependent Sequences, Mark-off statistical model for information source, Entropy and information rate of mark-off source.

SOURCE CODING: Encoding of the source output, Shannon's encoding algorithm, Communication Channels, Discrete communication channels.

Unit – II **8 Hours**

SOURCE CODING THEOREM: Huffman coding, Discrete memory less Channels, Mutual information, Channel Capacity.

CONTINUOUS CHANNEL: Differential entropy and mutual information for continuous Ensembles, Channel capacity Theorem.

Unit – III **8 Hours**

INTRODUCTION TO ERROR CONTROL CODING: Types of errors, Types of codes, Linear Block Codes: Matrix description. Error detection and correction, Standard arrays and table look up for decoding, Hamming Codes.

Unit – IV **8 Hours**

CYCLIC CODES: Binary Cyclic Codes, Algebraic structures of cyclic codes, Encoding using (n-k) bit shift register, Syndrome calculation, BCH codes.

RS AND GOLAY CODES: Golay codes and Shortened cyclic codes R S codes, Burst error correcting codes, Burst and Random Error correcting codes.

Unit – V **8 Hours**

CONVOLUTION CODES: Convolution Codes, Time domain approach, Transform domain approach.

Reference Books:

1. Ranjan Bose, ITC and Cryptography, TMH.
2. Thomas M. Cover & Joy A. Thomas, Elements of Information Theory, 2nd Edition, Wiley Publication.
3. Roberto Togneri& Christopher J. S deSilva, Fundamentals of Information Theory and Coding Design, CRC Press.
4. K. Sam Shanmugam, Digital and analog communication systems, John Wiley.
5. Simon Haykin, Digital communication, John Wiley.

Teaching-Learning Strategies in brief:

1. Learning by doing
2. Learning through discussion among the peer group
3. Open ended questions by teacher
4. Open ended questions from students
5. Reflective Learning
6. Provide relevant study material

Assessment methods and weightages in brief:

1. time-constrained examinations
2. closed-book class tests
3. problem based assignments
4. sessional examinations
5. semester examination
6. practical assignments
7. viva voce

Total Marks-100 - Internal assessment (25 Marks) and Semester Examination (75 Marks)

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE DET42
Title of the Course: Information Retrieval
L-T-P: 3-0-0
Credits: - 03
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcome (CO):

CO1. To identify basic theories and analysis tools as they apply to information retrieval. (Cognitive Level: Remember)
CO2. To develop understanding of problems and potentials of current IR systems. (Cognitive Level: Apply)
CO3. To learn and appreciate different retrieval algorithms and systems.(Cognitive Level: Evaluate)
CO4. To apply various indexing, matching, organizing, and evaluating methods to IR problem. (Cognitive Level: Analyze)
CO5. To become aware of current experimental and theoretical IR research.(Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	3	2	2	1	-	-	-	-	1	-	1	1	2	2	1
CO 2	3	2	2	1	2	1	2	1	1	-	1	1	2	2	1
CO 3	3	2	2	1	2	1	2	1	1	-	1	1	2	2	1
CO 4	3	2	2	1	2	1	2	1		1	1	1	2	2	1
CO 5	3	2	2	1	-	-	-	-	1	-	1	2	2	2	1

Detailed Syllabus

Unit – I: Information Retrieval Model. 8 Hours

Goals and history of IR. The impact of the eb on IR, Information retrieval model, Information retrieval evaluation, searching the Web

Unit -II: Document Presentation and search 8 Hours

Document Representation, Query languages and query operation, Meta-data search,
Indexing and searching, Scoring and ranking feature vectors

Unit III: Experimental Evaluation of IR **8 Hours**

Performance metrics: recall, precision, and F-measure; Evaluations on benchmark text collections.

Unit -IV: Ontology **8 Hours**

Ontology, domain specific search, parallel and distributed information retrieval

Unit -V: Recent Trends **8 Hours**

Recent trends in Web search and Information retrieval techniques.

Reference Books:

1. C. D. Manning, P. Raghavan and H. Schütze, Introduction to Information Retrieval, Cambridge University Press, 2008 (available at http://nlp.stanford.edu/IR-book).
2. Chakrabarti, S. (2002). Mining the web: Mining the Web: Discovering knowledge from hypertext data. Morgan-kaufman.
3. B. Croft, D. Metzler, T. Strohman, Search Engines: Information Retrieval in Practice, AddisonWesley, 2009 (available at http://ciir.cs.umass.edu/irbook/).
4. R. Baeza-Yates, B. Ribeiro-Neto, Modern Information Retrieval, Addison-Wesley, 2011.

Teaching-Learning Strategies

1. Build positive and peaceful environment in the classroom.
2. Provide testing pathway for the knowledge of the subject.
3. Provide subject materials to develop and explore different perspectives.
4. Encourage students for reasoning when solving problems.
5. Motivate the students to develop learning and thinking process.

Assessment methods and weightages in brief (4 to 5 sentences)

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program B. Tech (CSE)

Course Code: BTCSE DET43
Title of the Course: Quantum Computing
L-T-P: 3-0-0
Credits :3

COURSE OUTCOMES (COs)

CO-1: Explain the working of a Quantum Computing program, its architecture and program model . (Cognitive Level: Remember)
CO-2: Develop quantum logic gate circuits. (Cognitive Level: Apply)
CO-3: Understand the techniques used by Quantum algorithms. (Cognitive Level: Evaluate)
CO-4: Develop quantum algorithm. (Cognitive Level: Analyze)
CO-5: Program quantum algorithm on major toolkits. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	-	2	1	1	-	2	1	1	1	1	2	2
CO2	-	3	3	3	-	3	3	3	-	3	-	1	2	3	3
CO3	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2
CO4	2	1	3	3	2	1	3	3	2	1	-	1	1	3	2
CO5	2	2	3	3	2	2	3	3	2	2	1	2	3	3	3

Detailed Syllabus:

Unit 1 **10 Hours**

Introduction to Quantum Computing: Motivation for studying Quantum Computing, Major players in the industry (IBM, Microsoft, Rigetti, D-Wave etc.), Origin of Quantum Computing, Overview of major concepts in Quantum Computing: Qubits and multi-qubits states, Bra-ket notation, Bloch Sphere representation, Quantum SuperpositionQuantum Entanglement

Unit 2 **6 Hours**

Math Foundation for Quantum Computing: Matrix Algebra: basis vectors and orthogonality, inner product and Hilbert spaces, matrices and tensors, unitary operators and projectors, Dirac notation, Eigen values and Eigen vectors.

Unit 3 **10 Hours**

Building Blocks for Quantum Program: Architecture of a Quantum Computing platform, Details of q-bit system of information representation: Block Sphere, Multi-qubits States, Quantum superposition of qubits (valid and invalid superposition), Quantum Entanglement, Useful states from quantum

algorithmic perceptive e.g. Bell State, Operation on qubits: Measuring and transforming using gates. Quantum Logic gates and Circuit: Pauli, Hadamard, phase shift, controlled

Unit 4. **10 Hours**

gates, Ising, Deutsch, swap etc. Programming model for a Quantum Computing Program: Steps performed on classical computer, Steps performed on Quantum Computer, Moving data between bits and qubits. Quantum Algorithms

Unit 5 **10 Hours**

Basic techniques exploited by quantum algorithms: Amplitude amplification, Quantum Fourier Transform, Phase Kick-back, Quantum Phase estimation, Quantum Walks Major Algorithms: Shor's Algorithm, Grover's Algorithm, Deutsch's Algorithm, Deutsch -Jozsa Algorithm

Reference Books:

1. Michael A. Nielsen, "Quantum Computation and Quantum Information", Cambridge University Press.
2. David McMahon, "Quantum Computing Explained", Wiley

Teaching-Learning Strategies

1. Build positive and peaceful environment in the classroom.
2. Provide testing pathway for the knowledge of the subject.
3. Provide subject materials to develop and explore different perspectives.
4. Encourage students for reasoning when solving problems.
5. Motivate the students to develop learning and thinking process.

Assessment methods and weightages in brief (4 to 5 sentences)

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program B. Tech (CSE)

Course Code: BTCSE DET51
Title of the Course: Distributed Computing Systems
L-T-P: 3-0-0
Credits: 3

COURSE OUTCOMES (COs)

After completion of this course, the students should be able to:

CO1: Assess concepts related to distributed computing systems.(Cognitive Level: Understand)
CO2: Demonstrate details of distributed systems. (Cognitive Level: Remember)
CO3: Analyze performance and flexibility issues related to systems design decisions.(Cognitive Level: Evaluate)
CO4: Identify consistency issues in distributed systems.(Cognitive Level: Analyze)
CO5: Identify reliability issues in distributed systems. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		1	3		2		2	1	1	2	2	1		2
CO2		1		3	2	2	1				2	2		3	2
CO3	1		2	3		2		1		1	2	2	2		2
CO4		1		3	1	2	2	1	2		2	2		3	2
CO5	2		3	3		2				1	2	2	3		2

Detailed Syllabus:

Unit – I **8 Hours**

Introduction Of Distributed System: Goals, Types of Distributed systems**.**
Architectures: Architectural Styles, System architectures, Self-management in distributed systems.

Unit – II **8 Hours**

Processes: Threads, Virtualization, Clients, Servers, Code Migration, Software Agents.
Communication: Fundamentals, Remote Procedure Call, Message Oriented Communication, Stream-Oriented Communication, Multicast Communication**.**

Unit – III **8 Hours**

Naming: Names, Identifiers and Addresses, Flat Naming, Structured Naming, Attribute-Based Naming
Synchronization: Clock Synchronization, Logical Clocks, Mutual Exclusion, Global Positioning of nodes, Election Algorithms.

Unit – IV **8 Hours**

Consistency and Replication: Introduction, Data-Centric Consistency Models, Client Centric Consistency Models, Replica Management, Consistency Protocols,

Examples.

Unit – V **8 Hours**

FaultTolerance: Introduction to Fault Tolerance, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery.
Security: Introduction, Secure channels, Access Control, Security Management

Reference Books:

1. Distributed Systems – Principles and Paradigms, Andrew S. Tanenbaum, Maarten Van Steen, 2 PHI.
2. Distributed Systems Concepts and Design, George Couloris, Jean Dollimore, TimKindberg, Gordan Blair, 4/e, PEARSON.
3. Distributed Operating Systems Concepts and Design, Pradeep K. Sinha, PHI.

Teaching-Learning Strategies in brief:

1. Provide visuals, illustrations, explanations etc.
2. Provide testing pathway for the knowledge of the subject.
3. Provide subject materials to develop and explore different perspectives.
4. Encourage students for reasoning when solving problems.
5. Motivate the students to develop learning and thinking process.

Assessment methods and weightages in brief:

1. Two sessional tests
2. Assignments for each unit
3. Questions during class
4. Semester examination
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program B. Tech (CSE)

Course Code: BTCSE DET52
Title of the Course: Software Architecture
L-T-P :3-0-0
Credits: 3
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this Course, the students should be able to

CO-1 Explain software architectural requirements and drivers express influence of software architecture on business and technical activities. (Cognitive Level: Understand)
CO-2 Design to architectural styles and views. (Cognitive Level: Apply)
CO-3 Identify relationship and best fit of software architecture modelling for emerging technologies. (Cognitive Level: Evaluate)
CO-4 Identify key architectural structures of individual component in different phases of analysis, design and development. (Cognitive Level: Analyze)
CO-5 In position to apply styles and views to model and specify architecture for communication across multiple teams with different roles. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	**PO2**	**PO3**	**PO4**	PO5	**PO6**	PO7	PO8	PO9	PO10	PO11	**PO12**	PSO1	PSO2	PSO3
CO1	1	1	2	1	1	2	-	-	-	-	1	3	3	2	3
CO2	2	2	2	2	1	3	-	-	2	-	-	3	3	3	3
CO3	2	2	2	2	1	3	1	-	-	-	-	3	3	3	3
CO4	1	1	1	2	1	3	-	1	-	-	1	2	3	2	2
CO5	-	1	1	2	1	3	-	-	-	3	-	2	3	2	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.
Mapping with PSOs, where applicable.

UNIT I : INTRODUCTION AND ARCHITECTURAL DRIVERS 8 Hours
Introduction– What is software architecture? – Standard Definitions– Architectural structures – Influence of software architecture on organization-both business and technical – Architecture Business Cycle- Introduction – Functional requirements – Technical constraints – Quality Attributes.

UNIT II : QUALITY ATTRIBUTE WORKSHOP 8 Hours
Quality Attribute Workshop – Documenting Quality Attributes – Sixpartscenarios– Case studies.

UNIT III : ARCHITECTURAL VIEWS 8 Hours

Introduction – Standard Definitions for views – Structures and views – Representing views-available notations – Standard views – 4+1 view of RUP, Siemens 4 views, SEI's perspectives and views – Case studies

UNIT IV: ARCHITECTURAL STYLES 8 Hours

Introduction – Data flow styles – Call-return styles – Shared Information styles – Event styles – Case studies for each style.

UNIT V : DOCUMENTING THE ARCHITECTURE 8 Hours

Good practices – Documenting the Views using UML – Merits and Demerits of using visual languages – Need for formal languages – Architectural Description Languages – ACME – Case studies. Special topics: SOA and Web services – Cloud Computing – Adaptive structures

REFERENCES:

1. Paul Clements, Felix Bachmann, Len Bass, David Garlan, James Ivers, Reed Little, Paulo Merson, Robert Nord, and Judith Stafford, "Documenting Software Architectures. Views and Beyond", 2nd Edition, Addison-Wesley, 2010.
2. Paul Clements, Rick Kazman, and Mark Klein, "Evaluating software architectures: Methods and case studies. Addison-Wesley, 2001.
3. Mark Hansen, "SOA Using Java Web Services", Prentice Hall, 2007
4. David Garlan, Bradley Schmerl, and Shang-Wen Cheng, "Software Architecture-Based Self-Adaptation," 31-56. Mieso K Denko, Laurence Tianruo Yang, and Yan Zang (eds.), "Autonomic Computing and Networking". Springer Verlag, 2009

Teaching-Learning Strategies in brief (4 to 5 sentences)

Scenario based example is to be chosen for each unit and students are made to apply the knowledge acquired to do as class activity and assignments related to the covered part of the unit. This is to be discussed and analyzed for common mistakes made by the students

Assessment methods and weightages in brief (4 to 5 sentences)

Assessment will be carried out as internal assessment with weightage of 25 % based on sessional, assignment and quizzes. External assessment will have weightage of 75 % based final exam.

Name of the Academic Program: B. Tech. Computer Science & Engineering

Course Code: BTCSEDET-61
Title of the Course: Combinational Optimization
L-T-P: 3-1-0
Credits: 04
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this Course, the students should be able to:

CO-1 Describe the basic concept of Operations Research- Probability and decision- making.(Cognitive Level: Apply)
CO-2 Formulate the optimization problem with the help of industrial problems. (Cognitive Level: Evaluate)
CO-3 Solve the optimization problems using different types of known methods. (Cognitive Level: Analyze)
CO-4 Discuss the assignment problem & network flow problem. (Cognitive Level: Evaluate)
CO-5 Explain the basics of Genetic Algorithms & Simulated Annealing, and apply to sequencing and scheduling problems and travelling salesman problem. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		1	3		2		2	1	1	2	2	1		2
CO2		1		3	2	2	1				2	2		3	2
CO3	1		2	3		2		1		1	2	2	2		2
CO4		1		3	1	2	2	1	2		2	2		3	2
CO5	2		3	3		2				1	2	2	3		2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

UNIT-I: Basics Of Operations Research **8 Hours**

Decision-making procedure under certainty and under uncertainty,Operations Research- Probability and decision- making,Queuing or Waiting line theory, Simulation and Monte- Carlo Technique,Nature and organization of optimization problems, Scope and hierarchy of optimization, Typical applications of optimization.

UNIT- II: FORMULATION OF OPTIMIZATION PROBLEMS **8 Hours**

Essential features of optimization problems, Objective function, Continuous functions, Dis- crete-functions , Unimodal functions , Convex and concave functions, Investment costs and operating costs in objective function , Optimizing profitably constraints, Internal and external constraints, Formulation of optimization problems. Continuous functions, Discrete functions.

UNIT-III: Linear Programming And Transportation Problem 8 Hours

Necessary and sufficient conditions for optimum of unconstrained functions-Numerical methods for unconstrained functions, One-dimensional search, Gradient-free search with fixed step size. Linear Programming, Basic concepts of linear programming, Graphical in- terpretation, Simplex method, Apparent difficulties in the Simplex method.Transportation Problem, Loops in transportation table, Methods of finding initial basic feasible solution, Tests for optimality. Assignment Problem, Mathematical form of assignment problem, methods of solution.

UNIT-IV:Assignment Problem And Network Flow Problem 8 Hours

Network analysis by linear programming and shortest route, maximal flow problem. Introduction to Non-traditional optimization, Computational Complexity,NP-Hard, NP-Complete. Tabu Search-Basic Tabu search, Neighborhood, Candidate list, Short term and Long term memory

Unit-V: Genetic Algorithm And Simulated Annealin 8 Hours

Genetic Algorithms- Basic concepts, Encoding, Selection, Crossover, Mutation. Simulated Annealing- Acceptance probability, Cooling, Neighborhoods, Cost function. Application of GA and Simulated Annealing in solving sequencing and scheduling problems and Travelling salesman problem.

Reference Books:

1. Rao S.S., Optimization Theory and Applications, WileyEastern.
2. Hamdy A. Taha, Operations Research – An introduction, Prentice – HallIndia.
3. G.Zapfel,R.BaruneandM.Bogl,Metaheuristicsearchconcepts:Atutorialwith applications to production and logistics,Springer.
4. Gass S. I., Introduction to Linear Programming, Tata McGrawHill.
5. Reeves C., Modern heuristic techniques for combinatorial problems, OrientLongman.
6. Goldberg, Genetic algorithms in Search, optimization and Machine Learning, Addison Wesley.
7. K. Deb, Optimization for engineering design – algorithms and examples, Prentice Hall of India.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.

5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B.Tech (CSE)

Course Code: BTCSE DET63
Subject: Game Theory
L-T-P: 3-0-0
Credits: **03**
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO1: Distinguish a game situation from a pure individual's decision problem. (Cognitive Level: Remember)
CO2: Analyze concepts of players, strategies, payoffs, rationality, equilibrium. (Cognitive Level: Apply)
CO3: Describe sequential games using game trees, and to use the backward induction to solve such games. (Cognitive Level: Evaluate)
CO4: Describe simple simultaneous-move games using game tables, and to explain concepts of dominant, dominated, and rationalizable strategies, pure and mixed strategies, and best responses. (Cognitive Level: Analyze)
CO5:to find dominant strategy equilibrium, pure and mixed strategy Nash equilibrium. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	3	1	2	3	2	3	1	2	3	3	2	2
CO2	2	3	3	2	2	2	3	3	2	2	2	3	2	2	2
CO3	3	2	3	3	1	3	2	3	3	1	3	2	2	2	2
CO4	2	3	2	3	2	2	3	2	3	2	2	3	2	2	3
CO5	2	2	3	3	2	2	2	3	3	2	2	2	3	2	3

Detailed Syllabus

Unit – I **8 Hours**
INTRODUCTION TO GAME THEORY: strategies, costs, payoffs – solution concepts – finding equilibria – games with sequential moves – games with simultaneous moves – discrete strategies, continuous strategies – mixed strategies – games with incomplete information – expected payoffs – Prisoner's dilemma and repeated games – Nash equlibrium – Computational complexity of Nash equilibrium

Unit – II **8 Hours**
Games on networks – congestion games – selfish routing – Nash and wardrop equilibria for networks – price of anarchy – pricing network edges – network design with selfish agents – economic aspects of internet routing

Unit – III: **8 Hours**

Epistemic game theory – Modeling knowledge – rationality and belief – common belief in rationality – game strategies and perfect recall – cryptography and game theory – modeling cryptographic algorithms as games – multi-party computations – MPC and games

Unit – IV: **8 Hours**

Mechanism design – general principles– social choice – incentives– algorithms mechanism design – dis- tributed aspects – cost-sharing mechanisms – mechanism design without money – house allocation problem – stable matchings

Unit – V: **8 Hours**

Voting – evaluation of voting systems – strategic manipulation of votes – auctions– types of auctions – winner's curse – bidding strategies – fairness in auctions

Reference Books:

1. Martin Osborne. An Introduction to Game Theory. Oxford University Press, 2003.
2. Y. Narahari. Essentials of Game Theory and Mechanism Design. IISc Press, 2011
3. Phiip D. Straffin, Jr. Game Theory and Strategy. The Mathematical Association of America, January 1993.
4. Ken Binmore, Fun and Games : A Text On Game Theory, D. C. Heath & Company, 1992.
5. Noam Nisan et al. Algorithmic Game Theory, Cambridge University Press s 1st edition, 2007

Teaching-Learning Strategies in brief (4 to 5 sentences)

Lecture, Discussion, Model Development etc.

Assessment methods and weightages in brief (4 to 5 sentences)

1. Internal Assessment: 25
2. Internal Assessment includes Sessional Examination (Minimum Two), Assignments and, quizzes
3. External assessment: 75
4. This assessment has to be done with the end term examination of 75 marks.

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE DES12
Title of the Course: Advanced Software Engineering
L-T-P: 3-0-0
Credits: **03**
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO1. Analyze the need of Software Process Management. Compare different process Models for Software Development.(Cognitive Level: Remember)
CO2. To provide the idea of decomposing the given problem into Analysis, Desing, Implementation, Testing and Maintenance phases. (Cognitive Level: Apply)
CO3. To provide an idea of using various process models in the software industry according to given circumstances. (Cognitive Level: Evaluate)
CO4. To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project. (Cognitive Level: Analyze)
CO5. To know various processes used in all the phases of the product.(Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1		3												1	
CO2	2		1			2		2		3		2			3
CO3					3		1				1		1		
CO4	1	3		2		1			3			1			3
CO5				3							2			2	

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write ‘3’ in the box for ‘High-level’mapping, 2 for ‘Medium-level’mapping, 1 for ‘Low’-level’mapping.

Unit 1 :Overview **8 Hours**
Introduction:FAQsaboutSoftWareEngineering;ProfessionalandEthicalResponsibility;SoftWareProcess:Models;ProcessIteration,Specification,SoftWareDesignandImplementation;Verification&Validation;SoftWareEvolution;AutomatedProcessSupport.
SoftwareProjectManagementandRequirements
ProjectManagement:ManagementActivities,ProjectPlSoftWareProjectManagementandRequirementsProjectManagement:ManagementActivities,ProjectPlanning,ProjectScheduling,RiskManagement;SoftWareRequirements:FunctionalandNon-
FunctionalRequire-

ments,UserRequirements,SystemRequirements,RequirementsDocument;Requirements Engineering Process: Feasibility Studies, Requirements Elicitation and Analysis,RequirementsValidation,RequirementsManagement.

