JAMIA HAMDARD

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CBCS ENABLED SYLLABUS
B.TECH.
COMPUTER SCIENCE & ENGINEERING

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)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

School of Engineering Sciences and Technology

JAMIA HAMDARD

(DEEMED TO BE UNIVERSITY)

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CONTENTS

COntent

- **Approval date of the BOS meeting for the present syllabus**
- **Approval date and number for the Academic COuncil 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

SCHOOL OF ENGINEERING SCIENCES AND TECHNOLOGY

Vision Statement (School Level): To be**CO**me the best institution in the national and international map in terms of quality of teaching and research, technical knowledge and academics in the field **CO**mputer Science & Engineering, Electronics & **CO**mmunication Engineering, Bioinformatics with sincere honesty adding values in the **CO**re aspect of students 'life.

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

MS1: To offer state-of-the-art undergraduate, postgraduate and doctoral programs in **CO**mputer Science & Engineering, Electronics and **CO**mmunication 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 **CO**llaboration 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 be**CO**me problem solver and innovative developer and **CO**ntribute to the society by providing employment to others.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Vision Statement (Department/Centre Level): To be**CO**me the best institution in the national and international map in terms of quality of teaching and research, technical knowledge and academics in the field **CO**mputer Science & Engineering, Electronics & **CO**mmunication Engineering, Bioinformatics with sincere honesty adding values in the **CO**re aspect of students 'life.

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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 **CO**mpetence in the field of **CO**mputer science and engineering and develop solutions to the **CO**mplex problems.

PEO-3: To produce graduates having professional **CO**mpetence 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 **CO**ntext.

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 **CO**mprehend and write effectively and efficiently.

PO2: Domain knowledge: Develop domain knowledge in the **CO**mputer 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 **CO**mputer 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 **CO**mputer science and engineering to understand, analyze and develop **CO**mputer programs in the areas related to algorithms, multimedia, big data analytics, machine learning, artificial intelligence and networking for efficient design of **CO**mputer-based systems of varying **CO**mplexity.

PO7: Dynamism and team building skills: The students will be able to develop required skills to work efficiently on multidisciplinary projects and teams to ac**CO**mplish a **CO**mmon 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 **CO**ncepts of **CO**mputer 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 **CO**mputer Science and engineering for solving real world problems.

PSO 3: Should have the capability to analyze, **CO**mprehend, design & develop solutions for a variety of engineering applications and thus demonstrating professional ethics & **CO**ncern 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 Out**CO**mes (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 **CO**mputer Science and Engineering (CSE) is to prepare students to undertake careers involving innovation and problem solving using **CO**mputational techniques and technologies, or to undertake advanced studies for research careers or to take up Entrepreneurship.

2. THE PROGRAMME

Highlights of the **CO**urse are described in the following table:

2.1 B.TECH CSE

a.	Name of the Programme	BACHELOR OF TECHNOLOGY (**CO**MPUTER 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 Se**CO**ndary (12th / Intermediate) examination with Mathematics and Physics **CO**mpulsory, and one subject out of the following: **CO**mputer Science, Chemistry, Electronics from CBSE or any other Board re**CO**gnized 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 **CO**nducted 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 **CO**mpletion	Not more than 07 years (14 Semesters)
j.	**CO**mmencement of the Programme	July of every academic session

2.2 B.TECH CSE (Lateral Entry)

a.	Name of the Programme	BACHELOR OF TECHNOLOGY (**CO**MPUTER 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 **CO**mputer Science and Engineering/ Information Technology/ Electronics and **CO**mmunication/ Allied branches from a re**CO**gnized 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 **CO**mpletion	Not more than 06 years (12 Semesters)
j.	**CO**mmencement of the Programme	July of every academic session

3. PROGRAMME STRUCTURE

Semester-wise **CO**urse 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 **CO**re (FC)	Humanities and Social Sciences (HS), including Management	9	20.7
	Basic Sciences (BS) including Mathematics, Physics, Chemistry, Biology	31	
Professional **CO**re (PC)	Engineering Science (ES) **CO**urses including Workshop, Drawing, Basics of Electrical/ Mechanical/ **CO**mputer etc	33	63.9
	Professional **CO**re **CO**urses	76	
	Project Work, Seminar and/or Internship in Industry or elsewhere.	15	
Departmental Electives (DE)	Professional Elective (DE) **CO**urses 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 **CO**urses (MC)	Mandatory **CO**urses (MC)	0	Non-Credit
MOOC*	Online **CO**urses	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 **CO**urses
ES	Engineering Science **CO**urses
HS	Humanities and Social Sciences including Management **CO**urses
PC	Professional **CO**re **CO**urses
DE	Departmental Elective **CO**urses
OE	Open Elective **CO**urses
LC	Laboratory **CO**urse
MC	Mandatory **CO**urses
PROJ	Project
DISS	Dissertation
MOOCs	Massive Open Online **CO**urses

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 **CO**ntact 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 **CO**mpletes an additional 20 credits. These **CO**uld 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	25	75	100	3-1-0	4
BTCSE 102	Mathematics – I	BS	25	75	100	3-1-0	4
BTCSE 103	Basic Electrical Engineering	ES	25	75	100	3-1-0	4
BTCSE 104	Engineering Graphics & Design	ES	25	75	100	1-0-0	1
BTCSE 105	Applied Physics I Lab	BS	25	75	100	0-0-4	2
BTCSE 106	Basic Electrical Engineering Lab	ES	25	75	100	0-0-2	1
BTCSE 107	Engineering Graphics & Design Lab	ES	25	75	100	0-0-4	2
BTCSE 108	Essence of Indian Traditional knowledge	MC	25	75	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	25	75	100	3-1-0	4
BTCSE 202	Mathematics –II	BS	25	75	100	3-1-0	4
BTCSE 203	Programming for Problem Solving	ES	25	75	100	3-1-0	4
BTCSE 204	Workshop /Manufacturing Practices	ES	25	75	100	1-0-0	1
BTCSE 205	English Language	HS	25	75	100	2-0-0	2
BTCSE 206	Applied Physics – II Lab	BS	25	75	100	0-0-4	2
BTCSE 207	Programming for Problem Solving Lab	ES	25	75	100	0-0-4	2
BTCSE 208	Workshop /Manufacturing Practices Lab	ES	25	75	100	0-0-4	2
BTCSE 209	English Language Lab	HS	25	75	100	0-0-2	1
BTCSE 210	Basic Engineering Mechanics	BS	25	75	100	3-1-0	4
BTCSE 211	Environmental Sciences	MC	25	75	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	25	75	100	3-1-0	4
BTCSE 302	Chemistry	BS	25	75	100	3-1-0	4
BTCSE 303	Data structure & Algorithms	PC	25	75	100	3-1-0	4
BTCSE 304	Analog and Digital Electronics	ES	25	75	100	3-1-0	4
BTCSE 305	IT Workshop (Sci Lab/MATLAB)	PC	25	75	100	1-0-0	1
BTCSE 306	Humanities-I (Effective Technical **CO**mmunication)	HS	25	75	100	3-0-0	3
BTCSE 307	Software Engineering Lab	ES	25	75	100	0-0-4	2
BTCSE 308	Data structure & Algorithms Lab	PC	25	75	100	0-0-4	2
BTCSE 309	Analog and Digital Electronics Lab	ES	25	75	100	0-0-4	2
BTCSE 310	IT Workshop (Sci Lab/MATLAB) Lab	PC	25	75	100	0-0-4	2
BTCSE 311	Mathematics III	PC	25	75	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	25	75	100	3-1-0	4
BTCSE 402	**CO**mputer Organization and Architecture	PC	25	75	100	3-1-0	4
BTCSE 403	Operating Systems	PC	25	75	100	3-1-0	4
BTCSE 404	Design and Analysis of Algorithms	PC	25	75	100	3-1-0	4
BTCSE 405	Object Oriented Programming	PC	25	75	100	3-0-0	3
BTCSE 406	**CO**mputer Organization and Architecture + Operating Systems Lab	PC	25	75	100	0-0-4	2
BTCSE 407	Design and Analysis of Algorithms Lab	PC	25	75	100	0-0-4	2
BTCSE 408	Object Oriented Programming Lab	PC	25	75	100	0-0-4	2
BTCSE 409	Disaster Management	PC	25	75	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	25	75	100	3-1-0	4
BTCSE 502	Database Management Systems	PC	25	75	100	3-1-0	4
BTCSE 503	Formal Language & Automata Theory	PC	25	75	100	3-1-0	4
BTCSE 504	Java Programming	PC	25	75	100	3-1-0	4
BTCSE 505	Humanities II (Professional Practice, Law & Ethics)	HS	25	75	100	3-0-0	3
	Departmental Elective –I	DE	25	75	100	3-0-0	3
BTCSE 507	Database Management Systems Lab	PC	25	75	100	0-0-4	2
BTCSE 508	Java Programming Lab	PC	25	75	100	0-0-4	2
BTCSE 509	**CO**nstitution of India	MC	25	75	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	25	75	100	0-0-6	3
BTCSE 602	**CO**mpiler Design	PC	25	75	100	3-1-0	4
BTCSE 603	**CO**mputer Networks	PC	25	75	100	3-1-0	4
BTCSE 604	**CO**mpiler Design Lab	PC	25	75	100	0-0-4	2
BTCSE 605	**CO**mputer Networks Lab	PC	25	75	100	0-0-4	2
	Departmental Elective – II	DE	25	75	100	3-0-0	3
	Departmental Elective – III	DE	25	75	100	3-0-0	3
	Open Elective – I	OE	25	75	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	25	75	100	2-1-0	3
BTCSE 703	Data Encryption & **CO**mpression	PC	25	75	100	3-0-0	3
BTCSE 704	Advanced database Management System	PC	25	75	100	3-1-0	4
	Departmental Elective – IV	DE	25	75	100	3-0-0	3
	Departmental Elective – V	DE	25	75	100	3-0-0	3
	Open Elective – II	OE	25	75	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	25	75	100	3-0-0	3
	Open Elective – III	OE	25	75	100	3-0-0	3
	Open Elective –IV	OE	25	75	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 **CO**nsent of **CO**urse 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 **CO**urses available in each thread.

On-line MOOC **CO**urses may **CO**ntribute up to 20% of the credits, with in-house examination being **CO**nducted.

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 **CO**mputing	25	75	100	3-0-0	3
BTCSE DET12	MOOCS1	25	75	100	3-0-0	3
BTCSE DET13	Advanced Algorithms	25	75	100	3-0-0	3
Departmental Elective –II						
BTCSE DET21	Parallel and Distributed Algorithms	25	75	100	3-0-0	3
BTCSE DET22	**CO**mputational **CO**mplexity	25	75	100	3-0-0	3
BTCSE DET23	MOOCS2	25	75	100	3-0-0	3
Departmental Elective –III						
BTCSE DET31	Queuing Theory and Modeling	25	75	100	3-0-0	3
BTCSE DET32	**CO**mputational Number Theory	25	75	100	3-0-0	3
BTCSE DET33	MOOCS3	25	75	100	3-0-0	3
Departmental Elective –IV						

BTCSE DET41	Information Theory and **CO**ding	25	75	100	3-0-0	3
BTCSE DET42	Information Retrieval	25	75	100	3-0-0	3
BTCSE DET43	Quantum **CO**mputing	25	75	100	3-0-0	3
Departmental Elective –V						
BTCSE DET51	Distributed **CO**mputing Systems	25	75	100	3-0-0	3
BTCSE DET52	Software Architecture	25	75	100	3-0-0	3
BTCSE DET53	Approximation of Algorithms	25	75	100	3-0-0	3
Departmental Elective –VI						
BTCSE DET61	**CO**mbinational Optimization	25	75	100	3-0-0	3
BTCSE DET62	Software Project Management	25	75	100	3-0-0	3
BTCSE DET63	Game Theory	25	75	100	3-0-0	3
Systems						
Departmental Elective –I						
BTCSE DES11	MOOCS1	25	75	100	3-0-0	3
BTCSE DES12	Advanced Software Engineering	25	75	100	3-0-0	3
BTCSE DES13	Distributed Systems	25	75	100	3-0-0	3
Departmental Elective –II						

BTCSE DES21	Embedded Systems	25	75	100	3-0-0	3
BTCSE DES22	Advanced Operating Systems	25	75	100	3-0-0	3
BTCSE DES23	MOOCS2	25	75	100	3-0-0	3
Departmental Elective –III						
BTCSE DES31	MOOCS3	25	75	100	3-0-0	3
BTCSE DES32	Real Time Systems	25	75	100	3-0-0	3
BTCSE DES33	Software Re-engineering	25	75	100	3-0-0	3
Departmental Elective –IV						
BTCSE DES41	Signals and Networks	25	75	100	3-0-0	3
BTCSE DES42	Internet-of-Things	25	75	100	3-0-0	3
BTCSE DES43	Ad-Hoc and Sensor Networks	25	75	100	3-0-0	3
Departmental Elective –V						
BTCSE DES51	Agile Software Developments & DevOps	25	75	100	3-0-0	3
BTCSE DES52	Simulation and Modelling	25	75	100	3-0-0	3
BTCSE DES53	Software Testing & Quality Assurance	25	75	100	3-0-0	3
Departmental Elective –VI						

BTCSE DES61	Engineering System Analysis and Design	25	75	100	3-0-0	3
BTCSE DES62	Engineering System Design Optimization	25	75	100	3-0-0	3
BTCSE DES63	Fault Tolerant **CO**mputing	25	75	100	3-0-0	3
Data Science and Machine Intelligence						
Departmental Elective –I						
BTCSE DED11	Artificial Intelligence	25	75	100	3-0-0	3
BTCSE DED12	MOOCS1	25	75	100	3-0-0	3
BTCSE DED13	Machine Learning	25	75	100	3-0-0	3
Departmental Elective –II						
BTCSE DED21	MOOCS2	25	75	100	3-0-0	3
BTCSE DED22	Soft **CO**mputing	25	75	100	3-0-0	3
BTCSE DED23	Speech and Natural Language Processing	25	75	100	3-0-0	3
Departmental Elective –III						
BTCSE DED31	Data Analytics	25	75	100	3-0-0	3
BTCSE DED32	Pattern Re**CO**gnition	25	75	100	3-0-0	3

BTCSE DED33	MOOCS3	25	75	100	3-0-0	3
Departmental Elective –IV						
BTCSE DED41	Multi-agent Intelligent Systems	25	75	100	3-0-0	3
BTCSE DED42	Big Data Analytics	25	75	100	3-0-0	3
BTCSE DED43	Introduction to Blockchain Technology	25	75	100	3-0-0	3
Departmental Elective –V						
BTCSE DED51	Data Science	25	75	100	3-0-0	3
BTCSE DED52	Bioinformatics	25	75	100	3-0-0	3
BTCSE DED53	Digital **CO**mmunication	25	75	100	3-0-0	3
Departmental Elective –VI						
BTCSE DED61	Neural Networks and Deep Learning	25	75	100	3-0-0	3
BTCSE DED62	Cryptography and Network Security	25	75	100	3-0-0	3
BTCSE DED63	Network Programming	25	75	100	3-0-0	3
Applications						
Departmental Elective –I						

BTCSE DEA11	Digital Image Processing	25	75	100	3-0-0	3
BTCSE DEA12	MOOCS1	25	75	100	3-0-0	3
BTCSE DEA13	Optimization Techniques	25	75	100	3-0-0	3
Departmental Elective –II						
BTCSE DEA21	Human **CO**mputer Interaction	25	75	100	3-0-0	3
BTCSE DEA22	**CO**mputer Graphics and Visualization	25	75	100	3-0-0	3
BTCSE DEA23	MOOCS2	25	75	100	3-0-0	3
Departmental Elective –III						
BTCSE DEA31	Mobile **CO**mputing	25	75	100	3-0-0	3
BTCSE DEA32	Web and Internet Technology	25	75	100	3-0-0	3
BTCSE DEA33	MOOCS3	25	75	100	3-0-0	3
Departmental Elective –IV						
BTCSE DEA41	Embedded **CO**mputing Systems	25	75	100	3-0-0	3
BTCSE DEA42	Electronic Design Automation	25	75	100	3-0-0	3
BTCSE DEA43	Multimedia **CO**mputing	25	75	100	3-0-0	3
Departmental Elective –V						
BTCSE DEA51	**CO**mputer Vision	25	75	100	3-0-0	3
BTCSE DEA52	Human **CO**mputer Interface	25	75	100	3-0-0	3
BTCSE DEA53	Web Service and Service Oriented Architecture	25	75	100	3-0-0	3
Departmental Elective –VI						

BTCSE DEA61	Cloud **CO**mputing	25	75	100	3-0-0	3
BTCSE DEA62	Robotics	25	75	100	3-0-0	3
BTCSE DEA63	Android based App development	25	75	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	25	75	100	3-0-0	3
BTCSE OE12	Soft Skills and Interpersonal **CO**mmunication	25	75	100	3-0-0	3
BTCSE OE13	Cyber Law and Ethics	25	75	100	3-0-0	3
Open Elective – II						
BTCSE OE21	History of Science and Engineering	25	75	100	3-0-0	3
BTCSE OE22	Sustainable Development	25	75	100	3-0-0	3
BTCSE OE23	Ethical Hacking	25	75	100	3-0-0	3
Open Elective – III						
BTCSE OE31	Data Warehousing and Data Mining	25	75	100	3-0-0	3
BTCSE OE32	Enterprise Re-source and Plan-ning	25	75	100	3-0-0	3
BTCSE OE33	Rural Technology & **CO**mmunity Development	25	75	100	3-0-0	3
Open Elective – IV						
BTCSE OE41	Green **CO**mputing	25	75	100	3-0-0	3

BTCSE OE42	Customer Relationship Management	25	75	100	3-0-0	3
BTCSE OE43	Infrastructure Systems Planning	25	75	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 **CO**mplete 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 **CO**mmittee, duly **CO**nstituted for purpose, would prepare a merit list on the basis of the selection criteria.

c. Admission **CO**mmittee shall display/publish the list of candidates that are declared eligible for admission, after the due approval of the **CO**mpetent authority.

d. Eligible candidates shall have to **CO**mplete the prescribed formalities, for **CO**mpletion 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 ac**CO**unt for one attendance unit.

c. The **CO**ncerned teacher will take a roll call in every scheduled class, maintains and **CO**nsolidate the attendance re**CO**rd, which would be submitted to the Head of the Department at the **CO**nclusion of the semester.

d. Attendance on ac**CO**unt 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 re**CO**mmendations of the respective activity issued by the Head of the Department.

e. Attendance re**CO**rds 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 **CO**ntinuously absent from the classes without information for a period of 30 days, the **CO**ncerned teacher shall report it to the Head of the Department.

g. Head of the department may re**CO**mmend for striking off the name of a student from rolls, after ensuring '**one month COntinuous absence'**, from all the **CO**ncerned teachers.

h. A student, whose name has been struck off on ac**CO**unt 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 re**CO**mmend all such cases to the Dean of the faculty.

j. The Dean, on the re**CO**mmendation of the Head of the Department, may **CO**nsider the relaxation of attendance up to 10% on ac**CO**unt 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 **CO**mpetent authority) will be entertained after 15 days from the re**CO**very from illness etc.

k. A student detained on ac**CO**unt 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 **CO**ncerned teachers, will be based on unit tests, quizzes, presentation, programming test, demonstrations and assignments.

b. There will be three (3) Internal Assessment (Unit Tests) with a total of 20 marks ,and the best two (2) performances out of the three Unit tests of Internal Assessment will be **CO**unted. Other modes of assessment shall ac**CO**unt for remaining 5 marks.

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

d. The teacher **CO**ncerned shall maintain a regular re**CO**rd of the marks obtained by students in minor tests and display the same in due **CO**urse.

e. The **CO**ncerned teachers shall submit the **CO**mpiled internal assessment marks to the Head of the Department, on the **CO**nclusion of teaching of the current semester.

f. The Head shall display a **CO**py of the **CO**mpiled sheet, of internal assessment marks of all the papers, before forwarding it to the **CO**ntroller of Examination, i.e. at the **CO**nclusion 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 **CO**nducting semester examinations of theory and lab papers, those shall be **CO**nducted after the **CO**nclusion 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	03 Hours	04 Hours

3.	Total Marks	75 (Seventy Five Only)	75 (Seventy Five 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 **CO**pies 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 **CO**mpiled total marks (awarded in internal assessment, project Report and Viva-voce Examination), in the project-semester of each of the candidate, to the **CO**ntroller of Examination.

12. EXAMINATION

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

b. The marks obtained in a subject shall **CO**nsist 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 40%.

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 **CO**ncerned (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/**CO**urse 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 **CO**mpleting this **CO**urse, the students should be able to:

CO-1 Explain the **CO**nduction mechanism of semi**CO**nductors. (**CO**gnitive level: Understand)
CO-2 Identify the important differences in the operation of ordinary light and laser light. (**CO**gnitive level: Analyze)
CO-3 Specify how optical fibers can be used for **CO**mmunication.(**CO**gnitive level: Apply)
CO-4 Apply the phenomena of interference and diffraction to everyday optical observations. (**CO**gnitive level: Apply)
CO-5 Demonstrate a familiarity with some of the extraordinary properties of super-**CO**ndtors.(**CO**gnitive 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	-

*

Detailed Syllabus:

UNIT 1: SemiCOnductor Physics **10 Hours**

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

UNIT 2: Lasers **10 Hours**

Einstein's theory of matter radiation interaction and A and B **CO**efficients, amplification of light by population inversion, different types of lasers: He-Ne, Ruby, Properties of laser beams: monochromaticity, **CO**herence, 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 **CO**mmunication (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 super**CO**nductors, BCS Theory (Qualitative only), London's equations, applications of super**CO**nductors.

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. En**CO**urage participation of students in learning.
2. **CO**nnect the subject matter with the student's everyday life.
3. En**CO**urage the spirit of questioning by the students.
4. Arrange student friendly study material and other learning resources.
5. Create friendly environment **CO**nducive 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 **CO**mpleting this **CO**urse, the students should be able to:

CO-1 Apply the **CO**ncept 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.(**CO**gnitive 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.(**CO**gnitive Level: Apply)
CO-3 Discuss the nature of sequence and series and find the infinite series in terms of $\sin\theta$ and **CO**sθ of any **CO**ntinuous or dis**CO**ntinuous function in a bounded interval . (**CO**gnitive Level: Evaluate)
CO-4 Use the **CO**ncept of function of several variables analyse the nature of the **CO**ntinuity and differentiability of function of two variable and find the maxima and minima of the function in R^2.(**CO**gnitive 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 **CO**ntaining m equataions and n variables.(**CO**gnitive 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 **CO**urse Out**CO**me (**CO**) may be mapped with one or more Program Out**CO**mes (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 **CO**nvergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and **CO**sine series, Parseval's theorem.

