

**ACADEMIC REGULATIONS
COURSE STRUCTURE AND
DETAILED SYLLABUS**

COMPUTER SCIENCE AND ENGINEERING

B.TECH 4 YEAR UG COURSE

(Applicable for the batches admitted from 2020-2021)

REGULATION: R20

(I, II, III & IV Year Syllabus)



**J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
AUTONOMOUS**

Bhaskar Nagar, Moinabad Mandal, R.R. District,
Hyderabad – 500 075, Telegana State, India
Email: principal@jbiet.edu.in, Website: www.jbiet.edu.in

Institute-Vision and Mission

Vision:

To be a Centre of excellence in engineering and management education, research and application of knowledge to benefit society with blend of ethical values and global perception.

Mission:

M1: To provide world class engineering education, encourage research and development.

M2: To evolve innovative applications of technology and develop entrepreneurship.

M3: To mould the students into socially responsible and capable leaders.

Department - Vision and Mission

Vision:

To meet the emerging trends in Computer Science and Engineering, strive for self-reliance enabled through high end research by adopting a futuristic approach.

Mission:

M1: To impart qualitative education, prepare students refurbish their latent talents and aspire for a pragmatic career in Computer Science and Engineering.

M2: To provide an ambience to develop strategic areas of advance study with perception to foster industry centric education in Computer Science and Engineering.

M3: To inculcate self-learning among students to make them self-reliant and socially responsible.

Program Educational Objectives (PEOs):	
PEO1	To emphasize analytical, computational and programming based tools and methods of Computer Science and Engineering to solve real world problems.
PEO2	To mould the students careers through steering their confidence levels for better understanding, strengthening technical outlook for innovation and better communication at the job place where they are employed.
PEO3	To hone the technical skills for creation and productivity in Computer Science and Engineering beyond class room learning.
PEO4	To promote multi-disciplinary awareness through exposure to areas of project development and industrial training for sustainable competition in Research and Development.

Program Outcomes (POs):

PO1	Engineering Knowledge: Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO3	Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.
PO4	Conduct Investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
PO5	Modern Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6	The Engineer and Society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	Environment and Sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO9	Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentation and give and receive clear instructions.
PO11	Project Management and Finance: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO12	Life-long Learning: Recognize the need for and have the preparation and ability to Engage in independent and life- long learning in the broadest context of technological Change.

CSE Program Specific Outcomes (PSOs):

PSO1	Ability to design and develop computing system using mathematical knowledge and expertise outcomes other discipline.
PSO2	Ability to test and analyze quality of various systems to integrate them in larger computer systems.

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COMPUTER SCIENCE AND ENGINEERING**B. Tech Course Structure - R20****I YEAR – I SEMESTER**

S. No.	Code	Course Title	L	T	P	D	Credits
1	J110A	Differential Equations and Calculus	3	1	0	0	4
2	J110E	Engineering Chemistry	3	0	0	0	3
3	J112A	Basic Electrical Engineering	3	0	0	0	3
4	J1103	Chemistry Lab	0	0	2	0	1
5	J1121	Basic Electrical Engineering Lab	0	0	2	0	1
6	J1191	Engineering and IT Workshop	0	0	4	0	2
7	J1131	Engineering Drawing	0	0	0	6	3
8		Induction Program	-	-	-	-	-
Total			9	1	8	6	17

I YEAR – II SEMESTER

S. No.	Code	Course Title	L	T	P	D	Credits
1	J120B	English	3	0	0	0	3
2	J120A	Linear Algebra and Advanced Calculus	3	1	0	0	4
3	J120E	Semiconductor Physics	3	0	0	0	3
4	J125A	Programming for Problem Solving	3	0	0	0	3
5	J124A	Basic Electronics Engineering	3	0	0	0	3
6	J12M2	Gender Sensitization	2	0	0	0	0
7	J1202	English Language and Communication Skills Lab	0	0	2	0	1
8	J1203	Physics Lab	0	0	2	0	1
9	J1251	Programming for Problem Solving Lab	0	0	4	0	2
10	J1241	Basic Electronics Engineering Lab	0	0	2	0	1
Total			17	1	10	0	21