Unit 2 :SystemModels,SoftwarePrototypingandSpecifications 8 Hours

System Models, SoftWare Prototyping and Specifications System models: Context, Behavioural,Data,andObjectmodels,CASEWorkbenches;SoftWarePrototyping:PrototypingintheSoftWare Process, Rapid Prototyping Techniques, UserInterface Prototyping;Specifications:FormalSpecification in theSoftWareProcess,InterfaceSpecification,Behavioural Specification.

ArchitecturalDesign

Introduction: System Structuring; Control Models; Modular Decomposition; Domain- SpecificArchitectures;DistributedSystemsArchitectures:MultiprocessorArchitectures;Client-ServerArchitectures,DistributedObjectArchitectures;CORBA(CommonObjectRequestBrokerArchitecture)

SoftwareDesign

Object Oriented Design: Objects and Object Classes, Object-Oriented Design Process, DesignEvolution; Real Time SoftWare Design: Systems Design, Real-Time Executives, Monitoring andControlSystems,DataAcquisitionSystems;DesignWithReuse:Component-BasedDevelopment, Application Families, Design Patterns; User Interface Design: Principles, UserInteraction,InformationPresentation, UserSupport,Interface Evaluation.

Unit 3 :Verification, Validation and Testing 8 Hours

Verification and Validation (V & V): Static and Dynamic V & V, V & V Goals, V & V vs.Debugging, SoftWare Inspections / RevieWs, Clean-Room SoftWare Development; SoftWareTesting: Defect Testing, Integration Testing, Interface Testing, Object-Oriented Testing, TestingWorkbenches

Unit 4 : Managing People 8 Hours

Introduction;LimitstoThinking;MemoryOrganization;KnoWledgeModeling;Motivation;GroupWorking;ChoosingandKeepingPeople;thePeopleCapabilityMaturityModel

SoftwareCostEstimationandQualityManagement

SoftWare Cost Estimation: Productivity, Estimation Techniques, Algorithmic Cost Modelling,Project Duration and Staffing. Quality Management: Quality Assurance and Standards, QualityPlanning, Quality Control, SoftWare Measurement and Metrics; Process Improvement: Processand Product Quality, Process Analysis and Modelling, Process Measurement, the SEI ProcessMaturityModel, and ProcessClassification

Unit 5 :Evolution 8 Hours

Legacy Systems:Structures,Design,andAssessment;SoftWareChange:ProgramEvolutionDynamics, SoftWare Maintenance, Architectural Evolution; SoftWare Re- Engineering: SourceCodeTranslation,ReverseEngineering,ProgramStructureImprovement,ProgramModularization, DataRe-Engineering; ConfigurationManagement

Reference Books:

1. R. S. Pressman, “Software Engineering – A practitioner’s approach”, 7th Edition, McGraw Hill Int. Ed., 1992.
2. SoftWareEngineering:AnEngineeringApproach,byJ.F.PetersandW.Pedrycz,Publisher:

JohnWileyand Sons
3. SoftWareEngineering:APractitioner'sApproachbyRogerPressman,Publisher:McGraW-Hill
4. FundamentalsofSoftWareEngineeringbyGhez-zi,Jayazeri,andMandrioli,Publisher:Prentice-Hall
5. K. K. Agarwal and Yogesh Singh, Software Engineering, New Age
6. P. Jalote, “An Integrated approach to Software Engineering”, Narosa, 1991.
7. Stephen R. Schach, “Classical & Object Oriented Software Engineering”, IRWIN, 1996.
8. James Peter, W Pedrycz, “Software Engineering”, John Wiley & Sons

Teaching-Learning Strategies

1. Build positive and peaceful environment in the classroom.
2. Provide testing pathway for the knowledge of the subject.
3. Provide subject materials to develop and explore different perspectives.
4. Encourage students for reasoning when solving problems.
5. Motivate the students to develop learning and thinking process.

Assessment methods and weightages in brief (4 to 5 sentences)

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program B. Tech (CSE)

Course Code: BTCSE DES13
Title of the Course: Distributed Systems
L-T-P: 3-0-0
Credits: 3

COURSE OUTCOMES (COs)
After completion of this course, the students should be able to:

CO1: Assess concepts related to distributed computing systems.(Cognitive Level: Understand)
CO2: Demonstrate details of distributed systems. (Cognitive Level: Remember)
CO3: Analyze performance and flexibility issues related to systems design decisions. (Cognitive Level: Evaluate)
CO4: Identify consistency issues in distributed systems. (Cognitive Level: Analyze)
CO5: Identify reliability issues in distributed systems.(Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		1	3		2		2	1	1	2	2	1		2
CO2		1		3	2	2	1				2	2		3	2
CO3	1		2	3		2		1		1	2	2	2		2
CO4		1		3	1	2	2	1	2		2	2		3	2
CO5	2		3	3		2				1	2	2	3		2

Detailed Syllabus:

Unit – I **8 Hours**

Introduction Of Distributed System: Goals, Types of Distributed systems**.**
Architectures: Architectural Styles, System architectures, Self-management in distributed systems.

Unit – II **8 Hours**

Processes: Threads, Virtualization, Clients, Servers, Code Migration, Software Agents.
Communication: Fundamentals, Remote Procedure Call, Message Oriented Communication, Stream-Oriented Communication, Multicast Communication**.**

Unit – III **8 Hours**

Naming: Names, Identifiers and Addresses, Flat Naming, Structured Naming, Attribute-Based Naming
Synchronization: Clock Synchronization, Logical Clocks, Mutual Exclusion, Global Positioning of nodes, Election Algorithms.

Unit – IV **8 Hours**

Consistency and Replication: Introduction, Data-Centric Consistency Models, Client Centric Consistency Models, Replica Management, Consistency Protocols, Examples.

Unit – V **8 Hours**

FaultTolerance: Introduction to Fault Tolerance, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery.

Security: Introduction, Secure channels, Access Control, Security Management

Reference Books:

1. Distributed Systems – Principles and Paradigms, Andrew S. Tanenbaum, Maarten Van Steen, 2 /e, PHI.
2. Distributed Systems Concepts and Design, George Couloris, Jean Dollimore, TimKindberg, Gordan Blair, 4/e, PEARSON.
3. Distributed Operating Systems Concepts and Design, Pradeep K. Sinha, PHI.

Teaching-Learning Strategies in brief:

1. Provide visuals, illustrations, explanations etc.
2. Provide testing pathway for the knowledge of the subject.
3. Provide subject materials to develop and explore different perspectives.
4. Encourage students for reasoning when solving problems.
5. Motivate the students to develop learning and thinking process.

Assessment methods and weightages in brief:

1. Two sessional tests
2. Assignments for each unit
3. Questions during class
4. Semester examination
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: - B. Tech (CSE)

Course Code: BTCSE DES21
Title of the Course: Embedded Systems
L-T-P: 3-0-0
Credits: - 03
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO 1: Understand Embedded System evolution and their applications. (Cognitive Level: Understand)
CO 2: Analyze techniques and tools to create embedded firmware. (Cognitive Level: Apply)
CO 3: Apply Re configurable FPGA technique in embedded system. (Cognitive Level: Evaluate)
CO 4: Apply the Programming concepts in designing specific Applications. (Cognitive Level: Analyze)
CO-5: Evaluate systematic approaches to create embedded system Architecture. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		1	3		2		2	1	1	2	2	1		2
CO2		1		3	2	2	1				2	2		3	2
CO3	1		2	3		2		1		1	2	2	2		2
CO4		1		3	1	2	2	1	2		2	2		3	2
CO5	2		3	3		2				1	2	2	3		2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

Unit – 1 **8 Hours**
INTRODUCTION: Evolution of embedded systems & their applications, architectural diversity for embedded system development**.**

Unit – 2 **8 Hours**
TECHNIQUES AND TOOLS FOR EMBEDDED SOFTWARE DEVELOPMENT: Embedded Programming principles, Instruction Set, Architectures for embedded software development: arithmetic and logical, program control, string instructions, special or privileged instructions, Interrupt system, Input output programming, Memory management, Using High level languages for embedded programming, structured and Object Oriented Programming.

Unit – 3 **8 Hours**

RE-CONFIGURABLE FPGA FOR EMBEDDED COMPUTING R-FPGA and hardware software development, issues in Reconfigurable computing, placement and scheduling techniques, Design of digital systems on FPGAs, fault tolerant design on FPGAs, Retarget able assembling and compilation.

Unit – 4 **8 Hours**

APPLICATIONS: Specific applications.

Unit – 5 **8 Hours**

LATEST TRENDS IN EMBEDDED SYSTEM: On-chip networks: scalable, communication-centric embedded system design paradigm, Systematic Approach to Exploring Embedded System Architectures at Multiple Abstraction Levels, Selective Instruction Compression For Memory Energy, Reduction in Embedded Systems.

REFERENCE BOOKS

1. James O. Hamblen, Tyson S. Hall, Michael D. Furman, *Rapid Prototyping of Digital Systems*, Springer.
2. Anthony J. Massa, *Embedded Software Development with eCos*(Bruce Perens' Open Source Series),
3. Steve Kilts, *Advanced FPGA Design: Architecture, Implementation, and Optimization*, Wiley.
4. David Pellerin, *Practical FPGA Programming in C*, PHI.
5. Jean-Pierre Deschamps, Gery J.A. Bioul, Gustavo D. Sutter *Synthesis of Arithmetic Circuits: FPGA, ASIC and Embedded Systems*, Wiley.

Teaching-Learning Strategies in brief:

1. Encourage participation of students in learning.
2. Connect the subject matter with the student's everyday life.
3. Encourage the spirit of questioning by the students.
4. Arrange student friendly study material and other learning resources.
5. Create friendly environment conducive for learning.

Assessment methods and weightages in brief:

1. Two sessional examinations.
2. Assignments.
3. End semester examination.
4. Internal Assessment: 25 Marks, End Semester Examination:75 Marks &Total Marks: 100.

Name of the Academic Program: - B. Tech (CSE)

Course Code: BTCSE DES22
Title of the Course: Advanced Operating Systems
L-T-P: 3-0-0
Credits: 3

COURSE OUTCOMES (COs)

After completion of this course, the students should be able to:

CO1: Analyze mechanisms of OS to handle processes. (Cognitive Level: Apply)
CO2: Understand about threads and their implementation.(Cognitive Level: Evaluate)
CO3: Assess mechanisms involved in signals and scheduling in OS.(Cognitive Level: Analyze)
CO4: Identify components and management aspects of multiprocessing systems.(Cognitive Level: Evaluate)
CO5: Design and implementation of file management system.(Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2				3	1			1		3	1	
CO2													3	1	
CO3	3	2	3		3	2			3			1			1
CO4	3	3	2								1		3	1	
CO5	3			3	2					1	1	1	3	1	

and Program Specific Outcomes (PSOs)

Detailed Syllabus:

Unit – I **8 Hours**

INTRODUCTION TO UNIX: History, Need of change, Standards.
THE PROCESS AND THE KERNEL: Mode, space and context, Process abstraction, executing in kernel mode, synchronization by blocking interrupts, process scheduling, signals, process creation, termination, awaiting process termination, zombie processes.

Unit – II **8 Hours**

INTRODUCTION TO THREADS: Fundamental abstractions, Lightweight process design, issues to consider, User level thread libraries, scheduler activations, Multi threading on Solaris, Pthreads library, Thread library implementation.

Unit – III **8 Hours**

SIGNALS AND SESSION MANAGEMENT: Signal generation and handling, Unreliable signals, Reliable signals, Signals in SVR4, Signals implementation, Exceptions, Process Groups and Terminal management, SVR4 Sessions architecture Process Scheduling: Clock interrupt handling, Scheduler Goals, Traditional UNIX scheduling.

Unit – IV **8 Hours**

SYNCHRONIZATION AND MULTIPROCESSING: Introduction, Synchronization in Traditional UNIX Kernels, Multiprocessor Systems, Multiprocessor synchronization issues, Semaphores, spin

locks, condition variables Read-write locks for multiprocessor systems, Reference counts and other considerations

Unit – V **8 Hours**

FILE SYSTEM INTERFACE AND FRAMEWORK: The user interface to files, File systems, Special files, File system framework, The Vnode/Vfs architecture, Implementation Overview, File System dependent objects, Mounting a file system, Operations on files.

FILE SYSTEM IMPLEMENTATIONS: System V file system (s5fs) implementation, Berkeley FFS, FFS functionality enhancements and analysis, Temporary file systems, Buffer cache and other special-purpose file systems.

Reference Books:

1. Uresh Vahalia, *UNIX Internals*, Pearson Education, 2005.
2. Silberschatz & Galvin, *Operating System Concepts*, Wiley.
3. Richard Stevens, Stephen Rago, *Advanced Programming in the UNIX Environment*, Pearson Education.

Teaching-Learning Strategies in brief:

1. Provide visuals, illustrations, explanations etc.
2. Provide testing pathway for the knowledge of the subject.
3. Provide subject materials to develop and explore different perspectives.
4. Encourage students for reasoning when solving problems.
5. Motivate the students to develop learning and thinking process.

Assessment methods and weightages in brief:

1. Two sessional tests
2. Assignments for each unit
3. Questions during class
4. Semester examination
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B.Tech (CSE)

Course Code: BTCSE DES32
Title of the Course: Real Time Systems
L-T-P: 3-0-0
Credits: **03**
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO1: understand concepts of Real-Time systems and modeling. (Cognitive Level: Understand)
CO2: recognize the characteristics of a real-time system. (Cognitive Level: Remember)
CO3: understand and develop document on an architectural design of a real-time system. (Cognitive Level: Evaluate)
CO4: develop and document Task scheduling, resource management, real-time operating systems and fault tolerant applications of Real-Time Systems.(Cognitive Level: Analyze)
CO5: Analyze the Model for Real Time Communication.(Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3	1	2	2	3	1	2	2	2	2	2	2
CO2	2	3	3	2	2	2	3	2	2	2	3	2	3	2	2
CO3	3	2	3	3	1	3	3	3	1	3	3	2	3	2	3
CO4	2	3	2	3	2	2	2	3	2	2	2	2	2	2	3
CO5	2	2	3	3	2	2	3	3	2	2	3	2	3	2	2

Detailed Syllabus

Unit – I Definition, Typical Real Time Applications: 8 Hours
Digital Control, High Level Controls, Signal Processing etc., Release Times, Deadlines, and Timing Constraints, Hard Real Time Systems and Soft Real Time Systems, Reference Models for Real Time Systems: Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency.

Unit – IICommon Approaches To Real Time Scheduling: 8 Hours
Clock Driven Approach, Weighted Round Robin Approach, Priority Driven Approach, Dynamic Versus Static Systems, Optimality of Effective-Deadline-First (EDF) and Least-Slack-Time-First (LST) Algorithms, Offline Versus Online Scheduling, Scheduling Aperiodic and Sporadic jobs in Priority Driven and Clock Driven Systems.

Unit – IIIResources Access Control: 8 Hours
Effect of Resource Contention and Resource Access Control (RAC), Nonpreemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority-Ceiling

Protocol, Use of Priority-Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Unit Resources, Controlling Concurrent Accesses to Data Objects.

Unit – IVMultiprocessor System Environment: 8 Hours

Multiprocessor and Distributed System Model, Multiprocessor Priority-Ceiling Protocol, Schedulability of Fixed-Priority End-to-End Periodic Tasks, Scheduling Algorithms for End-to-End Periodic Tasks, End-to-End Tasks in Heterogeneous Systems, Predictability and Validation of Dynamic Multiprocessor Systems,
Scheduling of Tasks with Temporal Distance Constraints

Unit – VReal Time Communication: 8 Hours

Model of Real Time Communication, Priority-Based Service and Weighted Round-Robin Service Disciplines for Switched Networks, Medium Access Control Protocols for Broadcast Networks, Internet and Resource Reservation Protocols, Real Time Protocols, Communication in Multicomputer System, An Overview of Real Time Operating Systems.

Reference Book

1. Jane W. S. Liu, Real Time Systems, Pearson Education Publication.
2. Prof. Albert & M. K. Cheng, Real-Time Systems: Scheduling, Analysis, and Verification, John Wiley and Sons Publications.

Teaching-Learning Strategies in brief (4 to 5 sentences)

Lecture, Discussion, Model Development etc.

Assessment methods and weightages in brief (4 to 5 sentences)

1. Internal Assessment: 25
2. Internal Assessment includes Sessional Examination (Minimum Two), Assignments and, quizzes
3. External assessment: 75
4. This assessment has to be done with the end term examination of 75 marks.

Name of the Academic Program :B.Tech CSE

Course Code: BTCSE DES33
Title of the Course: Software Re-Engineering
L-T-P: 3-0-0

Credits: 3

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this Course, the students should be able to

CO1. Explain the concepts and technique of software reengineering.(Cognitive Level: Apply)
CO2. Apply reengineering techniques to maintain and modify software systems.(Cognitive Level: Evaluate)
CO3. Analyze and understand maintenance related problems associated with object-oriented software systems.(Cognitive Level: Analyze)
CO4. To Assess Quality issues in re-engineering processes. (Cognitive Level: Evaluate)
CO5. Able to perform complex design reengineering and reverse engineering problems.(Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3											2		
CO2			3		1					3		2			1
CO3		2						3			1		3		
CO4				2		2			3			1			1
CO5	3			3			1			2				2	

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level' mapping, 2 for 'Medium-level' mapping, 1 for 'Low'-level mapping.

Detailed Syllabus:

Unit 1: 8 Hours

Introduction To Software Reengineering (Reverse Engineering), Origin & Need Of Software Reengineering, Review Of Software Development Life Cycle, Software Evaluation Process, Software Maintenance

Unit 2: 8 Hours

Program Comprehension, Requirement Of Software Reengineering, Business Redefinition, Process Identification, Process Evaluation, Process Specification & Design, Prototyping, Refinement

Unit 3: **8 Hours**

Legacy Software System, Software Version & Release Management, Architectural Evolution, Types Of Restructuring, Automatic Program Restructuring, Data Restructuring, Source Code Translation, Forward Engineering, Difference Between Reverse & Forward Engineering

Unit 4: **8 Hours**

Software Reengineering Activities, Code Slicing, Code Refracting, Software Aging & Code Decay, Software Reusability.

Unit 5: **8 Hours**

Economics Of Software Reengineering, Cost Of Maintenance & Benefits, Legal & Ethical Issues In System Reengineering

Reference Books:

1. Seacord, Plakosh, Lewis, "Modernizing Legacy Systems: Software Technologies, Engineering Processes, And Business Practices", Addison-Wesley ISBN 0321118847, 2003
2. "Refactoring: Improving The Design From Existing Code", Addison-Wesley ISBN 0201485672, 2000
3. Miller, "Reengineering Software Legacy Systems", Butterworth Publishers, ISBN 1555581951, 1998.
4. Alam, T. Padenga, "Application Software Reengineering", Pearson, ISBN 9788131731857, 2010

Teaching-Learning Strategies

1. Build positive and peaceful environment in the classroom.
2. Provide testing pathway for the knowledge of the subject.
3. Provide subject materials to develop and explore different perspectives.
4. Encourage students for reasoning when solving problems.
5. Motivate the students to develop learning and thinking process.

Assessment methods and weightages in brief (4 to 5 sentences)

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program :B.Tech CSE

Course Code: BTCSE DES41
Title of the Course: Signals and Networks
L-T-P: 3-0-0

Credits: 3

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1 Ability to understand Definition, types of signals and their representations and types of systems.(Cognitive Level: Apply)
CO-2 Remember LTI Linear Time-Invariant Systems and apply it to the systems,(Cognitive Level: Evaluate)
CO-3 Fourier Analysis for Continuous-Time and Discrete-Time Signals and Systems, (Cognitive Level: Analyze)
CO-4 To understand Laplace-Trasform , Z-Transform and ROC,(Cognitive Level: Evaluate)
CO-5 Remember Network Theorems and different types of Two-port networks,(Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1				2	2	2	1	2	2	2	2	2
CO2	3	3	2	2		1	3	2	3		3	2	3	2	3
CO3	3	3	3	2			3	3	3		3	3	3	3	3
CO4	3	3	3	3		1	2	3	2		2	3	2	3	2
CO5	3	3	2	3	2		2	2	2	1	2	2	2	2	2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

Unit 1: **8 Hours**

Signals: classification of signals; signal operations: scaling, shifting and inversion; signal properties: symmetry, periodicity and absolute integrability; elementary signals.

Unit 2: **8 Hours**

Systems: classification of systems; system properties: linearity, time/shift-invariance, causality, stability; continuous-time linear time invariant (LTI) and discrete-time linear shift invariant (LSI) systems: impulse response and step response; response to an arbitrary input: convolution; system representation using differential and difference equations; Eigen functions of LTI/ LSI systems, frequency response and its relation to the impulse response.

Unit 3: **8 Hours**

Signal representation: signal space and orthogonal bases; Fourier series representation of continuous-time and discrete-time signals; continuous-time Fourier transform and its properties; Parseval's relation, time-bandwidth product; discrete-time Fourier transform and its properties; relations among various Fourier representations.

Unit 4: **8 Hours**

Sampling: sampling theorem; aliasing; signal reconstruction: ideal interpolator, zero-order hold, first-order hold; discrete Fourier transform and its properties. Laplace transform and Z-transform: definition, region of convergence, properties; transform-domain analysis of LTI/LSI systems, system function: poles and zeros; stability

Unit 5: **8 Hours**

Review of network theorems: superposition, Thevenin's, Norton's, reciprocity, maximum power transfer, Millman's and compensation theorems; Network topology: definition of basic terms, incidence matrix, tie-sets, cut-sets; Two port networks: characterization in terms of impedance, admittance, transmission, hybrid parameters and their relationships, interconnection of two port networks; Symmetrical two port network: T and π equivalents, image impedance, characteristic impedance and propagation constant (Number of Units may be decided by the School/Department/Centre)

Reference Books:

1. M. J. Roberts, "Fundamentals of Signals and Systems", Tata McGraw Hill, 2007.
2. M. E. Van Valkenburg, "Network Analysis", 3/e, Prentice Hall of India, 2003.
3. A.V. Oppenheim, A.S. Willsky and H.S. Nawab, "Signals and Systems", Prentice Hall of India, 2006.
4. B. P. Lathi,"Signal Processing and Linear Systems", Oxford University Press, 1998
5. Simon Haykin, Barry van Veen, "Signals and Systems", John Wiley and Sons, 1998

Teaching-Learning Strategies in brief

1. Learning by doing numericals
2. Learning through discussion among the peer group
3. Learning through Case Studies
4. Group Projects
5. Through Field Studies
6. Experiential Learning

Assessment methods and weightages in brief

Internal Assessment: 25, Semester Exam: 75 , Assessments through Sessionals , Assignments, Quizzes etc.