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

Limit, **CO**ntinuity 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/**CO**le, 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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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 **CO**mprehend the application of different theorems of electrical circuit.(**CO**gnitive Level: Apply)
CO 2 To analyze the single-phase ac circuits. (**CO**gnitive Level: Evaluate)
CO 3 To understand and formulate basic electric and magnetic circuits.(**CO**gnitive Level: Analyze)
CO4 To examine the working principles of electrical machines and power **CO**nverters. (**CO**gnitive Level: Evaluate)
CO5 To evaluate the **CO**mponents of low voltage electrical installations. (**CO**gnitive 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 **CO**nsisting of R, L, C, RL, RC, RLC **CO**mbinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta **CO**nnections.

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 **CO**nnections.

UNIT 4: Electrical Machines **10 Hours**

Generation of rotating magnetic fields, **CO**nstruction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss **CO**mponents and efficiency, starting and speed **CO**ntrol of induction motor. Single-phase induction motor. **CO**nstruction, working, torque-speed characteristic and speed **CO**ntrol of separately excited dc motor. **CO**nstruction and working of synchronous generators.

UNIT 5: Power COnverters **8 Hours**

DC-DC buck and boost **CO**nverters, duty ratio **CO**ntrol. Single-phase and three-phase voltage source inverters; sinusoidal modulation. **Electrical Installations :CO**mponents 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 **CO**nsumption, 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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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.(**CO**gnitive Level: Remember)
CO-2 Need for scaling the dimension of an object, different types of scaling and scale (plaindigonal and vernier scales).(**CO**gnitive Level: Apply)
CO-3 Create geometric **CO**nstructions; drawing parallel and perpendicular lines, and to **CO**nstruct engineering curves like ellipse, parabola, hyperbola, involute and cycloidal.(**CO**gnitive Level: Evaluate)
CO-4 Gain knowledge on types of projections and draw Orthographic projections of Lines, Planes, Solids, and Section of Solids.(**CO**gnitive Level: Analyze)
CO-5 **CO**nstruct isometric scale, isometric projections and views and **CO**nversion of orthographic views to isometric views and vice versa.(**CO**gnitive Level: Create)
CO-5 Create 2-D **CO**mputer drawing: setting up working space (units, grids etc.), creating and editing 2-D geometries(**CO**gnitive 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

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Detailed Syllabus

UNIT 1: Introduction to Engineering Drawing **10 Hours**
Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, **CO**nic 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-**CO**nventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes; **Projections of Regular Solids CO**vering, 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, **CO**ne – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and **CO**ne; 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, **CO**nventions; Isometric Views of lines, Planes, Simple and **CO**mpound Solids; **CO**nversion of Isometric Views to Orthographic Views and Vice-versa, **CO**nventions; **Overview of COmputer Graphics CO**vering, listing the **CO**mputer technologies that impact on graphical **CO**mmunication, 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, **CO**ordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The **CO**mmand 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 **CO**mpound 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 **CO**ordinate dimensioning and tolerancing; Orthographic **CO**nstraints, Snap to objects manually and automatically; Producing drawings by using various **CO**ordinate 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 **CO**mputer 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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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. (**CO**gnitive level: create).

CO2: Able to understand different phenomenon related to optics through experimentation (**CO**gnitive level: understand).

CO3: Able to understand the theoretical **CO**ncepts of optics through experimentation. (**CO**gnitive level: understand).

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

CO5: Able to apply the experimental knowledge in the real life (**CO**gnitive level: apply).

Mapping of COurse OutCOmes (COs) with Program OutCOmes (POs)

and Program Specific OutCOmes (PSOs)

	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O1	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 **CO**urse Out**CO**me (**CO**) may be mapped with one or more Program Out**CO**mes (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 (**λ**) of sodium light by measuring the diameters of Newton's Rings.
2. To determine wavelength (**λ**) 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 **CO**nstant 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 **CO**ncrete basic and advanced knowledge of the subject.
3. En**CO**urage 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 **CO**nducting quizzes.
3. By **CO**nducting 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 **CO**mponents of electric circuits. (**CO**gnitive level: Understand)

CO2: Able to apply Kirchoff laws. (**CO**gnitive level: Create)

CO3: Understand theorems and apply it to the electric circuits. (**CO**gnitive level: Understand)

CO4: Analyze RLC circuits. (**CO**gnitive level: Analyze)

CO5: Understand and apply RLC circuit for finding resonant frequency. (**CO**gnitive level: Understand)

Mapping of **CO**urse Out**CO**mes (**CO**s) with Program Out**CO**mes (POs)

and Program Specific Out**CO**mes (PSOs)

	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O1	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		

*

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 **CO**ncrete basic and advanced knowledge of the subject.
3. En**CO**urage 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 **CO**nducting quizzes.
3. By **CO**nducting 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 **CO**nstructions; drawing parallel and perpendicular lines, and to **CO**nstruct 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: **CO**nstruct isometric scale, isometric projections and views and **CO**nversion of orthographic views to isometric views and vice versa.

CO5: Create 2-D and 3-D **CO**mputer drawing: setting up working space (units, grids etc.), creating and editing 2-D geometries, use industry-standard **CO**mputer 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

List of experiments

S.No.	List of Assignments
1.	Lettering
2.	Dimensioning Practice
3.	Engineering Scale: - Plain Diagonal & Vernier Scale
4.	Engineering Curve: - Involute, **CO**nic 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 **CO**nstructions step by steps. Later on, assignment issued to check the understanding. I explain the **CO**nstruction 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 en**CO**urage 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 **CO**nducting quizzes.
2. By **CO**nducting 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 **CO**mpleting this **CO**urse, the students should be able to:

CO1. Identify the **CO**ncept of Traditional knowledge and its importance. (**CO**gnitive Level: Remember)

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

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

CO4. Interpret the **CO**ncepts of Intellectual property to protect the traditional knowledge. (**CO**gnitive Level: Analyze)

CO5. Explain the importance of Traditional knowledge in Agriculture and Medicine.(**CO**gnitive 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 **CO**ncepts-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, se**CO**nd &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 **CO**lonialism-the **CO**ming of British; Modernity & struggle for independence; Political e**CO**nomy of Indian society. Industrial, Urban, Agrarian and Tribal society; Caste, Class, Ethnicity and Gender; E**CO**logy and Environment;

UNIT 4: **8 Hours**

Issues & **CO**ncerns in post-**CO**lonial India (up to 1991); Issues & **CO**ncerns in post**CO**lonial India 2nd phase (LPG decade post 1991) ,

UNIT 5 : **8 Hours**

Social change in **CO**ntemporary India: Modernization and globalization, Secularism and **CO**mmunalism, 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), **CO**ntemporary India: A Sociological View, Viking
  6. Gadgil, Madhav&RamachandraGuha(1993), This Fissured Land: An E**CO**logical History of India, OU Press
- Sociology:
  1. Giddens, A (2009), Sociology, Polity, 6th edn.
  2. Haralambos M, RM Heald, M Holborn (2000), Sociology, **CO**llins
  3. Xaxa, V (2008), State, Society and Tribes Pearson
  4. Chandoke, Neera& Praveen Priyadarshi (2009), **CO**ntemporary India: E**CO**nomy, Society and Politics, Pearson
  5. Oommen,T.K.(ed.) (1997), Citizenship and National Identity: From **CO**lonialism 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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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 **CO**mpleting this **CO**urse, the students should be able to:

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

Detailed Syllabus:

UNIT 1: SemiCOnductor Materials 10 Hours

Semi**CO**nductors materials of interest for optoelectronic devices, LEDs: device structure, materials, characteristics and figures of merit, Semi**CO**nductor 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, **CO**ntinuity equation, In**CO**nsistency in Ampere's law, Maxwell's equations (differential and integral forms), Poynting theorem and Poynting vector, Propagation of plane electromagnetic waves in **CO**nducting and non-**CO**nducting 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, **CO**nservative and non-**CO**nservative forces, **CO**ncept of potential energy, Work energy theorem, Periodic and oscillatory motion, Simple harmonic motion, Time period, Frequency, Phase and phase **CO**nstant, Energy in simple harmonic motion, Damped and forced oscillations.

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

Crystalline and amorphous solids, Bragg's law, Historical background: Dis**CO**very of X-rays, Production of X-rays, Moseley's law, Properties of X-rays, **CO**ntinuous and characteristic X-rays, Soft and hard X-rays, Applications.

Reference Books:

1. Arthur Beiser, "**CO**ncepts 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. En**CO**urage participation of students in learning.
2. **CO**nnect the subject matter with the student's everyday life.
3. En**CO**urage the spirit of questioning by the students.
4. Arrange student friendly study material and other learning resources.
5. Create friendly environment **CO**nducive 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 **CO**mpleting this **CO**urse, the students should be able to:

CO-1 Discuss the problems of basic Probability and probability distribution of discrete random variables.(**CO**gnitive Level: Understand)
CO-2 Discrible the probability distribution of **CO**ntinuous random vriables and apply to solve problems.(**CO**gnitive Level: Remember)
CO-3 Find Bivariate Distributions and distribution of some and quotients.(**CO**gnitive Level: Evaluate)
CO-4 Solve the problems on Measures of central tendency and some others probabolitiy distributin like, Binomial and Normal Distributions. (**CO**gnitive Level: Analyze)
CO-5 Use the Application of Statistics like, Curve fitting and diffrent sample test of single prortions. (**CO**gnitive 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 – I: Basic Probability **10 Hours**
Probability spaces, **CO**nditional 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, **CO**rrelation **CO**efficient, Chebyshev's Inequality.
.

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, **CO**nditional 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, **CO**rrelation and regression – Rank **CO**rrelation

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

Curve fitting by the method of least squares- fitting of straight lines, se**CO**nd 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 **CO**rrelation **CO**efficients, 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 **CO**urse 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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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 **CO**mpleting this **CO**urse, the students should be able to:

CO1: Develop simple algorithms for arithmetic and logical problems.(**CO**gnitive Level: Understand)
CO2: Translate the algorithms to programs & execution (in C language). (**CO**gnitive Level: Apply)
CO3: Implement **CO**nditional branching, iteration and recursion.(**CO**gnitive Level: Evaluate)
CO4: De**CO**mpose a problem into functions and synthesize a **CO**mplete program using divide and **CO**nquer approach.(**CO**gnitive Level: Analyze)
CO5: Use arrays, pointers and structures to develop algorithms and programs.(**CO**gnitive 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

Detailed Syllabus:

Unit 1: **10 Hours**

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

Unit 2: **10 Hours**

Arithmetic expressions and precedence, **CO**nditional Branching, Writing and evaluation of **CO**nditionals and **CO**nsequent 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 **CO**mplexity 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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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 workshop.(**CO**gnitive 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.(**CO**gnitive 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.(**CO**gnitive Level: Analyze)
CO4. Understand a report related to hand tools and machine tools description referring to library books and laboratory manuals.(**CO**gnitive Level: Evaluate)
CO5. Understand report of procedures followed for a given task in fitting, carpentry, foundry, sheet metals, welding and machine shops. (**CO**gnitive 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	

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 **CO**mmence the lab.
2. **CO**relate 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 **CO**mpleting this **CO**urse, the students should be able to:

CO1: To develop **CO**mpetence in **CO**mmunication skills related to the production & presentation of messages in multiple formats & understand the importance of body language. (**CO**gnitive Level: Remember)

CO2: To develop the writing skills of the students so that they are capable of **CO**mmunicating efficiently. (**CO**gnitive Level: Apply)

CO 3: To familiarize students with the basics of the English language and help them to learn to identify language structures for **CO**rrect English usage. (**CO**gnitive Level: Evaluate)

CO4: To familiarize students with the basics of the English language and help them to learn to identify language structures for **CO**rrect English usage. (**CO**gnitive Level: Analyze)

CO5: To enhance vocabulary skills and make students fluent, thereby improving receptive and expressive skills. (**CO**gnitive 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	-

Detailed Syllabus:

Unit 1: Vocabulary Building **6 Hours**

The **CO**ncept 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 **CO**herence, organizing principles of paragraphs in documents, techniques for writing precisely and **CO**herently.

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 **CO**hesion, writing introduction, discussion and **CO**nclusion.

Unit -5: Writing Practices & Oral COmmunication: **8 Hours**

COmprehension, Essay, Resume, **CO**ver Letter, Note-Making and Precis writing.

Reference Books:

1. Adair, John. Effective **CO**mmunication. London: Pan Macmillan Ltd., 2003.
2. Hasson, Gill. Brilliant **CO**mmunication Skills. Great Britain: Pearson. Education, 2012.
3. Raman, Meenakshi & Sangeeta Sharma. Technical **CO**mmunication: 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 **CO**nfidently
2. **CO**mmunicate fluently and sustain **CO**mprehension of an extended dis**CO**urse.
3. Demonstrate ability to interpret texts and observe the rules of good writing.
4. To empower students to carry out day to day **CO**mmunication at the workplace by adequate understanding of various types of **CO**mmunication to facilitate efficient interpersonal **CO**mmunication.
5. Students will be able to navigate cross cultural en**CO**unters in a global e**CO**nomy. Facilitate students to develop learning to **CO**nstruct and deliver messages that in**CO**rporate the appropriate use of organizing **CO**ntent, language, vocabulary, kinesics, eye **CO**ntact, appearance, visual aids, and time **CO**nstraints

Assessment methods and weightages in brief:

1. By taking two sessional examinations.
2. By giving assignments.
3. By **CO**nducting 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 (**CO**gnitive level: understand).
CO2: Able to **CO**mpare the value of Plank's **CO**nstant through different LED (**CO**gnitive level: **CO**mpare).
CO3: Able to perform experiment related to semi**CO**nductor devices (**CO**gnitive level: understand).
CO4: Able to understand characteristics of voltage and current through different potentiometer. (**CO**gnitive level: understand).
CO5: Once the students perform the experiments they can apply the knowledge in the real life (**CO**gnitive level: understand).

Mapping of COurse OutCOmes (COs) with Program OutCOmes (POs)

and Program Specific OutCOmes (PSOs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO9	PO10	PO11	PO12	PS O1	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

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 **CO**nstant using Light Emitting Diode (LED).
3. Draw the V-I characteristic for Light Emitting Diode (LED) and determine the value of Plank's **CO**nstant.
4. Determination of Plank's **CO**nstant by plotting a curve between Threshold voltage and wavelength of LED.
5. To determine the value of Plank's **CO**nstant 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 **CO**nductivity of bad **CO**nductors such as card board, glass etc.

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide **CO**ncrete basic and advanced knowledge of the subject.
3. En**CO**urage 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 **CO**nducting quizzes.
3. By **CO**nducting 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 **CO**mpleting this **CO**urse, the students will learn:

CO 1 :ToworkwithanIDEtocreate,edit,**CO**mpile,runand debugprograms (**CO**gnitive Level : Apply)

CO 2 :Toanalyzethevariousstepsinprogramdevelopment. (**CO**gnitive Level: Analyze)

CO 3:Developprogramstosolvebasicproblems byunderstandingbasic**CO**nceptsinClike operators,**CO**ntrolstatements etc. (**CO**gnitive Level : Create)

CO 4 : To develop modular, reusableandreadableCProgramsusingthe**CO**nceptslikefunctions,arrays etc.(**CO**gnitive Level: Create)

CO 5: ToWriteprogramsusingtheDynamicMemoryAllocation**CO**ncept.(**CO**gnitive 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

List of Programs

1. WriteprogramthatdeclaresClassawardedforagivenpercentageofmarks,wheremark<40%=Failed,40%to<60%=Se**CO**ndclass,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. (**CO**nsider the operators +,-,*, /, %anduseSwitchStatement)
3. WriteaCprogramthatusesfunctionstoperformthefollowing:
   i. AdditionofTwoMatrices

   ii.MultiplicationofTwoMatrices

iii.

iii.TransposeofamatrixwithmemorydynamicallyallocatedforthenewmatrixasrowandCOlumn COuntsmaynotbesame.

4. Writea Cprogramto displaythe **CO**ntentsofa filetostandardoutputdevice.
5. WriteaCprogramthatdoesthefollowing:
6. It should first create a binary file and store 10 integers, where the file name and 10valuesaregiveninthe**CO**mmandline.(hint:**CO**nvertthestringsusingatoifunction)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 10valuesaregiveninthe**CO**mmandline.(hint:**CO**nvertthestringsusingatoifunction)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.,the**CO**ntentsofthefirstfilefollowedbythose ofthe se**CO**ndare 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. WriteaCprogramto**CO**nstructapyramidofnumbersas follows:

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

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide **CO**ncrete basic and advanced knowledge of the subject.
3. En**CO**urage 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, (3rdEdition)
iii. BrianW.KernighanandDennisM.Ritchie,TheCProgrammingLanguage,Prentice

iv. HallofIndia
v. R.G.Dromey, Howtosolveitby**CO**mputer,Pearson(16th Impression)
vi. ProgramminginC,StephenG.Kochan, FourthEdition,PearsonEducation.
vii. HerbertSchildt,C:The**CO**mpleteReference,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 **CO**ntrol lamp for different **CO**nfiguration.

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	3	2	2	3	3	2	3	1		1
CO2	2	2	3	2	2	2	2	3	3	3	2	3		2	1
CO3	3	2	3	2	1	2	2	3	2	3	1	3	1	1	1
CO4	2	2	3	2	2	3	2	3	2	3	2	3		2	
CO5	2	2	3	2	2	3	1	3	2	3	2	3	2		1

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 **CO**ntrol one lamp by a one switch with provision for plug socket with switch **CO**ntrol.
9		To **CO**ntrol two lamps by a one switch with provision for plug socket with switch **CO**ntrol.
10		To **CO**ntrol 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 **CO**mmence the lab.
2. **CO**relate 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 (4 to 5 sentences)

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Assessment methods and weightages in brief

1. By giving assignments.
2. By **CO**nducting quizzes.
3. By **CO**nducting 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. (**CO**gnitive level: understand).

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

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

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

CO5: To acquaint them with the uses of resume /CV preparation, report writing, format making etc. and to improve writing skills (**CO**gnitive 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	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 **CO**urse Out**CO**me (**CO**) may be mapped with one or more Program Out**CO**mes (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 **CO**mprehension 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 **CO**nversations.
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 **CO**mmunication i.e. Viva –interviews, GDs and public speaking, extempore

5. Experiment 5: Presenting in GD, Seminars and **CO**nferences. • Leadership Quality • Time Management • Achieving the target
6. Experiment 6: Activities on Interpersonal **CO**mmunication and Building Vocabulary i.e Role of Body Language in **CO**mmunication
7. Experiment 7: Activities on Reading **CO**mprehension
8. Experiment 8: Activities on Writing Skills i.e Resume, **CO**ver 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 **CO**ncrete basic and advanced knowledge of the subject.
3. En**CO**urage 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 **CO**nducting quizzes.
3. By **CO**nducting 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. (**CO**gnitive Level: Remember)
CO-2 **CO**mpute the equilibrium of rigid bodies in two dimensions. (**CO**gnitive Level: Apply)
CO-3 Determine the reaction force by applying laws of friction and the motion parameters of rigid body. (**CO**gnitive Level: Evaluate)
CO-4 Find the centroid, first and se**CO**nd moment of area. (**CO**gnitive Level: Analyze)
CO-5 Analysis the pin jointed frame (**CO**gnitive 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

*

Unit 1: **8 Hours**

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

Unit 2: **8 Hours**

Friction: Static and Kinetic friction, laws of dry friction, **CO**-efficient of friction, angle of friction, angle of repose, **CO**ne of friction, friction lock, friction of flat pivot and **CO**llared 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 **CO**mposite bodies, mass moment of inertia and area moment ofinertia by direct integration and **CO**mposite 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 **CO**ordinates,normal and tangential **CO**mponent.