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COMPUTER SCIENCE AND ENGINEERING**B. Tech Course Structure - R20****II YEAR – I SEMESTER**

S. No	Code	Course Title	L	T	P	D	Credits
1	J210B	Probability and Statistics	3	1	0	0	4
2	J215A	Data Structures	3	0	0	0	3
3	J216A	Database Management Systems	3	0	0	0	3
4	J215B	Digital Logic Design and Computer Organization	3	0	0	0	3
5	J215C	Object Oriented Programming through Java	3	0	0	0	3
6	J21M2	Environmental Science	2	0	0	0	0
7	J2151	Data Structures Lab	0	0	2	0	1
8	J2161	Database Management Systems Lab	0	0	3	0	1.5
9	J2152	Object Oriented Programming through Java Lab	0	0	3	0	1.5
10	J2153	Internship – I	0	0	2	0	1
Total			17	1	10	0	21

II YEAR – II SEMESTER

S. No	Code	Course Title	L	T	P	D	Credits
1	J225B	Operating Systems	3	0	0	0	3
2	J225D	Computer Networks	3	0	0	0	3
3	J226A	Mathematical Foundations of Computer Science	3	0	0	0	3
4	J225C	Design and Analysis of Algorithms	3	0	0	0	3
5	J225E	Formal Languages and Automata Theory	3	0	0	0	3
6	J225A	Python Programming	3	0	0	0	3
7	J22M1	Professional Ethics	2	0	0	0	0
8	J2201	Soft Skills	2	0	0	0	0
9	J2252	Operating System and Computer Networks Lab	0	0	3	0	1.5
10	J2251	Python Programming Lab	0	0	3	0	1.5
Total			22	0	6	0	21

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COMPUTER SCIENCE AND ENGINEERING**B. Tech Course Structure - R20****III YEAR – I SEMESTER**

S. No	Code	Course Title	L	T	P	D	Credits
1	J31EA	Managerial Economics and Management Science	3	1	0	0	4
2	J315B	Compiler Design	3	1	0	0	4
3	J315C	Web Technologies	3	0	0	0	3
4	J316A	Linux Programming	3	0	0	0	3
5	BTCSEO1	Open Elective – I	3	0	0	0	3
6	J31M1	Artificial Intelligence	2	0	0	0	0
7	J3101	Employability Skills	2	0	0	0	0
8	J3151	Web Technologies Lab	0	0	3	0	1.5
9	J3161	Linux Programming Lab	0	0	3	0	1.5
10	J3153	Internship – II	0	0	2	0	1
Total			19	1	8	0	21

III YEAR – II SEMESTER

S. No	Code	Course Title	L	T	P	D	Credits
1	F326A	Data Science Through R	3	0	0	0	3
2	F326C	Software Engineering	3	0	0	0	3
3	F320A	Information Security	3	0	0	0	3
4	BTCSEE1	Professional Elective – I	3	0	0	0	3
5	BTCSEE2	Professional Elective - II	3	0	0	0	3
6	BTCSEO2	Open Elective – II	3	0	0	0	3
7	J32M2	Cyber Security	2	0	0	0	0
8	F3261	Software Engineering Lab	0	0	2	0	1
9	J3201	Life Skills and Professional Skills Lab	0	0	4	0	2
Total			20	0	6	0	21

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COMPUTER SCIENCE AND ENGINEERING**B. Tech Course Structure - R20****IV YEAR – I SEMESTER**