Name of the Academic Program :B.Tech CSE

Course Code: BTCSE DES42
Title of the Course: Internet of Things
L-T-P: 3-0-0

Credits: 3

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcomes:

CO1: Understand the genesis and IOT architecture. (Cognitive Level: Remember)
CO2: Design and develop communication protocols in Internet of Things. (Cognitive Level: Apply)
CO3: Develop smart environment and applications which advance the Internet of Things. (Cognitive Level: Evaluate)
CO4: Analyze the societal impact of Internet of Things. (Cognitive Level: Analyze)
CO5: Analyze vulnerabilities, including recent attacks, involving the Internet of Things. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)and Program Specific Outcomes(PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		1	3		2		2	1	1	2	2	1		2
CO2		1		3	2	2	1				2	2		3	2
CO3	1		2	3		2		1		1	2	2	2		2
CO4		1		3	1	2	2	1	2		2	2		3	2
CO5	2		3	3		2				1	2	2	3		2

Detailed Syllabus:

Unit 1 – **8 Hours**

Overview: Iot-An Architectural Overview– Building An Architecture, Main Design Principles And Needed Capabilities, An Iot Architecture Outline, Standards Considerations. M2M And Iot Technology Fundamentals- Devices And Gateways, Local And Wide Area Networking, Data Management, Business Processes In Iot, Everything As A Service(Xaas), M2M And Iot Analytics, Knowledge Management

Unit 2 – **8 Hours**

Reference Architecture: Iot Architecture-State Of The Art – Introduction, State Of The Art, Reference Model And Architecture, Iot Reference Model - Iot Reference Architectureintroduction, Functional View, Information View, Deployment And Operational View, Other Relevant Architectural Views. Real-World Design Constraints- Introduction, Technical Design Constraints-Hardware Is Popular Again, Data Representation And Visualization, Interaction And Remote Control.

Unit 3 – **8 Hours**

IoT Data Link Layer & Network Layer Protocol: (3GPP MTC, IEEE 802.11, IEEE 802.15), Wirelesshart,Z-Wave,Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-Ipv4, Ipv6, 6lowpan, 6tisch,ND, DHCP, ICMP, RPL, CORPL, CARP

Unit 4 – **8 Hours**

Transport & Session Layer Protocols: Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) – Session Layer-HTTP, Coap, XMPP, AMQP, MQTT

Unit 5 – **8 Hours**

Service Layer Protocols & Security: Service Layer -ONEM2M, ETSI M2M, OMA, BBF – Security In IoT Protocols – MAC 802.15.4 , 6LOWPAN, RPL, Application Layer

Reference Book

1. Jan Holler, Vlasiostsiatsis, Catherine Mulligan, Stefan Avesand, Stamatiskarnouskos, David Boyle, "From Machine-To-Machine To The Internet Of Things: Introduction To A New Age Of Intelligence", 1 St Edition, Academic Press, 2014.
2. Peter Waher, "Learning Internet Of Things", PACKT Publishing, BIRMINGHAM – MUMBAI
3. Bernd Scholz-Reiter, Florian Michahelles, "Architecting The Internet Of Things", ISBN 978-3-642-19156-5 E-ISBN 978-3-642-19157-2, Springer
4. Daniel Minoli, "Building The Internet Of Things With Ipv6 And Mipv6: The Evolving World Of M2M Communications", ISBN: 978-1-118- 47347-4, Willy Publications
5. Vijay Madisetti And Arshdeepbahga, "Internet Of Things (A Hands-On Approach)", 1 St Edition, VPT, 2014.

Teaching-Learning Strategies

1. Learning by doing
2. Learning through discussion among the peer group
3. Open ended questions by teacher
4. Open ended questions from students
5. Reflective Learning

Assessment methods and weightages

1. time-constrained examinations
2. closed-book tests
3. problem based assignments
4. practical assignments and
5. viva voce interviews

Name of the Academic Program B. Tech (CSE)

Course Code: BTCSE DES51
Title of the Course: Agile Software Developments & DevOps
L-T-P: 3-1-0
Credits: 4
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1: Understand and demonstrate knowledge related to key principles of agile software development.(Cognitive Level: Apply)
CO-2: Apply modern software engineering techniques commonly used in agile software projects.(Cognitive Level: Evaluate)
CO-3: Analyze and apply principles of process improvement in software projects.(Cognitive Level: Analyze)
CO-4: Apply current enterprise-grade techniques for continuous development, testing, integration, and delivery.(Cognitive Level: Evaluate)
CO-5: Identify and apply the principles and processes of DevOps, Software Project Management in different program development.(Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	3	1	2	3	3	1	1	2	1	1	3	3	3
CO2	1	3	3	1	2	3	3	1	1	2	1	1	3	3	3
CO3	1	3	3	1	2	3	3	1	1	3	1	1	3	3	3
CO4	1	3	3	1	2	3	3	1	1	3	1	1	3	3	3
CO5	1	3	3	1	2	3	3	1	1	3	1	1	3	3	3

Detailed Syllabus:

Unit 1: AGILE METHODOLOGY 8 Hours
Theories for Agile Management, Agile Software Development, Traditional Model vs. Agile Model, Classification of Agile Methods, Agile Manifesto and Principles, Agile Project Management, Agile Team Interactions, Ethics in Agile Teams, Agility in Design, Testing , Agile Documentations, Agile Drivers, Capabilities and Values

Unit 2: AGILE PROCESSES 8 Hours
Lean Production, SCRUM, Crystal, Feature Driven Development, Adaptive Software Development, Extreme Programming: Method Overview, Lifecycle, Work Products, Roles and Practices.

Unit 3: AGILITY AND KNOWLEDGE MANAGEMENT 8 Hours
Agile Information Systems, Agile Decision Making, Earl_S Schools of KM, Institutional Knowledge Evolution Cycle, Development, Acquisition, Refinement, Distribution, Deployment , Leveraging, KM in Software Engineering, Managing Software Knowledge, Challenges of Migrating to Agile Methodologies, Agile Knowledge Sharing, Role of Story-Cards, Story-Card Maturity Model (SMM).

Unit 4: AGILITY AND REQUIREMENTS ENGINEERING 8 Hours

Impact of Agile Processes in RE, Current Agile Practices, Variance, Overview of RE Using Agile, Managing Unstable Requirements, Requirements Elicitation, Agile Requirements Abstraction Model, Requirements Management in Agile Environment, Agile Requirements Prioritization, Agile Requirements Modeling and Generation, Concurrency in Agile Requirements Generation.

Unit 5: DevOps 8 Hours

Linux Basics, Introduction to DevOps, Introduction to Cloud Computing, GIT: version control, Chef for Configuration Management, AWS, Puppet for configuration management, Jenkins-continuous integration, Docker containers.

Reference Books:

1. David J. Anderson and Eli Schragenheim, ―Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall, 2003.
2. Hazza and Dubinsky, ―Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer, 2009.
3. Craig Larman, ―Agile and Iterative Development: A Managers Guide, Addison-Wesley, 2004.
4. Kevin C. Desouza, ―Agile Information Systems: Conceptualization, Construction, and Management, Butterworth-Heinemann, 2007.

Teaching-Learning Strategies in brief

1. Providing examples, real life scenarios etc through online references, animation, slide show and video
2. Making groups for peer to peer learning and enabling discussions for motivating coordination and team-player skills
3. Giving them tutorials and topic based presentations for gaining more insights
4. Motivating them for research and product based learning

Assessment methods and weightages in brief

2. Assessing different groups through presentation and oral questionnaires
3. Assessing through quizzes for better objective evaluation
4. Assessing through sessionals and assignment submission apart from semester examination
5. Weightage is given on sincerety, punctuality, timely submissions, improvisations etc.

Name of the Academic Program:B.Tech CSE

Course Code: BTCSE DES52

Title of the Course: Simulation and Modeling

L-T-P: 3-0-0

Credits: 03

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcomes:

CO1: Apply existing knowledge of simulation and design discrete and continuous systems.(Cognitive Level: Remember)
CO2: To analyse different simulation software's and learn their selection procedure.(Cognitive Level: Apply)
CO3: To evaluate the steady state behaviour of the simulated and modelled system. (Cognitive Level: Evaluate)
CO4: To evaluate the simulation model through the process of verification and validation.(Cognitive Level: Analyze)
CO5: To synthesize and measure the performance of the simulation model.(Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		1	3		2		2	1	1	2	2	1		2
CO2		1		3	2	2	1				2	2		3	2
CO3	1		2	3		2		1		1	2	2	2		2
CO4		1		3	1	2	2	1	2		2	2		3	2
CO5	2		3	3		2				1	2	2	3		2

Detailed Syllabus:

Unit-I **8 Hours**

INTRODUCTION TO SIMULATION: Definitions of modeling& simulation, Concept of systems & system environment, components of a system, discrete & continuous systems, model of a system, types of models & simulation, Advantages, disadvantages, & pitfalls of simulation.
GENERAL PRINCIPLES: Concepts in discrete-event simulation, event-driven simulation, world views, list processing.

Unit-II **8 Hours**

SIMULATION SOFTWARE: History, Selection process, simulation in high level language(C, C++), desirable software features, general purpose simulation packages
BASIC PROBABILITY & STATISTICS: Terminology & concepts, Statistical modeling& probability distributions.
RANDOM-NUMBER GENERATION: Properties of random numbers, generation of pseudo-random numbers, techniques for generating random numbers, test for randomness.

Unit-III **8 Hours**

RANDOM-VARIATE GENERATION: Inverse transform, Direct transform, convolution, Accept-Reject

QUEUING MODELS: Characteristics, performance measures, steady-state behaviour, Networks of queues

INPUT MODELING: Data collection, Identifying distribution, parameter estimation, goodness-of-fit, multivariate & time series input models.

Unit-IV **8 Hours**

VERIFICATION & VALIDATION OF SIMULATION MODELS: Model building, verification & validation, verification of simulation models, calibration & validation of models, techniques for increasing model validity & credibility.

Unit-V **8 Hours**

OUTPUT ANALYSIS: Types of simulations with respect to output analysis, stochastic nature of output data, measures of performance & their estimation, output analysis for termination simulations & steady state simulations.

Brief overview of discrete & continuous simulation languages and applications of simulation.

REFERENCE BOOKS:

1. J. Banks, S. Carson & Nelson B.L., *Discrete-Event System simulation*, 4th edition , Pearson Education, 2007
2. A. M. Law, W. D. Kelton, *Simulation Modeling and analysis*, 3rd edition, MGH.:
3. W. feller, *An introduction to probability theory and its applications*, vol. 183, wiley eastern Ltd.
4. G. Gordon, *System Simulation*, PHI.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B.Tech. (CSE)

Course Code: BTCSE DES53
Title of the Course: Software Testing and Quality Assurance
L-T-P: 3-0-0
Credits: 03
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcomes:

CO 1 : Students should be able to have a detailed knowledge of software testing and quality assurance skills. (Cognitive Level: Understand)
CO 2 : Students can find out the defects or issues occurring in the software application before they are encountered by the end-user. (Cognitive Level: Remember)
CO 3 : Students can evaluate the overall performance of the software application being tested. (Cognitive Level: Evaluate)
CO 4 : Students can evaluate security-related issues for the software application under test. (Cognitive Level: Analyze)
CO 5 : Students can create and provide a high-quality software product to the end-user. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	1	2	3	1	3	1	3	1	3	3	3	1
CO2	1	2	3	1	2	3	1	3	1	3	1	3	3	3	1
CO3	1	2	3	1	2	3	1	3	1	3	1	3	3	3	1
CO4	1	2	3	1	2	3	1	3	1	3	1	3	3	3	1
CO5	1	2	3	1	2	-	1	1	1	2	1	1	3	3	1

Detailed Syllabus

Unit – I **8 Hours**
Software Design: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Halestead's Software Science, Function Point (FP) Based Measures, CyclomaticComplexity Measures: Control Flow Graphs.

Unit – II **8 Hours**
White Box and Black Box Testing: White box testing, static testing, static analysis tools, Structural testing: Unit/Code functional testing, Code coverage testing, Code complexity testing, Black Box testing, Requirements based testing, Boundary value analysis, Equivalence partitioning, state/graph based testing, Model based testing and model checking, Differences between white box and Black box testing.

Unit – III **8 Hours**

Integration, System, and Acceptance Testing: Top down and Bottom up integration, Bi- directional integration, System integration, Scenario Testing, Defect Bash, Functional versus Non-functional testing, Design/Architecture verification, Deployment testing, Beta testing, Scalability testing, Reliability testing, Stress testing, Acceptance testing: Acceptance criteria, test cases selection and execution

Unit – IV **8 Hours**

Test Selection & Minimization for Regression Testing: Regression testing, Regression test process, Initial Smoke or Sanity test, Selection of regression tests, Execution Trace, Dynamic Slicing, Test Minimization, Tools for regression testing, Ad hoc Testing: Pair testing, Exploratory testing, Iterative testing, Defect seeding.

Test Management and Automation: Test Planning, Management, Execution and Reporting, Software Test Automation: Scope of automation, Design & Architecture for automation, Generic requirements for test tool framework, Test tool selection, Testing in Object Oriented Systems.

Unit -V **8 Hours**

Introduction to Quality: Historical Perspective of Quality, Definitions of Quality, Core Components of Quality, Quality View, Financial Aspect of Quality, Customers, Suppliers and Processes, Total Quality Management (TQM), Quality Principles of Total Quality Management, Quality Management Through Statistical Process Control, Quality Management Through Cultural Changes, Continual (Continuous) Improvement Cycle, Quality in Different Areas, Benchmarking and Metrics, Problem Solving Techniques, Problem Solving SoftwareTools.

Software Quality: Introduction, Constraints of Software Product Quality Assessment, Quality and Productivity Relationship, Requirements of a Product, Organisation Culture, Characteristics of Software, Software Development Process, Types of Products, Schemes of Criticality Definitions, Problematic Areas of Software Development Life Cycle, Software Quality Management, Why Software Has Defects? Processes Related to Software Quality, Quality Management System Structure, Pillars of Quality Management System, and Important Aspects of QualityManagement.

REFERENCES BOOKS

1.Naik and Tripathy, “Software Testing and Quality Assurance”,Wiley
2.K. K. Aggarwal and Yogesh Singh, “Software Engineering”, New Age International Publication.
3.S. Desikan and G. Ramesh, “Software Testing: Principles and Practices”, Pearson Education.
4.Aditya P. Mathur, “Fundamentals of Software Testing”, PearsonEducation.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By taking semester examination.
4. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B.Tech. (CSE)

Course Code: BTCSE DES61
Title of the Course: Engineering System Analysis and Design
L-T-P: 3-0-0
Credits: 03
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1 Identify and apply the steps involved in functional and system analysis. (Cognitive Level: Understand)
CO-2 Choose and apply the methods for feasibility study (evaluate) through requirement analysis and structural analysis and design of the system as a whole. (Cognitive Level: Apply)
CO-3 Apply the data-oriented perspective of system and apply in the design. (Cognitive Level: Evaluate)
CO-4 Design the system with focus on standard coding conventions and design approaches. (Cognitive Level: Analyze)
CO-5 Create model using the convergence of all phase of system modelling in standard and universally accepted notations. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	3			2	3	2	2	3	3	2	3	2
CO2	3	2	2		2		2	3	2	2	3	2	2	3	2
CO3			2	3	2	1	3		2	3		3	3		2
CO4					2		2		2	2		2	2		2
CO5			2		3	2	3		2	3		3	3		2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

UNIT I **8 Hours**
Data information, functional allocation of management, qualities of information, system analysis and design life cycle, system design, system implementation, system evaluation, tools used in system analysis

UNIT II **8 Hours**
Feasibility analysis, quantification of costs and benefits, tools for prototype creation, data flow diagram, structural system analysis and design, example and cases, specification ori- ented design, procedure oriented design,

UNIT III **8 Hours**

Data oriented systems design, Entity Relationship Model, E-R diagrams, relationships car- dinality and participation, normalizing relations, various normal forms and their need, some examples of relational data basedesign,

UNIT IV **8 Hours**

Data input methods, coding techniques, requirements of coding schemes, error detection of codes, validating input data, input data controls interactive data input Designing outputs, output devices, designing output reports, screen design, graphical user interfaces ,interac- tive I/O on terminals

UNIT V **8 Hours**

Object oriented systems modelling, objects and their properties, classes, inheritance, poly- morphism, some cases of object oriented system modelling, Control, objectives of control, techniques used in control, testing information systems, types of tests, how to generate tests, security of information systems, disaster recovery, business process continuity.

Reference Books:

1. Kenneth E. Kendall and Julie E. Kendall, Systems Analysis and Design Publisher: Prentice Hall PTR, 5th Edition,2001
2. Arunesh Goyal, System Analysis design, Prentice HallIndia
3. Dennis and Wixom, System Analysis and Design,Wiley

Teaching-Learning Strategies in brief (4 to 5 sentences)

Scenario based example is to be chosen for each unit and students are made to apply the knowledge acquired to do as class activity and assignments related to the covered part of the unit. This is to be discussed and analyzed for common mistakes made by the students

Assessment methods and weightages in brief (4 to 5 sentences)

Assessment will be carried out as internal assessment with weightage of 25 % based on sessional, assignment and quizzes. External assessment will have weightage of 75 % based final exam.

Name of the Academic Program: B.Tech. (CSE)

Course Code: BTCSE DES62
Title of the Course:: Engineering System Design Optimization
L-T-P: 3-0-0
Credits: 03
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this Course, the students should be able to:

CO-1 To understand Optimization problem formulation. (Cognitive Level: Apply)
CO2- To use Single Variable Optimization Algorithm for Engineering System Design. (Cognitive Level: Evaluate)
CO3- To understand and apply Multivariable Optimization Algorithms. (Cognitive Level: Analyze)
CO4- To apply Constrained Optimization Algorithms for optimize Engineering System Design.(Cognitive Level: Evaluate)
CO5- To solve all types of single objective optimization problems.(Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	2	2	3	1	3	3	3	2	3	3	3	3	2	3
CO2	3	2	2	3	1	3	3	3	2	3	3	3	3	2	3
CO3	3	2	2	3	1	2	2	3	2	3	2	2	3	2	3
CO4	3	3	3	3	1	3	3	3	2	3	3	3	3	2	3
CO5	3	3	2	3	1	3	3	3	2	3	3	3	3	2	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

UNIT I **8 Hours**
Optimization problem formulation: Design variables, constraints, objective function and variable bounds, classification of optimization problems.

UNIT II **8 Hours**
Single Variable Optimization Algorithm: Bracketing methods (Exhaustive Search Method and Bounding Phase Method) Region Elimination Methods (Fibonacci Search method and Golden Section search method) Gradient based methods (Newton-Raphson method, Bisection Method, Secant Method).

UNIT III **8 Hours**
Multivariable Optimization Algorithms: Direct search methods (Hooke- Jeeves pattern search method), Gradient based methods (Cauchy's steepest descent method, Newton's method, Marquardt's method).

UNIT IV **8 Hours**

Constrained Optimization Algorithms: Kuhn-Tucker conditions, Penalty function method, Method of multipliers, Cutting plane method, Generalized Reduced Gradient method, Integer programming

UNIT V **8 Hours**

Nature Inspired Algorithms: global optima, genetic algorithm, simulated annealing

Reference Books

1. Arora, Jasbir S, Introduction to Optimum Design, Academic Press
2. Alam, SN Islam, S and Patel, SK, Advanced Guide to MATLAB: Practical Examples in Science and Engineering, IK International
3. Deb, Kalyanmoy, Optimization for Engineering Design : Algorithms and Examples, PHI
4. Rao, SS, Engineering Optimization : Theory and Practice, New Age International

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE DES63
Title of the Course: Fault Tolerant Computing
L-T-P: 3-0-0
Credits: **03**
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcomes:

CO1. Introduce the basic notions of fault tolerance. Understand the basics of fault tolerant computing. (Cognitive Level: Remember)
CO2. Design techniques for building fault tolerant computing systems. (Cognitive Level: Apply)
CO3. In particular, three strategies will be examined in depth: hardware, information, and software fault tolerance. (Cognitive Level: Evaluate)
CO4. Mathematical modeling techniques for quantifying the effectiveness of fault tolerance strategies. (Cognitive Level: Analyze)
CO5. Apply the ideas on simple fault tolerant computing examples. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	1		1	3		2		2	1	1	2	2	1		2
CO2		1		3	2	2	1				2	2		3	2
CO3	1		2	3		2		1		1	2	2	2		2
CO4		1		3	1	2	2	1	2		2	2		3	2
CO5	2		3	3		2				1	2	2	3		2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write ‘3 ’in the box for ‘High-level’mapping, 2 for ‘Medium-level’mapping, 1 for ‘Low’-level’mapping.

Detailed Syllabus

Unit 1: **8 Hours**

Goals and Applications of Fault Tolerant Computing : Reliability, Availability, Safety, Dependability, etc. Long Life, Critical Computation , High Availability Applications, Fault Tolerance as a Design Objective
Fault Models : Faults, Errors, and Failures , Causes and Characteristics of Faults, Logical and Physical Faults, Error Models

Unit 2: **8 Hours**

Fault Tolerant Design Techniques Based on Hardware Redundancy :Hardware Redundancy ,TMR, N-modular Redundancy , Voting Methods, Duplication, Standby Sparing, Watchdog Timers, Hybrid Hardware Redundancy , N-modular Redundancy with Spares , Sift-out Modular Redundancy , Triple-duplex Architecture , Fault Tolerant Interconnection Networks

Unit 3: **8 Hours**

Fault Tolerant Design Techniques Based on Information Redundancy :
Parity, M-of-N, Duplication Codes , Checksums, Cyclic Codes, Arithmetic Codes, Berger Codes,Hamming Error Correcting Codes , Code Selection Issues, Time Redundancy, Recomputing with Shifted Operands (RESO), Software Redundancy, Checks and N-version Programming

Unit 4: **8 Hours**

Reliability Evaluation Techniques : Failure Rate, Mean Time to Repair, Mean Time Between Failure , Reliability Modeling, Fault Coverage , M-of-N Systems, Markov Models , Safety, Maintainability, Availability

Unit 5: **8 Hours**

Fault Tolerance in VLSI Circuits : Failure Models in VLSI , Redundancy Techniques in VLSI ,Self-checking Logic ,Reconfiguration Array Structures ,Effect on Yield
Case Studies : FTSC, FTBBC , Space Shuttle , Tandem 16 Non Stop System , Stratus/32 System , ESS

Reference Books:

1. Shooman, Martin, Reliability of Computer Systems and Networks: Fault Tolerance, Analysis, and Design, Wiley Interscience, 2002. ISBN 9780471293422 (required) (used Spring 2003)
2. L. Pullum, Software fault tolerance techniques and implementation, Artech House, 2001, Norwood, MA.Online edition available through McGill libraries.
3. B. W. Johnson, Design and Analysis of Fault-Tolerant Digital Systems, Addison Wesley, 1989, Reading, MA

Teaching-Learning Strategies in brief (4 to 5 sentences)
Lecture, Discussion, Model Development etc.
Assessment methods and weightages in brief (4 to 5 sentences)
Sessional tests, quizzes, assignments etc.