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

Kinematics of Rigid Bodies: **CO**ncept of rigid body, type of rigid body motion, absolute motion, introduction to relative velocity, relative acceleration (**CO**rioli's **CO**mponent 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 **CO**nservation 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 **CO**mplex problem of the subject, assignment issued to check the understanding. I Provide study material, sample question and ppt. I always en**CO**urage 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 **CO**nducted
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 e**CO**nomy. (**CO**gnitive Level: Understand)
CO2. Predicting the **CO**nsequences of human actions on the web of life, global e**CO**nomy and quality of human life. (**CO**gnitive Level: Remember)
CO3. Developing critical thinking for shaping strategies (scientific, social, e**CO**nomic and legal) for environmental protection and **CO**nservation of biodiversity, social equity and sustainable development. (**CO**gnitive Level: Evaluate)
CO4. Acquiring values and attitudes towards understanding **CO**mplex environmentale**CO**nomic-social challenges and participating actively in solving current environmental problems and preventing the future ones. (**CO**gnitive Level: Analyze)
CO5. Adopting sustainability as a practice in life, society, and industry (**CO**gnitive 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 **CO**vering, Environment, Levels of organizations in environment, Structure and functions in an e**CO**system; Biosphere, its Origin and distribution on land, in water and in air, Broad nature of chemical **CO**mposition of plants and animals;

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

UNIT 3: **8 Hours**
Biodiversity and its **CO**nservation **CO**vering, Biodiversity at global, national and local levels; India as a mega-diversity nation; Threats to biodiversity (biotic, abiotic stresses), and strategies for **CO**nservation; Environmental Pollution **CO**vering, Types of pollution- Air, water (including urban, rural, marine), soil, noise, thermal, nuclear; Pollution prevention; Management of pollution- Ru-

ral/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 **CO**vering, Biotechnology for environmental protection- Biological indicators, bio-sensors; Remedial measures- Bio-remediation, phyto remediation, bio-pesticides, biofertilizers; Bio-reactors- Design and application. Social Issues and Environment **CO**vering, 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 **CO**vering, 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 **CO**vering, 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 **CO**nductivity of different types of soils; Determination of energy **CO**ntent 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 i**CO**-chemical parameters (pH, alkalinity, acidity, salinity, **CO**D, 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 & **CO**ntrol”, 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 **CO**x and Lehninger, “Biochemistry”

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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. **CO**mpare different process Models for Software Development.(**CO**gnitive Level: Understand)

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

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

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

CO-5. To know various processes used in all the phases of the product.(**CO**gnitive 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	

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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, **CO**hesion, **CO**upling, Software Design: Architectural Design, Data Design: Entity Relationship Design, User Interface Design, Object Oriented Design, Web Application Design: Aesthetic Design, **CO**ntent 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 **CO**ncepts, Garvin's Quality Dimension, McCall's Quality Factors, ISO 9126 Quality Factors

Unit 5.Maintenance and Software Metrics: 10 Hours

Maintenance: **CO**rrective, 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. En**CO**urage 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 **CO**nducting 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 micros**CO**pic chemistry in terms of atomic and molecular orbitals and intermolecular forces.(**CO**gnitive Level: Analyse)
CO-2Rationalize bulk properties and processes using thermodynamic **CO**nsiderations.(**CO**gnitive Level: Evaluate)
CO-3 Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectros**CO**pic techniques (**CO**gnitive Level: apply)
CO-4Rationalize periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.(**CO**gnitive Level: analyse and evaluate)
CO-5List major chemical reactions that are used in the synthesis of molecules.(**CO**gnitive 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

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Detailed Syllabus:

Unit 1: 10 Hours
Atomic and molecular structure , Schrodinger equation, Particle in a box solutions and their applications for **CO**njugated 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
Spectros**CO**pic techniques and applications Principles of spectros**CO**py and selection rules, Electronic spectros**CO**py, Fluorescence and its applications in medicine, Vibrational and rotational spectros-

COpy 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 **CO**mmonly 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. **CO**rrosion, Use of free energy **CO**nsiderations 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 **CO**nfigurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, **CO**ordination numbers and geometries, hard soft acids and bases, molecular geometries Stereochemistry : Representations of 3 dimensional structures, structural isomers and stereoisomers, **CO**nfigurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute **CO**nfigurations and **CO**nformational analysis. Isomerism in transitional metal **CO**mpounds (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 Spectros**CO**py, 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 **CO**urselearning out**CO**mes. Priority has been ac**CO**rded to formative assessment. Progress towardsachievement of learning out**CO**mes have been assessed using the following:

time-**CO**nstrainedexaminations; 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.(**CO**gnitive level: Understand, Remember)
CO-2: Implement various searching algorithms (**CO**gnitive level: Apply)
CO-3: Implement various sorting algorithms (**CO**gnitive level: Apply)
CO-4: Demonstrate understanding of non-linear data structures and implement them (**CO**gnitive level: Create, understand)
CO-5: Analyse non-linear data structures for various operations i.e. Creation, insertion, deletion, searching(**CO**gnitive 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 **CO**mplexity analysis.

UNIT 2: 10 Hours
Stacks and Queues: ADT Stack and its operations: Algorithms and their **CO**mplexity analysis, Applications of Stacks: Expression **CO**nversion and evaluation– **CO**rresponding algorithms and **CO**mplexity 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 **CO**mplexity 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 **CO**mplexity 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 **CO**mparison among all the methods, Hashing.

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

Reference books:

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, **CO**mputer Science Press.
2. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing **CO**mpany
3. "How to Solve it by **CO**mputer", 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 **CO**gnitive 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-**CO**nstrained 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 **CO**ncepts and techniques used in digital electronics, and Number **CO**nversions, Error **CO**rrection and detection, Digital logic families.(**CO**gnitive 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" **CO**nditions and laws. (**CO**gnitive Level: Apply)

CO3: To analyse and design various **CO**mbinational logic circuits.(**CO**gnitive Level: Evaluate)

CO4: Analyse basic functionalities of Latches and Flip-Flops; design of Sequential logic circuits.(**CO**gnitive Level: Analyze)

CO5: Have a understanding of the fundamental **CO**ncepts about various terms and circuits of A/D and D/A **CO**nverters(**CO**gnitive 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 **CO**mplements arithmetic, **CO**des, error detecting and **CO**rrecting **CO**des, 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 **CO**nditions, Multiplexer, De-Multiplexer/De**CO**ders, Adders, Subtractors, BCD arithmetic, carry lookahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital **CO**mparator, parity checker/generator, **CO**de **CO**nverters, priority en**CO**ders, de**CO**ders/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 **CO**nverter, parallel to serial **CO**nverter, ring **CO**unter, sequence generator, ripple(Asynchronous) **CO**unters, synchronous **CO**unters, **CO**unters design using flip flops, special **CO**unter IC's, asynchronous sequential **CO**unters, applications of **CO**unters.

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

Digital to analog **CO**nverters: weighted resistor/**CO**nverter, R-2R Ladder D/A **CO**nverter, specifications for D/A **CO**nverters, examples of D/A **CO**nverter ICs, sample and hold circuit, analog to digital **CO**nverters: quantization and en**CO**ding, parallel **CO**mparator A/D **CO**nverter, successive approximation A/D **CO**nverter, **CO**unting A/D **CO**nverter, dual slope A/Dc **CO**nverter, A/D **CO**nverter using voltage to frequency and voltage to time **CO**nversion, specifications of A/D **CO**nverters, example of A/D **CO**nverter 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), **CO**ntent addressable memory (CAM), charge de **CO**upled device memory (CCD), **CO**mmonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, **CO**mplex 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 **CO**mputer 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-**CO**nstrained 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.(**CO**gnitive Level: Understand)
CO2: Apply simulation for the verification of mathematical functions. (**CO**gnitive Level: Apply)
CO3: Utilize main features of the MATLAB program development environment to enable their usage in the higher learning. (**CO**gnitive Level: Evaluate)
CO4: Develop simple mathematical functions/equations in Scilab. (**CO**gnitive Level: Analyze)
CO5: Synthesize simple mathematical functions and operations using plots/display in Scilab. (**CO**g-nitive 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, **CO**ntrolling the hierarchy of operations, **CO**ntrolling 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, **CO**lon, 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 **CO**mmands, **CO**ntrol 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 , **CO**mments and **CO**ntinuation ,Elementary mathematical functions ,Pre-defined mathematical variables ,Booleans , **CO**mplex numbers, Integers , Floating point integers , ans variable , Strings , Dynamic type of variables ,matrix , The **CO**lon ”:” operator , The dollar ”$” operator

UNIT 5: SciLab Programming **8 Hours**

Looping and branching, if statement, select statement, for statement, while statement, break and **CO**ntinue, 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. En**CO**urage 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.(**CO**gnitive Level: Remember)
CO2: To emphasize the essential aspects of effective written **CO**mmunication necessary for professional success. (**CO**gnitive Level: Apply)
CO3: To enable the students to adopt strategies for effective reading and writing skills. (**CO**gnitive Level: Evaluate)
CO4: To enable students to learn the dynamics of social **CO**mmunication and to demonstrate the ability to learn the nuances of informal **CO**mmunication. (**CO**gnitive Level: Analyze)
CO5: To empower students to carry out day to day **CO**mmunication at the workplace by adequate understanding of various types of **CO**mmunication to facilitate efficient interpersonal **CO**mmunication.(**CO**gnitive 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	

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 **CO**mmunication, managing technical **CO**mmunication 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-**CO**nfidence.

Unit- 4: COmmunication and Technical Writing 8 Hours

Importance of talk in a team, **CO**nflict management, **CO**mmunication 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 **CO**mmunication. London: Pan Macmillan Ltd., 2003.
2. Hasson, Gill. Brilliant **CO**mmunication Skills. Great Britain: Pearson. Education, 2012.
3. Raman, Meenakshi & Sangeeta Sharma. Technical **CO**mmunication: 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 **CO**nsistent
2. **CO**nscientiousness: goal-driven and detail-oriented vs. casual and careless
3. Extraversion: outgoing and enthusiastic vs. solitary and guarded
4. Agreeableness: **CO**operative and flexible vs. defiant and stubborn
5. Neuroticism: anxious and volatile vs. **CO**nfident and stable

Assessment methods and weightage in brief:

1. By taking two sessional examinations.
2. By giving assignments.
3. By **CO**nducting 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 **CO**ncept of UML, design, implementation of test cases and OOP (**CO**gnitive level: understand).

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

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

CO4: Able to implement and deploy the software system (**CO**gnitive level: apply).

CO5: Able to perform tests on software system (**CO**gnitive 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	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

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: **CO**mponent 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 **CO**de 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 **CO**ncrete basic and advanced knowledge of the subject
3. En**CO**urage 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 **CO**nducting quizzes.
3. By **CO**nducting 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. ·(**CO**gnitive level: Understand,Analyze).

CO2: Analyze the time and space efficiency of the data structures.

CO3: Implement Single, Double, Circular linked lists and their applications. (**CO**gnitive level: Apply).

CO4: Implement the stack, Queue (Linked and Array Implementation) and their applications. (**CO**gnitive level: Apply)

CO5: Practical knowledge on Trees and Graph data structure and their applications. (**CO**gnitive 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	-	-	1	1	2	3	3	3	3
CO2	1	3	3	3	-	3	-	-	1	1	2	3	3	3	3
CO3	1	3	3	3	-	3	1	1	1	2	2	2	3	2	3
CO4	1	2	3	3	-	3	1	1	1	1	2	2	3	3	2
CO5	-	2	3	3	-	3	1	-	1	2	2	2	3	3	3

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. **CO**nversion 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 **CO**ncrete basic and advanced knowledge of the subject.
3. En**CO**urage 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 **CO**nducting quizzes.
3. By **CO**nducting 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 **CO**ntext of semi**CO**nductor physics. (**CO**gnitive level: Analyze)

CO2: To understand various analog electronics devices and observe their working in various **CO**nditions.(**CO**gnitive level: Understand)

CO3: To apply the characteristic knowledge of Junction behavior in the **CO**nstruction of Bipolar Junction Transistor and evaluate different types of working of transistors in various **CO**nfigurations. (**CO**gnitive level: Evaluate)

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

CO5: To understand various types of digital devices and their practical working knowledge.(**CO**gnitive 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	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 **CO**urse Out**CO**me (**CO**) may be mapped with one or more Program Out**CO**mes (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 Sili**CO**n Diode, and Zener diode and plot the respective graph.
2. To study the characteristics of PNP transistor in **CO**mmon base **CO**nfiguration and evaluate its Input resistance, Output resistance, and Current gain
3. To study the characteristics of NPN transistor in **CO**mmon base **CO**nfiguration 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 **CO**lpitt 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 **CO**mparators using logic gates

Teaching-Learning Strategies in brief

1. En**CO**urage 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. En**CO**urage to the students to implement the practical knowledge into projects

Assessment methods and weightages in brief

1. By **CO**nducting quiz based on experiments
2. By **CO**nducting 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. (**CO**gnitive Level: Understand)
CO2: Create and manipulate Vectors and Matrices in MATLAB. (**CO**gnitive Level: Create)
CO3: Utilize inbuilt features of MATLAB to manipulate Strings. (**CO**gnitive Level: Apply)
CO4: Able toinstall Scilab and manipulate Vectors and Matrices. (**CO**gnitive Level: Understand)
CO5: Synthesize simple mathematical functions and create plots in Scilab. (**CO**gnitive 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	1	2	1	1	-	1	1	3	2	1
CO2	1	2	3	-	-	3	2	1	1	-	1	1	3	2	1
CO3	1	2	3	1	-	3	2	1	1	-	1	1	3	2	1
CO4	-	2	3	-	1	1	2	1	1	-	1	1	3	2	1
CO5	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

1. Build positive environment in the Lab.
2. Provide **CO**ncrete basic and advanced knowledge of the subject.
3. En**CO**urage 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 **CO**nducting quizzes.
3. By **CO**nducting viva.
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 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 **CO**mpleting this **CO**urse, the students should be able to

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

*

Detailed Syllabus:

UNIT I: COncepts of Probability Theory **10 Hours**
Probability space; **CO**nditional probability and Bayes theorem; **CO**mbinatorial probability and sampling models.

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

UNIT III: Distributions **10 Hours**

Joint distributions, functions of random variables, moments of random variables; **CO**nditional 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 **CO**nvergence (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 **CO**variance 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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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.(**CO**gnitive Level: Understand)
CO-2 Understand and solve examples based on **CO**untings along with permutations and **CO**mbinations.(**CO**gnitive Level: Apply)
CO-3. Analyse and understand logical **CO**ncepts that are useful in **CO**mputer science . (**CO**gnitive Level: Evaluate)
CO-4. Understand various algebraic structures such as groups,ring and field which will be helpful in relating unrelated **CO**ncepts in terms of algebraic structures.(**CO**gnitive Level: Analyze)
CO-5. Understand graph theory which have wide application in mathematical situations.(**CO**gnitive 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	

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 **CO**mposite Function, Size of a Set, Finite and infinite Sets, **CO**untable and un**CO**untable 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 **CO**mmon Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

UNIT 2:Basic COunting Techniques **10 Hours**
Basic **CO**unting techniques-inclusion and exclusion, pigeon-hole principle, permutation and **CO**mbination.

UNIT 3:PropositionalLogic **10 Hours**

Syntax, Semantics, Validity and Satisfiability, Basic **CO**nnectives 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 **CO**ntradiction, Proof by **CO**ntraposition, Proof of Necessity and Sufficiency.

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

Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, **CO**ngruence 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 **CO**njunctive Normal Form

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

Graphs and their properties, Degree, **CO**nnectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph **CO**loring, **CO**loring maps and Planar Graphs, **CO**loring Vertices, **CO**loring Edges, List **CO**loring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix **CO**des, Bi-**CO**nnected **CO**mponent and Articulation Points, Shortest distances.

Reference books:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and Its Application to **CO**mputer 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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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, **CO**st, performance.(**CO**gnitive Level: Apply)

CO2. Understand the addressing modes, instruction formats and program **CO**ntrol statements. (**CO**gnitive Level: Evaluate)

CO3. Use of appropriate tools to design verify and test the CPU architecture. (**CO**gnitive Level: Analyze)

CO4. Learn the **CO**ncepts of parallel processing, pipelining and inter-processor**CO**mmunication and analyze the performance of **CO**mmercially available **CO**mputers. (**CO**gnitive Level: Evaluate)

CO5. To identify and **CO**mpare different methods for **CO**mputer I/Oand memory organization. (**CO**gnitive 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 **CO**ncepts, 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 **CO**mplete instruction, Multiple bus organization, Hardwired **CO**ntrol, Micro programmed **CO**ntrol, **CO**mputer 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 **CO**ncepts, Data hazards, Instruction hazards, Influence on instruction sets, Data path and **CO**ntrol **CO**nsiderations, Performance **CO**nsiderations, Exception handling. Case Study of Intel Atom Board.

Unit-IV **10 Hours**

MEMORY SYSTEM DESIGN: Basic **CO**ncepts, Semi**CO**nductor RAM – ROM, Speed, Size and **CO**st, Cache memories, Improving cache performance, Virtual memory, Memory management requirements, Associative memories, Se**CO**ndary 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, **CO**mputer Architecture and Organization, MGH, 1998.
2. William Stallings, **CO**mputer Organization and Architecture: Designing for Performance, Pearson Education, 2010.
3. M. Morris Mano, **CO**mputer System Architecture, 2nd Edition, PHI.
4. David A. Patterson and John L. Hennessy, ***CO****mputer Organization and Design: The Hardware/Software Interface*, Elsevier, 2012.
5. Carl Hamachar, Zvon**CO**Vranesic and SafwatZaky, ***CO****mputer Organization*, MGH, 1990.
6. Vincent P. Heuring and Harry F. Jordan, ***CO****mputer Systems Design and Architecture*, 2nd Edition, Pearson Education, 1996.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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. (**CO**gnitive Level: Remember)
CO-2: Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.(**CO**gnitive 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.(**CO**gnitive Level: Evaluate)
CO-4: Design and implement file management system. (**CO**gnitive 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 **CO**ntrollers.(**CO**gnitive 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, **CO**ncept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process **CO**ntrol Block (PCB), **CO**ntext switching

Thread: Definition, Various states, Benefits of threads, Types of threads, **CO**ncept 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 **CO**nditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ **CO**nsumer Problem, Semaphores, Event **CO**unters, Monitors, Message Passing, Classical IPC Problems: Reader's &Writer Problem, Dinning Philosopher Problem etc.

UNIT 3: 10 Hours

Deadlocks: Definition, Necessary and sufficient **CO**nditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Re**CO**very.

UNIT 4: 10 Hours

Memory Management: Basic **CO**ncept, Logical and Physical address map, Memory allocation: **CO**ntiguous Memory allocation –Fixedandvariablepartition– InternalandExternalfragmentationand**CO**mpaction; Paging: Principle of operation – Page allocation– Hardware support for paging, Protection and sharing, Disadvantages of paging.

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

UNIT 5: 10 Hours

I/O Hardware: I/O devices, Device **CO**ntrollers, direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Se**CO**ndary-Storage Structure: Disk structure, Disk scheduling algorithms

File Management: **CO**ncept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods(**CO**ntiguous, 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 **CO**ncepts 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. En**CO**urage 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.(**CO**gnitive level: Understand)
CO-2: Apply important algorithmic design paradigms(Divide & **CO**nquer, Greedy, Dynamic, Backtracking) and methods of analysis.(**CO**gnitive level: Apply)
CO-3: Analyze the asymptotic performance of algorithms. (**CO**gnitive level: Analyse)
CO-4: Write rigorous **CO**rrectness proofs for algorithms. (**CO**gnitive level: Apply)
CO-5: Design efficient algorithms without any error in **CO**mmon engineering design situations. (**CO**gnitive 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

Detailed Syllabus

UNIT - 1: **10 Hours**
Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of **CO**mplexity 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: **CO**mputability of Algorithms, **CO**mputability classes – P, NP, NP-**CO**mplete and NP-hard. **CO**ok's theorem, Standard NP-**CO**mplete 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 **CO**rmen, 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, Se**CO**nd 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 **CO**gnitive level

Assessment methods and weightages in brief

1. problem based assignments;
2. practical assignment laboratory reports;
3. observation of practical skills;
4. time-**CO**nstrained 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 **CO**ncepts like object, class and how they are used in a program.(**CO**gnitive Level: Remember)
CO2. Design simple abstract data types and its implementations, usingabstraction functions to document them.(**CO**gnitive Level: Apply)
CO3. Re**CO**gnize features of object-oriented design such as encapsulation,polymorphism, (**CO**gnitive Level: Evaluate)
inheritance, and **CO**mposition of systems based on objectidentity to apply it in industrial application.
CO4. Name and apply some **CO**mmon object-oriented design patterns and giveexamples of their use.(**CO**gnitive Level: Analyze)
CO5. Design applications with an event-driven graphical user interface.(**CO**gnitive 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

Detailed Syllabus:

Unit I - Introduction **10 Hours**
Introductory **CO**ncepts 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: **CO**ncrete State Space, **CO**ncrete 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-**CO**ntroller Pattern, **CO**mmands as Methods and as Objects, Implementing OO Language Features, Memory Management.

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

Generic types and **CO**llections: 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 **CO**gnitive level

Assessment methods and weightages in brief

1. problem based assignments;
2. practical assignment laboratory reports;
3. observation of practical skills;
4. time-**CO**nstrained 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 **CO**mputer **CO**mponents 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 **CO**ncepts of ALU and **CO**ntrol 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 **CO**mponent 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 **CO**ncrete basic and advanced knowledge of the subject.
3. En**CO**urage 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 **CO**nducting quizzes.
3. By **CO**nducting 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 **CO**mputational **CO**mplexities.
CO2 Illustrate Dynamic programming strategies and Greedy strategies.
CO3 Determine and Distinguish the **CO**ncept of Advance data structures.
CO4 Examine various graph algorithms and their **CO**mplexities.
CO5 Outline the basic **CO**ncepts of **CO**mputational **CO**mplexities.

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 **CO**ncrete basic and advanced knowledge of the subject.

3. En**CO**urage 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 **CO**nducting quizzes.
3. By **CO**nducting 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 (**CO**mputer 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 **CO**ncept of classand objects (**CO**gnitive level: understand).

CO2: Able to implement various forms of inheritance(**CO**gnitive level: Apply).

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

CO4. Able to implement the java packages (**CO**gnitive level: Apply)

CO5: Able to implement an ArrayList in Java (**CO**gnitive 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	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 **CO**urse Out**CO**me (**CO**) may be mapped with one or more Program Out**CO**mes (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 **CO**ntents of the array.

2. **CO**nsider 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 **CO**ncept of **hybrid inheritance** as per the above **CO**nditions.

3. Given that an EMPLOYEE class **CO**ntains 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 **CO**mpute Net salary of each employee. (DA=50% of Basic and In**CO**me 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 membersgetdata() 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, **CO**mparison
Create two objects of **Shape** named **S1** and **S2**. **CO**mpare these objects by using ***this pointer***. Kindly assign the values to the data members through the **CO**nstructor.

6. Write a C++ program to demonstrate the following **CO**ncepts:
   (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 **CO**ncepts:
   (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 se**CO**nd.java in **pack1** package and **pack2** package also **CO**ntain two class files named se**CO**nd.java, and fourth.java. Write a Java program to illustrate how the members of classes first, se**CO**nd, 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 **CO**ncrete basic and advanced knowledge of the subject.
3. En**CO**urage 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 **CO**nducting quizzes.
3. By **CO**nducting 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. (**CO**gnitive Level: Understand)
CO2. **CO**mpare hazards, disasters and associated natural phenomena and their interrelationships, causes and their effects. (**CO**gnitive Level: Remember)
CO3. **CO**mpare anthropogenic hazards, disasters and associated activities and their interrelationships of the sub-systems. (**CO**gnitive Level: Evaluate)
CO4. Apply knowledge about existing global frameworks and existing agreements and role of **CO**mmunity in successful Disaster Risk Reduction. (**CO**gnitive Level: Analyze)
CO5. Evaluate DM study including data search, analysis and presentation as a case study. (**CO**gnitive 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 **CO**urse Out**CO**me (**CO**) is mapped with one or more Program Out**CO**mes (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 managements case studies of disasters in Sikkim (eg) Earthquakes, Landside. Social E**CO**nomics 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 **CO**nstruction 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. **CO**pola, (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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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.(**CO**gnitive Level: Understand)
CO 2. To understand the processing of an HLL program for execution on a **CO**mputer. (**CO**gnitive Level: Apply)
CO 3. To understand the process of scanning and parsing. (**CO**gnitive Level: Evaluate)
CO 4. To know the design and implementation of assemblers, macro processor, linker and **CO**mpiler. (**CO**gnitive Level: Analyze)
CO 5. To have an understanding of loader, system software tools. (**CO**gnitive 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 **CO**mpiler, Introduction of scanning and parsing, Aspects of **CO**mpilation

UNIT 5 **10 Hours**

Linkers and Loaders: Introduction to linkers, , Relocation and Linking **CO**ncepts, 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, "**CO**mpilers: Principles, Techniques, and Tools",2nd Edition, Pearson Education Asia
5. D. M. Dhamdhere, "Systems Programming and Operating Systems", Se**CO**nd Revised Edition, Tata McGraw-Hill, 1999.