S. No	Code	Course Title	L	T	P	D	Credits
1	J415A	Machine Learning	3	1	0	0	4
2	BTECSEE3	Professional Elective - III	3	0	0	0	3
3	BTECSEE4	Professional Elective - IV	3	0	0	0	3
4	BTECSEE5	Professional Elective - V	3	0	0	0	3
5	BTECSEO3	Open Elective – III	3	0	0	0	3
6	F4151	Machine Learning Lab	0	0	3	0	1.5
7	F4161	Data Science through R Lab	0	0	3	0	1.5
8	F4152	Industry Oriented Mini Project	0	0	4	0	2
9	F4153	Project Stage – I	0	0	6	0	3
Total			15	0	16	0	24

IV YEAR – II SEMESTER

S. No	Code	Course Title	L	T	P	D	Credits
1	BTCSEE5	Professional Elective - VI	3	0	0	0	3
2	BTCSEE6	Open Elective – IV	3	0	0	0	3
3	F4252	Project Stage – II	0	0	14	0	7
4	F4251	Seminar	0	0	2	0	1
Total			6	0	16	0	14

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COMPUTER SCIENCE AND ENGINEERING**List of Professional Elective Courses – R20**

S. No	Code	Course Title	L	T	P	D	Credits
Professional Elective Course - I							
1	J326J	Data Mining and Data Warehousing	3	0	0	0	3
2	J325D	Soft Computing	3	0	0	0	3
3	J325E	Mobile Computing	3	0	0	0	3
Professional Elective Course - II							
1	J325F	Software Testing Methodologies	3	0	0	0	3
2	J325G	Computer Graphics	3	0	0	0	3
3	J325H	Cloud Computing	3	0	0	0	3
Professional Elective Course - III							
1	J417E	Internet of Things	3	0	0	0	3
2	J415D	Information Retrieval Systems	3	0	0	0	3
3	J415E	E-Commerce	3	0	0	0	3
Professional Elective Course - IV							
1	J415F	Web Services	3	0	0	0	3
2	J415G	Big Data Analytics	3	0	0	0	3
3	J416H	Software Architecture and Design Pattern	3	0	0	0	3
Professional Elective Course - V							
1	J415H	Database Security	3	0	0	0	3
2	J415J	Deep Learning	3	0	0	0	3
3	J415K	Computer Forensics	3	0	0	0	3
Professional Elective Course - VI							
1	J426D	Block Chain Technology	3	0	0	0	3
2	J426E	Quantum Computing	3	0	0	0	3
3	J426F	Android Application Development	3	0	0	0	3

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COMPUTER SCIENCE AND ENGINEERING**List of Open Elective Courses – R20****Open Elective-I**

S.No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	J31OA	Elements of CIVIL Engineering	CIVIL
2	J31OB	Environmental Impact Assessment	CIVIL
3	J31OC	Energy Engineering	EEE
4	J31OD	Sensors and Transducers	EEE
5	J31OE	Automotive Technology	MECH
6	J31OG	Principles of Sensors and their Application	ECE
7	J31OH	Principles of Communications	ECE
8	J31OI	Fundamentals of Database Management System	CSE
9	J31OJ	Principles of Operating Systems	CSE
10	J31OK	Introduction to Data Structures through Python	IT
11	J31OL	Introduction to Web Design	IT
12	J31OM	Basics of Object Oriented Programming	ECM
13	J31ON	Fundamentals of Digital Logic Design	ECM
14	J31OP	Introduction to Mining Technology	MIE
15	J31OR	Numerical solution of Ordinary differential equations (Common to EEE,ECE,CSE,IT & ECM) OR Number Theory & Cryptography (Common to CE,EEE,ME,ECE,CSE,IT,ECM & MIE)	Mathematics
16	J31OS	Nano Materials	Physics
17	J31OT	Chemistry of Engineering Materials	Chemistry
18	J31OU	Technical Communication Skills	English
19	J31OV	Entrepreneurship	MBA

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COMPUTER SCIENCE AND ENGINEERING**List of Open Elective Courses – R20****Open Elective-II**