Name of the Academic Program: B.Tech. (CSE)

Course Code: BTCSE DED13
Title of the Course::Machine Learning
L-T-P: 3-0-0
Credits: 03
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO1: Implement and analyze existing learning algorithms, including well-studied methods for classification, regression, structured prediction, clustering, and representation learning. (Cognitive Level: Remember)
CO2: Integrate multiple facets of practical machine learning in a single system: data preprocessing, learning, regularization and model selection. (Cognitive Level: Apply)
CO3: Describe the formal properties of models and algorithms for learning and explain the practical implications of those results. (Cognitive Level: Evaluate)
CO4: Compare and contrast different paradigms for learning (supervised, unsupervised, etc.). (Cognitive Level: Analyze)
CO5: Design experiments to evaluate and compare different machine learning techniques on real-world problems. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	3	3	3		1	2	1	1	1	3	2	3
CO2	2	3	3		2	3	3	3	1	2	1	1	1	3	2
CO3	1	2	2	3	3				3	1		2	3	3	2
CO4	2	3	3		3	2	3	3			2	1	3	3	1
CO5	3	2		2	3	1	2	2	3			2	2	1	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level' mapping.

Detailed Syllabus:

Unit 1: 6 Hours
Introduction to Artificial Intelligence and Machine Learning, History of AI, Machine learning and Deep Learning, Modern AI: Applications and the Machine Learning Workflow, Retrieving Data, introduction to Jupyter Notebook, Data Cleaning, Handling Missing Values and Outliers,

Unit 2: 8 Hours
Exploratory Data Analysis for Machine Learning, Feature Engineering and variable transformation, Estimation and Inference, Hypothesis testing

Unit 3: **10 Hours**

Supervised Machine Learning: Regression, Introduction to Supervised Machine Learning, Types of Machine Learning, Interpretation and Prediction, Linear Regression, Regression and Classification, Data Splits.

Unit 4: **10 Hours**

Supervised Machine Learning: Classification, Logistic Regression, Error Measurement, K-Nearest Neighbors, Support Vector Machines, Decision Trees

Unit 5: **8 Hours**

Ensemble Models, Modeling Unbalanced Classes, Deep Learning and Reinforcement learning

Reference Books:

1. Bishop, Christopher M. "Pattern recognition." *Machine learning* 128.9 (2006).
2. Zaki, Mohammed J., Wagner Meira Jr, and Wagner Meira. *Data mining and analysis: fundamental concepts and algorithms*. Cambridge University Press, 2014.
3. Alpaydin, Ethem. *Introduction to machine learning*. MIT press, 2020.

Teaching-Learning Strategies in brief

1. Compare AI with machine learning and traditional information processing, and discuss its strengths and limitations and its application to complex and human-centered problems.
2. Identify problems that are amenable to solution by machine learning methods, and which AI methods may be suited to solving a given problem.
3. Implement supervised and unsupervised machine learning techniques
4. Calculate error, accuracy measurement and hypothesis testing.
5. Introduction of deep learning techniques, neural network and reinforcement learning.

Assessment methods and weightages in brief

1. Internal Assessment: 25
2. Semester Exam: 75
3. Assessments through Sessional, Assignments, Quizzes etc.

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE DED 22
Title of the Course: Soft Computing
L-T-P: 3-0-0
Credits: 03
(L=Lecture hours, T=Tutorial hours, P=Practical hours

Course Outcome

O 1. Identify and describe soft computing techniques and their roles in building intelligent machines. (Cognitive Level: Understand)
O 2. Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems. (Cognitive Level: Remember)
O 3. Apply genetic algorithms to combinatorial optimization problems. (Cognitive Level: Evaluate)
O 4. Evaluate and compare solutions by various soft computing approaches for a given problem. (Cognitive Level: Analyze)
O 5. Use various tools to solve soft computing problems. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	3	2	2	1	2	1	1	1	1	1	1	1	2	1	3
CO 2	3	2	3		2	-	-	-	1	1	1	1	2	1	3
CO 3	3	2	3	2	2	1	1	-	1	-	1	1	2	1	3
CO 4	3	3	2		2	-	1	1	1	1	1	1	2	1	3
CO 5	3	3	3	2	2	1	-	-	1	-	-	1	2	1	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3 'in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus

Unit-1: Introduction to Soft Computing and Neural Networks 8 Hours

Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics

Unit-2: Fuzzy Logic 8 Hours

Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making.

Unit-3: Neural Networks **8 Hours**

Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks

Unit-4: Genetic Algorithms **8 Hours**

Goals of optimization, comparison with traditional methods, schemata, Terminology in GA – strings, structure, parameter string, data structures, operators, coding fitness function, algorithm, applications of GA in Machine Learning : Machine Learning Approach to Knowledge Acquisition.

Unit-5: Matlab/Python Lib **8 Hours**

Introduction to Matlab/Python, Arrays and array operations, Functions and Files, Study of neural network toolbox and fuzzy logic toolbox, Simple implementation of Artificial Neural Network and Fuzzy Logic, Recent Trends in various classifiers, neural networks and genetic algorithm

Reference Books:

1. Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications,
2. S.Rajasekaran, G. A. Vijayalakshami, PHI.
3. Genetic Algorithms: Search and Optimization, E. Goldberg.
4. Neuro-Fuzzy Systems, Chin Teng Lin, C. S. George Lee, PHI. Build_Neural_Network_With_MS_Excel_sample by Joe choong.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B.Tech. (CSE)

Course Code: BTCSE DED31
Title of the Course::Data Analytics
L-T-P: 3-0-0
Credits: 03
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO1 Understand the essentials of BI & data analytics and the corresponding terminologies. (Cognitive Level: Understand)
CO2 Analyse the steps involved in the BI - Analytics process. (Cognitive Level: Apply)
CO3 Evaluate competently on the topic of analytics.(Cognitive Level: Evaluate)
CO4 Apply the K-Means Clustering with Iris Dataset.(Cognitive Level: Analyze)
CO5 Create the real time scenario (Case study) by using BI & Analytics techniques. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3		2	2	1	1	1	3	3	3
CO2	3	3	3	3	3	3	2	2	2	2	1	1	3	3	3
CO3	3	3	3	3	3	3			2	1		1		3	3
CO4	3	3	3	3	3	3	2	2			1	1	3		3
CO5	3	3	3	3	3	3	2	2	1			2	3	3	

UNIT 1: 8 Hours

BUSINESS INTELLIGENCE Introduction - History and Evolution: Effective and Timely decisions, Data Information and Knowledge, Architectural Representation, Role of mathematical Models, Real Time Business Intelligent System.

UNIT 2: 10 Hours

BI – DATA MINING & WAREHOUSING Data Mining - Introduction to Data Mining, Architecture of Data Mining and How Data mining works (Process), Functionalities & Classifications of Data Mining, Representation of Input Data, Analysis Methodologies. Data Warehousing - Introduction to Data Warehousing, Data Mart, Online Analytical Processing (OLAP) – Tools, Data Modelling, Difference between OLAP and OLTP, Schema – Star and Snowflake Schemas, ETL Process – Role of ETL

UNIT 3: 8 Hours

BI – DATA PREPARTTION :Data Validation - Introduction to Data Validation, Data Transformation – Standardization and Feature Extraction, Data Reduction – Sampling, Selection, PCA, Data Discretization

UNIT 4: **8 Hours**

BI – DATA ANALYTICS PROCESS ANALYTICS PROCESS **I**ntroduction to analytics process, Types of Analytical Techniques in BI – Descriptive, Predictive, Perspective, Social Media Analytics, Behavioural, Iris Datasets

UNIT 5: **8 Hours**

IMPLEMENTATION OF BI – ANALYTICS PROCESS Operational Intelligence: Technological – Business Activity Monitoring, Complex Event Processing, Business Process Management, Metadata, Root Cause Analysis

TEXTBOOKS

1. Carlo-Vercellis, "Business Intelligence Data Mining and Optimization for Decision-Making", First Edition Link: https://bit.ly/3d6XxOr
2. Drew Bentely, "Business Intelligence and Analytics",@2017 Library Pres., ISBN: 978-1-9789-2136-8Link https://www.academia.edu/40285447/Business_Intelligence_and_Analytics
3. Larissa T. Moss & Shaku Atre, "Business Intelligence Roadmap: The Complete Project Lifecycle for Decision-Support Applications", First Edition, Addison-Wesley Professional, 2003
4. Kimball, R., Ross, M., Thornthwaite, W., Mundy, J., and Becker, B. John, "The Data Warehouse Lifecycle Toolkit: Practical Techniques for Building Data Warehouse and Business Intelligence Systems", Second Edition, Wiley & Sons, 2008.

Teaching - Learning Strategies

1. Blended Learning
2. Brainstorming
3. Case Study
4. Computer Aided Presentation
5. Computer Labs/Laptop Instruction
6. Demonstration

Assessment methods and weightages in brief

1. Internal Assessment: 25
2. Semester Exam: 75 - Assessments through Sessional, Assignments, Quizzes etc.

Name of the Academic Program: B. Tech (CSE)
Course Code: BTCSE – DED32
Title of the Course: Pattern Recognition
L-T-P: 3-0-0
Credits: **03**
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES(COs)

O 1. Understand the various types of Pattern recognition techniques and to apply Bayesian classification for solving various classification problems. (Cognitive Level: Apply)
O 2. Create a Bayesian Network, predict and draw inference from a Bayesian network. (Cognitive Level: Evaluate)
O 3. Apply principal component analysis and linear discriminant analysis to reduce the dimensionality. (Cognitive Level: Analyze)
O 4. Formulate the optimal decision boundary with the use of proper learning strategy. (Cognitive Level: Evaluate)
O 5. Apply unsupervised learning techniques to solve critical problems. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	1	3	2	3	1	3	1	3	1	3
CO2	3	2	1	1	3	-	1	1	3	-	1	-	2	1	3
CO3	3	2	2	1	3	1	2	1	3	1	2	1	3	2	2
CO4	3	3	3	3	3	1	3	3	3	1	3	3	3	3	3
CO5	2	2	3	3	3	1	3	3	3	1	3	2	3	2	3

UNIT - I: Introduction to Pattern Recognition: 8 Hours

Introduction to pattern recognition - definition, steps of pattern classification, applications of pattern classification, types of pattern classification, classification vs clustering.

Bayesian decision theory - decision rule based on prior probability, decision rule based on posterior probability, decision rule based on conditional risk, naive Bayes classifier.

UNIT – II: 8 Hours

Bayesian Network - causation, correlation, Bayesian network structure, Markov rule, prediction, inference, and learning.

Maximum likelihood estimation - parameter estimation and its types. Bayesian estimation vs maximum likelihood estimation.

UNIT - III: Dimensionality Reduction: **8 Hours**

Curse of dimensionality, methods of dimensionality reduction, feature extraction and feature selection, PCA – Computation of Covariance Matrix, eigen values and eigen vectors, LDA- between class scatter matrix and within class scatter matrix, applications of PCA and LDA

UNIT – IV: **8 Hours**

Linear Discriminant Function: Decision boundary for two categories, Decision boundary for c categories, learning linear discriminants, Learning through iterative optimization, gradient descent, and perceptron rule.

Support Vector Machine – Introduction, Optimal Hyperplane, Linear SVM, Linear SVM with soft margins, Non-linear SVM, Types of Kernel functions

Artificial Neural Network – Introduction, Classification using perceptron rule, Classification using gradient descent.

UNIT – V: Unsupervised learning & Clustering **8 Hours**

Introduction, Supervised learning vs Unsupervised learning, Classification vs Clustering, Approaches to Clustering – K-Means Clustering, Spectral Clustering and Graph Based Clustering, Hierarchical Clustering, Nearest Neighbor Method, Ensemble Clustering.

Reference Books:

1. David G. Stork, Peter E. Hart, and Richard O. Duda, Pattern Classification, 2nd Edition, Wiley Publications
2. Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006.
3. Geoff Dougherty,Pattern Recognition and Classification: An Introduction, Springer, 2012.
4. Sergios Theodoridis, Pattern Recognition, 4th Edition, AP, 2008

Teaching-Learning Strategies in brief (4 to 5 sentences)
Apart from lectures, use of ICT for better visualization of the concepts and to demonstrate the working of various pattern recognition techniques for model development.
Assessment methods and weightages in brief (4 to 5 sentences)
During the course, two sessional examinations will be conducted each of 10 marks for internal assessment. Apart from sessional examination, teacher assessment of 5 marks is carried out by attendance and the assignments.

Name of the Academic Program: B.Tech. (CSE)

Course Code: BTCSE DED41
Title of the Course::Multi-agent Intelligent Systems
L-T-P: 3-0-0
Credits: 03
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcomes:

CO1: Understand development of software agents. (Cognitive Level: Remember)

CO2: Analyse Multi agent and Intelligent agents. (Cognitive Level: Apply)

CO3: Analyse and Apply Agents and security. (Cognitive Level: Evaluate)

CO4: Analyseand evaluate applications of agents. (Cognitive Level: Analyze)

CO5: AnalyzeSoftware Agents for computer network security. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes(PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			2	2	1		2	1	1		2	1	1		
CO2	2	3	3	3	1	1				1			1		1
CO3			2	2	1		1		1		1			2	
CO4	2	3	3	3	1	2	1	2		2	1	2			2
CO5	2		3	3	1				1					2	

Detailed Syllabus:

Unit 1 **8 Hours**

Agent Definition, Agent Programming Paradigms, Agent Vs. Object, Aglet, Mobile Agents, Agent Frameworks, Agent Reasoning, Interface Agents: Metaphors with Character, Processes, threads, daemons, Components, Java Beans, ActiveX, Sockets, RPCs, Distributed Computing.

Unit 2 **8 Hours**

Agent–Oriented Programming, Jini Architecture, Actors and Agents, Typed and proactive messages, Interaction between agents, Reactive Agents, Cognitive Agents, Interaction protocols, Agent coordination, Agent negotiation, Software Agent for Cooperative Learning, Agent Organization, Self - interested agents in electronic commerce applications, Interface Agents, Agent Communication Languages, Agent Knowledge representation.

Unit 3 **8 Hours**

Agent adaptability, Agent-Based Framework for Interoperability, Agents for Information Gathering, Belief Desire Intension, Mobile Agent Applications, Towards an Industrial-Strength Open Agent Architecture, Agent Security Issues, Mobile Agents Security, Protecting Agents against Malicious Hosts, Untrusted Agent, Black Box Security, Authentication for agents, Security issues for aglets.

Unit 4 **8 Hours**

Multi Agent system: Theoretical approaches and NASA applications – Agent based control for multi-UAV information collection- Agent based decision support system for Glider pilots – Multi agent system in E- Health Territorial Emergencies

Unit 5 **8 Hours**

Software Agents for computer network security-Multi-Agent Systems, Ontologies and Negotiation for Dynamic Service Composition in Multi- Organizational Environmental Management.

Reference books:

1. Jeffrey M. Bradshaw, *Software Agents*, AAAI Press , 1997
2. Richard Murch, Tony Johnson, *Intelligent Software Agents*, Prentice Hall , 1999
3. Gerhard Weiss, *Multi Agent Systems – A Modern Approach to Distributed Artificial Intelligence*, MIT Press , 2016
4. Mohammad Essaaidi, Maria Ganzha, and Marcin Paprzycki, *Software Agents, Agent Systems and Their Applications*, IOS Press , 2012

Teaching-Learning Strategies

1. Learning by doing
2. Learning through discussion among the peer group
3. Open ended questions by teacher
4. Open ended questions from students
5. Reflective Learning

Assessment methods and weightages

1. time-constrainedexaminations
2. closed-book tests
3. problem based assignments
4. practicalassignments and
5. viva voce interviews

Name of the Academic Program : B.Tech. CSE

Course Code: BTCSE DED 42
Title of the Course: Big Data Analytics
L-T-P : 3-0-0
Credits :3
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1 Understand the Big Data Platform and its Usecases, Provide an overview of ApacheHadoop. (Cognitive Level: Understand)
CO-2 Provide HDFS Concepts and Interfacing withHDFS. (Cognitive Level: Remember)
CO-3 Provide hands on Hadoop/Map Reduce EcoSystem.(Cognitive Level: Evaluate)
CO-4 Apply analytics on Structured, UnstructuredData.(Cognitive Level: Analyze)
CO-5 Exposure to Data Analytics withR.(Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3		1	2	1	1	1	3	1	3
CO2	2	3	3		2	3	3	2	1	2	1	1	2	3	3
CO3	3	2	2	3	3				3	1		2	3	3	3
CO4	2	3	3		3	2	3	2			1	1	3	3	2
CO5	3	3		3	3	1	2	2	1	3		2	1	2	1

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

UNIT 1: 8 Hours
Introduction To Big Data And Hadoop, Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to InfosphereBigInsights and Big Sheets.

UNIT 2: 8 Hours
HDFS(Hadoop Distributed File System), The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

UNIT 3: 8 Hours
Map Reduce, Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

Unit 4: **8 Hours**

Hadoop Eco System, Pig :Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.
Hive :Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.
Hbase :HBasics, Concepts, Clients, Example, Hbase Versus RDBMS.
Big SQL : Introduction

UNIT 5: **8 Hours**

Data Analytics with R, Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with BigR.

Reference Books:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
3. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.
4. AnandRajaraman and Jefrey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.
5. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
6. Glen J. Myat, "Making Sense of Data", John Wiley & Sons, 2007

Teaching-Learning Strategies in brief

1. Identify Big Data and its BusinessImplications.
2. List the components of Hadoop and HadoopEco-System
3. Access and Process Data on Distributed FileSystem
4. Manage Job Execution in HadoopEnvironment
5. Develop Big Data Solutions using Hadoop EcoSystem
6. Analyze InfosphereBigInsights Big DataRecommendations.
7. Apply Machine Learning Techniques usingR.

Assessment methods and weightages in brief

1. Internal Assessment: 25
2. Semester Exam: 75 - Assessments through Sessional, Assignments, Quizzes etc.

Name of the Academic Program: B.Tech(CSE)

Course Code: BTCSE DED43
Title of the Course: Introduction to Blockchain Technology
L-T-P: 3-0-0
Credits: **03**
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcomes (COs):

CO-1: Describe the basic concepts and technology used for block chain. (Cognitive Level: Remember)
CO-2: Describe the primitives of the distributed computing and cryptography related to block chain. (Cognitive Level: Apply)
CO-3: Illustrate the concepts of Bitcoin and their usage. (Cognitive Level: Evaluate)
CO-4: Implement Ethereum block chain contract. (Cognitive Level: Analyze)
CO-5: Apply security features in block chain technologies. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	1	-	-	-	1	-	1	1	2	2	1
CO2	3	2	2	1	-	2	2	-	1	-	1	1	2	2	1
CO3	3	2	2	1	-	1	-	2	1	-	1	1	2	2	1
CO4	3	2	2	1	2	-	1	-		1	1	1	2	2	1
CO5	3	2	2	1	-	1	-	-	1	-	1	2	2	2	1

Detailed Syllabus

Unit-I **08 Hours**
Introduction: Need for Distributed Record Keeping, Modeling faults and adversaries, Byzantine Generals problem, Consensus algorithms and their scalability problems, Nakamoto's concept with Blockchain based cryptocurrency, Technologies Borrowed in Blockchain – hash pointers, consensus, byzantine fault-tolerant distributed computing, digital cash etc.

Unit-II **08 Hours**
Basic Distributed Computing & Crypto primitives: Atomic Broadcast, Consensus, Byzantine Models of fault tolerance, Hash functions, Puzzle friendly Hash, Collison resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge systems.
Bitcoin basics: Bitcoin blockchain, Challenges and solutions, proof of work, Proof of stake, alternatives to Bitcoin consensus, Bitcoin scripting language and their use.

Unit-III **08 Hours**
Ethereum basics: Ethereum and Smart Contracts, The Turing Completeness of Smart Contract Languages and verification challenges, using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts, Writing smart contracts using Solidity & JavaScript.

Unit-IV **08 Hours**

Privacy, Security issues in Blockchain: Pseudo-anonymity vs. anonymity, Zcash and Zk-SNARKS for anonymity preservation, attacks on Blockchains: Sybil attacks, selfish mining, 51% attacks advent of algorand; Sharding based consensus algorithms to prevent these attacks.

Unit-V **08 Hours**

Case Studies: Block chain in Financial Service, Supply Chain Management and Government Services

Reference Books:

1. Narayanan, Bonneau, Felten, Miller and Goldfeder, "Bitcoin and Cryptocurrency Technologies – A Comprehensive Introduction", Princeton University Press.
2. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017.
3. Imran Bashir, "Mastering Blockchain: Distributed ledger technology, decentralization, and smart contracts explained", Packt Publishing.
4. MerunasGrincalaitis, "Mastering Ethereum: Implement Advanced Blockchain Applications Using Ethereum-supported Tools, Services, and Protocols", Packt Publishing.
5. Prof. Sandip Chakraborty, Dr. Praveen Jayachandran, "Blockchain Architecture Design And Use Cases"[MOOC], NPTEL: https://nptel.ac.in/courses/106/105/106105184/

Teaching-Learning Strategies in brief (4 to 5 sentences)

Lecture, Discussion, Model Development etc.

Assessment methods and weightages in brief (4 to 5 sentences)

Sessional tests, quizzes, assignments etc.

Name of the Academic Program: - B. Tech (CSE)

Course Code: BTCSE DED-51
Title of the Course: Data Science
L-T-P: 3-0-0
Credits: - 03
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1: Understand the fundamental concepts of data science. (Cognitive Level: Remember)
CO-2: Evaluate and Apply the data analysis techniques for applications handling large data.(Cognitive Level: Apply)
CO-3: Demonstrate the various machine learning algorithms used in data science process. (Cognitive Level: Evaluate)
CO-4: Understand the ethical practices of data science.(Cognitive Level: Analyze)
CO-5: Remember to think through the ethics surrounding privacy, data sharing and algorithmic decision-making.(Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3		1	2	1	1	1	3	1	3
CO2	2	3	3		2	3	3	2	1	2	1	1	2	3	3
CO3	3	2	2	3	3				3	1		2	3	3	3
CO4	2	3	3		3	2	3	2			1	1	3	3	2
CO5	3	3		3	3	1	2	2	1	3		2	1	2	1

Unit-1 INTRODUCTION TO DATA SCIENCE **8 Hours**
Definition– Big Data and Data Science Hype – Why data science – Getting Past the Hype – The Current Landscape – Data Scientist - Data Science Process Overview – Defining goals – Retrieving data – Data preparation – Data exploration – Data modeling – Presentation.

Unit-2 BIG DATA AND ANALYTICS **8 Hours**
Problems when handling large data – General techniques for handling large data through data analytics – Case study – Steps in big data – Distributing data storage and processing with Frameworks – Case study.'

Unit-3 MACHINE LEARNING **8 Hours**
Machine learning – Modeling Process – Training model – Validating model – Predicting new observations –Supervised learning algorithms – Unsupervised learning algorithms.

Unit-4 DEEP LEARNING **8 Hours**
Introduction – Deep Feedforward Networks – Regularization – Optimization of Deep Learning – Convolutional Networks – Recurrent and Recursive Nets – Applications of Deep Learning.

Unit-5 DATA VISUALIZATIONETHICS AND RECENT TRENDS 8 Hours

Introduction to data visualization – Data visualization options – Filters – MapReduce – Dashboard development tools – Creating an interactive dashboard with dc.js-summary. Data Science Ethics – Doing good data science – Owners of the data - Valuing different aspects of privacy - Getting informed consent - The Five Cs – Diversity – Inclusion – Future Trends.