Teaching-Learning Strategies in brief:

1. Build positive environment in the classroom.
2. Provide **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**ncepts and database management system software. (**CO**gnitive Level: Apply)
CO-2. To have a high-level understanding of major DBMS **CO**mponents and their function(**CO**gnitive Level: Evaluate)
CO-3. Ability to model an application's data requirements using **CO**nceptual modeling tools like ER diagrams and design database schemas based on the **CO**nceptual model. (**CO**gnitive Level: Analyze)
CO-4. Design SQL **CO**mmands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS.(**CO**gnitive Level: Evaluate)
CO-5. Derive a program for data-intensive application using DBMS APIs. (**CO**gnitive 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 **CO**urse Out**CO**me (**CO**) may be mapped with one or more Program Out**CO**mes (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: Network Model, Relational and Object-Oriented Data Models. Entity-Relationship Model.

Unit 2. Relational Data Model and Query Languages **10 Hours**
Relational data model **CO**ncepts, various Keys. Integrity, Domain, Referential- **CO**nstraints.
Relational Query Languages: Relational Algebra, Tuple and Domain Relational Calculus, SQL: DDL and DML **CO**mmands & queries, Joins – Natural, **CO**nditional, Inner, Outer Join.

Unit 3. Database Design

Functional Dependencies & Normalization for Relational Databases: Functional Dependencies, Trivial, Non trivial dependencies. Armstrong's Axioms, Lossless Join and Dependency Preserving De**CO**mposition, Normal Forms Based on Primary Keys, (1NF, 2NF, 3NF & BCNF). Multivalued dependency.

Unit 4. Transaction Processing **10 Hours**

Transaction Processing: **CO**ncurrency **CO**ntrol, ACID Property, Serializability: Serializability of Scheduling, **CO**nflict & view serializable schedule, re**CO**very from transaction failures, deadlock handling. **CO**ncurrency **CO**ntrol Techniques: Locking Techniques for **CO**ncurrency **CO**ntrol, time stamping proto**CO**ls for **CO**ncurrency **CO**ntrol.

Unit 5. Storage and Security of Database & Advanced Databases **08 Hours**

File Organization, Indexing and Hashing Overview of file organization techniques, Indexing and Hashing- Basic **CO**ncepts, Static Hashing, Dynamic Hashing. Advanced Topics: Object Oriented Relational Databases, Logical Databases, Web databases, Distributed databases, Data warehousing and Data Mining.

Text Books:

1. "Database System **CO**ncepts", 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, **CO**mputer 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. En**CO**urage 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 **CO**nducting 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.(**CO**gnitive Level: Remember)
CO2: Design finite automata to accept a set of strings of a language. (**CO**gnitive Level: Apply)
CO3: Design **CO**ntext free grammars to generate strings of **CO**ntext free language. (**CO**gnitive Level: Evaluate)
CO4: Determine equivalence of languages accepted by Push down Automata and languages generated by **CO**ntext free grammars. (**CO**gnitive Level: Analyze)
CO5: Write the hierarchy of formal languages, grammars and machines. (**CO**gnitive 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: **CO**ntext-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 **CO**ntext-free Languages, Deterministic Pushdown Automata, Closure Properties of CFLs.

Unit – III: COntext-Sensitive Languages **10 Hours**
COntext-Sensitive Languages: **CO**ntext-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-Re**CO**gnizable (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 **CO**mputation, Pearson Education Asia.
2. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of **CO**mputation, Pearson Education Asia.

Reference Books

1. Dexter C. Kozen, Automata and **CO**mputability, Undergraduate Texts in **CO**mputer Science, Springer.
2. Michael Sipser, Introduction to the Theory of **CO**mputation, PWS Publishing.
3. John Martin, Introduction to Languages and the Theory of **CO**mputation, 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. En**CO**urage 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 **CO**nducting 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 be**CO**me familiar with the fundamental **CO**ncepts in OOP like encapsulation,Inheritance and Polymorphism. (**CO**gnitive Level: Remember)
CO2 . Design and develop java programs, analyze, and interpret object oriented data and report results.(**CO**gnitive Level: Apply)
CO3. Design an object oriented system, AWT **CO**mponents and multithreaded processes as per needs and specifications.(**CO**gnitive Level: Evaluate)
CO4. Participate and succeed in **CO**mpetitive examinations like GATE, Engineering services, recruitment interviews etc.(**CO**gnitive Level: Analyze)
CO5. Plan their career in java based technologies like HADOOP etc. (**CO**gnitive Level: Evaluate)

Mapping of COurse OutCOmes (COs) with Program OutCOmes (POs) and Program Specific OutCOmes (PSOs)

	PO 1	PO 2	PO3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO11	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

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Detailed Syllabus

Unit 1: **8 Hours**

JVM architecture, Data types, Variables, S**CO**pe and life time of variables, arrays, operators, **CO**ntrol statements, type **CO**nversion and casting, simple java program, **CO**nstructors, 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: **CO**ncepts of streams, Stream classes- Byte and Character stream, Reading **CO**nsole Input and Writing **CO**nsole 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: **CO**ncepts ofThread, Thread life cycle, creating threads using Thread class and Runnable interface, Synchronization, Thread priorities, Inter Thread **CO**mmunication.

UNIT - IV **8 Hours**

Check Box, Check Box Group, Choice, List Box, Panels – Scroll Pane, Menu, Scroll Bar. Working with Frame class, **CO**lour, Fonts and layout managers. EVENT HANDLING: Events, Event sources, Event Listeners, Event Delegation Model (EDM)

UNIT - V **8 Hours**

Hierarchy of swing **CO**mponents. **CO**ntainers, Top level **CO**ntainers - JFrame, JWindow, JDialog, JPanel, JButton, JToggleButton, JCheckBox, JRadioButton, JLabel,JTextField, JTextArea, JList, J**CO**mboBox, 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 **CO**mplete 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. En**CO**urage 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 **CO**nducting 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.(**CO**gnitive Level: Understand)
CO 2 : To understand instil Moral and Social Values and Loyalty and to appreciate the rights of others. (**CO**gnitive Level: Remember)
CO 3 : To apply knowledge on global development on governance (**CO**gnitive Level: Evaluate)
CO 4 : To analyse knowledge on risk management, **CO**mpliances, ethics and sustainability aspects (**CO**gnitive Level: Analyze)
CO 5 : To evaluate and create best governance practices followed worldwide (**CO**gnitive 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 – **CO**urage – Valuing time – **CO**operation – **CO**mmitment – Empathy – Self-**CO**nfidence – 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 – **CO**nsensus and **CO**ntroversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories, Engineering as Experimentation – Engineers as responsible Experimenters – **CO**des 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 – **CO**llective Bargaining – **CO**nfidentiality – **CO**nflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

UNIT IV GLOBAL ISSUES **8 Hours**

Multinational **CO**rporations – Environmental Ethics – **CO**mputer Ethics – Weapons Development – Engineers as Managers – **CO**nsulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –**CO**de of **CO**nduct – **CO**rporate Social Responsibility

UNIT V Ethics & Business: **8 Hours**

Ethics, Business Ethics, Organization Structure and Ethics, Addressing Ethical Dilemmas, **CO**de of Ethics, Indian Ethos, Designing **CO**de of **CO**nduct, Policies, Fair practices and frameworks. Sustainability: **CO**rporate Social Responsibility, **CO**rporate Sustainability Reporting Framework, Legal Framework, **CO**nventions, Treaties on Environmental and Social Aspects, Triple Bottom Line, Principle of Absolute Liability - Case Studies, Indian and **CO**ntemporary 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. **CO**mputer Aided Presentation
6. **CO**mputer Labs/Laptop Instruction
7. Demonstration
8. Direct Instruction
9. Dis**CO**very 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 s**CO**pe and need of DBMS (**CO**gnitive level : Apply)
CO2. To develop ability to understand various algorithms based on DBMS. (**CO**gnitive level : Understand)
CO3. To apply the best **CO**ding effectively practices and to identify and use the language specific feature available us a library function. (**CO**gnitive level : Apply)
CO4. To understand the design of DBMS applications based on Object Oriented Programming Principles. (**CO**gnitive level : Create)
CO5.To learn why unit testing is part of developer role and apply it in DBMS (**CO**gnitive level : Apply)

Mapping of COurse OutCOmes (COs) with Program OutCOmes (POs) and Program Specific Out-COmes (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 **CO**urse Out**CO**me (**CO**) may be mapped with one or more Program Out**CO**mes (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 **CO**lumns.
Experiment 2: Alter employee table to add job_grade **CO**lumn 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 depart-ment_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 **CO**rresponding 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 **CO**ncrete basic and advanced knowledge of the subject.
3. En**CO**urage 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 **CO**nducting quizzes.
3. By **CO**nducting 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 s**CO**pe and need of Java Programming (**CO**gnitive level : Apply)
CO2. To develop ability to understand various algorithms based on Java Programming. (**CO**gnitive level : Understand)
CO3. To apply the best **CO**ding effectively practices and to identify and use the language specific feature available us a library function. (**CO**gnitive level : Apply)
CO4. To understand the design of Java applications based on Object Oriented Programming Principles. (**CO**gnitive level : Create)
CO5.To learn why unit testing is part of developer role and apply it in java (**CO**gnitive 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

*

List of experiments

Q1. Write a program to implement final keyword in a class or a method.

Q2. Write a program to **CO**mpare two strings by using equals() method .

Q 3. Write a program to to use toString() method.

Q 4. Write a program to implement the **CO**ncept of multiple inheritance.

Q 5. Write a program to implement the **CO**ncept 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, **CO**ncrete 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 **CO**ncept of **CO**nstructor with parameterise and default **CO**nstructor.

Q 10. Write a program to implement OverRiding in java.

Q 11. Write a program to Overloading the **CO**nstructor in java.

Q 12. Write a program to implement the This() as well as Super() method.

Q 13. Write a program to follow the **CO**ncept of Pure Dynamic Binding or Dynamic Method Dispatching.

Q 14. Write a program to implement the **CO**ncept 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 **CO**ncrete basic and advanced knowledge of the subject.
3. En**CO**urage 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 **CO**nducting quizzes.
3. By **CO**nducting 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 **CO**mpleting this **CO**urse, 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.(**CO**gnitive Level: Understand)
CO2. Discuss the intellectual origins of the framework of argument that informed the **CO**nceptualization of social reforms leading to revolution in India.(**CO**gnitive Level: Apply)
CO3. Discuss the circumstances surrounding the foundation of the **CO**ngress 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 **CO**nstitution. (**CO**gnitive Level: Evaluate)
CO4. Discuss the passage of the Hindu **CO**de Bill of 1956(**CO**gnitive Level: Analyze)
CO5. Understand the role of Election **CO**mmission of India.(**CO**gnitive 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 **CO**mmittee, (**CO**mposition & Working), Philosophy of the Indian **CO**nstitution: 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 **CO**nstitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT III: Organs of Governance: 8 Hours
Parliament: **CO**mposition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, **CO**uncil 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 **CO**rporation. 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 **CO**mmission: Role and Functioning. Chief Election **CO**mmissioner and Election **CO**mmissioners. State Election **CO**mmission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Reference Books:

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

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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 **CO**ncepts of formal languages and their application to **CO**mpiler Design.(**CO**gnitive level: Analyse)
CO-2: Develop a familiarity with fundamental principles of **CO**mpiler design.
(**CO**gnitive level: Understand)
CO-3: Demonstrate the process of translating a high-level language to executable **CO**de.
(**CO**gnitive level: Apply)
CO-4: Analyze different parsing techniques and algorithms. (**CO**gnitive level: Analyse)
CO-5: Generate intermediate **CO**de for statements in the high-level languages. (**CO**gnitive 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 **CO**mpilation 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): **CO**ntext-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 S**CO**pe, Intermediate **CO**de Generation: Translation of different language features, different types of intermediate forms. **CO**de Improvement(optimization): Analysis: **CO**ntrol-flow, data-flow dependence etc.; **CO**de improvement local optimization, global optimization, loop optimization, peep-hole optimization etc. Architecture dependent **CO**de improvement: instruction scheduling (for pipeline), loop optimization (for cache memory) etc. Register allocation and target **CO**de generation

UNIT 5: **8 Hours**

Advanced topics: Type systems, data abstraction, **CO**mpilation of Object-Oriented features and non-imperative programming languages

Reference Books:

1. AllenI.Holub,**CO**mpilerDesigninC,PHI,2003.
2. N.FischerandR. J. LeBlanc, Craftinga**CO**mpilerwithC, BenjaminCummings,2003.
3. J.P.Bennet,Introductionto**CO**mpilerTechniques,2nd Edition, TMH, 2003.
4. Henk Alblas and Albert Nymeyer, Practice and Principles of **CO**mpiler 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-**CO**nstrained 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 **CO**ncepts of data **CO**mmunication andnetworks,TCP/IP and OSI reference models.(**CO**gnitive Level: Apply)
CO-2: Analyze, specify and design the topological and routing strategies for an IP based networking infrastructure. (**CO**gnitive Level: Evaluate)
CO-3: Demonstrate the working of existing proto**CO**ls and identify deficiencies in existing proto**CO**ls, and formulate newand better proto**CO**ls.(**CO**gnitive Level: Analyze)
CO-4: Develop network programming for a given problem.(**CO**gnitive Level: Evaluate)
CO-5: **CO**nfigure DNS DDNS, TELNET, EMAIL, File Transfer Proto**CO**l (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools. (**CO**gnitive 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 **CO**mmunication **CO**mponents: Representation of data and its flow Networks, Various **CO**nnection Topology, Proto**CO**ls and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, **CO**nnecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, **CO**ncepts on spread spectrum.

UNIT 2: **10 Hours**
Data Link Layer and Medium Access Sub Layer: Error Detection and Error **CO**rrection - Fundamentals, Block **CO**ding, Hamming Distance, CRC; Flow **CO**ntrol and Error **CO**ntrol proto**CO**ls - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggy backing, Random Access, Multiple access proto**CO**ls - 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 proto**CO**ls.

UNIT 4: **10 Hours**

Transport Layer: Process to Process **CO**mmunication, User Datagram Proto**CO**l (UDP), Transmission **CO**ntrol Proto**CO**l (TCP), SCTP **CO**ngestion **CO**ntrol; 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 Proto**CO**l (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic **CO**ncepts of Cryptography

Reference books

1. Data **CO**mmunication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw-Hill.
2. Data and **CO**mputer **CO**mmunication, 8th Edition, William Stallings, Pearson Prentice Hall India.
3. **CO**mputer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
4. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas **CO**mer, 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-**CO**nstrained 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 **CO**mpiler works. (**CO**gnitive level: Analyse)
CO-2: To implement the techniques of Lexical Analysis and Syntax Analysis. (**CO**gnitive level: Apply)
CO-3: Develop programs for top down and bottom-up parsing. (**CO**gnitive level: Create)
CO-4: To generate the intermediate **CO**de. (**CO**gnitive level: Create)
CO-5: To implement **CO**de Optimization techniques. (**CO**gnitive 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	1	3	3		1	2	3	3	3	1		1	2
CO2	3	3	3	3	3	2		2	3	3	2	1			2
CO3	3	3	3	3	3	2		2	3	3	3	1	1		2
CO4	3	2	3	3	3			2	3	3	2	1			2
CO5	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 **CO**mpute the FOLLOW of non-terminals.
7. Write a program to check whether a string satisfies the **CO**ndition 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 **CO**nstant propagation.

Teaching-Learning Strategies

1. Build positive and peaceful environment in the laboratory.
2. Provide subject materials to develop and explore different perspectives.
3. En**CO**urage students to implement and analyse **CO**ncepts of **CO**mpiler 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. (**CO**gnitive level: understand).

CO2: Learn and use the software CIS**CO** Packet Tracer. (**CO**gnitive level: understand).

CO3: Able to **CO**nfigure different network algorithms using Cis**CO** Packet Tracer. (**CO**gnitive level: create).

CO4: Able to write and implement Algorithms for error detection. (**CO**gnitive level: understand).

CO5: To implement different LAN and WAN using Graph data structures . (**CO**gnitive 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	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

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List of experiments

1. Tostudy Network devices and cables used for **CO**mmunication 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 Proto**CO**ls
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 Proto**CO**l Analyzer Tool (Ethereal/Wireshark)

Teaching-Learning Strategies in brief

1. Build positive environment in the Lab.
2. Provide **CO**ncrete basic and advanced knowledge of the subject.
3. En**CO**urage 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 **CO**nducting quizzes.
3. By **CO**nducting 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 be**CO**me familiar with the fundamental **CO**ncepts in OOP like encapsulation,Inheritance and Polymorphism. (**CO**gnitive Level: Remember)
CO2 : Design and develop java programs, analyze, and interpret object oriented data and report results.(**CO**gnitive Level: Apply)
CO3 :Design an object oriented system, AWT **CO**mponents and multithreaded processes as per needs and specifications.(**CO**gnitive Level: Evaluate)
CO4 :Participate and succeed in **CO**mpetitive examinations like GATE, Engineering services, recruitment interviews etc.(**CO**gnitive Level: Analyze)
CO5 :Plan their career in java based technologies like HADOOP etc (**CO**gnitive Level: Create)

Mapping of COurse OutCOmes (COs) with Program OutCOmes (POs) and Program Specific OutCOmes (PSOs)

	PO 1	PO 2	PO3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO11	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

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Detailed Syllabus
Unit 1: **8 Hours**
JAVA BASICS: Review of Object oriented **CO**ncepts, History of Java, Java buzzwords, JVM architecture, Data types, Variables, S**CO**pe and life time of variables, arrays, operators, **CO**ntrol statements, type **CO**nversion and casting, simple java program, **CO**nstructors, methods, Static block, Static Data, Static Method String and String Buffer Classes, Using Java API Document.

UNIT - II **8 Hours**
INHERITANCE AND POLYMORPHISM: Basic **CO**ncepts, 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: **CO**ncepts of streams, Stream classes- Byte and Character stream, Reading **CO**nsole Input and Writing **CO**nsole output, File Handling.

UNIT - III **8 Hours**

EXCEPTION HANDLING: Exception types, Usage of Try, Catch, Throw, Throws and Finally keywords, Built-in Exceptions, Creating own Exception classes.MULTI THREADING: **CO**ncepts ofThread, Thread life cycle, creating threads using Thread class and Runnable interface, Synchronization, Thread priorities, Inter Thread **CO**mmunication.

UNIT - IV **8 Hours**

AWT **CO**NTROLS: The AWT class hierarchy, user interface **CO**mponents- Labels, Button, Text **CO**mponents, Check Box, Check Box Group, Choice, List Box, Panels – Scroll Pane, Menu, Scroll Bar. Working with Frame class, **CO**lour, 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 **CO**mponents. **CO**ntainers, Top level **CO**ntainers - JFrame, JWindow, JDialog, JPanel, JButton, JToggleButton, JCheckBox, JRadioButton, JLabel,JTextField, JTextArea, JList, J**CO**mboBox, 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 **CO**mplete 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-**CO**nstrained 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 **CO**urse is to make students remember database management systems, with an emphasis on how to organize, maintain and retrieve efficiently and effectively.(**CO**gnitive Level: Remember)
CO2: Help students understand the fundamental elements of relational database management systems, Explain the basic **CO**ncepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL. (**CO**gnitive Level: Apply)
CO3: Apply designing of ER-models to represent simple database application scenarios, **CO**nvert the ER-model to relational tables, populate relational database and formulate SQL queries on data. (**CO**gnitive Level: Evaluate)
CO4: Analyse the database design by normalization. (**CO**gnitive Level: Analyze)
CO5: Evaluate and create basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing. (**CO**gnitive 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, **CO**ntrol 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. **CO**ncurrency **CO**ntrol – Locks, Optimistic **CO**ncurrency **CO**ntrol (Backward and Forward validations), Timestamping **CO**ncurrency **CO**ntrol.