S.No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	J32OA	Construction Management, Contracts and valuation	CIVIL
2	J32OB	Energy Audit & Green buildings	CIVIL
3	J32OC	Hybrid Electric Vehicles	EEE
4	J32OD	Energy Auditing Conservation and Managements	EEE
5	J32OE	Fundamentals of Operations Research	MECH
6	J32OG	Software Defined Radio	ECE
7	J32OH	Basics of IC Technology	ECE
8	J32OI	Fundamentals of Computer Networks	CSE
9	J32OJ	Introduction to Java Programming	CSE
10	J32OK	Computer Organization	IT
11	J32OL	Fundamentals of Human Computer Interaction	IT
12	J32OM	Introduction to Microprocessors and Microcontrollers	ECM
13	J32ON	Internet of Things	ECM
14	J32OP	Introduction to Surface Mining	MIE
15	J32OR	Numerical Solution of Partial Differential Equations	Mathematics
16	J32OS	Advanced Physics for Engineers	Physics
17	J32OT	Green Chemistry	Chemistry
18	J32OU	Technical Writing Skills	English
19	J32OV	Research Methodology	MBA

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COMPUTER SCIENCE AND ENGINEERING

List of Open Elective Courses – R20

Open Elective-III

S.No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	J41OA	Waste Management	CIVIL
2	J41OB	Road Safety Engineering	CIVIL
3	J41OC	Electrical Engineering Materials	EEE
4	J41OD	Non-Conventional Energy Sources	EEE
5	J41OE	Basics of Robotics	MECH
6	J41OG	Digital Systems Using VHDL	ECE
7	J41OH	MATLAB Programming Language	ECE
8	J41OI	Introduction to Python Programming	CSE
9	J41OJ	Introduction to Mobile Application Development	CSE
10	J41OK	Fundamentals of Object Oriented Programming Through C++	IT
11	J41OL	Fundamentals of Data Science	IT
12	J41OM	Introduction to Neural networks	ECM
13	J41ON	IC Applications	ECM
14	J41OP	Introduction to Geology	MIE
15	J41OR	Integral Transforms And Integral Equations	Mathematics
16	J41OS	NDT And Vacuum Technology	Physics
17	J41OT	Nano Chemistry	Chemistry
18	J41OU	Teamwork and Team Building	English
19	J41OV	Intellectual Property Rights	MBA

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List of Open Elective Courses – R20

Open Elective-IV

S.No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	J42OA	Air Pollution & Control	CIVIL
2	J42OB	Disaster Management	CIVIL
3	J42OC	Special Electrical Machines	EEE
4	J42OD	Electrical Safety Engineering	EEE
5	J42OE	Digital Manufacturing	MECH
6	J42OG	Consumer Electronics	ECE
7	J42OH	Nano Electronics	ECE
8	J42OI	Fundamentals of Cloud Computing	CSE
9	J42OJ	Introduction to Big Data Analytics	CSE
10	J42OK	Fundamentals of E-Commerce	IT
11	J42OL	E-Waste Management	IT
12	J42OM	Introduction to Embedded Systems	ECM
13	J42ON	Introduction to Network Security	ECM
14	J42OP	Introduction to Mine Environment	MIE

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COMPUTER SCIENCE AND ENGINEERING

B. Tech Course Structure - R20

I YEAR – I SEMESTER

S. No.	Code	Course Title	L	T	P	D	Credits
1	J110A	Differential Equations and Calculus	3	1	0	0	4
2	J110E	Engineering Chemistry	3	0	0	0	3
3	J112A	Basic Electrical Engineering	3	0	0	0	3
4	J1103	Chemistry Lab	0	0	2	0	1
5	J1121	Basic Electrical Engineering Lab	0	0	2	0	1
6	J1191	Engineering and IT Workshop	0	0	4	0	2
7	J1131	Engineering Drawing	0	0	0	6	3
8		Induction Program	-	-	-	-	-
Total			9	1	8	6	17