Reference Books:

1. Introducing Data Science, Davy Cielen, Arno D. B. Meysman, Mohamed Ali, Manning Publications Co., 1st edition, 2016
2. An Introduction to Statistical Learning: with Applications in R, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer, 1st edition, 2013
3. Deep Learning, Ian Goodfellow, YoshuaBengio, Aaron Courville, MIT Press, 1st edition, 2016
4. Ethics and Data Science, D J Patil, Hilary Mason, Mike Loukides, O' Reilly, 1st edition, 2018

Teaching-Learning Strategies in brief:

1. Encourage participation of students in learning.
2. Connect the subject matter with the student's everyday life.
3. Encourage the spirit of questioning by the students.
4. Arrange student friendly study material and other learning resources.
5. Create friendly environment conducive for learning.

Assessment methods and weightages in brief:

1. Two sessional examinations.
2. Assignments.
3. Oral quizzes in the class.
4. End semester examination.
5. Internal Assessment: 25 Marks, End Semester Examination :75 Marks &Total Marks: 100.

Name of the Academic Program: - B. Tech (CSE)

Course Code: BTCSE DED52
Title of the Course: Bioinformatics
L-T-P: 3-0-0
Credits: 03
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1 Have the knowledge of bioinformatics and its respective applications.(Cognitive Level: Understand)
CO-2 Use bioinformatics search tools on the internet for mining data, pairwise and multiple sequence alignments.(Cognitive Level: Remember)
CO-3 Design parsimony tree for developing phylogenetic relations.(Cognitive Level: Evaluate)
CO-4 Extract information from different types of bioinformatics data (gene, protein, disease, etc.), including their biological characteristics and relationships.(Cognitive Level: Analyze)
CO-5 analyze processed data with the support of analytical and visualization tool. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2				3	1			1		3	1	
CO2													3	1	
CO3	3	2	3		3	2			3						1
CO4	3	3	2								1		3	1	
CO5	3			3	2					1	1		3	1	

and Program Specific Outcomes (PSOs)

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

Unit 1: Introduction to Bioinformatics: 8 Hours
Define Bioinformatics, History, applications, Introduction to Data mining.
Biological Databases: collecting and storing sequences , storage techniques (flat and relational), Understanding and Using Biological Databases.

Unit 2: **Programming Languages for bioinformatics 8 Hours**
Perl Basics, Perl applications for bioinformatics- Bioperl, Java Basics, R Basics. Linux perating System, mounting/ unmounting files, tar, gzip / gunzip.

Unit 3:Sequence Analysis 8 Hours
Sequence alignment algorithms: pairwise alignment and multiple sequence alignment. Tools used for sequence analysis.Dot plot matrix, Dynamic Programming, Phylogenetic analysis- UPGMA.

Unit 4: **Structure prediction and visualization** **8 Hours**

Levels of protein structure:Protein visualization, Primary structure, Secondary structure, Tertiary structure &Quaternarystructure, Motifs of protein structure: Hydrophobic and hydrophilic regions, RamachandranplotAlpha-helix, Beta sheets, Loops, Topology diagrams &various structural motifs.

Protein structure prediction: Impediments, Secondary/fold recognition, Threading/tertiary structures,Sequence considerations, Structural considerations, Energy consideration, Energy landscape &Validation. Nucleic acid structures: DNA structures, RNA structures & Secondary structure prediction in RNA.

Unit 5: Computer Aided Drug Designing **8 Hours**

Protein Function Prediction,Metabolic Pathway analysis, Computer aideddrug designing

Hidden Markov Model:

Viterbi algorithm, Forward algorithm, Backward algorithm, Profile-HMM, Baum-Welch algorithm to optimize HMM-profile.

Reference Books:

1. R. Durbin, S. Eddy, A. Krogh, and G. Mitchison (1998), Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids. Cambridge University Press
2. Edward Keedwell and Ajit Narayanan (2005), Intelligent Bioinformatics: The Application of Artificial Intelligence Techniques to Bioinformatics Problems, Wiley
3. Fundamental concepts of Bioinformatics – D E Krane and M L Raymer, Pearson Education.
4. Bioinformatics Methods & applications, Genomics, Proteomics & Drug Discovery – Rastogi, Mendiratta and Rastogi, PHI, New Delhi.

Teaching-Learning Strategies in brief

1. For teaching, ICT tools have been used. Also, white board teaching had been done for explaining and clarifying many concepts and numericals.
2. Assessment methods and weightages :2 sessionals had been conducted. Also, assignments were provided. Quizes had been conducted too.

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE DED61
Title of the Course: Neural Network and Deep Learning
L-T-P: 3-0-0 Credits: **03**
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO1. Develop the concepts of Artificial Intelligence and Neural Networks.(Cognitive Level: Apply)
CO2. Differentiate various machine learning strategies and how to apply them.(Cognitive Level: Evaluate)
CO3. Designand formulate various Neural Network architectures. (Cognitive Level: Analyze)
CO4. Create the concepts of Deep Learning and compare it with machine learning.(Cognitive Level: Evaluate)
CO5. Apply Deep Learning Algorithms Students over various applications.(Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	1	-	-	1	-	-	1	-	3	3	1	1
CO2	2	2	-	1	3	-	1	3	-	1	3	3	3	3	1
CO3	3	3	2	1	3	1	1	3	1	1	3	3	3	2	1
CO4	1	3	3	2	-	-	2	-	-	2	-	3	3	2	2
CO5	3	3	3	2	3	1	2	3	1	2	3	3	3	3	3

UNIT - I: Introduction to Neural Network: 8 Hours

Introduction to Artificial Intelligence & Neural Network: Definition, Biological Neuron, Analogy of Biological Neural Network and Artificial Neural Network, Mathematical definition of Neural Network, Model of ANN, Advantages and Benefits of ANN, Features of ANN, Types of activation function, Learning Rate, Synaptic Weights.
Neural Network Architecture: Single Layer Feed Forward NN, Multiple layer Feed Forward NN, Recurrent Neural Network.

UNIT – II: Introduction to Machine Learning: 8 Hours

Machine Learning: Definition, types- supervised, unsupervised and reinforcement learning, and Learning process. Learning in ANN: Error Correction Learning, Hebbian Learning, Competitive Learning.
Introduction to Programming with R and python, Data preprocessing
Descending the Right Curve: Interpreting Learning as Optimization, Cost Functions.
Validating Machine Learning: Depicting Learning Curves, Training, testing and validation.

UNIT - III: Types of Neural Networks 8 Hours

Single layer perceptron: Least Mean Square Algorithm, Multilayer perceptron: Backpropagation Algorithm, Radial-basis function network, Support Vector Machine, Principal Components Analysis, Self-Organized Maps.

UNIT - IV: Introduction to Deep Learning: **8 Hours**

Introducing Deep Learning, Machine learning principles, Basics of Deep Learning.
Moving towards Deep Learninsg: Benefits, Improving Processing Speed, Deep Learning vs other forms of AI, Find Smarter solutions, end to end learning.
Deep learning & Neural Network: Convolution Neural Networks, Recurrent Neural Networks

UNIT – V: Applications of Deep Learning **8 Hours**

Applications and fields requiring Deep Learning, Deep Learning tools.
Interacting with Deep Learning: Image Classification, Advanced CNN, Language Processing, Playing with Reinforcement Learning.

Reference Books:

1. Simon Haykins, Neural Networks – A comprehensive foundation, Prentice Hall, Pearson Education, 1999.
2. Jaun Paul Mueller, Luca Massaron, Machine Learning for Dummies(With R and python), John Wiley & Sons, 2016.
3. Jaun Paul Mueller, Luca Massaron, Deep Learning for Dummies, John Wiley & Sons, 2019.
4. S. N. Deepa, S.N. Sivanandam, Principles of Soft Computing, John Wiley & Sons, 2007

Teaching-Learning Strategies in brief

Apart from lectures, use of ICT for better visualization of the concepts and to demonstrate the working of various learning algorithms for model development.

Assessment methods and weightages in brief

During the course, two sessional examinations will be conducted each of 10 marks for internal assessment. Apart from sessional examination, teacher assessment of 5 marks is carried out by attendance and the assignments.

Name of the Academic Program - Bachelor of Technology (CSE)

Course Code: BTCSE DED62
Title of the Course: Cryptography and Network Security
L-T-P: 3-0-0
Credits: - 03
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1: Demonstrate the knowledge related to the concepts of security in networking and data transmission.(Cognitive Level: Remember)
CO-2: Apply different mathematical concepts related to cryptography.(Cognitive Level: Apply)
CO-3: Apply and evaluate different cryptographic techniques.(Cognitive Level: Evaluate)
CO-4: Apply and evaluate different network security protocols.(Cognitive Level: Analyze)
CO-5: Demonstrate knowledge and apply mechanisms related to network security, internet security and information security.(Cognitive Level: Evaluate)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	1	2	-	2	1	1	1	3	3	3
CO2	3	3	3	3	3	1	2	-	2	1	1	1	3	3	3
CO3	3	3	3	3	3	2	2	-	2	2	1	1	3	3	3
CO4	3	3	3	3	3	2	2	-	2	2	1	1	3	3	3
CO5	3	3	3	3	3	2	2	1	2	2	1	1	3	3	3

Detailed Syllabus:

Unit-I **8 Hours**
Algebra: Group, cyclic group, cyclic subgroup, field, probability. Number Theory: Fermat's theorem, Chinese remainder theorem, primality testing algorithm, Euclid's algorithm for integers, Cryptography and cryptanalysis, Classical Cryptography, substitution cipher, Pseudo
Random bit generators, stream ciphers and RC4.

Unit-II **8 Hours**
Block ciphers: Modes of operation, DES and its variants, AES, linear and differential cryptanalysis. One-way function , trapdoor one-way function, Public key cryptography, RSA cryptosystem, Diffie-Hellman key exchange algorithm, Elgamal Cryptosystem.

Unit-III **8 Hours**
Cryptographic hash functions, secure hash algorithm, Message authentication, digital signature, RSA digital signature, Elgamal digital signature.

Unit-IV **8 Hours**
Overview of Network Security, Security services, attacks, SecurityIssues in TCP/IP suite- Sniffing, spoofing, Authentication functions - Message AuthenticationCodes - Hash Functions - Security of Hash Functions and MACs - MD5message Digest algorithm - Secure Hash Algorithm - Digital Signatures, Authenticationprotocols-Kerberos, X.509**.**

Unit-V **8 Hours**

IP Security-AH and ESP, SSL/TLS, SSH, Web Security-HTTPS, DNSSecurity, Electronic Mail Security (PGP, S/MIME).Intruders,Viruses, Worms, Trojan horses, Distributed, Denial-Of-Service (DDoS), Firewalls, IDS, Honey nets, Honeypots.Introduction to wireless network security, Risks and Threats of Wireless networks, Wireless LAN Security (WEP, WPA).

Reference Books:

1. William Stallings, "Cryptography and Network Security"
2. Alfred J. Menezes, Paul C. van Oorschot, Scott A. Vanstone, "Handbook Of Applied Cryptography"
3. Charlie Kaufman, Radia Perlman, Mike Speciner, "Network Security: Private Communication in a Public World

Teaching-Learning Strategies in brief

1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Providing LMS to access study materials across various devices.
4. Encourage the students to ask more & more questions.
5. Motivate the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Sessional examination
2. Assignments.
3. Class tests
4. Semester examination
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program - Bachelor of Technology (CSE)

Course Code: BTCSE DED63
Title of the Course: Network Programming
L-T-P: 3-0-0
Credits: - 03
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

Course Outcomes

CO1. To apply Linux utilities and library functions.(Cognitive Level: Understand)
CO2. To analyze File and Directory management. (Cognitive Level: Apply)
CO3. To interpret Signal generation and handling.(Cognitive Level: Evaluate)
CO4. To understand IPC, network programming in Java. (Cognitive Level: Analyze)
CO5. To evaluate processes to communicate with each other across a Computer Network. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		1	3		2		2	1	1	2	2	1		2
CO2		1		3	2	2	1				2	2		3	2
CO3	1		2	3		2		1		1	2	2	2		2
CO4		1		3	1	2	2	1	2		2	2		3	2
CO5	2		3	3		2				1	2	2	3		2

UNIT – I: Linux Utilities **8 Hours**

File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking utilities, Filters, Text processing utilities and Backup utilities. Bourne again shell(bash) – Introduction, pipes and redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples.
Review of C programming concepts-arrays, strings (library functions), pointers, function pointers, structures, unions, libraries in C.

UNIT – II: Files-File Concept **8 Hours**

File types File System Structure, Inodes, File Attributes, file I/O in C using system calls, kernel support for files, file status information-stat family, file and record locking-lockf and fcntl functions, file permissions- chmod, fchmod, file ownership-chown, lchown ,fchown, links-soft links and hard links – symlink, link, unlink. File and Directory management – Directory contents, Scanning Directories- Directory file APIs. Process- Process concept, Kernel support for process, process attributes, process control – process creation, replacing a process image, waiting for a process, process termination, zombie process, orphan process.

UNIT – III: Signals **8 Hours**

Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise , alarm, pause, abort, sleep functions. Interprocess Communication – Introduction to IPC mechanisms, Pipes- creation, IPC between related processes using unnamed pipes, FIFOs-creation, IPC between unrelated processes using FIFOs(Named pipes), differences between unnamed and named pipes, popen and pclose library functions, Introduction to message queues, semaphores and shared memory. Message Queues- Kernel support for messages, UNIX system V APIs for messages, client/server example. Semaphores-Kernel support for semaphores, UNIX system V APIs for semaphores.

UNIT – IV: Shared Memory **8 Hours**

Kernel support for shared memory, UNIX system V APIs for shared memory, client/server example.Network IPC – Introduction to Unix Sockets, IPC over a network, Client-Server model ,Address formats(Unix domain and Internet domain), Socket system calls for Connection Oriented – Communication, Socket system calls for Connectionless-Communication, Example-Client/Server Programs- Single Server-Client connection, Multiple simultaneous clients, Socket options – setsockopt, getsockopt, fcntl.

UNIT-V : Network Programming in Java **8 Hours**

Network basics, TCP sockets, UDP sockets (datagram sockets), Server programs that can handle one connection at a time and multiple connections (using multithreaded server), Remote Method Invocation (Java RMI)-Basic RMI Process, Implementation details-Client-Server Application.

REFERENCE BOOKS:

1. Linux System Programming, Robert Love, O'Reilly, SPD.
2. Advanced Programming in the UNIX environment, 2nd Edition, W.R.Stevens, Pearson Education.
3. UNIX for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education.
4. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Wiley India Edition.
5. Unix Network Programming The Sockets Networking API, Vol.-I,W.R.Stevens, Bill Fenner, A.M.Rudoff, Pearson Education.
6. Unix Internals, U.Vahalia, Pearson Education.
7. Unix shell Programming, S.G.Kochan and P.Wood, 3rd edition, Pearson Education.
8. C Programming Language, Kernighan and Ritchie, PHI

Teaching-Learning Strategies in brief

1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Providing LMS to access study materials across various devices.
4. Encourage the students to ask more & more questions.
5. Motivate the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Sessional examination
2. Assignments.
3. Class tests
4. Semester examination
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: B. Tech (CSE)
Course Code: BTCSE – DEA11
Title of the Course: Digital Image Processing
L-T-P: 3-0-0 Credits: **03**
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

O 1. Understand the various types of Pattern recognition techniques and to apply Bayesian classification for solving various classification problems. (Cognitive Level: Remember)
O 2. Create a Bayesian Network, predict and draw inference from a Bayesian network. (Cognitive Level: Apply)
O 3. Apply principal component analysis and linear discriminant analysis to reduce the dimensionality. (Cognitive Level: Evaluate)
O 4. Formulate the optimal decision boundary with the use of proper learning strategy. (Cognitive Level: Analyze)
O 5. Apply unsupervised learning techniques to solve critical problems. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	2	1	1	2	2	1	2	2	1	3	3	2
CO2	3	2	2	2	1	-	2	2	1	2	2	1	2	3	2
CO3	2	3	3	2	1	1	3	2	1	3	2	1	3	3	2
CO4	3	3	3	3	2	-	3	3	2	3	3	2	3	3	3
CO5	2	3	3	3	3	-	3	3	3	3	3	3	2	3	3

Unit – I **6 Hours**

Introduction and Fundamentals: Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization.
Image Enhancement in Spatial Domain: Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening – The Laplacian.

Unit – II **8 Hours**

Image Enhancement in Frequency Domain: Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters – Gaussian Highpass Filters; Homomorphic Filtering.

Unit – III. **10 Hours**

Color Image Processing: Color Fundamentals, Color Models, Converting Colors to different models, Color Transformation, Smoothing and Sharpening, Color Segmentation.
Morphological Image Processing: Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening

Unit – IV **10 Hours**

Segmentation: Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance, Line Detection, Corner Detection.

Unit – V. **8 Hours**

Feature Extraction: Representation, Topological Attributes, Geometric Attributes
Description: Boundary-based Description, Region-based Description, Relationship.
Object Recognition: Deterministic Methods, Clustering, Statistical Classification, Syntactic Recognition, Tree Search, Graph Matching.

REFERENCE BOOKS:

1. Digital Image Processing 2nd Edition, Rafael C. Gonzales and Richard E. Woods. Published by: Pearson Education.
2. Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by: John Wiley and Sons, NY.
3. Fundamentals of Digital Image Processing, A.K. Jain. Published by PrenticeHall, Upper Saddle River, NJ.
4. Computer Vision Algorithms and Applications, 2nd Edition, Richard Szeliski, Springer.
5. Computer Vision Models, Learning and Inference, Simon J.D. Prince, Cambridge University Press, 2012

Teaching-Learning Strategies in brief
1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Providing LMS to access study materials across various devices.
4. Encourage the students to ask more & more questions.
5. Motivate the students to develop critical & strategic thinking
6.

Assessment methods and weightages in brief
1. Sessional examination
2. Assignments.
3. Class tests
4. Semester examination
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program : BTech CSE

Course Code: BTCSE DEA21
Title of the Course: Human Computer Interaction
L-T-P :3-0-0
Credits: 3
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1 Describe and apply core theories, models and methodologies from the field of HCI.(Cognitive Level: Understand)
CO-2 Describe what the user-centered design cycle is and explain how to practice this approach to design interactive software systems.(Cognitive Level: Remember)
CO-3 Analyze one after another the main features of interactive systems, and explain how to gauge the usability of digital environments, tools and interfaces. (Cognitive Level: Evaluate)
CO-4 Demonstrate a thorough understanding and solid knowledge of the principles and techniques of human-computer interaction. (Cognitive Level: Analyze)
CO-5 Abletodrawonavarietyoftechniquesandrelevantknowledgeandappropriately apply them to new situations and real-life problems. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1		2	1	1		1					2		1
CO2	3	1	1	2	1		1				1				
CO3	1	3		1	1	1		1		1		1		2	
CO4	2	1		1		2	1		1				1	1	
CO5	1	2		2	1	2		1				1			2

Detailed Syllabus

UNIT 1: **6 Hours**
HCI foundations- Input–output channels, Human memory, Thinking: reasoning and problemsolving, Emotion, Individual differences, Psychology and the design of interactive systems,Text entry devices, Positioning, pointing and drawing, Display devices, Devices for virtualreality and3Dinteraction,Physicalcontrols,sensorsandspecialdevices,Paper:printingandscanning

UNIT 2: **8 Hours**
Designing- Programming Interactive systems- Models of interaction, Frameworks and HCI,Ergonomics,Interactionstyles,ElementsoftheWIMPinterface,Thecontextoftheinteraction,Experience,engagementandfun,Paradigmsforinteraction,
Cantered design and testing- Interaction design basics-The process of design, User focus,Scenarios,Navigationdesign,Screendesignandlayout,Iterationandprototyping,Designfornon-Mouse interfaces, HCI in the software process, Iterative design and prototyping, Designrules, Principles to support usability, Standards and Guidelines, Golden rules and heuristics,HCIpatterns

UNIT 3: **10 Hours**

Implementation support - Elements of windowing systems, Programming the application,Usingtoolkits Userinterfacemanagementsystems,Evaluationtechniques,Evaluationthroughexpertanalysis,Evaluationthrough userparticipation,Universaldesign,User support

UNIT 4: 10 Hours

Models and Theories - Cognitive models, Goal and task hierarchies, Linguistic models, Thechallengeofdisplay-basedsystems,Physicalanddevicemodels,Cognitive architectures

UNIT 5: 8 Hours

Collaboration and communication - Face-to-face communication, Conversation, Text-basedcommunication, Group working, Dialog design notations, Diagrammatic notations, Textualdialognotations,Dialogsemantics,Dialoganalysisanddesign
Humanfactorsandsecurity-Groupware,Meetinganddecisionsupportsystems,Sharedapplications and artifacts, Frameworks for groupware Implementing synchronous groupware,Mixed,AugmentedandVirtualReality.

Reference Books:

1. A Dix, Janet Finlay, G D Abowd, R Beale., Human-Computer Interaction, 3rd Edition, Pearson Publishers,2008.
2. Shneiderman, Plaisant, Cohen and Jacobs, Designing the User Interface: Strategies for Effective Human Computer Interaction, 5th Edition, Pearson Publishers, 2010.
3. Human Computer Interaction Handbook: Fundamentals, Evolving Technologies, and Emerging Applications ,Julie A. Jacko
4. Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Guidelines by Jeff Johnson. 2014

Teaching-Learning Strategies in brief

Identify and describe various HCI methodologies, including input and interaction types. Articulate the co-dependency of the user and the technology in an HCI system. Analyze how the study of interface / Interactivity / interaction influences the design of an HCI system.

Assessment methods and weightages Teacher's Assessment: Teachers Assessment of 25 marks is based on one of the / or
combination of few of following

1. Power point presentation of casestudies
2. Question &answer
3. Quiz

Name of the Academic Program: B.Tech(CSE)

Course Code: BTCSE DEA31
Title of the Course: Mobile Computing
L-T-P: 3-0-0
Credits: **03**
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO-1 Understand the basics concepts in mobile communications and its services.(Cognitive Level: Apply)
CO-2 Analyse the various communication access techniques and Illustrate the technical format, addressing and transmission strategies of packets. (Cognitive Level: Evaluate)
CO-3 Evaluate the effectiveness of different mobile computing frameworks. (Cognitive Level: Analyze)
CO-4 Understand the functionality of MAC, Network layer and Identifying a routing protocol for given Ad-hoc Networks. Demonstrate the Adhoc networks concepts and its routing protocols.(Cognitive Level: Evaluate)
CO-5 Analyse the failure recovery method in TCP. Identify and solve database issues using hoarding techniques. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO 3
CO1	2	1	1	1	1	1	1	1	1	1	1	1	1	-	-
CO2	-	3	2	3	3	2	3	3	2	3	-	1	1	2	3
CO3	1	-	3	2	-	3	2	-	3	2	1	1	1	2	2
CO4	-	-	3	3	-	3	3	-	3	3	-	1	1	3	2
CO5	2	1	-	1	1	-	1	1	-	1	1	2	1	1	1

Detailed Syllabus:

UNIT I. 6 Hours
INTRODUCTION : Introduction to Mobile Computing - Architecture of Mobile Computing - Novel Applications – Limitations.GSM - GSM System Architecture - Radio Interface – Protocols - Localization and Calling - Handover - Security - New Data Services.