Unit-III **10 Hours**
OBJECT-BASED DATABASES: Object-based databases – **CO**mplex 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 Se**CO**ndary 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 & **CO**ntrol. 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 **CO**ronel, *Database System **CO**ncepts*, Cengage Learning, 2008.
3. Raghu Ramakrishnan & Johannes Gehrke, *Data base Management Systems*, TMH
4. A. Silberschatz, H.F. Korth, S. Sudarshan, *Data base System **CO**ncepts*, 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. **CO**MPUTER AIDED PRESENTATION
5. **CO**MPUTER 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.(**CO**gnitive level: Analyse)
CO-2: Design and apply Graph Algorithms (**CO**gnitive level: Apply)
CO-3: Evaluate different approaches of Number -Theoretic Algorithms (**CO**gnitive level: Understand)
CO-4: Design and apply String-Matching Algorithms (**CO**gnitive level: Apply)
CO-5: Demonstrate a familiarity with Probabilistic and Randomized Algorithms (**CO**gnitive 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

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Detailed Syllabus:

Unit – I: Review of Analysis Techniques **8 Hours**
Growth of Functions: Asymptotic notations, Standard notations and **CO**mmon functions, Recurrences and Solution of Recurrence equations: The substitution method, The recurrence, Tree method, The master method: Amortized Analysis, Aggregate, Ac**CO**unting 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 **CO**rmen, 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 **CO**mputer 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 **CO**gnitive level

Assessment methods and weightages in brief

1. problem based assignments;
2. practical assignment laboratory reports;
3. observation of practical skills;
4. time-**CO**nstrained 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 **CO**ncepts of parallel and distributed **CO**mputing systems. (**CO**gnitive level: Understand)
CO-2: Identify performance and flexibility issues related to systems design decisions. (**CO**gnitive level: Analyze)
CO-3: Develop and implement Sorting, Graph Algorithms, Dense Matrix Algorithms and Agreement Proto**CO**ls (**CO**gnitive level: Create, Apply)
CO-4: Demonstrate understanding of Failure Re**CO**very, Fault Tolerance, Distributed Resource Management (**CO**gnitive level: Understand)
CO-5: Implement Programming Using the Message Passing Paradigm, Transactions and **CO**ncurrency **CO**ntrol (**CO**gnitive 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

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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 **CO**mputing Platforms, Physical Organization of Parallel Platforms, **CO**mmunication **CO**sts in Parallel Machines Routing Mechanisms for Inter**CO**nnection 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. **CO**ncepts 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

De**CO**mposition Techniques: Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing, Methods for **CO**ntaining 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 **CO**mmunication 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 Proto**CO**ls: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, **CO**nsensus problem, Interactive **CO**nsistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic **CO**mmit 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 **CO**mputers, 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 Re**CO**very in Distributed Systems: **CO**ncepts in Backward and Forward re**CO**very, Re**CO**very in **CO**ncurrent systems, Obtaining **CO**nsistent Checkpoints, Re**CO**very in Distributed Database Systems, Fault Tolerance: Issues in Fault Tolerance, **CO**mmit Proto**CO**ls, Voting proto**CO**ls, Dynamic voting proto**CO**ls.

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 **CO**mmunication with **CO**mputation, **CO**llective **CO**mmunication and **CO**mputation Operations, Groups and **CO**mmunicators, Transactions, Nested transactions, Locks, Optimistic **CO**ncurrency **CO**ntrol, Timestamp ordering, **CO**mparison of methods for **CO**ncurrency **CO**ntrol, Distributed Transactions: Flat and nested distributed transactions, Atomic **CO**mmit proto**CO**ls, **CO**ncurrency **CO**ntrol in distributed transactions, Distributed deadlocks, Transaction re**CO**very. Replication: System model and group **CO**mmunication, 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. **CO**ulouris, Dollimore, Kindberg, "Distributed System: **CO**ncepts and Design", Pearson Education.

3. Tenanuanbaum, Steen," Distributed Systems", PHI.
4. Distributed Operating Systems: **CO**ncepts And Design By Pradeep K. Sinha Eastern E**CO**nomy 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 **CO**gnitive 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-**CO**nstrained 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 **CO**mpleting this **CO**urse, the students should be able to:

- **CO1** Demonstrate a familiarity with major algorithms and algorithmic techniques (brutal force techniques, greedy techniques, divide-and-**CO**nquer and dynamic programming, randomized algorithms).(**CO**gnitive 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 **CO**mplexity. (**CO**gnitive Level: Remember)
- **CO3** Apply and evaluate **CO**mputational efficiency that influence the choice of algorithms, such as programming time, maintainability, and the use of application specific patterns in the input data. (**CO**gnitive Level: Evaluate)
- **CO4** Design new algorithms for specific applications, using the algorithms and algorithmic techniques presented. (**CO**gnitive Level: Analyze)
- **CO5** Design Finite State Machine, Pushdown Automata, and Turing Machine.Explain the Decidability or Un-decidability of various problems. (**CO**gnitive 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

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Detailed Syllabus:

Unit – I: Introduction to COmputational COmplexity 8 Hours
Introduction: Easy and hard problems, Algorithms and **CO**mplexity, Turing machines: Models of **CO**mputation, 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: **CO**unting and diagonalization, Tape reduction, Universal Turing machine, Undecidability of halting, Reductions, Rice's theorem, Deterministic **CO**mplexity Classes: DTIME[t], Linear Speed-up Theorem, P Time, Polynomial reducibility, Polytime algorithms: 2-satisfiability, 2-**CO**lourability.

Unit – III:NP and NP-COmpleteness **8 Hours**

NP and NP-**CO**mpleteness: Non-deterministic Turing machines, NTIME[t], NP, Polynomial time verification, NP-**CO**mpleteness, **CO**ok-Levin Theorem, Polynomial transformations: 3- satisfiability, clique, **CO**lourability, Hamilton cycle, partition problems, Pseudo-polynomial time, Strong NP-**CO**mpleteness, Knapsack, NP-hardness.

Unit – IV: Space COmplexity and hierarchy theorems **8 Hours**

Space **CO**mplexity and hierarchy theorems: DSPACE[s], Linear Space **CO**mpression Theorem, PSPACE, NPSPACE. PSPACE = NPSPACE, PSPACE-**CO**mpleteness, Quantified Boolean Formula problem is PSPACE-**CO**mplete, L, NL and NL- **CO**mpleteness, NL=**CO**NL. Hierarchy theorems.

Unit – V: Randomized COmplexityOptimization and approximation **8 Hours**

Randomized **CO**mplexity: The classes BPP, RP, ZPP, Interactive proof systems: IP = PSPACE, Optimization and approximation: **CO**mbinatorial optimization problems, Relative error, Bin-packing problem, Polynomial and fully polynomial approximation schemes, Vertex **CO**ver, traveling salesman problem, minimum partition.

Reference book:

1. Anany V. Levitin, Introduction to the Design and Analysis of Algorithms, Addison Wesley.
2. T. H. **CO**rmen, C. E. Leiserson, R. L. Rivest and C. Stein, Introduction to Algorithms, MIT Press.
3. Walter Savitch, JAVA, An introduction to **CO**mputer 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. En**CO**urage 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 **CO**mpleting this **CO**urse, the students should be able to

CO1: Understand the fundamental **CO**ncepts of probability and acquire knowledge of standard distributions which can describe real life phenomena.(**CO**gnitive Level: Understand)
CO2: Identify various distribution functions and acquire skills in handling situations involving more than one variable.(**CO**gnitive Level: Apply)
CO3: Analyze the various classifications of Random Processes and characterize phenomena which evolve with respect to time in a probabilistic manner.(**CO**gnitive Level: Evaluate)
CO4: Understand the basic characteristic features of a queuing system and acquire skills in analyzing queuing models.(**CO**gnitive Level: Analyze)
CO5: Analyze a network of queues with Poisson external arrivals, exponential service requirements and independent routing. (**CO**gnitive 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 **CO**ntinuous 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 **CO**nditional distributions – **CO**variance – **CO**rrelation 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 **CO**mputer 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, "**CO**mputer 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. En**CO**urage 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 **CO**mpleting this **CO**urse, the students should be able to:
CO-1 Understand basics of number theory and its application in cryptography.(**CO**gnitive Level: Apply)
CO-2 Apply skills for writing programs for cryptography algorithms.(**CO**gnitive Level: Evaluate)
CO-3 Develop and design many techniques to real-world problems.(**CO**gnitive Level: Analyze)
CO-4 Use and analysis **CO**mputational problems from Algebra and Number Theory.(**CO**gnitive Level: Evaluate)
CO-5 Create and apply modern tools in wide area of given set of problems. (**CO**gnitive 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

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Detailed Syllabus:

Unit – I: Basic Number Theory **8 Hours**
Divisibility, Arithmetic addition, subtraction, multiplication, Primes and Greatest **CO**mmon divisors, Euclidean algorithm,Fundamental theorem of arithmetic and Modular arithmetic,

Unit – II:COngruences **8 Hours**
Equivalence relations, Definition, and basic properties of **CO**ngruences, 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 **CO**ding theory.

Reference Books:

1. Victor Shoup, A **CO**mputational 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. En**CO**urage 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 **CO**nducting 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 **CO**ncept of information and entropy and applications of information theory. (**CO**gnitive level: Analyse)
CO-2: Measure information in terms of probability and entropy. (**CO**gnitive level: Apply)
CO-3: Apply Shannon's theorem for **CO**ding.(**CO**gnitive level: Apply)
CO-4: Calculatechannel capacity.(**CO**gnitive level: Apply)
CO-5: Apply **CO**ding and error **CO**rrecting techniques.(**CO**gnitive 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 **CO**ntent of symbols in long independent Sequences, Average information **CO**ntent of symbols in long dependent Sequences, Mark-off statistical model for information source, Entropy and information rate of mark-off source.

SOURCE CODING: En**CO**ding of the source output, Shannon's en**CO**ding algorithm, **CO**mmunication Channels, Discrete **CO**mmunication channels.

Unit – II **8 Hours**

SOURCE CODING THEOREM: Huffman **CO**ding, Discrete memory less Channels, Mutual information, Channel Capacity.

CONTINUOUS CHANNEL: Differential entropy and mutual information for **CO**ntinuous Ensembles, Channel capacity Theorem.

Unit – III **8 Hours**

INTRODUCTION TO ERROR CONTROL CODING: Types of errors, Types of **CO**des, Linear Block **CO**des: Matrix description. Error detection and **CO**rrection, Standard arrays and table look up for de**CO**ding, Hamming **CO**des.

Unit – IV **8 Hours**

CYCLIC CODES: Binary Cyclic **CO**des, Algebraic structures of cyclic **CO**des, En**CO**ding using (n-k) bit shift register, Syndrome calculation, BCH **CO**des.

RS AND GOLAY CODES: Golay **CO**des and Shortened cyclic **CO**des R S **CO**des, Burst error **CO**rrecting **CO**des, Burst and Random Error **CO**rrecting **CO**des.

Unit – V **8 Hours**

CONVOLUTION CODES: COnvolution **CO**des, Time domain approach, Transform domain approach.

Reference Books:

1. Ranjan Bose, ITC and Cryptography, TMH.
2. Thomas M. **CO**ver & Joy A. Thomas, Elements of Information Theory, 2nd Edition, Wiley Publication.
3. Roberto Togneri& Christopher J. S deSilva, Fundamentals of Information Theory and **CO**ding Design, CRC Press.
4. K. Sam Shanmugam, Digital and analog **CO**mmunication systems, John Wiley.
5. Simon Haykin, Digital **CO**mmunication, 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-**CO**nstrained 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. (**CO**gnitive Level: Remember)
CO2. To develop understanding of problems and potentials of current IR systems. (**CO**gnitive Level: Apply)
CO3. To learn and appreciate different retrieval algorithms and systems.(**CO**gnitive Level: Evaluate)
CO4. To apply various indexing, matching, organizing, and evaluating methods to IR problem. (**CO**gnitive Level: Analyze)
CO5. To be**CO**me aware of current experimental and theoretical IR research.(**CO**gnitive 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	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	1	-	-	-	-	1	-	1	1	2	2	1
CO2	3	2	2	1	2	1	2	1	1	-	1	1	2	2	1
CO3	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
CO5	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, S**CO**ring and ranking feature vectors

Unit III: Experimental Evaluation of IR **8 Hours**

Performance metrics: recall, precision, and F-measure; Evaluations on benchmark text **CO**llections.

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: Dis**CO**vering 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. En**CO**urage 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 **CO**nducting 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 **CO**mputing program, its architecture and program model . (**CO**gnitive Level: Remember)
CO-2: Develop quantum logic gate circuits. (**CO**gnitive Level: Apply)
CO-3: Understand the techniques used by Quantum algorithms. (**CO**gnitive Level: Evaluate)
CO-4: Develop quantum algorithm. (**CO**gnitive Level: Analyze)
CO-5: Program quantum algorithm on major toolkits. (**CO**gnitive 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 **CO**mputing: Motivation for studying Quantum **CO**mputing, Major players in the industry (IBM, Microsoft, Rigetti, D-Wave etc.), Origin of Quantum **CO**mputing, Overview of major **CO**ncepts in Quantum **CO**mputing: Qubits and multi-qubits states, Bra-ket notation, Bloch Sphere representation, Quantum SuperpositionQuantum Entanglement

Unit 2 **6 Hours**

Math Foundation for Quantum **CO**mputing: 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 **CO**mputing 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, **CO**ntrolled

Unit 4. **10 Hours**

gates, Ising, Deutsch, swap etc. Programming model for a Quantum **CO**mputing Program: Steps performed on classical **CO**mputer, Steps performed on Quantum **CO**mputer, 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 **CO**mputation and Quantum Information", Cambridge University Press.
2. David McMahon, "Quantum **CO**mputing 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. En**CO**urage 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 **CO**nducting 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 **CO**mpletion of this **CO**urse, the students should be able to:

CO1: Assess **CO**ncepts related to distributed **CO**mputing systems.(**CO**gnitive Level: Understand)
CO2: Demonstrate details of distributed systems. (**CO**gnitive Level: Remember)
CO3: Analyze performance and flexibility issues related to systems design decisions.(**CO**gnitive Level: Evaluate)
CO4: Identify **CO**nsistency issues in distributed systems.(**CO**gnitive Level: Analyze)
CO5: Identify reliability issues in distributed systems. (**CO**gnitive 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, **CO**de Migration, Software Agents.
COmmunication: Fundamentals, Remote Procedure Call, Message Oriented **CO**mmunication, Stream-Oriented **CO**mmunication, Multicast **CO**mmunication**.**

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 **CO**nsistency Models, Client Centric **CO**nsistency Models, Replica Management, **CO**nsistency Proto**CO**ls, Examples.

Unit – V **8 Hours**

FaultTolerance: Introduction to Fault Tolerance, Process Resilience, Reliable Client-Server **CO**mmunication, Reliable Group **CO**mmunication, Distributed **CO**mmit, Re**CO**very.
Security: Introduction, Secure channels, Access **CO**ntrol, Security Management

Reference Books:

1. Distributed Systems – Principles and Paradigms, Andrew S. Tanenbaum, Maarten Van Steen, 2 PHI.
2. Distributed Systems **CO**ncepts and Design, George **CO**uloris, Jean Dollimore, TimKindberg, Gordan Blair, 4/e, PEARSON.
3. Distributed Operating Systems **CO**ncepts 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. En**CO**urage 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 **CO**mpleting this **CO**urse, the students should be able to

CO-1 Explain software architectural requirements and drivers express influence of software architecture on business and technical activities. (**CO**gnitive Level: Understand)
CO-2 Design to architectural styles and views. (**CO**gnitive Level: Apply)
CO-3 Identify relationship and best fit of software architecture modelling for emerging technologies. (**CO**gnitive Level: Evaluate)
CO-4 Identify key architectural structures of individual **CO**mponent in different phases of analysis, design and development. (**CO**gnitive Level: Analyze)
CO-5 In position to apply styles and views to model and specify architecture for **CO**mmunication across multiple teams with different roles. (**CO**gnitive 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

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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 **CO**nstraints – 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 **CO**mputing – 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 **CO**mputing 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 **CO**vered part of the unit. This is to be discussed and analyzed for **CO**mmon 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 **CO**mpleting this **CO**urse, the students should be able to:

CO-1 Describe the basic **CO**ncept of Operations Research- Probability and decision- making.(**CO**gnitive Level: Apply)
CO-2 Formulate the optimization problem with the help of industrial problems. (**CO**gnitive Level: Evaluate)
CO-3 Solve the optimization problems using different types of known methods. (**CO**gnitive Level: Analyze)
CO-4 Discuss the assignment problem & network flow problem. (**CO**gnitive Level: Evaluate)
CO-5 Explain the basics of Genetic Algorithms & Simulated Annealing, and apply to sequencing and scheduling problems and travelling salesman problem. (**CO**gnitive 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	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO 1	1		1	3		2		2	1	1	2	2	1		2
CO 2		1		3	2	2	1				2	2		3	2
CO 3	1		2	3		2		1		1	2	2	2		2
CO 4		1		3	1	2	2	1	2		2	2		3	2
CO 5	2		3	3		2				1	2	2	3		2

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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, S**CO**pe and hierarchy of optimization, Typical applications of optimization.

UNIT- II: FORMULATION OF OPTIMIZATION PROBLEMS **8 Hours**

Essential features of optimization problems, Objective function, **CO**ntinuous functions, Dis- crete-functions , Unimodal functions , **CO**nvex and **CO**ncave functions, Investment **CO**sts and operating

COsts in objective function , Optimizing profitably **CO**nstraints, Internal and external **CO**nstraints, Formulation of optimization problems. **CO**ntinuous functions, Discrete functions.

UNIT-III: Linear Programming And Transportation Problem 8 Hours

Necessary and sufficient **CO**nditions for optimum of un**CO**nstrained functions-Numerical methods for un**CO**nstrained functions, One-dimensional search, Gradient-free search with fixed step size. Linear Programming, Basic **CO**ncepts 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, **CO**mputational **CO**mplexity,NP-Hard, NP-**CO**mplete. 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 **CO**ncepts, En**CO**ding, Selection, Crossover, Mutation. Simulated Annealing- Acceptance probability, **CO**oling, Neighborhoods, **CO**st 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,Metaheuristicsearch**CO**ncepts:Atutorialwith applications to production and logistics,Springer.
4.Gass S. I., Introduction to Linear Programming, Tata McGrawHill.
5.Reeves C., Modern heuristic techniques for **CO**mbinatorial 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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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. (**CO**gnitive Level: Remember)
CO2: Analyze **CO**ncepts of players, strategies, payoffs, rationality, equilibrium. (**CO**gnitive Level: Apply)
CO3: Describe sequential games using game trees, and to use the backward induction to solve such games. (**CO**gnitive Level: Evaluate)
CO4: Describe simple simultaneous-move games using game tables, and to explain **CO**ncepts of dominant, dominated, and rationalizable strategies, pure and mixed strategies, and best responses. (**CO**gnitive Level: Analyze)
CO5:to find dominant strategy equilibrium, pure and mixed strategy Nash equilibrium. (**CO**gnitive 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, **CO**sts, payoffs – solution **CO**ncepts – finding equilibria – games with sequential moves – games with simultaneous moves – discrete strategies, **CO**ntinuous strategies – mixed strategies – games with in**CO**mplete information – expected payoffs – Prisoner's dilemma and repeated games – Nash equlibrium – **CO**mputational **CO**mplexity of Nash equilibrium

Unit – II **8 Hours**
Games on networks – **CO**ngestion games – selfish routing – Nash and wardrop equilibria for networks – price of anarchy – pricing network edges – network design with selfish agents – e**CO**nomic aspects of internet routing

Unit – III: **8 Hours**

Epistemic game theory – Modeling knowledge – rationality and belief – **CO**mmon belief in rationality – game strategies and perfect recall – cryptography and game theory – modeling cryptographic algorithms as games – multi-party **CO**mputations – MPC and games

Unit – IV: **8 Hours**

Mechanism design – general principles– social choice – incentives– algorithms mechanism design – dis- tributed aspects – **CO**st-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 & **CO**mpany, 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. **CO**mpare different process Models for Software Development.(**CO**gnitive Level: Remember)
CO2. To provide the idea of de**CO**mposing the given problem into Analysis, Desing, Implementation, Testing and Maintenance phases. (**CO**gnitive Level: Apply)
CO3. To provide an idea of using various process models in the software industry ac**CO**rding to given circumstances. (**CO**gnitive Level: Evaluate)
CO4. To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are **CO**nducted in a software project. (**CO**gnitive Level: Analyze)
CO5. To know various processes used in all the phases of the product.(**CO**gnitive 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	PO10	PO11	PO12	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	

*

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-FunctionalRequirements,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: **CO**ntext, Behaviour-
al,Data,andObjectmodels,CASEWorkbenches;SoftWarePrototyping:PrototypingintheSoftWare Process, Rapid Prototyping Techniques, UserInterface Prototyping;Specifications:FormalSpecification in theSoftWareProcess,InterfaceSpecification,Behavioural Specification.

ArchitecturalDesign

Introduction: System Structuring; **CO**ntrol Models; Modular De**CO**mposition; Domain- SpecificArchitectures;DistributedSystemsArchitectures:MultiprocessorArchitectures;Client-
ServerArchitec-
tures,DistributedObjectArchitectures;**CO**RBA(**CO**mmonObjectRequestBrokerArchitecture)

SoftwareDesign

Object Oriented Design: Objects and Object Classes, Object-Oriented Design Process, DesignEvolution; Real Time SoftWare Design: Systems Design, Real-Time Executives, Monitoring and**CO**ntrol-Systems,DataAcquisitionSystems;DesignWithReuse:**CO**mponent-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

Introduc-
tion;LimitstoThinking;MemoryOrganization;KnoWledgeModeling;Motivation;GroupWorking;ChoosingandKeepingPeople;thePeopleCapabilityMaturityModel

SoftwareCOstEstimationandQualityManagement

SoftWare **CO**st Estimation: Productivity, Estimation Techniques, Algorithmic **CO**st Modelling,Project Duration and Staffing. Quality Management: Quality Assurance and Standards, QualityPlanning, Quality **CO**ntrol, 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: Source**CO**deTranslation,ReverseEngineering,ProgramStructureImprovement,ProgramModularization, DataRe-Engineering; **CO**nfigurationManagement

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. FundamentalsofSoftWareEngineeringbyGhezzi,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. En**CO**urage 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 **CO**nducting 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 **CO**ncepts related to distributed **CO**mputing systems.(**CO**gnitive Level: Understand)
CO2: Demonstrate details of distributed systems. (**CO**gnitive Level: Remember)
CO3: Analyze performance and flexibility issues related to systems design decisions. (**CO**gnitive Level: Evaluate)
CO4: Identify **CO**nsistency issues in distributed sys tems. (**CO**gnitive Level: Analyze)
CO5: Identify reliability issues in distributed systems.(**CO**gnitive 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, **CO**de Migration, Software Agents.
COmmunication: Fundamentals, Remote Procedure Call, Message Oriented **CO**mmunication, Stream-Oriented **CO**mmunication, Multicast **CO**mmunication**.**

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 **CO**nsistency Models, Client Centric **CO**nsistency Models, Replica Management, **CO**nsistency Proto**CO**ls, Examples.