I YEAR – II SEMESTER

S. No.	Code	Course Title	L	T	P	D	Credits
1	J120B	English	3	0	0	0	3
2	J120A	Linear Algebra and Advanced Calculus	3	1	0	0	4
3	J120E	Semiconductor Physics	3	0	0	0	3
4	J125A	Programming for Problem Solving	3	0	0	0	3
5	J124A	Basic Electronics Engineering	3	0	0	0	3
6	J12M2	Gender Sensitization	2	0	0	0	0
7	J1202	English Language and Communication Skills Lab	0	0	2	0	1
8	J1203	Physics Lab	0	0	2	0	1
9	J1251	Programming for Problem Solving Lab	0	0	4	0	2
10	J1241	Basic Electronics Engineering Lab	0	0	2	0	1
Total			17	1	10	0	21

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COMPUTER SCIENCE AND ENGINEERING

B. Tech Course Structure - R20

II YEAR – I SEMESTER

S. No	Code	Course Title	L	T	P	D	Credits
1	J210B	Probability and Statistics	3	1	0	0	4
2	J215A	Data Structures	3	0	0	0	3
3	J216A	Database Management Systems	3	0	0	0	3
4	J215B	Digital Logic Design and Computer Organization	3	0	0	0	3
5	J215C	Object Oriented Programming through Java	3	0	0	0	3
6	J21M2	Environmental Science	2	0	0	0	0
7	J2151	Data Structures Lab	0	0	2	0	1
8	J2161	Database Management Systems Lab	0	0	3	0	1.5
9	J2152	Object Oriented Programming through Java Lab	0	0	3	0	1.5
10	J2153	Internship – I	0	0	2	0	1
Total			17	1	10	0	21

II YEAR – II SEMESTER

S. No	Code	Course Title	L	T	P	D	Credits
1	J225B	Operating Systems	3	0	0	0	3
2	J225D	Computer Networks	3	0	0	0	3
3	J226A	Mathematical Foundations of Computer Science	3	0	0	0	3
4	J225C	Design and Analysis of Algorithms	3	0	0	0	3
5	J225E	Formal Languages and Automata Theory	3	0	0	0	3
6	J225A	Python Programming	3	0	0	0	3
7	J22M1	Professional Ethics	2	0	0	0	0
8	J2201	Soft Skills	2	0	0	0	0
9	J2252	Operating System and Computer Networks Lab	0	0	3	0	1.5
10	J2251	Python Programming Lab	0	0	3	0	1.5
Total			22	0	6	0	21

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S. No	Code	Course Title	L	T	P	D	Credits
1	J31EA	Managerial Economics and Management Science	3	1	0	0	4
2	J315B	Compiler Design	3	1	0	0	4
3	J315C	Web Technologies	3	0	0	0	3
4	J316A	Linux Programming	3	0	0	0	3
5	BTCSEO1	Open Elective – I	3	0	0	0	3
6	J31M1	Artificial Intelligence	2	0	0	0	0
7	J3101	Employability Skills	2	0	0	0	0
8	J3151	Web Technologies Lab	0	0	3	0	1.5
9	J3161	Linux Programming Lab	0	0	3	0	1.5
10	J3153	Internship – II	0	0	2	0	1
Total			19	1	8	0	21

III YEAR – II SEMESTER

S. No	Code	Course Title	L	T	P	D	Credits
1	F326A	Data Science Through R	3	0	0	0	3
2	F326C	Software Engineering	3	0	0	0	3
3	F320A	Information Security	3	0	0	0	3
4	BTCSEE1	Professional Elective – I	3	0	0	0	3
5	BTCSEE2	Professional Elective - II	3	0	0	0	3
6	BTCSEO2	Open Elective – II	3	0	0	0	3
7	J32M2	Cyber Security	2	0	0	0	0
8	F3261	Software Engineering Lab	0	0	2	0	1
9	J3201	Life Skills and Professional Skills Lab	0	0	4	0	2
Total			20	0	6	0	21

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COMPUTER SCIENCE AND ENGINEERING**B. Tech Course Structure - R20****IV YEAR – I SEMESTER**