UNIT II 8 Hours
DATA LINK LAYER : Medium Access Control Protocol - Wireless MAC Issues - Hidden and exposed terminals - near and far terminals – SDMA – FDMA – TDMA – CDMA - Tunnelling Cellular Mobility - IPv6.

UNIT III 10 Hours

MOBILE NETWORK LAYER : Mobile IP – Goals – Assumption - Entities and Terminology - IP Packet Delivery - Agent Advertisement and Discovery – Registration - Tunnelling and Encapsulation – Optimizations -Dynamic Host Configuration Protocol.

UNIT IV **10 Hours**

MOBILE TRANSPORT LAYER : Traditional TCP - Indirect TCP - Snooping TCP - Mobile TCP - Fast Retransmit and Fast Recovery - Transmission /Time-Out Freezing - Selective Retransmission - Transaction Oriented TCP.

UNIT V **8 Hours**

DATABASE ISSUES : Hoarding Techniques - Caching Invalidation Mechanisms - Client Server Computing with Adaptation- Power Aware and Context Aware Computing - Transactional Models - Query Processing – Recovery - and Quality of Service Issues.

Reference books:

1. Reza Behravanfar, “Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML”, Cambridge University Press, October 2004.
2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden, Schwiebert, Loren, “Fundamentals of Mobile and Pervasive Computing”, McGraw-Hill Professional, 2005.
3. Hansmann, Merk, Nickolas, Stober, “Principles of Mobile Computing”, second edition, Springer, 2003.Martyn Mallick, “Mobile and Wireless Design Essentials”, Wiley DreamTech, 2003.
4. Ivan Stojmenovic and Cacute, “Handbook of Wireless Networks and Mobile Computing”, Wiley, 2002.
5. Jochen Schiller, “Mobile Communications”, Second edition Addison-Wesley, 2008.

Teaching-Learning Strategies in brief (4 to 5 sentences)

Lecture, Discussion, Model Development etc.

Assessment methods and weightages in brief (4 to 5 sentences)

Sessional tests, quizzes, assignments etc.

Name of the Academic Program: B.Tech(CSE)

Course Code: BTCSE DEA32
Title of the Course: **Web and Internet Technology**
L-T-P: 3-0-0
Credits: **03**
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES:

Upon completion of this course, students will be able to:

CO 1: Create web pages using PHP and identify the difference between the HTML PHP and XML documents. (Cognitive Level: Remember)
CO 2: Identify the engineering structural design of XML and parse tree and analyse the difference between and PHP and XML. (Cognitive Level: Apply)
CO 3: Understand the concept of JAVA SCRIPTS and identify the difference between the JSP and Servlet. (Cognitive Level: Evaluate)
CO 4: Design web application using MVC architecture and apply JDBC and ODBC technologies to create database connectivity (Cognitive Level: Analyze)
CO 5: Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services. (Cognitive Level: Evaluate)

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

Unit – I **6 Hours**

INTRODUCTION: Introduction to Multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work. Convergence of Computer, Communication and Entertainment Products ,Stages of Multimedia Projects: Multimedia hardware, Memory & storage devices, Communication devices, Multimedia software's, presentation tools, tools for object generations, video, sound, image capturing, authoring tools, card and page based authoring tools.

Unit – II **8 Hours**

MULTIMEDIA BUILDING BLOCKS: Text, Sound MIDI, Digital Audio, audio file formats, MIDI under windows environment Audio & Video Capture.

Unit – III **10 Hours**

EMERGENCE OF THE INTERNET: Terminology, Accessibility: Language & Connectivity, Services of the Internet: E-Mail, World Wide Web (WWW), Remote Access, Collaboration, File Sharing, Internet Telephony; Use & Culture: Usenet, From gopher to WWW, Search Engines: Wais, Archie, Web Search Engine.

Unit – IV **10 Hours**

INTRODUCTION AND WEB DEVELOPMENT STRATEGIES: History of Web, Protocols governing Web, Creating Websites for individual and Corporate World, Cyber Laws, Web Applications, Writing Web Projects, Identification of Objects, Target Users, Web Team, Planning and Process Development.

Unit – V **8 Hours**

CONCEPTS OF WEB PROGRAMMING: Developing Web using HTML, DHTML, CSS, XML, Using Scripting Languages such as JavaScript

REFERENCE BOOKS

1. David Hillman, Multimedia technology and Applications, Galgotia Publications.
2. Rosch, Multimedia Bible, Sams Publishing.
3. Stephen Holzner, HTML Black Book , Wiley Dreamtech.
4. *Deitel&Deitel, Goldberg, Internet and world wide web – How to Program, Pearson Education.*

Teaching-Learning Strategies in brief

Identify and describe various HCI methodologies, including input and interaction types. Articulate the co-dependency of the user and the technology in an HCI system. Analyze how the study of interface / Interactivity / interaction influences the design of an HCI system.

Assessment methods and weightages

Teacher's Assessment: Teachers Assessment of 25 marks is based on one of the / or combination of few of following

1. Power point presentation of casestudies
2. Question &answer
3. Quiz

Name of the Academic Program : BTech CSE

Course Code: BTCSE DEA43
Title of the Course: - MULTIMEDIA COMPUTING
L-T-P :3-1-0
Credits : 4
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this Course, the students should be able to

CO-1 Identify different media; representations of different multimedia data and data formats. (Cognitive Level: Apply)
CO-2 Analyze various compression techniques. (Cognitive Level: Evaluate)
CO-3 Compare various audio and video file formats. (Cognitive Level: Analyze)
CO-4 Apply different coding technique for solving real world problems. (Cognitive Level: Evaluate)
CO-5 Choose optical storage media suitable for multimedia applications. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	1	1	1	1	1	1	1	1	1	-	-
CO2	-	3	2	3	3	2	3	3	2	3	-	1	1	2	3
CO3	1	-	3	2	-	3	2	-	3	2	1	1	1	2	2
CO4	-	-	3	3	-	3	3	-	3	3	-	1	1	3	2
CO5	2	1	-	1	1	-	1	1	-	1	1	2	1	1	1

Detailed Syllabus:

Unit 1. **6 Hours**

MM Introduction: Overview of multimedia, Multimedia building blocks, Digital representation, Interaction techniques and devices.
Multimedia architecture: Introduction to multimedia architectures, User interfaces, Windows multimedia support, Windows API for Multimedia, Multimedia Database Systems, Media streaming, Multimedia authoring tools, Multimedia OS.
Programming aspects of using Windows/Open-source API for developing applications, Design & programming aspects of application for audio/video streaming.

Unit 2 **8 Hours**
Introduction to Image Processing and Compression applications,

Image Processing:
Basic Image fundamentals, Image data types, image file formats (GIF, BMP, TIFF, JPEG), Image acquisition, Image enhancement: Enhancement by point processing, Spatial filtering, Color imageprocessing.
Image compression: Types of compression: Lossy& lossless, symmetrical & asymmetrical, intraframe&interframe Hybrid, Loss less: RLE, Shannon- Fano algorithm, Arithmetic coding. Lossy: Vector quantization, fractal compression technique, transform coding, psycho-analysis, interframe correlation.

Hybrid: JPEG-DCT
Programs considerations for image enhancement using point processing and image compression.

Unit 3 10 Hours
Multimedia Audio:
Data structures used in audio files, Characteristics of sound waves, psycho, digital audio, MIDI and MIDI File format, CD and DVD formats.
Audio file formats: WAV, VOC, AVI, MPEG Audio
Audio compression: Compression in audio PCM,DM, DPCM
Study of different audio file formats and compression techniques
Programming considerations for audio compression.

Unit 4 10 Hours
Study of different text formats and video formats.
Text :Visual representation of text, Digital representation of text, Text compression: Huffman coding, LZ & LZW,
Text file formats: TXT, DOC, RTF, PDF.
Video: Digitization of video, Video capturing , Video transmission standards; EDTV, CCER, CIF, SIF, HDTV, Video formats: H-26I, H-263. MPEG Video compression. Video streaming. Study and analysis of video formats, compression and streaming .

Unit 5 8 Hours
Animation and Multimedia Languages, Learn to use OpenGL
Animation: Basics of animation, types of animation, principles of animation, techniques of animation, Creating animation.
OpenGL: Open GL over windows/Linux, Extension, programming languages, SDK, shadowing techniques, rendering, Programming aspects in creating simple animation using OpenGL

Reference Books:

1. Gonzalez, Woods, "Digital Image Processing" Addison Wesley
2. Ze-Nian Li, Marks S. Drew, "Fundamentals of Multimedia", Pearson Education.
3. Edward Angel, ‖OpenGL: A Primer‖, Addison-Wesley.
4. “DeMustified Video”

Teaching-Learning Strategies
1. Introduce to the students the characteristics and design methodologies ofMultimedia
2. Expose students to theoretical and fundamental concepts of multimedia, its applications and the techniquesinvolved
3. Help students learn the issues involved in capturing, processing, manipulating, storing, and retrieving various kinds of continuousmedia.

Teacher’s Assessment: Teachers Assessment of 25 marks is based on one of the / or combination of few of following
1. Power point presentation of casestudies
2. Question &answer
3. Qu

iz

Name of the Academic Program: B. Tech (CSE)

Course Code: BTCSE – DEA51
Title of the Course: Computer Vision
L-T-P: 3-0-0 Credits: **03**
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

'O 1. Create and formulate the concepts of digital image and image enhancement in spatial domain.(Cognitive Level: Remember)
'O 2. Formulate and apply various image smoothing and sharpening filters in frequency domain. (Cognitive Level: Apply)
'O 3. Design color models and apply various morphological operations over an image. (Cognitive Level: Evaluate)
'O 4. Develop and apply the concept of point, edge line and region segmentation. (Cognitive Level: Analyze)
'O 5. Investigate feature extraction techniques and apply object recognition. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	2	1	1	2	2	1	2	2	1	3	3	2
CO2	3	2	2	2	1	-	2	2	1	2	2	1	2	3	2
CO3	2	3	3	2	1	1	3	2	1	3	2	1	3	3	2
CO4	3	3	3	3	2	-	3	3	2	3	3	2	3	3	3
CO5	2	3	3	3	3	-	3	3	3	3	3	3	2	3	3

Unit – I **6 Hours**

Introduction and Fundamentals: Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization.
Image Sensors: Introduction, Types of Image Sensors, Applications.

Unit – II **8 Hours**

Image Enhancement in Spatial Domain: Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening – The Laplacian.
Image Enhancement in Frequency Domain: Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters – Gaussian Highpass Filters; Homomorphic Filtering.

Unit – III **10 Hours**

Color Image Processing: Color Fundamentals, Color Models, Converting Colors to different models, Color Transformation, Smoothing and Sharpening, Color Segmentation.

Morphological Image Processing: Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening

Unit – IV **10 Hours**

Segmentation: Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance, Line Detection, Corner Detection.

Unit – V **10 Hours**

Feature Extraction: Representation, Topological Attributes, Geometric Attributes

Description: Boundary-based Description, Region-based Description, Relationship.

Object Recognition: Deterministic Methods, Clustering, Statistical Classification, Syntactic Recognition, Tree Search, Graph Matching.

REFERENCE BOOKS:

1. Computer Vision Algorithms and Applications, 2nd Edition, Richard Szeliski, Springer.
2. Computer Vision Models, Learning and Inference, Simon J.D. Prince, Cambridge University Press, 2012
3. Digital Image Processing 2nd Edition, Rafael C. Gonzalez and Richard E.
4. Woods. Published by: Pearson Education.
5. Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by:
6. John Wiley and Sons, NY.
7. Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall, Upper Saddle River, NJ.

Teaching-Learning Strategies

1. Introduce to the students the characteristics and design methodologies ofMultimedia
2. Expose students to theoretical and fundamental concepts of multimedia, its applications and the techniquesinvolved
3. Help students learn the issues involved in capturing, processing, manipulating, storing, and retrieving various kinds of continuousmedia.

Assessment methods and weightages

1. Te
   achers Assessment of 25 marks is based on one of the / or
2. co
   mbination of few of following
3. Power point presentation of casestudies
4. Question &answer
5. Quiz

Name of the Academic Program :B.Tech CSE

Course Code: BTCSE DEA 52
Title of the Course: Human Computer Interface.
L-T-P :3-1-0.
Credits: 4
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO1 Design andDevelopmentprocessesandlifecycleofHumanComputerInterface. (Cognitive Level: Understand)
CO2 Analyzeproductusabilityevaluationsandtestingmethods.(Cognitive Level: Apply)
CO3 Applytheinterfacedesignstandards/guidelinesforcrossculturalanddisabledusers (Cognitive Level: Evaluate)
CO4 Categorize,DesignandDevelopHumanComputerInterfaceinproperarchitecturalstructures. (Cognitive Level: Analyze)
CO5 Analyze one after another the main features of interactive systems, and explain how to gauge the usability of digital environments, tools and interfaces.(Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	2	1	1	2	2	1	2	2	1	3	3	2
CO2	3	2	2	2	1	-	2	2	1	2	2	1	2	3	2
CO3	2	3	3	2	1	1	3	2	1	3	2	1	3	3	2
CO4	3	3	3	3	2	-	3	3	2	3	3	2	3	3	3
CO5	2	3	3	3	3	-	3	3	3	3	3	3	2	3	3

Detailed Syllabus:

Unit 1 **8 Hours**
Introduction to Interaction Design: User Experience – The process of Interaction Design – Interaction design and User Experience. Understanding and Conceptualizing Interaction: Conceptual Models – Interface Metaphors – Interaction Types – Paradigms and Frameworks. Cognitive Aspects: Cognition – Cognitive Framework. Social Interaction – Emotional Interaction.

Unit 2: **8 Hours**
Interfaces: Types – Natural User Interfaces, Data Gathering: Key Issues – Data Recording – Interviews – Questionnaires – Observation – Choosing and Combining Technique. Data Analysis, Interpretation and Presentation: Qualitative and Quantitative – Simple Analysis – Tools -Theoretical Frameworks – Presenting the Findings.

Unit 3 **9 Hours**

Process of Interaction Design: Introduction. Establishing Requirements: Data Gathering for Requirements – Task Description – Task Analysis, Design, Prototyping and Construction: Prototyping and Construction – Conceptual Design and Physical Design – Using Scenarios, Prototypes in Design. Evaluation: Introduction – Evaluation Framework.

Unit 4 MOBILE HCI **9 Hours**

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools. – Case Studies

Unit 5: WEB INTERFACE DESIGN **8 Hours**

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow – Case Studies

Reference Books:

1. Research Methods in Human-Computer Interaction, Second Editionby Jonathan Lazar, Jinjuan Heidi Feng, Harry Hochheiser, Morgan Kaufmann (2017)
2. Sharp, H., Rogers, Y., and Preece, J, "Interaction Design: Beyond Human – Computer Interaction", Third Edition, John Wiley & Sons, Inc., 2011.
3. Wilbert O. Galitz, "The Essential Guide to User Interface Design: An Introduction to Gui Design Principles and Techniques", Third Edition, John Wiley Sons, 2002.
4. Benyon, D., Turner, P., and Turner, S, "Designing Interactive Systems: People, Activities, Contexts, and Technologies", Addison-Wesley, 2005.

Teaching-Learning Strategies in brief:

Students will be given theoretical knowledge of and practical experience in the fundamental aspects of human perception, cognition, and learning as relates to the design, implementation, and evaluation of interfaces.

Assessment methods and weightages in brief

Evaluation will be based on the assignments that they will complete throughout the semester .Students will be evaluated based on their project progress, specifically creativity and care with which they develop their research, scientific rigor that they display in conducting their work, the quality of the final product of the project, and how well they work as a team.

Name of the Academic Program: - B.Tech. (CSE)

Course Code: BTCSE DEA53
Title of the Course: Web Service and Service Oriented Architecture
L-T-P: 3-0-0
Credits: - 03
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO1 Demonstrate the knowledge of service oriented computing prototype, its evolution and the advent of web services.(Cognitive Level: Understand)

CO2 Identify the appropriate service description to implement the ordering of message exchange patterns.(Cognitive Level: Remember)

CO3 Apply and evaluate the quality aspects of the Web service. (Cognitive Level: Evaluate)

CO4 Apply Action Scripts to utilize various programmatic techniques. (Cognitive Level: Analyze)

CO5 Apply the knowledge of service oriented computing prototype, progress and the advent of web services. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	2	1	1	2	2	1	2	2	1	3	3	2
CO2	3	2	2	2	1	-	2	2	1	2	2	1	2	3	2
CO3	2	3	3	2	1	1	3	2	1	3	2	1	3	3	2
CO4	3	3	3	3	2	-	3	3	2	3	3	2	3	3	3
CO5	2	3	3	3	3	-	3	3	3	3	3	3	2	3	3

UNIT – I: 8 Hours

Web Service Evolution and Emergence - Evolution of distributed computing, Core distributed computing technologies – client/server, CORBA, JAVA RMI, Microsoft DCOM, MOM, Distributed Computing Challenges, the Role of J2EE and XML in Distributed Computing, the Emergence of Web Services and Service Oriented Architecture (SOA). Introduction to Web Services – The definition of web services, the basic operational model of web services, the tools and technologies that enable web services, the advantages and disadvantages of using web services.

UNIT – II: 8 Hours

Web Services Architecture – What is a web service? The architecture and its characteristics, the core building blocks of web services, the standards and technologies available for implementing web services, web services communication, and the basic steps for implementing web services are all cov-

ered. WSDL Introduction, Nonfunctional Service Description, WSDL1.1 Vs WSDL 2.0, WSDL Document, WSDL Elements, WSDL Binding, WSDL Tools, WSDL Port Type, WSDL Limitations

UNIT – III: 10 Hours

A Quick Overview of XML – XML namespaces, XML document structure Structure definition in XML documents, XML scheme reuse, Navigation and transformation of documents SOAP stands for Simple Object Access Protocol. Communication between applications and wire protocols As a messaging protocol, SOAP SOAP message structure, SOAP envelope Service Oriented Architectures, Encoding SOA re-examined, In a SOA, service roles, dependable messaging, SOA Development Lifecycle, Enterprise Service Bus HTTP SOAP binding, SOAP communication model SOAP error handling

UNIT – IV: 8 Hours

Service Registration and Discovery: The Role of Service Registries, Service Discovery, Universal Description, Discovery, and Integration UDDI Architecture, UDDI Data Model, Interfaces, UDDI Implementation, UDDI with WSDL, UDDI specification, Service Addressing and Notification, Web Service Referencing and Addressing, Web Service Notification

UNIT – V: 8 Hours

Security considerations for SOA and web services, Mechanisms for network security, Topologies for application-level security, Standards for XML security, Semantics and Web Services, The semantic interoperability problem, The role of metadata, Service metadata, Overview of .NET and J2EE, SOA and Web Service Management, Managing Distributed System, Enterprise management Framework, Standard distributed management frameworks, Web service management, Richer schema languages, WS- Metadata Exchange.

Reference book:

1. "Service-Oriented Architecture: Analysis and Design for Services and Microservices (The Prentice Hall Service Technology Series from Thomas Erl)" by Thomas Erl.
2. "Web Services, Service-Oriented Architectures and Cloud Computing" by Barry.
3. "Security for Web Services and Service-Oriented Architectures" by Elisa Bertino and Federica Paci.
4. Expert Service-Oriented Architecture In C#: Using The Web Services Enhancements 2.0" by Jeffrey Hasan.

Teaching-Learning Strategies in brief

1. Provide visuals, illustrations, explanations etc.
2. Provide basic and advanced knowledge about the subject.
3. Providing LMS to access study materials across various devices.
4. Encourage the students to ask more & more questions.
5. Motivate the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. Sessional examination (2 Nos.)
2. Assignments.
3. Class tests
4. Semester examination
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Name of the Academic Program: BTech CSE

Course Code: BTCSE DEA61
Title of the Course: Cloud computing
L-T-P: 3-0-0
Credits: 3
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After completing this Course, the students should be able to:

CO-1: Articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing. (Cognitive level: Analyse)
CO-2: Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.(Cognitive level: Analyse)
CO-3: Explain the core issues of cloud computing such as security, privacy, and interoperability. (Cognitive level: Apply)
CO-4: Provide the appropriate cloud computing solutions and recommendations according to the applications used.(Cognitive level: Apply)
CO-5: Collaboratively research and write a research paper, and present the research online.(Cognitive level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3			2						1	1	2	2	1
CO2	3	2	3		2		1			1			2		
CO3	3		2					1			1	1	3	3	
CO4	3	2	3	3	3	3			2					2	2
CO5	3			3	3		1		3	1	3		2		2

Detailed Syllabus:

UNIT I **6 Hours**
History of Centralized and Distributed Computing - Overview of Distributed Computing, Cluster computing, Grid computing. Technologies for Network based systems- System models for Distributed and cloud computing- Software environments for distributed systems and clouds.

UNIT II **8 Hours**
Introduction to Cloud Computing- Cloud issues and challenges - Properties - Characteristics - Service models, Deployment models. Cloud resources: Network and API - Virtual and Physical

computational resources - Data-storage. Virtualization concepts - Types of Virtualization- Introduction to Various Hypervisors - High Availability (HA)/Disaster Recovery (DR) using Virtualization, Moving VMs .

UNIT III **10 Hours**

Service models - Infrastructure as a Service (IaaS) - Resource Virtualization: Server, Storage, Network - Case studies. Platform as a Service (PaaS) - Cloud platform & Management: Computation, Storage - Case studies. Software as a Service (SaaS) - Web services - Web 2.0 - Web OS - Case studies – Anything as a service (XaaS).

UNIT IV **10 Hours**

Cloud Programming and Software Environments – Parallel and Distributed Programming paradigms – Programming on Amazon AWS and Microsoft Azure – Programming support of Google App Engine – Emerging Cloud software Environment.

UNIT V **8 Hours**

Cloud Access: authentication, authorization and accounting - Cloud Provenance and meta-data - Cloud Reliability and fault-tolerance - Cloud Security, privacy, policy and compliance- Cloud federation, interoperability and standards.