Unit – V **8 Hours**

FaultTolerance: Introduction to Fault Tolerance, Process Resilience, Reliable Client-Server **CO**mmunication, Reliable Group **CO**mmunication, Distributed **CO**mmit, Re**CO**very.
Security: Introduction, Secure channels, Access **CO**ntrol, Security Management

Reference Books:

1. Distributed Systems – Principles and Paradigms, Andrew S. Tanenbaum, Maarten Van Steen, 2 /e, PHI.
2. Distributed Systems **CO**ncepts and Design, George **CO**uloris, Jean Dollimore, TimKindberg, Gordan Blair, 4/e, PEARSON.
3. Distributed Operating Systems **CO**ncepts 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. En**CO**urage 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. (**CO**gnitive Level: Understand)
CO 2: Analyze techniques and tools to create embedded firmware. (**CO**gnitive Level: Apply)
CO 3: Apply Re **CO**nfigurable FPGA technique in embedded system. (**CO**gnitive Level: Evaluate)
CO 4: Apply the Programming **CO**ncepts in designing specific Applications. (**CO**gnitive Level: Analyze)
CO-5: Evaluate systematic approaches to create embedded system Architecture. (**CO**gnitive 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

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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 **CO**ntrol, 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 Re**CO**nfigurable **CO**mputing, placement and scheduling techniques, Design of digital systems on FPGAs, fault tolerant design on FPGAs, Retarget able assembling and **CO**mpilation.

Unit – 4 **8 Hours**

APPLICATIONS: Specific applications.

Unit – 5 **8 Hours**

LATEST TRENDS IN EMBEDDED SYSTEM: On-chip networks: scalable, **CO**mmunication-centric embedded system design paradigm, Systematic Approach to Exploring Embedded System Architectures at Multiple Abstraction Levels, Selective Instruction **CO**mpression 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 e**CO**s*(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. En**CO**urage participation of students in learning.
2. **CO**nnect the subject matter with the student's everyday life.
3. En**CO**urage the spirit of questioning by the students.
4. Arrange student friendly study material and other learning resources.
5. Create friendly environment **CO**nducive 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. (**CO**gnitive Level: Apply)
CO2: Understand about threads and their implementation.(**CO**gnitive Level: Evaluate)
CO3: Assess mechanisms involved in signals and scheduling in OS.(**CO**gnitive Level: Analyze)
CO4: Identify **CO**mponents and management aspects of multiprocessing systems.(**CO**gnitive Level: Evaluate)
CO5: Design and implementation of file management system.(**CO**gnitive 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	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	

Detailed Syllabus:

Unit – I **8 Hours**
INTRODUCTION TO UNIX: History, Need of change, Standards.
THE PROCESS AND THE KERNEL: Mode, space and **CO**ntext, 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 **CO**nsider, 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, **CO**ndition variables Read-write locks for multiprocessor systems, Reference **CO**unts and other **CO**nsiderations

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 **CO**ncepts*, 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. En**CO**urage 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 **CO**ncepts of Real-Time systems and modeling. (**CO**gnitive Level: Understand)
CO2: re**CO**gnize the characteristics of a real-time system. (**CO**gnitive Level: Remember)
CO3: understand and develop document on an architectural design of a real-time system. (**CO**gnitive Level: Evaluate)
CO4: develop and document Task scheduling, resource management, real-time operating systems and fault tolerant applications of Real-Time Systems.(**CO**gnitive Level: Analyze)
CO5: Analyze the Model for Real Time **CO**mmunication.(**CO**gnitive Level: Create)

Mapping of COurse OutCOmes (COs) with Program OutCOmes (POs)

	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	2	2	3	1	2	2	3	1	2	2	2	2	2	2
CO 2	2	3	3	2	2	2	3	2	2	2	3	2	3	2	2
CO 3	3	2	3	3	1	3	3	3	1	3	3	2	3	2	3
CO 4	2	3	2	3	2	2	2	3	2	2	2	2	2	2	3
CO 5	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 **CO**ntrol, High Level **CO**ntrols, Signal Processing etc., Release Times, Deadlines, and Timing **CO**nstraints, 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 **CO**nstraints 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 **CO**ntention and Resource Access **CO**ntrol (RAC), Nonpreemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Proto**CO**ls, Stack Based Priority-Ceiling Proto**CO**l, Use of Priority-Ceiling Proto**CO**l in Dynamic Priority Systems, Preemption Ceiling Proto**CO**l, Access **CO**ntrol in Multiple-Unit Resources, **CO**ntrolling **CO**ncurrent Accesses to Data Objects.

Unit – IVMultiprocessor System Environment: 8 Hours

Multiprocessor and Distributed System Model, Multiprocessor Priority-Ceiling Proto**CO**l, 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 **CO**nstraints

Unit – VReal Time COmmunication: 8 Hours

Model of Real Time **CO**mmunication, Priority-Based Service and Weighted Round-Robin Service Disciplines for Switched Networks, Medium Access **CO**ntrol Proto**CO**ls for Broadcast Networks, Internet and Resource Reservation Proto**CO**ls, Real Time Proto**CO**ls, **CO**mmunication in Multi**CO**mputer 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 **CO**mpleting this **CO**urse, the students should be able to

CO1. Explain the **CO**ncepts and technique of software reengineering.(**CO**gnitive Level: Apply)
CO2. Apply reengineering techniques to maintain and modify software systems.(**CO**gnitive Level: Evaluate)
CO3. Analyze and understand maintenance related problems associated with object-oriented software systems.(**CO**gnitive Level: Analyze)
CO4. To Assess Quality issues in re-engineering processes. (**CO**gnitive Level: Evaluate)
CO5. Able to perform **CO**mplex design reengineering and reverse engineering problems.(**CO**gnitive 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 **CO**urse Out**CO**me (**CO**) may be mapped with one or more Program Out**CO**mes (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 **CO**mprehension, 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 **CO**de Translation, Forward Engineering, Difference Between Reverse & Forward Engineering

Unit 4: **8 Hours**

Software Reengineering Activities, **CO**de Slicing, **CO**de Refracting, Software Aging & **CO**de Decay, Software Reusability.

Unit 5: **8 Hours**

E**CO**nomics Of Software Reengineering, **CO**st Of Maintenance & Benefits, Legal & Ethical Issues In System Reengineering

Reference Books:

1. Sea**CO**rd, Plakosh, Lewis, "Modernizing Legacy Systems: Software Technologies, Engineering Processes, And Business Practices", Addison-Wesley ISBN 0321118847, 2003
2. "Refactoring: Improving The Design From Existing **CO**de", 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. En**CO**urage 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 **CO**nducting 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.(**CO**gnitive Level: Apply)
CO-2 Remember LTI Linear Time-Invariant Systems and apply it to the systems,(**CO**gnitive Level: Evaluate)
CO-3 Fourier Analysis for **CO**ntinuous-Time and Discrete-Time Signals and Systems, (**CO**gnitive Level: Analyze)
CO-4 To understand Laplace-Trasform , Z-Transform and ROC,(**CO**gnitive Level: Evaluate)
CO-5 Remember Network Theorems and different types of Two-port networks,(**CO**gnitive 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

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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; **CO**ntinuous-time linear time invariant (LTI) and discrete-time linear shift invariant (LSI) systems: impulse response and step response; response to an arbitrary input: **CO**nvolution; 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 **CO**ntinuous-time and discrete-time signals; **CO**ntinuous-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 re**CO**nstruction: ideal interpolator, zero-order hold, first-order hold; discrete Fourier transform and its properties. Laplace transform and Z-transform: definition, region of **CO**nvergence, 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 **CO**mpensation 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, inter**CO**nnection of two port networks; Symmetrical two port network: T and π equivalents, image impedance, characteristic impedance and propagation **CO**nstant (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. (**CO**gnitive Level: Remember)
CO2: Design and develop **CO**mmunication proto**CO**ls in Internet of Things. (**CO**gnitive Level: Apply)
CO3: Develop smart environment and applications which advance the Internet of Things. (**CO**gnitive Level: Evaluate)
CO4: Analyze the societal impact of Internet of Things. (**CO**gnitive Level: Analyze)
CO5: Analyze vulnerabilities, including recent attacks, involving the Internet of Things. (**CO**gnitive 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 **CO**nsiderations. 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 **CO**nstraints- Introduction, Technical Design **CO**nstraints-Hardware Is Popular Again, Data Representation And Visualization, Interaction And Remote **CO**ntrol.

Unit 3 – **8 Hours**

IoT Data Link Layer & Network Layer Proto**CO**l: (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, **CO**RPL, CARP

Unit 4 – **8 Hours**

Transport & Session Layer Proto**CO**ls: Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) – Session Layer-HTTP, **CO**ap, XMPP, AMQP, MQTT

Unit 5 – **8 Hours**

Service Layer Proto**CO**ls & Security: Service Layer -ONEM2M, ETSI M2M, OMA, BBF – Security In IoT Proto**CO**ls – 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 **CO**mmunications", 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-**CO**nstrained 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.(**CO**gnitive Level: Apply)
CO-2: Apply modern software engineering techniques **CO**mmonly used in agile software projects.(**CO**gnitive Level: Evaluate)
CO-3: Analyze and apply principles of process improvement in software projects.(**CO**gnitive Level: Analyze)
CO-4: Apply current enterprise-grade techniques for **CO**ntinuous development, testing, integration, and delivery.(**CO**gnitive Level: Evaluate)
CO-5: Identify and apply the principles and processes of DevOps, Software Project Management in different program development.(**CO**gnitive 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, **CO**ncurrency in Agile Requirements Generation.

Unit 5: DevOps 8 Hours

Linux Basics, Introduction to DevOps, Introduction to Cloud **CO**mputing, GIT: version **CO**ntrol, Chef for **CO**nfiguration Management, AWS, Puppet for **CO**nfiguration management, Jenkins-**CO**ntinuous integration, Docker **CO**ntainers.

Reference Books:

1. David J. Anderson and Eli Schragenheim, ―Agile Management for Software Engineering: Applying the Theory of **CO**nstraints for Business Results, Prentice Hall, 2003.
2. Hazza and Dubinsky, ―Agile Software Engineering, Series: Undergraduate Topics in **CO**mputer Science, Springer, 2009.
3. Craig Larman, ―Agile and Iterative Development: A Managers Guide, Addison-Wesley, 2004.
4. Kevin C. Desouza, ―Agile Information Systems: **CO**nceptualization, **CO**nstruction, 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 **CO**ordination 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 **CO**ntinuous systems.(**CO**gnitive Level: Remember)
CO2: To analyse different simulation software's and learn their selection procedure.(**CO**gnitive Level: Apply)
CO3: To evaluate the steady state behaviour of the simulated and modelled system. (**CO**gnitive Level: Evaluate)
CO4: To evaluate the simulation model through the process of verification and validation.(**CO**gnitive Level: Analyze)
CO5: To synthesize and measure the performance of the simulation model.(**CO**gnitive 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, **CO**ncept of systems & system environment, **CO**mponents of a system, discrete & **CO**ntinuous 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 & **CO**ncepts, 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, **CO**nvolution, Accept-Reject

QUEUING MODELS: Characteristics, performance measures, steady-state behaviour, Networks of queues

INPUT MODELING: Data **CO**llection, 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 & **CO**ntinuous 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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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. (**CO**gnitive Level: Understand)
CO 2 : Students can find out the defects or issues occurring in the software application before they are en**CO**untered by the end-user. (**CO**gnitive Level: Remember)
CO 3 : Students can evaluate the overall performance of the software application being tested. (**CO**gnitive Level: Evaluate)
CO 4 : Students can evaluate security-related issues for the software application under test. (**CO**gnitive Level: Analyze)
CO 5 : Students can create and provide a high-quality software product to the end-user. (**CO**gnitive 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 **CO**ncept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo **CO**des, Flow Charts, **CO**upling and **CO**hesion 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, Cyclomatic**CO**mplexity Measures: **CO**ntrol Flow Graphs.

Unit – II **8 Hours**
White Box and Black Box Testing: White box testing, static testing, static analysis tools, Structural testing: Unit/**CO**de functional testing, **CO**de **CO**verage testing, **CO**de **CO**mplexity 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: S**CO**pe 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, **CO**re **CO**mponents 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 **CO**ntrol, Quality Management Through Cultural Changes, **CO**ntinual (**CO**ntinuous) Improvement Cycle, Quality in Different Areas, Benchmarking and Metrics, Problem Solving Techniques, Problem Solving SoftwareTools.

Software Quality: Introduction, **CO**nstraints 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.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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. (**CO**gnitive 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. (**CO**gnitive Level: Apply)
CO-3 Apply the data-oriented perspective of system and apply in the design. (**CO**gnitive Level: Evaluate)
CO-4 Design the system with focus on standard **CO**ding **CO**nventions and design approaches. (**CO**gnitive Level: Analyze)
CO-5 Create model using the **CO**nvergence of all phase of system modelling in standard and universally accepted notations. (**CO**gnitive 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

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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 **CO**sts 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, **CO**ding techniques, requirements of **CO**ding schemes, error detection of **CO**des, validating input data, input data **CO**ntrols 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, **CO**ntrol, objectives of **CO**ntrol, techniques used in **CO**ntrol, testing information systems, types of tests, how to generate tests, security of information systems, disaster re**CO**very, business process **CO**ntinuity.

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 **CO**vered part of the unit. This is to be discussed and analyzed for **CO**mmon 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 **CO**mpleting this **CO**urse, the students should be able to:

CO-1 To understand Optimization problem formulation. (**CO**gnitive Level: Apply)
CO2- To use Single Variable Optimization Algorithm for Engineering System Design. (**CO**gnitive Level: Evaluate)
CO3- To understand and apply Multivariable Optimization Algorithms. (**CO**gnitive Level: Analyze)
CO4- To apply **CO**nstrained Optimization Algorithms for optimize Engineering System Design.(**CO**gnitive Level: Evaluate)
CO5- To solve all types of single objective optimization problems.(**CO**gnitive 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	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

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Detailed Syllabus:

UNIT I **8 Hours**
Optimization problem formulation: Design variables, **CO**nstraints, 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 **CO**nditions, 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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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 **CO**mputing. (**CO**gnitive Level: Remember)
CO2. Design techniques for building fault tolerant **CO**mputing systems. (**CO**gnitive Level: Apply)
CO3. In particular, three strategies will be examined in depth: hardware, information, and software fault tolerance. (**CO**gnitive Level: Evaluate)
CO4. Mathematical modeling techniques for quantifying the effectiveness of fault tolerance strategies. (**CO**gnitive Level: Analyze)
CO5. Apply the ideas on simple fault tolerant **CO**mputing examples. (**CO**gnitive 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

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Detailed Syllabus

Unit 1: **8 Hours**

Goals and Applications of Fault Tolerant **CO**mputing : Reliability, Availability, Safety, Dependability, etc. Long Life, Critical **CO**mputation , 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 Inter**CO**nnection Networks

Unit 3: **8 Hours**

Fault Tolerant Design Techniques Based on Information Redundancy :
Parity, M-of-N, Duplication **CO**des , Checksums, Cyclic **CO**des, Arithmetic **CO**des, Berger **CO**des,Hamming Error **CO**rrecting **CO**des , **CO**de Selection Issues, Time Redundancy, Re**CO**mputing 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 **CO**verage , 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 ,Re**CO**nfiguration 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 **CO**mputer 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. (**CO**gnitive Level: Remember)
CO2: Integrate multiple facets of practical machine learning in a single system: data preprocessing, learning, regularization and model selection. (**CO**gnitive Level: Apply)
CO3: Describe the formal properties of models and algorithms for learning and explain the practical implications of those results. (**CO**gnitive Level: Evaluate)
CO4: **CO**mpare and **CO**ntrast different paradigms for learning (supervised, unsupervised, etc.). (**CO**gnitive Level: Analyze)
CO5: Design experiments to evaluate and **CO**mpare different machine learning techniques on real-world problems. (**CO**gnitive 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 **CO**urse Out**CO**me (**CO**) may be mapped with one or more Program Out**CO**mes (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 re**CO**gnition." *Machine learning* 128.9 (2006).
2. Zaki, Mohammed J., Wagner Meira Jr, and Wagner Meira. *Data mining and analysis: fundamental **CO**ncepts and algorithms*. Cambridge University Press, 2014.
3. Alpaydin, Ethem. *Introduction to machine learning*. MIT press, 2020.

Teaching-Learning Strategies in brief

1. **CO**mpare AI with machine learning and traditional information processing, and discuss its strengths and limitations and its application to **CO**mplex 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

CO1 Identify and describe soft **CO**mputing techniques and their roles in building intelligent machines. (**CO**gnitive Level: Understand)

CO2 Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems. (**CO**gnitive Level: Remember)

CO3 Apply genetic algorithms to **CO**mbinatorial optimization problems. (**CO**gnitive Level: Evaluate)

CO4 Evaluate and **CO**mpare solutions by various soft **CO**mputing approaches for a given problem. (**CO**gnitive Level: Analyze)

CO5 Use various tools to solve soft **CO**mputing problems. (**CO**gnitive 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

Detailed Syllabus

Unit-1: Introduction to Soft COmputing and Neural Networks **8 Hours**

Evolution of **CO**mputing: Soft **CO**mputing **CO**nstituents, From **CO**nventional AI to **CO**mputational 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, **CO**mparison with traditional methods, schemata, Terminology in GA – strings, structure, parameter string, data structures, operators, **CO**ding 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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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 **CO**rresponding terminologies. (**CO**gnitive Level: Understand)
CO2 Analyse the steps involved in the BI - Analytics process. (**CO**gnitive Level: Apply)
CO3 Evaluate **CO**mpetently on the topic of analytics.(**CO**gnitive Level: Evaluate)
CO4 Apply the K-Means Clustering with Iris Dataset.(**CO**gnitive Level: Analyze)
CO5 Create the real time scenario (Case study) by using BI & Analytics techniques. (**CO**gnitive 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, **CO**mplex 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 **CO**mplete 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", Se**CO**nd Edition, Wiley & Sons, 2008.

Teaching - Learning Strategies

1. Blended Learning
2. Brainstorming
3. Case Study
4. **CO**mputer Aided Presentation
5. **CO**mputer 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)

CO1 Understand the various types of Pattern re**CO**gnition techniques and to apply Bayesian classification for solving various classification problems. (**CO**gnitive Level: Apply)

CO2 Create a Bayesian Network, predict and draw inference from a Bayesian network. (**CO**gnitive Level: Evaluate)

CO3 Apply principal **CO**mponent analysis and linear discriminant analysis to reduce the dimensionality. (**CO**gnitive Level: Analyze)

CO4 Formulate the optimal decision boundary with the use of proper learning strategy. (**CO**gnitive Level: Evaluate)

CO5 Apply unsupervised learning techniques to solve critical problems. (**CO**gnitive 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 re**CO**gnition - 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 **CO**nditional risk, naive Bayes classifier.

UNIT – II: 8 Hours

Bayesian Network - causation, **CO**rrelation, 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 – **CO**mputation of **CO**variance 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 Re**CO**gnition and Machine Learning, Springer, 2006.
3. Geoff Dougherty,Pattern Re**CO**gnition and Classification: An Introduction, Springer, 2012.
4. Sergios Theodoridis, Pattern Re**CO**gnition, 4th Edition, AP, 2008

Teaching-Learning Strategies in brief (4 to 5 sentences)
Apart from lectures, use of ICT for better visualization of the **CO**ncepts and to demonstrate the working of various pattern re**CO**gnition techniques for model development.
Assessment methods and weightages in brief (4 to 5 sentences)
During the **CO**urse, two sessional examinations will be **CO**nducted 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. (**CO**gnitive Level: Remember)

CO2: Analyse Multi agent and Intelligent agents. (**CO**gnitive Level: Apply)

CO3: Analyse and Apply Agents and security. (**CO**gnitive Level: Evaluate)

CO4: Analyseand evaluate applications of agents. (**CO**gnitive Level: Analyze)

CO5: AnalyzeSoftware Agents for **CO**mputer network security. (**CO**gnitive 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, **CO**mponents, Java Beans, ActiveX, Sockets, RPCs, Distributed **CO**mputing.

Unit 2 **8 Hours**

Agent–Oriented Programming, Jini Architecture, Actors and Agents, Typed and proactive messages, Interaction between agents, Reactive Agents, **CO**gnitive Agents, Interaction proto**CO**ls, Agent **CO**-ordination, Agent negotiation, Software Agent for **CO**operative Learning, Agent Organization, Self - interested agents in electronic **CO**mmerce applications, Interface Agents, Agent **CO**mmunication 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 **CO**ntrol for multi-UAV information **CO**llection- Agent based decision support system for Glider pilots – Multi agent system in E- Health Territorial Emergencies

Unit 5 **8 Hours**

Software Agents for **CO**mputer network security-Multi-Agent Systems, Ontologies and Negotiation for Dynamic Service **CO**mposition 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-**CO**nstrainedexaminations
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. (**CO**gnitive Level: Understand)
CO-2 Provide HDFS **CO**ncepts and Interfacing withHDFS. (**CO**gnitive Level: Remember)
CO-3 Provide hands on Hadoop/Map Reduce E**CO**System.(**CO**gnitive Level: Evaluate)
CO-4 Apply analytics on Structured, UnstructuredData.(**CO**gnitive Level: Analyze)
CO-5 Exposure to Data Analytics withR.(**CO**gnitive 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

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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 **CO**ncepts, **CO**mmand Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and S**CO**op and Hadoop archives, Hadoop I/O: **CO**mpression, 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 E**CO** System, Pig :Introduction to PIG, Execution Modes of Pig, **CO**mparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.
Hive :Hive Shell, Hive Services, Hive Metastore, **CO**mparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.
Hbase :HBasics, **CO**ncepts, Clients, Example, Hbase Versus RDBMS.
Big SQL : Introduction

UNIT 5: 8 Hours

Data Analytics with R, Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, **CO**llaborative 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 **CO**nnector 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 **CO**mponents of Hadoop and HadoopE**CO**-System
3. Access and Process Data on Distributed FileSystem
4. Manage Job Execution in HadoopEnvironment
5. Develop Big Data Solutions using Hadoop E**CO**System
6. Analyze InfosphereBigInsights Big DataRe**CO**mmendations.
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 **CO**ncepts and technology used for block chain. (**CO**gnitive Level: Remember)
CO-2: Describe the primitives of the distributed **CO**mputing and cryptography related to block chain. (**CO**gnitive Level: Apply)
CO-3: Illustrate the **CO**ncepts of Bit**CO**in and their usage. (**CO**gnitive Level: Evaluate)
CO-4: Implement Ethereum block chain **CO**ntract. (**CO**gnitive Level: Analyze)
CO-5: Apply security features in block chain technologies. (**CO**gnitive 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 Re**CO**rd Keeping, Modeling faults and adversaries, Byzantine Generals problem, **CO**nsensus algorithms and their scalability problems, Nakamoto's **CO**ncept with Blockchain based cryptocurrency, Technologies Borrowed in Blockchain – hash pointers, **CO**nsensus, byzantine fault-tolerant distributed **CO**mputing, digital cash etc.