S. No	Code	Course Title	L	T	P	D	Credits
1	J415A	Machine Learning	3	1	0	0	4
2	BTECSEE3	Professional Elective - III	3	0	0	0	3
3	BTECSEE4	Professional Elective - IV	3	0	0	0	3
4	BTECSEE5	Professional Elective - V	3	0	0	0	3
5	BTECSEO3	Open Elective – III	3	0	0	0	3
6	F4151	Machine Learning Lab	0	0	3	0	1.5
7	F4161	Data Science through R Lab	0	0	3	0	1.5
8	F4152	Industry Oriented Mini Project	0	0	4	0	2
9	F4153	Project Stage – I	0	0	6	0	3
Total			15	0	16	0	24

IV YEAR – II SEMESTER

S. No	Code	Course Title	L	T	P	D	Credits
1	BTCSEE5	Professional Elective - VI	3	0	0	0	3
2	BTCSEE6	Open Elective – IV	3	0	0	0	3
3	F4252	Project Stage – II	0	0	14	0	7
4	F4251	Seminar	0	0	2	0	1
Total			6	0	16	0	14

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COMPUTER SCIENCE AND ENGINEERING**List of Professional Elective Courses – R20**

S. No	Code	Course Title	L	T	P	D	Credits
Professional Elective Course - I							
1	J326J	Data Mining and Data Warehousing	3	0	0	0	3
2	J325D	Soft Computing	3	0	0	0	3
3	J325E	Mobile Computing	3	0	0	0	3
Professional Elective Course - II							
1	J325F	Software Testing Methodologies	3	0	0	0	3
2	J325G	Computer Graphics	3	0	0	0	3
3	J325H	Cloud Computing	3	0	0	0	3
Professional Elective Course - III							
1	J417E	Internet of Things	3	0	0	0	3
2	J415D	Information Retrieval Systems	3	0	0	0	3
3	J415E	E-Commerce	3	0	0	0	3
Professional Elective Course - IV							
1	J415F	Web Services	3	0	0	0	3
2	J415G	Big Data Analytics	3	0	0	0	3
3	J416H	Software Architecture and Design Pattern	3	0	0	0	3
Professional Elective Course - V							
1	J415H	Database Security	3	0	0	0	3
2	J415J	Deep Learning	3	0	0	0	3
3	J415K	Computer Forensics	3	0	0	0	3
Professional Elective Course - VI							
1	J426D	Block Chain Technology	3	0	0	0	3
2	J426E	Quantum Computing	3	0	0	0	3
3	J426F	Android Application Development	3	0	0	0	3

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COMPUTER SCIENCE AND ENGINEERING**List of Open Elective Courses – R20****Open Elective-I**

S.No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	J31OA	Elements of CIVIL Engineering	CIVIL
2	J31OB	Environmental Impact Assessment	CIVIL
3	J31OC	Energy Engineering	EEE
4	J31OD	Sensors and Transducers	EEE
5	J31OE	Automotive Technology	MECH
6	J31OG	Principles of Sensors and their Application	ECE
7	J31OH	Principles of Communications	ECE
8	J31OI	Fundamentals of Database Management System	CSE
9	J31OJ	Principles of Operating Systems	CSE
10	J31OK	Introduction to Data Structures through Python	IT
11	J31OL	Introduction to Web Design	IT
12	J31OM	Basics of Object Oriented Programming	ECM
13	J31ON	Fundamentals of Digital Logic Design	ECM
14	J31OP	Introduction to Mining Technology	MIE
15	J31OR	Numerical solution of Ordinary differential equations (Common to EEE,ECE,CSE,IT & ECM) OR Number Theory & Cryptography (Common to CE,EEE,ME,ECE,CSE,IT,ECM & MIE)	Mathematics
16	J31OS	Nano Materials	Physics
17	J31OT	Chemistry of Engineering Materials	Chemistry
18	J31OU	Technical Communication Skills	English
19	J31OV	Entrepreneurship	MBA