Reference Books

1. Barrie Sosinsky, " Cloud Computing Bible" John Wiley & Sons, 2010
2. Tim Mather, Subra Kumaraswamy, and Shahed Latif, Cloud Security and Privacy An Enterprise Perspective on Risks and Compliance, O'Reilly 2009

Teaching-Learning Strategies in brief (4 to 5 sentences)

1. Learning by doing
2. Learning through discussion among the peer group
3. Open ended questions by teacher
4. Open ended questions from students
5. Reflective Learning
6. Provide relevant study material

Assessment methods and weightages in brief (4 to 5 sentences)

1. time-constrained examinations
2. closed-book class tests
3. problem based assignments
4. sessional examinations
5. semester examination
6. practical assignments
7. viva voce
8. Internal assessment (25 Marks)
9. Semester Examination (75 Marks)

Name of the Academic Program: - B. Tech (CSE)

Course Code: BTCSE DEA62
Title of the Course: ROBOTICS
L-T-P: 3-0-0
Credits: - 03
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

CO 1: Understand the types of Robots and their applications. (Cognitive Level: Remember)
CO 2: Apply the concept of drive system for designing Robots. (Cognitive Level: Apply)
CO 3: Understand sensor technology for creating vision system to Robot. (Cognitive Level: Evaluate)
CO 4: Design and develop Robotics Kinematics and Dynamics. (Cognitive Level: Analyze)
CO 5: Create a program to control robot mechanism. (Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3			2						1	1	2	2	1
CO2	3	2	3		2		1			1			2		
CO3	3		2					1			1	1	3	3	
CO4	3	2	3	3	3	3			2					2	2
CO5	3			3	3		1		3	1	3		2		2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

UNIT 1: FUNDAMENTALS OF ROBOT. 8 Hours

Robot - Definition - Robot Anatomy - Coordinate Systems, Work Envelope Types and Classification-Specifications-Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load- Robot Parts and their Functions-Need for Robots-Different Applications.

UNIT 2: ROBOT DRIVE SYSTEMS AND END EFFECTORS. 8 Hours

Pneumatic Drives-Hydraulic Drives-Mechanical Drives-Electrical Drives-D.C. Servo Motors, Stepper Motors, A.C. Servo Motors-Salient Features, Applications and Comparison of all these Drives, End Effectors-Grippers-Mechanical Grippers, Pneumatic and Hydraulic- Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

UNIT 3: SENSORS AND MACHINE VISION. 8 Hours

Requirements of a sensor, Principles and Applications of the following types of sensors- Position sensors - Piezo Electric Sensor, LVDT, Resolvers, Optical Encoders, pneumatic Position Sensors, Range Sensors Triangulations Principles, Structured, Lighting Approach, Time of Flight, Range Finders, Laser Range Meters, Touch Sensors ,binary Sensors., Analog Sensors, Wrist Sensors, Compliance Sensors, Slip Sensors, Camera, Frame Grabber, Sensing and Digitizing Image Data- Signal Conversion, Image Storage, Lighting Techniques, Image Processing and Analysis-Data Reduction, Segmentation, Feature Extraction, Object Recognition, Other Algorithms, Applications- Inspection, Identification, Visual Serving and Navigation.

UNIT 4: ROBOT KINEMATICS AND ROBOT PROGRAMMING 8 Hours

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

UNIT 5: IMPLEMENTATION AND ROBOT ECONOMICS 8 Hours

RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

REFERENCES:

1. Craig J.J., “Introduction to Robotics Mechanics and Control”, Pearson Education, 2008.
2. Deb S.R., “Robotics Technology and Flexible Automation” Tata McGraw Hill Book Co., 1994.
3. Koren Y., “Robotics for Engineers", Mc Graw Hill Book Co., 1992.
4. Fu.K.S.,Gonzalz R.C. and Lee C.S.G., “Robotics Control, Sensing, Vision and Intelligence”, McGraw Hill Book Co., 1987.
5. Janakiraman P.A., “Robotics and Image Processing”, Tata McGraw Hill, 1995.

Teaching-Learning Strategies in brief:

1. Encourage participation of students in learning.
2. Connect the subject matter with the student’s everyday life.
3. Encourage the spirit of questioning by the students.
4. Arrange student friendly study material and other learning resources.
5. Create friendly environment conducive for learning.

Assessment methods and weightages in brief:

1. Two sessional examinations.
2. Assignments.
3. End semester examination.
4. Internal Assessment: 25 Marks, End Semester Examination:75 Marks &Total Marks: 100.

OPEN ELECTIVES

Open Elective –I (Semester-V)

Program: B.Tech. (CSE)

Course Code: BTCSE OE11 **Title of the Course:ICT for Development**

L-T-P : 3-0-0 **Credits**: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Skills to analyze, design, implement, test and evaluate ICT systems. (Cognitive Level: Create)
CO2: Skills to consider the impact of current and new technologies on methods of working in the outside world and on social, economic, ethical and moral issues.(Cognitive Level: Analyze)
CO3: ICT-based solutions to solve problems. (Cognitive Level: Evaluate)
CO4: The ability to recognize potential risks when using ICT, and use safe, secure and responsible practice. (Cognitive Level: Understand)
CO5: To analyze ICT tools for the development.(Cognitive Level: Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	1	1	2	1	1	1	-	1	-	-	1	1	1	1	1
CO 2	1	1	1	-	1	-	2	2	1	-	1	-	2	2	-
CO 3	1	1	-	1	2	1	-	1	-	1	-	1	1	1	1
CO 4	1	-	1	1	2	-	1	2	1	-	3	-	2	2	1
CO 5	1	1	-	2	3	1	-	1	-	1	1	1	1	1	2

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

Unit I Types and components of computer systems: **(8 Hours)**

Hardware consists of the physical components of a computer system Internal components including Central Processing Unit (CPU), processor, motherboard Internal memory including random access memory (RAM), read-only memory (ROM) Hardware components including graphics card, sound card, Network Interface Card (NIC), camera, internal/ external storage devices, System software pro-

vides the services that the computer requires to operate Examples of system software including compilers, linkers, device drivers, operating systems and utilities, Analogue and digital data Characteristics of analogue and digital data Differences between analogue and digital data The need to convert: analogue to digital data so it can be processed by a computer , digital data to analogue data so it can be used to control devices

Unit II Input and Output devices **(8 Hours)**

Input and output devices Characteristics, uses, advantages and disadvantages of input devices including: keyboard, numeric keypad, pointing devices, remote control, joystick/driving wheel, touch screen (as an input device), scanners, camera, microphone, sensors, light pen, Direct data entry: Characteristics, uses, advantages and disadvantages of direct data entry devices including: magnetic stripe reader, chip and PIN reader, Radio Frequency Identification (RFID) reader, Optical Mark Recognition/Reader (OMR), Optical Character Recognition/Reader (OCR), bar code reader, QR scanner, Characteristics, uses, advantages and disadvantages of output devices including: monitors, touch screen (as an output device), multimedia projector, laser printer, inkjet printer, dot matrix printer, plotter, 3D printers, speaker, actuator

Unit III The effects of using IT ***(*8 Hours)**

Microprocessor-controlled devices, Potential health problems related to the prolonged use of IT equipment, Including: repetitive strain injury (RSI), back problems, eye problems, headaches The causes of these health issues and strategies for preventing them

Unit IV ICT applications: **(8 Hours)**

Communication media, Mobile communication, Computer modelling; Including: personal finance, bridge and building design, flood water management, traffic management, weather forecasting Advantages and disadvantages of using computer modelling rather than humans, Characteristics, uses, advantages and disadvantages of satellite systems including Global Positioning Systems (GPS), satellite navigation, Geographic Information Systems (GIS), media communication systems (satellite television, satellite phone)

Unit V- The systems life cycle: **(8 Hours)**

Characteristics, uses, advantages and disadvantages of the research methods of observation, interviews, questionnaires and examination of existing documents The need to identify the inputs, outputs and processing of the current system, problems with the current system, the user and information requirements for the new system, Identify and justify suitable hardware and software for the new system Design file/data structures, input formats, output formats and validation routines File/data structures including field length, field name, data type, coding of data for example M for male, F for female Validation routines including range check, character check, length check, type check, format check, presence check, check digit Input formats including data capture forms Output formats including screen layouts and report layouts

Text books:

1. Castells, Manuel,"Networks of Outrage and Hope: Social Movements in the Internet Age", 2nd Edition, John Wiley & Sons, 2015

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B.Tech. (CSE)

Course Code: BTCSE OE12 Title of the Course:Soft Skills and Interpersonal Communication

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Students can gain potential knowledge towards Grammatical and Communicative competence through the useful inputs and task-based activities. (Cognitive Level: Understand)
CO2: This enables them to build their confidence in using English language.(Cognitive Level: Apply)
CO3: To be able to compete with the globalized world and become successful in all the challenges that they face.(Cognitive Level: Apply)
CO4: To develop Linguistic competence and Communicative competence which helps them to develop "thinking" skill in English. (Cognitive Level: Create)
CO5: The students can hone their interpersonal and employability skills draw upon real-life situations and examples.(Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	-	1	1	1	-	1	-	2	3	2	2	1	3
CO2	1	-	1	-	3	-	-	-	1	-	1	2	2	2	3
CO3	1	-	-	2	-	1	-	1	-	3	1	2	1	1	3
CO4	1	1	2	1	1	-	1	-	1	3	3	1	-	-	3
CO5	-	-	-	-	1	-	1	-	1	1	2	2	1	1	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

UNIT I - Self Analysis: **(8 Hours)**

SWOT Analysis, Who am I, Attributes, Importance of Self Confidence, Self Esteem.

UNIT II - Creativity: **(8 Hours)**
Out of box thinking, Lateral Thinking, OBJECTIVE THINKING, perception.

UNIT III - Attitude: **(8 Hours)**
Factors influencing Attitude, Challenges and lessons from Attitude, Etiquette.

UNIT IV – Motivation: **(8 Hours)**

Factors of motivation, Self-talk, Intrinsic & Extrinsic Motivators.

UNIT V: Goal Setting : **(8 Hours)**

Wish List, SMART Goals, Blue print for success, Short Term, Long Term, Life Time Goals. Time Management Value of time, Diagnosing Time Management, Weekly Planner To do list, Prioritizing work. Extempore

TEXT BOOK:

1. SOFT SKILLS, 2015, Career Development Centre, Green Pearl Publications.

REFERENCE BOOK:

1. Covey Sean, Seven Habits of Highly Effective Teens, New York, Fireside Publishers, 1998.
2. Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998.
3. Thomas A Harris, I am ok, You are ok , New York-Harper and Row, 1972 4. Daniel Coleman, Emotional Intelligence, Bantam Book, 2006

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B.Tech. (CSE)

Course Code: BTCSE OE13 **Title of the Course:Cyber Law and Ethics**

L-T-P : 3-0-0 **Credits**: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers. (Cognitive Level: Understand)
CO2: The students will learn the rights and responsibilities as an employee, team member and a global citizen.(Cognitive Level: Apply)
CO3: Describe Information Technology act and Related Legislation.(Cognitive Level: Evaluate)
CO4: Demonstrate Electronic business and legal issues. (Cognitive Level: Apply)
CO5: Interpret Cyber Ethics.(Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	-	1	1	1	-	3	2	-	2	3	1	1	3
CO2	1	-	1	-	-	-	-	3	-	2	-	2	1	1	3
CO3	1	2	-	2	1	1	-	3	3	-	3	2	2	2	3
CO4	1	1	-	-	2	-	1	3	-	3	2	-	2	1	3
CO5	1	-	1	-	1	-	1	3	2	3	-	2	1	1	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

UNIT I: Applied Ethics **(8 Hours)**

What ethics is and is not, Explore differences between laws and ethics, Ethical viewpoints, Virtue, Natural Rights, Fairness (Justice), Ethical decision making process, Laws and ethics of employee monitoring, Review ethical codes of IT professional organizations

UNIT II: Cyber Law: Legal Issues and Challenges in India, USA and EU **(8 Hours)**
A) Data Protection, Cyber Security,
B) Legal recognition of Digital Evidence
C) Recognition of liability in the digital world

D) Jurisdiction Issues in Transnational Crimes

UNIT III: HIPAA: Health Insurance Portability and Accountability Act **(8 Hours)**

Basics of HIPAA, Implications of HIPAA for IT professionals, Administrative procedures, Physical safeguards, Technical security services, Technical security mechanisms

UNIT IV Cyberspace Intellectual Property Laws and Issues **(8 Hours)**

Copyright law: Fair use, DRM (Digital Rights Management) and the DMCA (Digital Millennium Copyright Act), Copyright Web issues; Patent Law: Software patents issues, Trademarks; Cybersquatting, Using trademarks in meta-tags, Software License agreements

UNIT V: Cyber Crime and Related Laws **(8 Hours)**

Review of cybercrime statistics and trends, Cybercrime categories, Computer fraud, Gray Hat Hacking, Crimes and penalties under the Computer Fraud and Abuse Act (CFAA)

Reference Book:

1. Yatindra Singh, "Cyber Laws", Universal Law Publishing, Sixth edition.
2. Ajit Narayanan and Bennum,"Law, Computer Science and Artificial Intelligence". Intellect Books, 1998.
3. Linda Brennan and Victoria Johnson : Social, ethical and policy implication of Information Technology, IGI Global, 2003.
4. Kamath Nandan : Law relating to Computer, Internet and E-Commerce, Universal Law Publishing,2016
5. Arvind Singhal and Everett Rogers : India's Communication Revolution : From Bullock Carts to Cyber Marts.SAGE India; First edition (20 November 2000)
6. Lawrence Lessing : Code and other Laws of cyberspace.Basic Books (30 November 1999)
7. Mike Godwin : Cyber Rights Defencing free speech in the Digital Age.MIT Press; Updated edition (15 July 2003); CBS PUBLISHERS & DISTRIBUTORS PVT. LTD 01149348098
8. SunitBelapure and Nina Godbole, Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives, Wiley India Pvt. Ltd, 2011.
9. Mark F Grady, FransescoParisi, "The Law and Economics of Cyber Security", Cambridge University Press, 2006
10. Jonathan Rosenoer, "Cyber Law: The law of the Internet", Springer-Verlag, 1997.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Open Elective –II (Semester-VI)

Program: B.Tech. (CSE)

Course Code: BTCSE OE21 Title of the Course:History of Science and Engineering

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

Upon successful completion of this course, students will be able to
CO1: Understand Astronomy, Mathematics, Engineering and Medicine of ancient India. (Cognitive Level: Understand)
CO2: Analyze Scientific and Technological Developments in Medieval India.(Cognitive Level: Analyze)
CO3: Will be aware of Surveyors, Botanists, Doctors, under the EI Company‘s Service.(Cognitive Level: Apply)
CO4: Will be aware of various scientists of India.(Cognitive Level: Apply)
CO5: Familiar with ISRO, DRDO, etc.(Cognitive Level: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	2	1	-	1	1	1	-	1	1	1	3	2	2	1	3
CO 2	1	-	1	-	2	-	1	-	1	-	1	2	2	2	3
CO 3	1	-	-	-	-	1	-	1	-	1	1	2	1	1	3
CO 4	1	1	2	1	1	-	1	-	1	-	3	1	-	-	3
CO 5	-	-	-	-	1	-	1	1	1	1	2	2	1	1	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write ‘3’ in the box for ‘High-level’mapping, 2 for ‘Medium-level’mapping, 1 for ‘Low’-level’mapping.

Detailed Syllabus:

Unit-I: Science and Technology-The beginning (8 Hours)

Development in different branches of Science in Ancient India: Astronomy, Mathematics, Engineering and Medicine.Developments in metallurgy: Use of Copper, Bronze and Iron in Ancient India. Development of Geography: Geography in Ancient Indian Literature.

Unit-II: Developments in Science and Technology in Medieval India (8 Hours)
Scientific and Technological Developments in Medieval India; Influence of the Islamic world and Europe; The role of *maktabs, madrasas* and *karkhanas*set up.Developments in the fields of Mathematics, Chemistry, Astronomy and Medicine. Innovations in the field of agriculture - new crops introduced new techniques of irrigation etc.

Unit-III: Developments in Science and Technology in Colonial India (8 Hours)
Early European Scientists in Colonial India- Surveyors, Botanists, Doctors, under the Company's Service. Indian Response to new Scientific Knowledge, Science and Technology in Modern India: Development of research organizations like CSIR and DRDO; Establishment of Atomic Energy Commission; Launching of the space satellites.

Unit-IV: Prominent scientist of India since beginning and their achievement (8 Hours)
Mathematics and Astronomy: Baudhayan, Aryabhtatta, Brahmgupta, Bhaskaracharya, Varahamihira, Nagarjuna. Medical Science of Ancient India (Ayurveda & Yoga): Susruta, Charak, Yoga & Patanjali. Scientists of Modern India: Srinivas Ramanujan, C.V. Raman, Jagdish Chandra Bose, Homi Jehangir Bhabha Dr. APJ Abul Kalam Azad and Dr. Vikram Sarabhai.

Textbook:

1. HISTORY OF SCIENCE AND TECHNOLOGY IN INDIA Dr. Binod Bihari Satpathy

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B.Tech. (CSE)

Course Code: BTCSE OE22 Title of the Course:Sustainable Development

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES(CO)

After completion of this course, students will be able to:

CO1: Understand the basic concept of Sustainable Development (SD), the environmental, social and economic dimensions. (Cognitive Level: Understand)
CO2: Understand the embedment of sustainability issues in environmental, societal, and economic systems, and the relevance of the conditions, interrelations, and dynamics of these systems.(Cognitive Level: Understand)
CO3: Demonstrate knowledge and understanding of the current sustainable development policies followed by selected countries.(Cognitive Level: Apply)
CO4: To identify different stakeholders in a challenge to sustainability, and analyze the political and economic structures that connect them.(Cognitive Level: Analyze)
CO5: Assess the sustainable practices of any community based on metrics.(Cognitive Level: Apply)
CO6: Demonstrate judging capability of the impact of any decision on the sustainable development metric of a community.(Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	-	1	1	1	-	1	1	1	3	2	-	1	3
CO2	1	-	1	-	2	-	1	-	1	-	1	2	-	2	3
CO3	1	2	-	-	-	1	-	1	-	1	1	2	1	1	3
CO4	1	1	2	1	1	-	1	-	1	-	3	1	2	2	3
CO5	-	-	1	-	1	-	1	1	1	1	2	2	1	1	3
CO6	2	2	-	-	2	-	-	-	-	-	2	3	2	1	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailoed Syllabus:

UNIT-I **(8 Hours)**

Introduction to Sustainable Development: Glimpse into History and Current practices - Broad introduction to SD - its importance, need, impact and implications; definition coined; evolution of SD perspectives (MDGs AND SDGs) over the years; recent debates; 1987 Brundtland Commission and outcome; later UN summits (Rio summit, etc.) and outcome.

Unit-II **(8 Hours)**

Dimensions to Sustainable Development - society, environment, culture and economy; current challenges - natural, political, socio-economic imbalance; sustainable development initiatives and policies of various countries : global, regional, national, local; needs of present and future generation - political, economic, environmental.

Unit-III **(8 Hours)**

Frameworks of Sustainability - Analytical frameworks in sustainability studies, sustainability metrics: criteria and indicators; the significance of quantitative and qualitative assessments of sustainability; current metrics and limitations; metrics for mapping and measuring sustainable development; application of the metrics in real scenarios.

Unit-IV **(8 Hours)**

Critical Perspectives on Sustainable Development: Resource management and implications on sustainable development - implications for valuation, risk assessment; integrated decision-making processes: requirements of information, information flow, data analytics, learning from historical data, multicriteria decisions, multi level decisions, participatory decisions ; translating impact chains to information flows - impact of governance and policies

Unit-V **(8 Hours)**

Case Studies & Projects on Rural Sustainable Development (Indian village perspectives) - Village resources (broad perspectives); current challenges and thematic areas; village social hierarchy; village economy; needs of present and future generation; conflicts - sustainability and rural culture & tradition; road to achieving sustainable development goals - bridging conflicts and way forward.

Reference Book:

1. M.H. Fulekar (Editor), Bhawana Pathak (Editor), R K Kale (Editor).“Environment and Sustainable Development“, Springer Nature; 2014th edition (16 October 2013).

2. Introduction to Sustainable Development – 15 April 2018, by Martin J. Ossewaarde (Author), SAGE Publications Pvt. Ltd; First edition (15 April 2018)

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B.Tech. (CSE)

Course Code: BTCSE OE23 **Title of the Course:Ethical Hacking**

L-T-P : 3-0-0

Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES(CO)

At the end of the course, students will be able to

CO1: Summarize the core concepts related to malware, hardware and software vulnerabilities and their causes. (Cognitive Level: Create)

CO2: Choose state-of-the-art tools to exploit the vulnerabilities related to computer system and networks.(Cognitive Level: Evaluate)

CO3: Experiment with various tools to exploit web applications.(Cognitive Level: Apply)

CO4: Solve the security issues in web applications.(Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	2	2	2	2	1	1	-	-	1	3	3	1
CO2	1	1	1	-	3	-	1	-	1	1	1	-	2	2	1
CO3	1	2	2	3	2	2	-	1	-	1	1	-	3	2	-
CO4	2	1	2	2	2	3	2	-	1	1	-	1	2	2	1

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

UNIT I **(8 Hours)**

Introduction to Ethical Hacking- Internet Crime Current Report-Essential Terminology-Elements of Information Security -Motives, Goals, and Objectives of Information Security Attacks- Internet Crime Current Report-Essential Terminology-Elements of Information Security -Motives, Goals, and Objectives of Information Security Attacks

UNIT II **(8 Hours)**

Hacking Concepts- Why Ethical Hacking is Necessary -Scope and Limitations of Ethical Hacking -Skills of an Ethical Hacker -Why Ethical Hacking is Necessary -Scope and Limitations of Ethical Hacking -Skills of an Ethical Hacker

UNIT III **(8 Hours)**

Footprinting Concepts- Footprinting Terminology -What is Footprinting?-Why Footprinting?-Objectives of Footprinting-Email Footprinting- System Hacking- Cracking Passwords -Password Cracking-Password Complexity-Password Cracking Techniques -Types of Password Attacks.

UNIT IV **(8 Hours)**

Trojan Concepts- What is a Trojan?-Purpose of Trojans -Indications of a Trojan Attack-Anti-Trojan Software - Anti-Trojan Software: Trojan Hunter - Anti-Trojan Software: Emsisoft Anti-Malware. Types of Viruses -System or Boot Sector Viruses -File and Multipartite Viruses - Macro Viruses - Cluster Viruses -Stealth/Tunneling Viruses-Encryption Viruses.

UNIT V **(8 Hours)**

An introduction to the particular legal, professional and ethical issues likely to face the domain of ethical hacking, ethical responsibilities, professional integrity and making appropriate use of the tools and techniques associated with ethical hacking – Social Engineering, Host Reconnaissance, Session Hijacking, Hacking - Web Server, Database, Password Cracking, Network and Wireless, Trojan, Backdoor, UNIX, LINUX, Microsoft, NOVEL Server, Buffer Overflow, Denial of Service Attack, Methodical Penetration Testing.