Unit-II **08 Hours**

Basic Distributed **CO**mputing & Crypto primitives: Atomic Broadcast, **CO**nsensus, Byzantine Models of fault tolerance, Hash functions, Puzzle friendly Hash, **CO**llison resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge systems.
Bit**CO**in basics: Bit**CO**in blockchain, Challenges and solutions, proof of work, Proof of stake, alternatives to Bit**CO**in **CO**nsensus, Bit**CO**in scripting language and their use.

Unit-III **08 Hours**

Ethereum basics: Ethereum and Smart **CO**ntracts, The Turing **CO**mpleteness of Smart **CO**ntract Languages and verification challenges, using smart **CO**ntracts to enforce legal **CO**ntracts, **CO**mparing Bit**CO**in scripting vs. Ethereum Smart **CO**ntracts, Writing smart **CO**ntracts 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 **CO**nsensus 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, "Bit**CO**in and Cryptocurrency Technologies – A **CO**mprehensive 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 **CO**ntracts explained", Packt Publishing.
4. MerunasGrincalaitis, "Mastering Ethereum: Implement Advanced Blockchain Applications Using Ethereum-supported Tools, Services, and Proto**CO**ls", Packt Publishing.
5. Prof. Sandip Chakraborty, Dr. Praveen Jayachandran, "Blockchain Architecture Design And Use Cases"[MOOC], NPTEL: https://nptel.ac.in/**CO**urses/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 **CO**ncepts of data science. (**CO**gnitive Level: Remember)
CO-2: Evaluate and Apply the data analysis techniques for applications handling large data.(**CO**gnitive Level: Apply)
CO-3: Demonstrate the various machine learning algorithms used in data science process. (**CO**gnitive Level: Evaluate)
CO-4: Understand the ethical practices of data science.(**CO**gnitive Level: Analyze)
CO-5: Remember to think through the ethics surrounding privacy, data sharing and algorithmic decision-making.(**CO**gnitive 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 – **CO**nvolutional 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 **CO**nsent - 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 **CO**urville, 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. En**CO**urage participation of students in learning.
2. **CO**nnect the subject matter with the student's everyday life.
3. En**CO**urage the spirit of questioning by the students.
4. Arrange student friendly study material and other learning resources.
5. Create friendly environment **CO**nducive 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.(**CO**gnitive Level: Understand)
CO-2 Use bioinformatics search tools on the internet for mining data, pairwise and multiple sequence alignments.(**CO**gnitive Level: Remember)
CO-3 Design parsimony tree for developing phylogenetic relations.(**CO**gnitive Level: Evaluate)
CO-4 Extract information from different types of bioinformatics data (gene, protein, disease, etc.), including their biological characteristics and relationships.(**CO**gnitive Level: Analyze)
CO-5 analyze processed data with the support of analytical and visualization tool. (**CO**gnitive 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	PO7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO1	PSO 2	PSO 3
CO 1	3	3	2				3	1			1		3	1	
CO 2													3	1	
CO 3	3	2	3		3	2			3						1
CO 4	3	3	2								1		3	1	
CO 5	3			3	2					1	1		3	1	

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Detailed Syllabus:

Unit 1: Introduction to Bioinformatics: **8 Hours**
Define Bioinformatics, History, applications, Introduction to Data mining.
Biological Databases: **CO**llecting 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, Se**CO**ndary 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, Se**CO**ndary/fold re**CO**gnition, Threading/tertiary structures,Sequence **CO**nsiderations, Structural **CO**nsiderations, Energy **CO**nsideration, Energy landscape &Validation. Nucleic acid structures: DNA structures, RNA structures & Se**CO**ndary structure prediction in RNA.

Unit 5: COmputer Aided Drug Designing **8 Hours**

Protein Function Prediction,Metabolic Pathway analysis, **CO**mputer 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 **CO**ncepts of Bioinformatics – D E Krane and M L Raymer, Pearson Education.
4. Bioinformatics Methods & applications, Genomics, Proteomics & Drug Dis**CO**very – 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 **CO**ncepts and numericals.
2. Assessment methods and weightages :2 sessionals had been **CO**nducted. Also, assignments were provided. Quizes had been **CO**nducted 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 **CO**ncepts of Artificial Intelligence and Neural Networks.(**CO**gnitive Level: Apply)
CO2. Differentiate various machine learning strategies and how to apply them.(**CO**gnitive Level: Evaluate)
CO3. Designand formulate various Neural Network architectures. (**CO**gnitive Level: Analyze)
CO4. Create the **CO**ncepts of Deep Learning and **CO**mpare it with machine learning.(**CO**gnitive Level: Evaluate)
CO5. Apply Deep Learning Algorithms Students over various applications.(**CO**gnitive 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 **CO**rrection Learning, Hebbian Learning, **CO**mpetitive Learning.
Introduction to Programming with R and python, Data preprocessing
Descending the Right Curve: Interpreting Learning as Optimization, **CO**st 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 **CO**mponents 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: **CO**nvolution 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 **CO**mprehensive 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 **CO**mputing, John Wiley & Sons, 2007

Teaching-Learning Strategies in brief

Apart from lectures, use of ICT for better visualization of the **CO**ncepts and to demonstrate the working of various learning algorithms for model development.

Assessment methods and weightages in brief

During the **CO**urse, two sessional examinations will be **CO**nducted 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 **CO**ncepts of security in networking and data transmission.(**CO**gnitive Level: Remember)
CO-2: Apply different mathematical **CO**ncepts related to cryptography.(**CO**gnitive Level: Apply)
CO-3: Apply and evaluate different cryptographic techniques.(**CO**gnitive Level: Evaluate)
CO-4: Apply and evaluate different network security proto**CO**ls.(**CO**gnitive Level: Analyze)
CO-5: Demonstrate knowledge and apply mechanisms related to network security, internet security and information security.(**CO**gnitive 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 Authentication**CO**des - Hash Functions - Security of Hash Functions and MACs - MD5message Digest algorithm - Secure Hash Algorithm - Digital Signatures, Authenticationproto**CO**ls-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, S**CO**tt A. Vanstone, "Handbook Of Applied Cryptography"
3. Charlie Kaufman, Radia Perlman, Mike Speciner, "Network Security: Private **CO**mmunication 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. En**CO**urage 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.(**CO**gnitive Level: Understand)
CO2. To analyze File and Directory management. (**CO**gnitive Level: Apply)
CO3. To interpret Signal generation and handling.(**CO**gnitive Level: Evaluate)
CO4. To understand IPC, network programming in Java. (**CO**gnitive Level: Analyze)
CO5. To evaluate processes to **CO**mmunicate with each other across a **CO**mputer Network. (**CO**gnitive 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, **CO**mmand substitution, shell **CO**mmands, the environment, quoting, test **CO**mmand, **CO**ntrol structures, arithmetic in shell, shell script examples.
Review of C programming **CO**ncepts-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 re**CO**rd 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 **CO**ntents, Scanning Directories- Directory file APIs. Process- Process **CO**ncept, Kernel support for process, process

attributes, process **CO**ntrol – 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 **CO**mmunication – 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 **CO**nnection Oriented – **CO**mmunication, Socket system calls for **CO**nnectionless-**CO**mmunication, Example-Client/Server Programs- Single Server-Client **CO**nnection, 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 **CO**nnection at a time and multiple **CO**nnections (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. En**CO**urage 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)

CO1 Understand the various types of Pattern re**CO**gnition techniques and to apply Bayesian classification for solving various classification problems. (**CO**gnitive Level: Remember)

CO2 Create a Bayesian Network, predict and draw inference from a Bayesian network. (**CO**gnitive Level: Apply)

CO3 Apply principal **CO**mponent analysis and linear discriminant analysis to reduce the dimensionality. (**CO**gnitive Level: Evaluate)

CO4 Formulate the optimal decision boundary with the use of proper learning strategy. (**CO**gnitive Level: Analyze)

CO5 Apply unsupervised learning techniques to solve critical problems. (**CO**gnitive 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, **CO**mponents 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: **CO**ntrast 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; **CO**rrespondence 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, **CO**lor Models, **CO**nverting **CO**lors to different models, **CO**lor Transformation, Smoothing and Sharpening, **CO**lor Segmentation.
Morphological Image Processing: Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of **CO**nnected **CO**mponents, **CO**nvex 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, **CO**rner 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 Re**CO**gnition, 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 **CO**mputer 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. **CO**mputer Vision Algorithms and Applications, 2nd Edition, Richard Szeliski, Springer.
5. **CO**mputer 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. En**CO**urage 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 **CO**mputer 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 **CO**re theories, models and methodologies from the field of HCI.(**CO**gnitive Level: Understand)
CO-2 Describe what the user-centered design cycle is and explain how to practice this approach to design interactive software systems.(**CO**gnitive 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. (**CO**gnitive Level: Evaluate)
CO-4 Demonstrate a thorough understanding and solid knowledge of the principles and techniques of human-**CO**mputer interaction. (**CO**gnitive Level: Analyze)
CO-5 Abletodrawonavarietyoftechniquesandrelevantknowledgeandappropriately apply them to new situations and real-life problems. (**CO**gnitive 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**	**PSO 1**	**PSO 2**	**PSO 3**
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,Physical**CO**ntrols,sensorsandspecialdevices,Paper:printingandscanning

UNIT 2: **8 Hours**
Designing- Programming Interactive systems- Models of interaction, Frameworks and HCI,Ergonomics,Interactionstyles,ElementsoftheWIMPinterface,The**CO**ntextoftheinteraction,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 - **CO**gnitive models, Goal and task hierarchies, Linguistic models, Thechallengeofdisplay-basedsystems,Physicalanddevicemodels,**CO**gnitive architectures

UNIT 5: **8 Hours**

COllaboration and **CO**mmunication - Face-to-face **CO**mmunication, **CO**nversation, Text-based**CO**mmunication, 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-**CO**mputer Interaction, 3rd Edition, Pearson Publishers,2008.
2. Shneiderman, Plaisant, **CO**hen and Ja**CO**bs, Designing the User Interface: Strategies for Effective Human **CO**mputer Interaction, 5th Edition, Pearson Publishers, 2010.
3. Human **CO**mputer 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 **CO**mputing
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 **CO**ncepts in mobile **CO**mmunications and its services.(**CO**gnitive Level: Apply)
CO-2 Analyse the various **CO**mmunication access techniques and Illustrate the technical format, addressing and transmission strategies of packets. (**CO**gnitive Level: Evaluate)
CO-3 Evaluate the effectiveness of different mobile **CO**mputing frameworks. (**CO**gnitive Level: Analyze)
CO-4 Understand the functionality of MAC, Network layer and Identifying a routing proto**CO**l for given Ad-hoc Networks. Demonstrate the Adhoc networks **CO**ncepts and its routing proto**CO**ls.(**CO**gnitive Level: Evaluate)
CO-5 Analyse the failure re**CO**very method in TCP. Identify and solve database issues using hoarding techniques. (**CO**gnitive 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 **CO**mputing - Architecture of Mobile **CO**mputing - Novel Applications – Limitations.GSM - GSM System Architecture - Radio Interface – Proto**CO**ls - Localization and Calling - Handover - Security - New Data Services.

UNIT II **8 Hours**
DATA LINK LAYER : Medium Access **CO**ntrol Proto**CO**l - 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 Dis**CO**very – Registration - Tunnelling and Encapsulation – Optimizations -Dynamic Host **CO**nfiguration Proto**CO**l.

UNIT IV **10 Hours**

MOBILE TRANSPORT LAYER : Traditional TCP - Indirect TCP - Snooping TCP - Mobile TCP - Fast Retransmit and Fast Re**CO**very - Transmission /Time-Out Freezing - Selective Retransmission - Transaction Oriented TCP.

UNIT V **8 Hours**

DATABASE ISSUES : Hoarding Techniques - Caching Invalidation Mechanisms - Client Server **CO**mputing with Adaptation- Power Aware and **CO**ntext Aware **CO**mputing - Transactional Models - Query Processing – Re**CO**very - and Quality of Service Issues.

Reference books:

1. Reza Behravanfar, "Mobile **CO**mputing 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 **CO**mputing", McGraw-Hill Professional, 2005.
3. Hansmann, Merk, Nickolas, Stober, "Principles of Mobile **CO**mputing", se**CO**nd edition, Springer, 2003.Martyn Mallick, "Mobile and Wireless Design Essentials", Wiley DreamTech, 2003.
4. Ivan Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile **CO**mputing", Wiley, 2002.
5. Jochen Schiller, "Mobile **CO**mmunications", Se**CO**nd 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 **CO**mpletion of this **CO**urse, students will be able to:

CO 1: Create web pages using PHP and identify the difference between the HTML PHP and XML documents. (**CO**gnitive Level: Remember)
CO 2: Identify the engineering structural design of XML and parse tree and analyse the difference between and PHP and XML. (**CO**gnitive Level: Apply)
CO 3: Understand the **CO**ncept of JAVA SCRIPTS and identify the difference between the JSP and Servlet. (**CO**gnitive Level: Evaluate)
CO 4: Design web application using MVC architecture and apply JDBC and ODBC technologies to create database **CO**nnectivity (**CO**gnitive Level: Analyze)
CO 5: Have a Good grounding of Web Application Terminologies, Internet Tools, E – **CO**mmerce and other web services. (**CO**gnitive 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. **CO**nvergence of **CO**mputer, **CO**mmunication and Entertainment Products ,Stages of Multimedia Projects: Multimedia hardware, Memory & storage devices, **CO**mmunication 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 & **CO**nnectivity, Services of the Internet: E-Mail, World Wide Web (WWW), Remote Access, **CO**llaboration, 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, Proto**CO**ls governing Web, Creating Websites for individual and **CO**rporate 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 **CO**mbination 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 **CO**mpleting this **CO**urse, the students should be able to

CO-1 Identify different media; representations of different multimedia data and data formats. (**CO**gnitive Level: Apply)
CO-2 Analyze various **CO**mpression techniques. (**CO**gnitive Level: Evaluate)
CO-3 **CO**mpare various audio and video file formats. (**CO**gnitive Level: Analyze)
CO-4 Apply different **CO**ding technique for solving real world problems. (**CO**gnitive Level: Evaluate)
CO-5 Choose optical storage media suitable for multimedia applications. (**CO**gnitive 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 **CO**mpression 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, **CO**lor imageprocessing.

Image COmpression: Types of **CO**mpression: Lossy& lossless, symmetrical & asymmetrical, intraframe&interframe Hybrid, Loss less: RLE, Shannon- Fano algorithm, Arithmetic **CO**ding. Lossy: Vector quantization, fractal **CO**mpression technique, transform **CO**ding, psycho-analysis, interframe **CO**rrelation. Hybrid: JPEG-DCT
Programs **CO**nsiderations for image enhancement using point processing and image **CO**mpression.

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 **CO**mpression: Huffman **CO**ding, 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 **CO**mpression. Video streaming. Study and analysis of video formats, **CO**mpression 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 **CO**ncepts of multimedia, its applications and the techniquesinvolved
3. Help students learn the issues involved in capturing, processing, manipulating, storing, and retrieving various kinds of **CO**ntinuousmedia.

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 – 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)

CO1 Create and formulate the **CO**ncepts of digital image and image enhancement in spatial domain.(**CO**gnitive Level: Remember)
CO2 Formulate and apply various image smoothing and sharpening filters in frequency domain. (**CO**gnitive Level: Apply)
CO3 Design **CO**lor models and apply various morphological operations over an image. (**CO**gnitive Level: Evaluate)
CO4 Develop and apply the **CO**ncept of point, edge line and region segmentation. (**CO**gnitive Level: Analyze)
CO5 Investigate feature extraction techniques and apply object re**CO**gnition. (**CO**gnitive 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. **CO**mputer Vision Algorithms and Applications, 2nd Edition, Richard Szeliski, Springer.
2. **CO**mputer 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 **CO**mputer 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 **CO**ncepts of multimedia, its applications and the techniquesinvolved
3. Help students learn the issues involved in capturing, processing, manipulating, storing, and retrieving various kinds of **CO**ntinuousmedia.

Assessment methods and weightages

1. Teachers 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 andDevelopmentprocessesandlifecycleof Human**CO**mputerInterface. (**CO**gnitive Level: Understand)
CO2 Analyzeproductusabilityevaluationsandtestingmethods.(**CO**gnitive Level: Apply)
CO3 Applytheinterfacedesignstandards/guidelinesforcrossculturalanddisabledusers (**CO**gnitive Level: Evaluate)
CO4 Categorize,DesignandDevelopHuman**CO**mputerInterfaceinproperarchitecturalstructures. (**CO**gnitive 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.(**CO**gnitive 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 **CO**nceptualizing Interaction: **CO**nceptual Models – Interface Metaphors – Interaction Types – Paradigms and Frameworks. **CO**gnitive Aspects: **CO**gnition – **CO**gnitive Framework. Social Interaction – Emotional Interaction.

Unit 2: **8 Hours**
Interfaces: Types – Natural User Interfaces, Data Gathering: Key Issues – Data Re**CO**rding – Interviews – Questionnaires – Observation – Choosing and **CO**mbining 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 **CO**nstruction: Prototyping and

COnstruction – **CO**nceptual Design and Physical Design – Using Scenarios, Prototypes in Design. Evaluation: Introduction – Evaluation Framework.

Unit 4 MOBILE HCI **9 Hours**

Mobile E**CO**system: 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, **CO**ntextual Tools, Overlays, Inlays and Virtual Pages, Process Flow – Case Studies

Reference Books:

1. Research Methods in Human-**CO**mputer Interaction, Se**CO**nd Editionby Jonathan Lazar, Jinjuan Heidi Feng, Harry Hochheiser, Morgan Kaufmann (2017)
2. Sharp, H., Rogers, Y., and Preece, J, "Interaction Design: Beyond Human – **CO**mputer 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, **CO**ntexts, 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, **CO**gnition, 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 **CO**mplete 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 **CO**nducting 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 **CO**mputing prototype, its evolution and the advent of web services.(**CO**gnitive Level: Understand)

CO2 Identify the appropriate service description to implement the ordering of message exchange patterns.(**CO**gnitive Level: Remember)

CO3 Apply and evaluate the quality aspects of the Web service. (**CO**gnitive Level: Evaluate)

CO4 Apply Action Scripts to utilize various programmatic techniques. (**CO**gnitive Level: Analyze)

CO5 Apply the knowledge of service oriented **CO**mputing prototype, progress and the advent of web services. (**CO**gnitive 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 **CO**mputing, **CO**re distributed **CO**mputing technologies – client/server, **CO**RBA, JAVA RMI, Microsoft D**COM**, MOM, Distributed **CO**mputing Challenges, the Role of J2EE and XML in Distributed **CO**mputing, 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 **CO**re building blocks of web services, the standards and technologies available for implementing web services, web services **CO**mmunication, and the basic steps for implementing web services are all **CO**v-

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 Proto**CO**l. **CO**mmunication between applications and wire proto**CO**ls As a messaging proto**CO**l, SOAP SOAP message structure, SOAP envelope Service Oriented Architectures, En**CO**ding SOA re-examined, In a SOA, service roles, dependable messaging, SOA Development Lifecycle, Enterprise Service Bus HTTP SOAP binding, SOAP **CO**mmunication model SOAP error handling

UNIT – IV: 8 Hours

Service Registration and Dis**CO**very: The Role of Service Registries, Service Dis**CO**very, Universal Description, Dis**CO**very, 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 **CO**nsiderations 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 **CO**mputing" 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. En**CO**urage 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 **CO**mputing
L-T-P: 3-0-0
Credits: 3
(L=Lecture hours, T=Tutorial hours, P=Practical hours)

COURSE OUTCOMES (COs)

After **CO**mpleting this **CO**urse, the students should be able to:

CO-1: Articulate the main **CO**ncepts, key technologies, strengths, and limitations of cloud **CO**mputing and the possible applications for state-of-the-art cloud **CO**mputing. (**CO**gnitive level: Analyse)
CO-2: Identify the architecture and infrastructure of cloud **CO**mputing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.(**CO**gnitive level: Analyse)
CO-3: Explain the **CO**re issues of cloud **CO**mputing such as security, privacy, and interoperability. (**CO**gnitive level: Apply)
CO-4: Provide the appropriate cloud **CO**mputing solutions and re**CO**mmendations ac**CO**rding to the applications used.(**CO**gnitive level: Apply)
CO-5: **CO**llaboratively research and write a research paper, and present the research online.(**CO**gnitive 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 **CO**mputing - Overview of Distributed **CO**mputing, Cluster **CO**mputing, Grid **CO**mputing. Technologies for Network based systems- System models for Distributed and cloud **CO**mputing- Software environments for distributed systems and clouds.

UNIT II **8 Hours**
Introduction to Cloud **CO**mputing- Cloud issues and challenges - Properties - Characteristics - Service models, Deployment models. Cloud resources: Network and API - Virtual and Physical

COmputational resources - Data-storage. Virtualization **CO**ncepts - Types of Virtualization- Introduction to Various Hypervisors - High Availability (HA)/Disaster Re**CO**very (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: **CO**mputation, 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 ac**CO**unting - Cloud Provenance and meta-data - Cloud Reliability and fault-tolerance - Cloud Security, privacy, policy and **CO**mpliance- Cloud federation, interoperability and standards.

Reference Books

1. Barrie Sosinsky, " Cloud **CO**mputing Bible" John Wiley & Sons, 2010
2. Tim Mather, Subra Kumaraswamy, and Shahed Latif, Cloud Security and Privacy An Enterprise Perspective on Risks and **CO**mpliance, 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-**CO**nstrained 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. (**CO**gnitive Level: Remember)
CO 2: Apply the **CO**ncept of drive system for designing Robots. (**CO**gnitive Level: Apply)
CO 3: Understand sensor technology for creating vision system to Robot. (**CO**gnitive Level: Evaluate)
CO 4: Design and develop Robotics Kinematics and Dynamics. (**CO**gnitive Level: Analyze)
CO 5: Create a program to **CO**ntrol robot mechanism. (**CO**gnitive 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 1: FUNDAMENTALS OF ROBOT. 8 Hours

Robot - Definition - Robot Anatomy - **CO**ordinate Systems, Work Envelope Types and Classification- Specifications-Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load- Robot Parts and their Functions-Need for Robots-Different Applications.