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COMPUTER SCIENCE AND ENGINEERING**List of Open Elective Courses – R20****Open Elective-II**

S.No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	J32OA	Construction Management, Contracts and valuation	CIVIL
2	J32OB	Energy Audit & Green buildings	CIVIL
3	J32OC	Hybrid Electric Vehicles	EEE
4	J32OD	Energy Auditing Conservation and Managements	EEE
5	J32OE	Fundamentals of Operations Research	MECH
6	J32OG	Software Defined Radio	ECE
7	J32OH	Basics of IC Technology	ECE
8	J32OI	Fundamentals of Computer Networks	CSE
9	J32OJ	Introduction to Java Programming	CSE
10	J32OK	Computer Organization	IT
11	J32OL	Fundamentals of Human Computer Interaction	IT
12	J32OM	Introduction to Microprocessors and Microcontrollers	ECM
13	J32ON	Internet of Things	ECM
14	J32OP	Introduction to Surface Mining	MIE
15	J32OR	Numerical Solution of Partial Differential Equations	Mathematics
16	J32OS	Advanced Physics for Engineers	Physics
17	J32OT	Green Chemistry	Chemistry
18	J32OU	Technical Writing Skills	English
19	J32OV	Research Methodology	MBA

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COMPUTER SCIENCE AND ENGINEERING

List of Open Elective Courses – R20

Open Elective-III

S.No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	J41OA	Waste Management	CIVIL
2	J41OB	Road Safety Engineering	CIVIL
3	J41OC	Electrical Engineering Materials	EEE
4	J41OD	Non-Conventional Energy Sources	EEE
5	J41OE	Basics of Robotics	MECH
6	J41OG	Digital Systems Using VHDL	ECE
7	J41OH	MATLAB Programming Language	ECE
8	J41OI	Introduction to Python Programming	CSE
9	J41OJ	Introduction to Mobile Application Development	CSE
10	J41OK	Fundamentals of Object Oriented Programming Through C++	IT
11	J41OL	Fundamentals of Data Science	IT
12	J41OM	Introduction to Neural networks	ECM
13	J41ON	IC Applications	ECM
14	J41OP	Introduction to Geology	MIE
15	J41OR	Integral Transforms And Integral Equations	Mathematics
16	J41OS	NDT And Vacuum Technology	Physics
17	J41OT	Nano Chemistry	Chemistry
18	J41OU	Teamwork and Team Building	English
19	J41OV	Intellectual Property Rights	MBA

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List of Open Elective Courses – R20

Open Elective-IV

S.No.	Code	Name of the Subject	Name of the BOS offering the Subject
1	J42OA	Air Pollution & Control	CIVIL
2	J42OB	Disaster Management	CIVIL
3	J42OC	Special Electrical Machines	EEE
4	J42OD	Electrical Safety Engineering	EEE
5	J42OE	Digital Manufacturing	MECH
6	J42OG	Consumer Electronics	ECE
7	J42OH	Nano Electronics	ECE
8	J42OI	Fundamentals of Cloud Computing	CSE
9	J42OJ	Introduction to Big Data Analytics	CSE
10	J42OK	Fundamentals of E-Commerce	IT
11	J42OL	E-Waste Management	IT
12	J42OM	Introduction to Embedded Systems	ECM
13	J42ON	Introduction to Network Security	ECM
14	J42OP	Introduction to Mine Environment	MIE

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – I Sem			
Course Code: J110A	DIFFERENTIAL EQUATIONS AND CALCULUS (COMMON TO CE, EEE, ME, ECE, CSE, IT, ECM& MIE)	L	T	P	D
Credits: 4		3	1	0	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. Methods of solving first order differential equations and learn about its applications to basic engineering problems
2. Methods of solving higher order differential equations and learn about its applications to basic engineering problems
3. The fourier series of a periodic function
4. Improper integrals using beta and gamma functions
5. Maximum and minimum value of a given function

Module 1:

First Order, First Degree ODE and its Applications: (9L)

Differential equations of first order and first degree - Exact differential equation, Linear and Bernoulli differential equation, applications of differential equations of first order and first degree -Newton's law of cooling, Law of natural growth and decay, orthogonal trajectories.