REFERENCE BOOKS:

1. Hacking for Dummies, Book by Kevin Beaver
2. The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration ... Book by Patrick Engebretson.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Open Elective –III (Semester-VII)

Program: B.Tech. (CSE)

Course Code: BTCSE OE31 **Title of the Course: Data Warehousing & Data Mining**

L-T-P : 3-0-0 **Credits**: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

After learning the course the students should be able to:

CO1: Perform the preprocessing of data and apply mining techniques on it. (Cognitive Level: Apply)
CO2: Identify the association rules, classification, and clusters in large data sets. (Cognitive Level: Analyze)
CO3: Solve real world problems in business and scientific information using data mining. (Cognitive Level: Evaluate)
CO4: Use data analysis tools for scientific applications. (Cognitive Level: Analyze)
CO5: Implement various supervised machine learning algorithms. (Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	2	1	2	-	1	-	1	1	2	2	1
CO2	2	3	2	3	3	2	1	-	-	1	1	1	1	1	1
CO3	2	2	-	2	3	3	2	1	-	1	-	1	2	1	-
CO4	3	2	2	3	2	2	1	-	1	-	-	1	1	1	1
CO5	2	2	3	3	3	2	-	1	-	1	-	1	1	1	1

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

Unit-I **(8 Hours)**

DATA MINING CONCEPTS: Introduction to Data Mining: KDD (Knowledge Discover from Databases) Process and Data Mining; KDD Steps; Types of Data for Data Mining, Data Mining Functionalities, Architectures of data mining system; Classification of Data Mining Systems; Data Mining Task Primitives; Major Issues in Data Mining. Introduction to Data Preprocessing, Data Cleaning: Handling Missing Values, Noisy Data, Data Integration.

Unit-II **(8 Hours)**

MINING ASSOCIATION RULES: Association Rule Mining: Market basket Analysis; Frequent Itemsets, Closed Itemsets, and Association Rules; Support and Confidence; Apriori Algorithm for Mining Frequent

Itemsets using Candidate Generation; Generating Association Rules from Frequent Itemsets; Improving the Efficiency of Apriori Algorithm; FP-Growth Algorithm for Mining Frequent Itemsets without Candidate Generation; Correlation Analysis.

Unit-III **(8 Hours)**

CLASSIFICATION AND PREDICTION: Classification Rule Mining: Introduction to Classification and Prediction; Classification by Decision Tree Induction; Attribute Selection Measures: Information Gain, Gain Ratio, and Gini Index; Bayesian Classification: Bayes' Theorem, Naïve Bayesian Classification; K-nearest Neighbor classification(KNN); Linear Regression Technique;Support Vector Machine(SVM); Basics of Neural Network, Genetic Algorithm.

Unit-IV **(8 Hours)**

CLUSTER ANALYSIS IN DATA MINING: Cluster Analysis; A Categorization of Major Clustering Methods: Partitioning Methods(k-means, k-medoids), Density Based Methods, Grid Based Methods, Model Based Clustering Methods, Outlier Analysis.

Unit-V **(8 Hours)**

DATA VISUALIZATION & INTRODUCTION TO DATAWAREHOUSING: Data Visualization: Aggregation, Historical information; Data Summarization; Introduction to Data Warehouse: Basic concepts in data warehousing, Data Warehouse Architecture, Design; OLAP, OLTP, Data Cube Technology.

Reference Book:

1. Data Mining: Concepts and Techniques, 3/e– January 2007by Han (Author), Elsevier; Third edition, January 2007.
2. Data Mining and Data Warehousing: Principles and Practical Techniques–June 2019, Cambridge University Press

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide concrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced concepts of the subject.
4. Encourage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B.Tech. (CSE)

Course Code: BTCSE OE32 **Title of the Course:Enterprise Resource and planning**

L-T-P : 3-0-0 **Credits**: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES(CO)

After studying this Paper, Students will be able to;

CO1: Demonstrate a good understanding of the basic issues in ERP systems. (Cognitive Level: Apply)

CO2: Analyse the strategic options for ERP identification and adoption.(Cognitive Level: Analyze)

CO3: Design the ERP implementation strategies. (Cognitive Level: Create)

CO4: Understand the need of Business Systems and Processes through strategic analysis of ERP systems. (Cognitive Level: Understand)

CO5: Develop and design the modules used in ERP systems, and can customize the existing modules of ERP systems. (Cognitive Level: Create)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	2	2	2	-	1	-	1	1	1	-	-
CO2	3	2	2	2	2	2	1	-	1	1	1	1	1	1	1
CO3	3	2	-	2	3	3	2	1	-	1	-	1	2	1	1
CO4	1	-	1	1	-	-	1	1	1	-	1	1	1	1	-
CO5	3	3	3	3	3	2	-	-	1	-	1	1	1	1	1

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write ‘3’ in the box for ‘High-level’mapping, 2 for ‘Medium-level’mapping, 1 for ‘Low’-level’mapping.

Detailed Syllabus:

Unit-I **(8 Hours)**

Introduction to ERP: ERP Overview, Benefits, Business process reengineering, ERP implementation life cycle, Options of various paradigms, Supply chain Management, Critical factors guiding selection and evaluation, Strategies for successful implementation, impediments and initiatives to achieve success, Critical success and failure factors, Integrating ERP into organizational culture.

Unit-II **(8 Hours)**

SAP and ABAP: Architecture of SAP, Data types in ABAP, ABAP programming Language, ABAP User Dialogs, Function groups and function modules, Accessing Database Access, open SQL, Native SQL, ABAP Object Orientation, Classes and objects in ABAP, Inheritance, Interfaces, Triggering and Handling Events, ABAP data dictionary, Declarations, selection screens, Formatting and Displaying Data, Program Events, , Dynpros, BSP applications.

Unit-III **(8 Hours)**

SD: Basic functions and master data in SD, Sales orders, Deliveries, Pricing, Billing, Transportation, Credit Management. MM: Basic functions and master data, Consumption based planning, Purchasing, Inventory management, Evaluation of materials, Invoice verification, Balance sheet evaluation,Material ledger.

Unit-IV **(8 Hours)**

Introduction, SAP AG, Baan Company, Oracle Corporation, People Soft, JD Edwards World Solutions Co, System Software Associates, Inc. (SSA); QAD; A Comparative Assessment and Selection of ERP Packages and Modules.

Unit-V **(8 Hours)**

Issues in Implementing ERP Packages; Pre-evaluation Screening; Package Evaluatio; Project Planning Phase; Gap Analysis; Reengineering; Configuration; Implementation; Team Training; Testing; Going Live; End-User Training; Post Implementation (Maintenance Mode). Selection of ERPVendors, Future Direction in ERP.

Reference Books:

1. Manufacturing Resource Planning (MRP II) with Introduction to ERP; SCM; an CRM by Khalid Sheikh, Publisher: McGraw-Hill

2. The Impact of Enterprise Systems on Corporate Performance: A study of ERP, SCM, and CRM System Implementations [An article from: Journal of Operations Management] by K.B. Hendricks; V.R. Singhal; and J.K. Stratman, Publisher: Elsevier

3. ERP and Supply Chain Management by Christian N. Madu, Publisher: CHI

4. Implementing SAP ERP Sales & Distribution by Glynn C. Williams, Publisher McGraw-Hill

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Assessment methods and weightages in brief

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2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B.Tech. (CSE)

Course Code: BTCSE OE33

Title of the Course:Rural Technology & Community development

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES(CO)

By the end of the course, students should be able to

CO1: Understand rural development model. (Cognitive Level: Understand)

CO2: Learn different measures in rural development and its impact on overall economy. (Cognitive Level: Analyze)

CO3: Understand and learn importance of technologies in rural and community development. (Cognitive Level: Understand)

CO4: Understand challenges and opportunities in rural development.(Cognitive Level: Understand)

CO5: Analyze the cases of model villages.(Cognitive Level: Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	1	-	2	1	1	-	1	-	-	1	-	1	1	-	1
CO 2	-	1	1	-	-	1	2	-	1	-	1	1	-	1	2
CO 3	1	-	1	1	-	1	-	2	2	2	2	2	1	-	2
CO 4	1	-	1	-	1	1	3	3	2	3	2	2	-	1	1
CO 5	1	1	-	-	1	-	2	2	-	2	2	-	2	2	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

Unit-I **(8 Hours)**

RURAL DEVELOPMENT - Concepts and connotations, Basic Elements, Growth Vs. Development, Why rural development, Rising expectations and development, Development and Change, Human beings as cause and consequences of development. RURAL ECONOMY OF INDIA - Introduction, size and structure, The

characteristics of rural sector, The role of agricultural sub-sector, The role of non-agricultural sub-sector, Challenges and opportunities.

Unit-II **(8 Hours)**

MEASURES OF DEVELOPMENT - Introduction, Measures of level of rural development, Measures of income distribution, Measures of development simplified, Concepts and measures of rural poverty.

PARADIGMS OF RURAL DEVELOPMENT - Introduction, The modernization theory, The dependency theory of Marxist School, Rosenstein- Rodan's theory of 'Big Push', Lewis' model of economic development, The human capital model of development, The Gandhian Concept of Rural Development theories from other social sciences.

Unit-III **(8 Hours)**

Using Water Resources - The water cycle, Drinking Water, Water quality testing, Water filtering ,Extraction from Groundwater ,Pumps Rope and washer pump ,Manuel pumps, Treadle pump, Irrigation for agriculture, Channel systems, Sprinkler systems, Drip systems Water diversion ,Water storage Building Infrastructures and Creating Energy - Basic energy uses , Energy Sources - Firewood, Solar Energy, Hydroelectricity, Hydromechanical, Wind Energy, Energy Storage, Connecting to the Electrical Network, Environmental Considerations.

Use of ICT in Rural and agricultural development - Education, Healthcare, Agriculture, Business, Resource Mapping, Digital and Social Media Marketing Decision Support Systems for soil conservation and farm management Waste Management and Sanitation.

Unit-IV **(8 Hours)**

DEVELOPING COMMUNITIES - Introduction, Service Learning and community development, Theory and practice of community development, Community development issues. The diverse meaning of community development, The knowledge base of community development, International community development.

Different forms of Rural Entrepreneurship, Significance , Business planning for a new venture: the concept of planning paradigm, Forms of business enterprises-Sole proprietorship, partnership and corporations, Product and Process development, Marketing analysis and competitive analysis, strategies; Financial resources; debt financing, banks and financial institutions and other non-bank financial sources; Government programmes : direct loan assistance and subsidies; Industrial and legal issues for rural enterprises.

Unit-V **(8 Hours)**

Role of Micro-Finance institutions in rural development, Use of ICT in Rural development, Watershed Management - Water-Cup Competition by Paani Foundation, Community Safe Water Solutions, Visit to a 'Woman Self help group' nearby and study of its functioning and its role in development. Visit to model villages in nearby region - Ralegan-Siddhi, Dist - Ahemadnagar, Hiware Bazar Dist - Ahemadnagar, Tikekarwadi - Dist. - Pune, BuchekarwadiDist- Pune etc.

Text Books:

1. "Rural Development: Principles, Policies and Management" - KatarSingh , Sage Publications.

2. "Introduction to Community Development - Theory, Practice and Service Learning", Edited by J W Robinson, Sage Publications.

3. G. N. Tiwari, Solar Energy: Fundamentals, Design, Modeling and Applications, Narosa, 2002.

4. “Fundamentals of Entrepreneurship”, H. Nandan, Third Edition, PHL Learning Pvt. Ltd.,

5. “Monetary Economics-Institutions, Theory and Policy”, First Edition, S B Gupta, S Chand Publications, ISBN – 9788121904346.

Teaching-Learning Strategies in brief

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5. Motivate to the students to develop critical & strategic thinking

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Open Elective –IV (Semester-VIII)

Program: B.Tech. (CSE)

Course Code: BTCSE OE41 **Title of the Course:Green Computing**

L-T-P : 3-0-0 **Credits**: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES(CO)

CO1: To understand the concepts of technologies that conform to low-power computation.(Cognitive Level: Understand)

CO2: To understand green (power-efficient) technologies for components of one single computer, such as CPU, memory and disk, and appreciate cutting edge designs for these components.(Cognitive Level: Understand)

CO3: To have a basic understanding of a variety of technologies applied in building a green system and to identify the various key sustainability and green IT trends.(Cognitive Level: Understand)

CO4: To discuss the various laws, standards and protocols for regulating green IT.(Cognitive Level: Analyze)

CO5: Be able to use a range of tools to help monitor and design green systems.(Cognitive Level: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	1	-	1	-	1	-	-	1	-	1	-	1	1	1	2
CO 2	1	-	-	1	1	1	-	-	-	1	-	1	1	1	1
CO 3	1	2	-	2	1	-	2	2	-	1	1	1	1	-	1
CO 4	1	-	1	-	1	-	1	1	1	-	-	1	-	-	1
CO 5	-	1	1	-	-	1	2	-	1	-	1	-	2	2	1

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write ‘3’ in the box for ‘High-level’mapping, 2 for ‘Medium-level’mapping, 1 for ‘Low’-level’mapping.

Detailed Syllabus:

Unit-I **(8 Hours)**

Green IT Fundamentals: Business, IT, and the Environment –Green computing: carbon foot print, scoop on power –Green IT Strategies: Drivers, Dimensions, and Goals –Environmentally Responsible Business: Policies, Practices, and Metrics.

Unit-II **(8 Hours)**

Green Assets: Buildings, Data Centers, Networks, and Devices - Green Business Process Management: Modeling, Optimization, and Collaboration –Green Enterprise Architecture –Environmental Intelligence Green Supply Chains –Green Information Systems: Design and Development Models.

Unit-III **(8 Hours)**

Virtualizing of IT systems –Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling –Best ways for Green PC –Green Data center –Green Grid framework.

Unit-IV **(8 Hours)**

Socio-cultural aspects of Green IT –Green Enterprise Transformation Roadmap –Green Compliance: Protocols, Standards, and Audits –Emergent Carbon Issues: Technologies and Future.

Unit-V **(8 Hours)**

The Environmentally Responsible Business Strategies (ERBS) –Case Study Scenarios for Trial Runs – calculating the carbon footprint – greening mobile devices - CASE STUDIES –Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

Text Books

1. BhuvanUnhelkar, Green IT Strategies andApplications-Using Environmental Intelligence, CRC Press, June 2011

2. Woody Leonhard, Katherrine Murray, Green Home computing for dummies, August 2009.

Reference Books:

1. Alin Gales, Michael Schaefer, Mike Ebbers, Green Data Center: steps for the Journey, Shoff/IBM rebook, 2011.

2. John Lamb, The Greening of IT, Pearson Education, 2009.

3. Jason Harris, Green Computing and Green IT-Best Practices on regulations & industry, Lulu.com, 2008.

4. Carl Speshocky, Empowering Green Initiatives with IT, John Wiley & Sons, 2010.

5. Wu Chun Feng (editor), Green computing: Large Scale energy efficiency, CRC Press, 2012

Teaching-Learning Strategies in brief

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Assessment methods and weightages in brief

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2. By giving assignments.
3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B.Tech. (CSE)

Course Code: BTCSE OE42 Title of the Course:Customer Relationship Management

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES(CO)

By the end of the course, you should be able to:

CO1: Analyze relationship theory and relationship economics from the point of view of the customer and the organization. (Cognitive Level: Analyze)

CO2: Critically analyze an organization's relational strategies with stakeholder groups that affect how well it meets customer needs.(Cognitive Level: Analyze)

CO3: Evaluate CRM implementation strategies.(Cognitive Level: Evaluate)

CO4: Formulate and assess strategic, operational and tactical CRM decisions.(Cognitive Level: Create)

CO5: Plan and conduct an investigation on an aspect of CRM, and communicate findings in an appropriate format.(Cognitive Level: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	-	1	1	-	-	-	2	1	2	3	2	2	1	2	2
CO 2	1	-	-	1	1	1	-	2	-	2	-	2	1	2	2
CO 3	-	1	-	1	-	1	2	-	3	1	2	3	1	1	1
CO 4	1	1	-	1	-	1	3	-	3	2	1	3	2	2	2
CO 5	1	-	1	-	-	1	2	1	-	2	3	3	1	1	3

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

Unit-I: **(8 Hours)**

CRM Concepts: Acquiring Customers, Customer Loyalty, and Optimizing Customer Relationships. CRM Defined: Success Factors, the Three Levels of Service/ Sales Profiling, Service Level Agreements (SLAs), Creating and Managing Effective SLAs.

Unit-II: **(8 Hours)**

CRM in Marketing: One-to-one Relationship Marketing, Cross Selling & Up Selling, Customer Retention, Behavior Prediction, Customer Profitability & Value Modeling, Channel Optimization, Event-Based marketing. CRM and Customer Service: The Call Centre, Call Scripting, Customer Satisfaction Measurement.

Unit-III: **(8 Hours)**

Sales Force Automation: Sales Process, Activity, Contact, Lead and Knowledge Management. Field Force Automation. CRM Links in E-Business: E-Commerce and Customer Relationships on the Internet, Enterprise Resource Planning (ERP), Supply Chain Management (SCM), Supplier Relationship Management (SRM), Partner Relationship Management (PRM).

Unit-IV: **(8 Hours)**

Analytical CRM: Managing and Sharing Customer Data - Customer Information Databases, Ethics andLegalities of Data Use. Data Warehousing and Data Mining Concepts. Data Analysis: Market Basket Analysis (MBA), Click Stream Analysis, Personalization and Collaborative Filtering.

Unit-V: **(8 Hours)**

CRM Implementation: Defining Success Factors, Preparing a Business Plan-Requirements, Justification, Processes. Choosing CRM Tools: Defining Functionalities, Homegrown Versus Outsourced Approaches. Managing Customer Relationships: Conflict, Complacency, Resetting the CRM Strategy. Selling CRM,Internally: CRM Development Team, Scoping and Prioritizing, Development and Delivery, Measurement.

Reference Books:

1.Stanley A. Brown, Customer relationship Management, John Wiley & Sons, Canada, Ltd.

2. Jagdish Seth, et al: Customer Relationship Management

3. Kristin L. Anderson & Carol J Kerr: Customer Relationship Management

4. H. Schmitt, Customer Experience Management: A revolutionary approach to connecting with your customers.

5. Ken Bernett, 2005, The Hand Book of Key Customer Relationship Management, Pearson Education

6. Jagdish N Sheth, Parvatiyar Atul, G Shainesh, Customer Relationship Management: Emerging Concepts, Tools and Applications, 1st Edition, Tata McGraw Hill, June 2008

7. Judith W .Kincaid , Customer Relationship Management Getting it Right, Pearson Education

8. H. Peeru Mohamed , A Sagadevan, Custmer Relationship Management, A Step by Step Approach, Vikas Publishing House

9. Customer Centricity –Focus on right customer for strategic advantage, by Peter Fader, Wharton Digital Press, 2012

Teaching-Learning Strategies in brief

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Assessment methods and weightages in brief

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3. By conducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.

Program: B.Tech. (CSE)

Course Code: BTCSE OE43 Title of the Course:Infrastructure Systems planning

L-T-P : 3-0-0 Credits: **3**

(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (CO)

CO1: Explain the basic concepts related to Infrastructure Projects. (Cognitive Level: Understand)
CO2: Explain the role of private sector in infrastructure growth.(Cognitive Level: Understand)
CO3: Describe the strategies for successful Infrastructure Project implementation. (Cognitive Level: Understand)
CO4: Develop Infrastructure modelling and Life Cycle Analysis Techniques.(Cognitive Level: Create)
CO5: Explain Sustainable development of Infrastructure. (Cognitive Level: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
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CO 2	-	1	2	-	2	1	2	-	-	2	-	2	2	2	-
CO 3	1	-	1	-	-	-	-	-	2	2	3	3	1	1	1
CO 4	-	1	-	1	-	1	-	1	1	1	2	-	1	1	1
CO 5	1	-	1	-	1	-	2	3	-	2	-	2	2	2	1

Each Course Outcome (CO) may be mapped with one or more Program Outcomes (POs). Write '3' in the box for 'High-level'mapping, 2 for 'Medium-level'mapping, 1 for 'Low'-level'mapping.

Detailed Syllabus:

Unit-I (8 Hours)

AN OVERVIEW OF BASIC CONCEPTS RELATED TO INFRASTRUCTURE: Introduction to Infrastructure, an overview of the Power Sector in India., An Overview of the Water Supply and Sanitation Sector in India., an overview of the Road, Rail, Air and Port Transportation Sectors in India. , an overview of the Telecommunications Sector in India., an overview of the Urban Infrastructure in India, an over view of the Rural Infrastructure in India, an Introduction to Special Economic Zones,

Organizations and layers in the field of Infrastructure, The Stages of an Infrastructure Project Lifecycle., an overview of Infrastructure Project Finance.

Unit-II **(8 Hours)**

PRIVATE INVOLVEMENT IN INFRASTRUCTURE: A Historical Overview of Infrastructure Privatization. The Benefits of Infrastructure Privatization,Problems with Infrastructure Privatization, Challenges inPrivatization of water Supply: A Case Study, Challenges in Privatization of Power: Case Study, Privatization of Infrastructure in India: Case Study, Privatization of Road Transportation Infrastructure in India.

Unit-III **(8 Hours)**

CHALLENGES TO SUCCESSFUL IMPLEMENTATION: INFRASTRUCTURE PLANNING AND Mapping Facing the Landscape of Risks in Infrastructure Projects, Economic and Demand Risks: The Case study for Political Risks, Socius Maintenance of Infrastructure. Environmental Risks, Cultural Risks in International Infrastructure Projects, Legal andContractual Issues in Infrastructure, Challenges in Construction and Maintenance of Infrastructure.

Unit-IV **(8 Hours)**

STRATEGIES FOR SUCCESSFUL INFRASTRUCTURE PROJECT IMPLEMENTATION:Risk Management Framework for Infrastructure Projects, Shaping the Planning Phase ofInfrastructure Projects to mitigate risks, Designing Sustainable Contracts, Introduction to Fair Process and Negotiation, Negotiating with multiple Stakeholders on Infrastructure Projects.

Unit-V **(8 Hours)**

SUSTAINABLE DEVELOPMENT OF INFRASTRUCTURE: Information Technology and Systems for Successful Infrastructure Management, and Maintenance of Infrastructure Facilities, Infrastructure Innovative Design Modeling and Life Cycle Analysis Techniques, Capacity Building and Improving the Governments Role in Infrastructure Implementation, An Integrated Framework for Successful Infrastructure Planning and Management Infrastructure Management Systems and Future Directions.

Reference Book

1. France, Robert L. Wetland Design: Principles and Practices for Landscape Architects and Land Use Planners. New York, NY: W.W. Norton & Company, 2002. ISBN: 9780393730739.

2. Lyle, John T. Regenerative Design for Sustainable Development. New York City, NY: John Wiley & Sons, 2008. ISBN: 9780471178439.

3. Buy at MIT Press Lynch, Kevin, and Gary Hack. Site Planning. 3rd ed. Cambridge, MA: MIT Press, 1984. ISBN: 9780262121064.

4. Marsh, William M. Landscape Planning: Environmental Applications. New York, NY: John Wiley & Sons, 2005. ISBN: 9780471485834.

5. Randolph, John. Environmental Land Use Planning Management. Washington, DC: Island Press, 2004. ISBN: 9781559639484.

6. Steiner, Frederick R. The Living Landscape: an Ecological Approach to Landscape Planning. New York, NY: McGraw-Hill, 2000. ISBN: 9780070793989.

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