UNIT 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 **CO**mparison 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 **CO**nsiderations.

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 En**CO**ders, 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, **CO**mpliance Sensors, Slip Sensors, Camera, Frame Grabber, Sensing and Digitizing Image Data- Signal **CO**nversion, Image Storage, Lighting Techniques, Image Processing and Analysis-Data Reduction, Segmentation, Feature Extraction, Object Re**CO**gnition, 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) Ja**CO**bians, Velocity and Forces-Manipulator Dynamics, Trajectory Generator, Manipulator Mechanism Design-Derivations and problems. Lead through Programming, Robot programming Languages-VAL Programming-Motion **CO**mmands, Sensor **CO**mmands, End Effector **CO**mmands and simple Programs.

UNIT 5: IMPLEMENTATION AND ROBOT ECONOMICS 8 Hours

RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety **CO**nsiderations for Robot Operations - E**CO**nomic Analysis of Robots.

REFERENCES:

1. Craig J.J., “Introduction to Robotics Mechanics and **CO**ntrol”, 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 **CO**ntrol, 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. En**CO**urage participation of students in learning.
2. **CO**nnect the subject matter with the student’s everyday life.
3. En**CO**urage the spirit of questioning by the students.
4. Arrange student friendly study material and other learning resources.
5. Create friendly environment **CO**nducive 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. (**CO**gnitive Level: Create)
CO2: Skills to **CO**nsider the impact of current and new technologies on methods of working in the outside world and on social, e**CO**nomic, ethical and moral issues.(**CO**gnitive Level: Analyze)
CO3: ICT-based solutions to solve problems. (**CO**gnitive Level: Evaluate)
CO4: The ability to re**CO**gnize potential risks when using ICT, and use safe, secure and responsible practice. (**CO**gnitive Level: Understand)
CO5: To analyze ICT tools for the development.(**CO**gnitive Level: Analyze)

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	1	-	1	-	-	1	1	1	1	1
CO2	1	1	1	-	1	-	2	2	1	-	1	-	2	2	-
CO3	1	1	-	1	2	1	-	1	-	1	-	1	1	1	1
CO4	1	-	1	1	2	-	1	2	1	-	3	-	2	2	1
CO5	1	1	-	2	3	1	-	1	-	1	1	1	1	1	2

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Detailed Syllabus:

Unit I Types and COmponents of COmputer systems: **(8 Hours)**
Hardware **CO**nsists of the physical **CO**mponents of a **CO**mputer system Internal **CO**mponents including Central Processing Unit (CPU), processor, motherboard Internal memory including random access memory (RAM), read-only memory (ROM) Hardware **CO**mponents including graphics card, sound card, Network Interface Card (NIC), camera, internal/ external storage devices, System software provides the services that the **CO**mputer requires to operate Examples of system software including **CO**mpilers, 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 **CO**nvert: analogue to digital data so it can be processed by a **CO**mputer , digital data to analogue data so it can be used to **CO**ntrol 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 **CO**ntrol, joystick/driving wheel, touch screen (as an input device), scanners, camera, microphone, sensors, light pen, Direct data entry: Char-

acteristics, uses, advantages and disadvantages of direct data entry devices including: magnetic stripe reader, chip and PIN reader, Radio Frequency Identification (RFID) reader, Optical Mark Re**CO**gnition/Reader (OMR), Optical Character Re**CO**gnition/Reader (OCR), bar **CO**de 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-**CO**ntrolled 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 **CO**mmunication, **CO**mputer modelling; Including: personal finance, bridge and building design, flood water management, traffic management, weather forecasting Advantages and disadvantages of using **CO**mputer modelling rather than humans, Characteristics, uses, advantages and disadvantages of satellite systems including Global Positioning Systems (GPS), satellite navigation, Geographic Information Systems (GIS), media **CO**mmunication 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, **CO**ding 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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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 **CO**mmunicative **CO**mpetence through the useful inputs and task-based activities. (**CO**gnitive Level: Understand)
CO2: This enables them to build their **CO**nfidence in using English language.(**CO**gnitive Level: Apply)
CO3: To be able to **CO**mpete with the globalized world and be**CO**me successful in all the challenges that they face.(**CO**gnitive Level: Apply)
CO4: To develop Linguistic **CO**mpetence and **CO**mmunicative **CO**mpetence which helps them to develop "thinking" skill in English. (**CO**gnitive Level: Create)
CO5: The students can hone their interpersonal and employability skills draw upon real-life situations and examples.(**CO**gnitive 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

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Detailed Syllabus:

UNIT I - Self Analysis: **(8 Hours)**

SWOT Analysis, Who am I, Attributes, Importance of Self **CO**nfidence, 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. **CO**vey 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 **CO**leman, Emotional Intelligence, Bantam Book, 2006

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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. (**CO**gnitive Level: Understand)
CO2: The students will learn the rights and responsibilities as an employee, team member and a global citizen.(**CO**gnitive Level: Apply)
CO3: Describe Information Technology act and Related Legislation.(**CO**gnitive Level: Evaluate)
CO4: Demonstrate Electronic business and legal issues. (**CO**gnitive Level: Apply)
CO5: Interpret Cyber Ethics.(**CO**gnitive 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

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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 **CO**des 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 re**CO**gnition of Digital Evidence
C) Re**CO**gnition 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 **CO**pyright Act), **CO**pyright 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, **CO**mputer fraud, Gray Hat Hacking, Crimes and penalties under the **CO**mputer Fraud and Abuse Act (CFAA)

Reference Book:

1. Yatindra Singh, "Cyber Laws", Universal Law Publishing, Sixth edition.
2. Ajit Narayanan and Bennum,"Law, **CO**mputer 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 **CO**mputer, Internet and E-**CO**mmerce, Universal Law Publishing,2016
5. Arvind Singhal and Everett Rogers : India's **CO**mmunication Revolution : From Bullock Carts to Cyber Marts.SAGE India; First edition (20 November 2000)
6. Lawrence Lessing : **CO**de 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, **CO**mputer Forensics And Legal Perspectives, Wiley India Pvt. Ltd, 2011.
9. Mark F Grady, Franses**CO**Parisi, "The Law and E**CO**nomics 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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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 **CO**mpletion of this **CO**urse, students will be able to
CO1: Understand Astronomy, Mathematics, Engineering and Medicine of ancient India. (**CO**gnitive Level: Understand)
CO2: Analyze Scientific and Technological Developments in Medieval India.(**CO**gnitive Level: Analyze)
CO3: Will be aware of Surveyors, Botanists, Doctors, under the EI **CO**mpany's Service.(**CO**gnitive Level: Apply)
CO4: Will be aware of various scientists of India.(**CO**gnitive Level: Apply)
CO5: Familiar with ISRO, DRDO, etc.(**CO**gnitive 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	1	-	1	1	1	-	1	1	1	3	2	2	1	3
CO2	1	-	1	-	2	-	1	-	1	-	1	2	2	2	3
CO3	1	-	-	-	-	1	-	1	-	1	1	2	1	1	3
CO4	1	1	2	1	1	-	1	-	1	-	3	1	-	-	3
CO5	-	-	-	-	1	-	1	1	1	1	2	2	1	1	3

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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 **CO**pper, 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 **CO**lonial India- Surveyors, Botanists, Doctors, under the **CO**mpany'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 **CO**mmission; 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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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 **CO**ncept of Sustainable Development (SD), the environmental, social and e**CO**-nomic dimensions. (**CO**gnitive Level: Understand)
CO2: Understand the embedment of sustainability issues in environmental, societal, and e**CO**nomic systems, and the relevance of the **CO**nditions, interrelations, and dynamics of these systems.(**CO**gnitive Level: Under-stand)
CO3: Demonstrate knowledge and understanding of the current sustainable development policies followed by selected **CO**untries.(**CO**gnitive Level: Apply)
CO4: To identify different stakeholders in a challenge to sustainability, and analyze the political and e**CO**nom-ic structures that **CO**nnect them.(**CO**gnitive Level: Analyze)
CO5: Assess the sustainable practices of any **CO**mmunity based on metrics.(**CO**gnitive Level: Apply)
CO6: Demonstrate judging capability of the impact of any decision on the sustainable development metric of a **CO**mmunity.(**CO**gnitive 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

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 **CO**ined; evolution of SD perspectives (MDGs AND SDGs) over the years; recent debates; 1987 Brundtland **CO**mmission and out**CO**me; later UN summits (Rio summit, etc.) and out**CO**me.

Unit-II (8 Hours)

Dimensions to Sustainable Development - society, environment, culture and e**CO**nomy; current challenges - natural, political, socio-e**CO**nomic imbalance; sustainable development initiatives and policies of various **CO**untries : global, regional, national, local; needs of present and future generation - political, e**CO**nomic, 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 e**CO**nomy; needs of present and future generation; **CO**nflicts - sustainability and rural culture & tradition; road to achieving sustainable development goals - bridging **CO**nflicts 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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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 **CO**urse, students will be able to

CO1: Summarize the **CO**re **CO**ncepts related to malware, hardware and software vulnerabilities and their causes. (**CO**gnitive Level: Create)

CO2: Choose state-of-the-art tools to exploit the vulnerabilities related to **CO**mputer system and networks.(**CO**gnitive Level: Evaluate)

CO3: Experiment with various tools to exploit web applications.(**CO**gnitive Level: Apply)

CO4: Solve the security issues in web applications.(**CO**gnitive 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

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 **CO**ncepts- Why Ethical Hacking is Necessary -S**CO**pe and Limitations of Ethical Hacking -Skills of an Ethical Hacker -Why Ethical Hacking is Necessary -S**CO**pe and Limitations of Ethical Hacking -Skills of an Ethical Hacker

UNIT III **(8 Hours)**

Footprinting **CO**ncepts- Footprinting Terminology -What is Footprinting?-Why Footprinting?-Objectives of Footprinting-Email Footprinting- System Hacking- Cracking Passwords -Password Cracking-Password **CO**mplexity-Password Cracking Techniques -Types of Password Attacks.

UNIT IV **(8 Hours)**

Trojan **CO**ncepts- 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 Re**CO**nnaissance, 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 **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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 Mining**

L-T-P : 3-0-0 **Credits**: **3**

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

COURSE OUTCOMES (CO)

After learning the **CO**urse the students should be able to:

CO1: Perform the preprocessing of data and apply mining techniques on it. (**CO**gnitive Level: Apply)
CO2: Identify the association rules, classification, and clusters in large data sets. (**CO**gnitive Level: Analyze)
CO3: Solve real world problems in business and scientific information using data mining. (**CO**gnitive Level: Evaluate)
CO4: Use data analysis tools for scientific applications. (**CO**gnitive Level: Analyze)
CO5: Implement various supervised machine learning algorithms. (**CO**gnitive 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

Detailed Syllabus:

Unit-I **(8 Hours)**

Introduction to data mining (DM): Motivation for Data Mining - Data Mining-Definition and Functionalities – Classification of DM Systems - DM task primitives - Integration of a Data Mining system with a Database or a Data Warehouse - Issues in DM – KDD Process

Unit-II **(8 Hours)**

Data Pre-processing: Data summarization, data cleaning, data integration and transformation, data reduction, data discretization and **CO**ncept hierarchy generation, feature extraction , feature transformation, feature selection, introduction to Dimensionality Reduction, CUR de**CO**mposition

Unit-III **(8 Hours)**

COncept Description, Mining Frequent Patterns, Associations and **CO**rrelations:

What is **CO**ncept description? - Data Generalization and summarization-based characterization - Attribute relevance - class **CO**mparisons, Basic **CO**ncept, efficient and scalable frequent item-set mining methods,

mining various kind of association rules, from association mining to **CO**rrelation analysis, Advanced Association Rule Techniques, Measuring the Quality of Rules.

Unit-IV **(8 Hours)**

Classification and Prediction

Classification vs. prediction, Issues regarding classification and prediction, Statistical-Based Algorithms, Distance-Based Algorithms, Decision Tree-Based Algorithms, Neural Network-Based Algorithms, Rule-Based Algorithms, **CO**mbining Techniques, accuracy and error measures, evaluation of the accuracy of a classifier or predictor. Neural Network Prediction methods: Linear and nonlinear regression, Logistic Regression Introduction of tools such as DB Miner / WEKA / DTREG DM Tools

Unit-V: **(8 Hours)**

Cluster Analysis and Clustering: Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms, Partitioning Clustering -K-Means Algorithm, K-Means Additional issues, PAM Algorithm; Hierarchical Clustering – Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering, Strengths and Weakness; Outlier Detection, Clustering high dimensional data, clustering Graph and Network data.

Reference Book:

1. Data Mining: **CO**ncepts 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

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3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting 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. (**CO**gnitive Level: Apply)

CO2: Analyse the strategic options for ERP identification and adoption.(**CO**gnitive Level: Analyze)

CO3: Design the ERP implementation strategies. (**CO**gnitive Level: Create)

CO4: Understand the need of Business Systems and Processes through strategic analysis of ERP systems. (**CO**gnitive Level: Understand)

CO5: Develop and design the modules used in ERP systems, and can customize the existing modules of ERP systems . (**CO**gnitive 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

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, **CO**nsumption based planning, Purchasing, Inventory management, Evaluation of materials, Invoice verification, Balance sheet evaluation,Material ledger.

Unit-IV **(8 Hours)**

Introduction, SAP AG, Baan **CO**mpany, Oracle **CO**rporation, People Soft, JD Edwards World Solutions **CO**, System Software Associates, Inc. (SSA); QAD; A **CO**mparative 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; **CO**nfiguration; 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 **CO**rporate 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

Teaching-Learning Strategies in brief

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4. En**CO**urage 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 **CO**nducting 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 **CO**urse, students should be able to

CO1: Understand rural development model. (**CO**gnitive Level: Understand)

CO2: Learn different measures in rural development and its impact on overall e**CO**nomy. (**CO**gnitive Level: Analyze)

CO3: Understand and learn importance of technologies in rural and **CO**mmunity development. (**CO**gnitive Level: Understand)

CO4: Understand challenges and opportunities in rural development.(**CO**gnitive Level: Understand)

CO5: Analyze the cases of model villages.(**CO**gnitive Level: Analyze)

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	1	-	1	-	-	1	-	1	1	-	1
CO2	-	1	1	-	-	1	2	-	1	-	1	1	-	1	2
CO3	1	-	1	1	-	1	-	2	2	2	2	2	1	-	2
CO4	1	-	1	-	1	1	3	3	2	3	2	2	-	1	1
CO5	1	1	-	-	1	-	2	2	-	2	2	-	2	2	3

Detailed Syllabus:

Unit-I (8 Hours)

RURAL DEVELOPMENT - **CO**ncepts and **CO**nnotations, Basic Elements, Growth Vs. Development, Why rural development, Rising expectations and development, Development and Change, Human beings as cause and **CO**nsequences of development. RURAL E**CO**NOMY 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 in**CO**me distribution, Measures of development simplified, **CO**ncepts 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 e**CO**nomic development,

The human capital model of development, The Gandhian **CO**ncept 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, **CO**nnecting to the Electrical Network, Environmental **CO**nsiderations.

Use of ICT in Rural and agricultural development - Education, Healthcare, Agriculture, Business, Resource Mapping, Digital and Social Media Marketing Decision Support Systems for soil **CO**nservation and farm management Waste Management and Sanitation.

Unit-IV **(8 Hours)**

DEVELOPING **CO**MMUNITIES - Introduction, Service Learning and **CO**mmunity development, Theory and practice of **CO**mmunity development, **CO**mmunity development issues. The diverse meaning of **CO**mmunity development, The knowledge base of **CO**mmunity development, International **CO**mmunity development.

Different forms of Rural Entrepreneurship, Significance , Business planning for a new venture: the **CO**ncept of planning paradigm, Forms of business enterprises-Sole proprietorship, partnership and **CO**rporations, Product and Process development, Marketing analysis and **CO**mpetitive 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 **CO**mpetition by Paani Foundation, **CO**mmunity 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 **CO**mmunity 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 E**CO**nomics-Institutions, Theory and Policy”, First Edition, S B Gupta, S Chand Publications, ISBN – 9788121904346.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide **CO**ncrete basic and advanced knowledge of the subject.
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4. En**CO**urage 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 **CO**nducting 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 **CO**ncepts of technologies that **CO**nform to low-power **CO**mputation.(**CO**gnitive Level: Understand)

CO2: To understand green (power-efficient) technologies for **CO**mponents of one single **CO**mputer, such as CPU, memory and disk, and appreciate cutting edge designs for these **CO**mponents.(**CO**gnitive 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.(**CO**gnitive Level: Understand)

CO4: To discuss the various laws, standards and proto**CO**ls for regulating green IT.(**CO**gnitive Level: Analyze)

CO5: Be able to use a range of tools to help monitor and design green systems.(**CO**gnitive 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	2
CO2	1	-	-	1	1	1	-	-	-	1	-	1	1	1	1
CO3	1	2	-	2	1	-	2	2	-	1	1	1	1	-	1
CO4	1	-	1	-	1	-	1	1	1	-	-	1	-	-	1
CO5	-	1	1	-	-	1	2	-	1	-	1	-	2	2	1

Detailed Syllabus:

Unit-I **(8 Hours)**

Green IT Fundamentals: Business, IT, and the Environment –Green **CO**mputing: carbon foot print, s**CO**op 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 **CO**llaboration –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, Tele**CO**mmuting, tele**CO**nferencing 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 **CO**mpliance: Proto**CO**ls, 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 Tele**CO**m Sector.

Text Books

1. BhuvanUnhelkar, Green IT Strategies andApplications-Using Environmental Intelligence, CRC Press, June 2011
2. Woody Leonhard, Katherrine Murray, Green Home **CO**mputing 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 **CO**mputing and Green IT-Best Practices on regulations & industry, Lulu.**CO**m, 2008.
4. Carl Speshocky, Empowering Green Initiatives with IT, John Wiley & Sons, 2010.
5. Wu Chun Feng (editor), Green **CO**mputing: Large Scale energy efficiency, CRC Press, 2012

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage to the students to ask more & more questions.
5. Motivate to the students to develop critical & strategic thinking
6.

Assessment methods and weightages in brief

1. By taking two sessional examinations.
2. By giving assignments.
3. By **CO**nducting 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 **CO**urse, you should be able to:

CO1: Analyze relationship theory and relationship e**CO**nomics from the point of view of the customer and the organization. (**CO**gnitive Level: Analyze)

CO2: Critically analyze an organization's relational strategies with stakeholder groups that affect how well it meets customer needs.(**CO**gnitive Level: Analyze)

CO3: Evaluate CRM implementation strategies.(**CO**gnitive Level: Evaluate)

CO4: Formulate and assess strategic, operational and tactical CRM decisions.(**CO**gnitive Level: Create)

CO5: Plan and **CO**nduct an investigation on an aspect of CRM, and **CO**mmunicate findings in an appropriate format.(**CO**gnitive 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	-	-	-	2	1	2	3	2	2	1	2	2
CO2	1	-	-	1	1	1	-	2	-	2	-	2	1	2	2
CO3	-	1	-	1	-	1	2	-	3	1	2	3	1	1	1
CO4	1	1	-	1	-	1	3	-	3	2	1	3	2	2	2
CO5	1	-	1	-	-	1	2	1	-	2	3	3	1	1	3

*

Detailed Syllabus:

Unit-I: (8 Hours)

CRM **CO**ncepts: 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, **CO**ntact, Lead and Knowledge Management. Field Force Automation. CRM Links in E-Business: E-**CO**mmerce 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 **CO**ncepts. Data Analysis: Market Basket Analysis (MBA), Click Stream Analysis, Personalization and **CO**llaborative 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: **CO**nflict, **CO**mplacency, Resetting the CRM Strategy. Selling CRM,Internally: CRM Development Team, S**CO**ping 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 **CO**nnecting 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 **CO**ncepts, 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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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 **CO**nducting 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 **CO**ncepts related to Infrastructure Projects. (**CO**gnitive Level: Understand)
CO2: Explain the role of private sector in infrastructure growth.(**CO**gnitive Level: Understand)
CO3: Describe the strategies for successful Infrastructure Project implementation. (**CO**gnitive Level: Understand)
CO4: Develop Infrastructure modelling and Life Cycle Analysis Techniques.(**CO**gnitive Level: Create)
CO5: Explain Sustainable development of Infrastructure. (**CO**gnitive 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	-	1	2	1	3	2	2	1	1
CO2	-	1	2	-	2	1	2	-	-	2	-	2	2	2	-
CO3	1	-	1	-	-	-	-	-	2	2	3	3	1	1	1
CO4	-	1	-	1	-	1	-	1	1	1	2	-	1	1	1
CO5	1	-	1	-	1	-	2	3	-	2	-	2	2	2	1

Detailed Syllabus:

Unit-I **(8 Hours)**

AN OVERVIEW OF BASIC **CO**NCEPTS 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 Tele**CO**mmunications Sector in India., an overview of the Urban Infrastructure in India, an over view of the Rural Infrastructure in India, an Introduction to Special E**CO**nomic 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, E**CO**nomic and Demand Risks: The Case study for Political Risks, Socius Maintenance of Infrastructure. Environmental Risks, Cultural Risks in International Infrastructure Projects, Legal and**CO**ntractual Issues in Infrastructure, Challenges in **CO**nstruction 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 **CO**ntracts, 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 & **CO**mpany, 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 E**CO**logical Approach to Landscape Planning. New York, NY: McGraw-Hill, 2000. ISBN: 9780070793989.

Teaching-Learning Strategies in brief

1. Build positive environment in the classroom.
2. Provide **CO**ncrete basic and advanced knowledge of the subject.
3. Solve problems based on the basic & advanced **CO**ncepts of the subject.
4. En**CO**urage 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 **CO**nducting class tests.
4. By taking semester examination.
5. Internal assessment (25 Marks) & Semester Examination (75 Marks) &Total Marks-100.