Module 2:

Second and Higher order ODE with Constant Coefficients: (10L)

Second order linear differential equations with constant coefficients: Solution of Homogenous, non-homogeneous differential equations, Non-Homogeneous terms of the type e^{ax} , $\sin(ax)$, $\cos(ax)$, polynomials in x , $e^{ax} \cdot V(x)$, $xV(x)$. Method of variation of parameters; Equations reducible to linear ODE with constant Coefficients: Euler-Cauchy equation, Legendre's equation.

Module 3:

Sequences and Fourier Series: (10L)

UNIT I: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences.

Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, P-test, Alternating series: Leibnitz test, Absolute and Conditionally Convergence.

UNIT II: Determination of Fourier coefficients – Fourier series – even and odd functions, Fourier series in an arbitrary interval- even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

Module 4:

Calculus and Improper Integrals: (9L)

UNIT I: Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem.

Taylor's Series

UNIT II: Definition of Improper Integrals, Beta functions: Properties and other forms of beta functions (statements only) and problems, Gamma functions: Properties of Gamma functions (statements only), Relation between the Beta and Gamma functions (without proofs) and Evaluation of improper integrals using Beta and Gamma functions

Module 5:

Functions of Multi variables: (10L)

Limits, Continuity, Partial differentiation, partial derivatives of first and second order, Jacobian, Taylor's theorem of two variables (without proof). Maxima and Minima of two variables, Lagrange's method of undetermined Multipliers.

Text books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2015 Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. R.K.Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2015.

Reference Books:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B. V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

E - Resources:

1. <https://nptel.ac.in/courses/111106100>
2. <https://www.math.ust.hk/~machas/differential-equations.pdf>
3. https://en.wikipedia.org/wiki/Fourier_series
4. <https://www.khanacademy.org/math/ap-calculus-bc/bc-integration-new/bc-6-13/a/improper-integrals-review>
5. https://onlinecourses.nptel.ac.in/noc20_ma15/preview

Course outcomes:

The student will be able to:

1. Formulate and solve the First order linear differential equations
2. Apply the concepts of higher order linear differential equations with constant coefficients solving physical problems arising in engineering.
3. Determine Fourier series expansion of a given function
4. Analyze the improper integrals
5. Find the maxima and minimal of multivariable functions

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	2	3	-	-	-	-	-	-	-	3	-	-
CO2	3	3	2	3	-	-	-	-	-	-	-	3	-	-
CO3	2	2	1	1	-	-	-	-	-	-	-	2	-	-
CO4	3	3	2	1	-	-	-	-	-	-	-	2	-	-
CO5	3	3	2	2	-	-	-	-	-	-	-	2	-	-
Average	3.0	3.0	1.9	1.6	-	-	-	-	-	-	-	2.4	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – I Sem			
Course Code: J110E	ENGINEERING CHEMISTRY (COMMON TO EEE, ECE, CSE, IT & ECM)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. To understand the microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2. To know the suitability of water for domestic and industrial purposes.
3. To acquire Knowledge about different types of batteries and to understand the concepts of corrosion.
4. To impart the basic knowledge of spectroscopic techniques and molecular energy levels
5. Gain the knowledge of chemical reactions those are used in the synthesis of molecules.

Module 1:

Atomic Structure And Theories Of Bonding: (9L)

Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N₂, O₂, F₂, CO and NO. Crystal Field Theory (CFT), Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral, Octahedral and square planar geometries. Band structure of solids and effect of doping on conductance.

Module-2:

Water And Its Treatment: (8L)

Introduction – hardness of water – Causes of hardness - Types of hardness- temporary and permanent – expression and units of hardness – Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization. Boiler troubles-scale & sludge formation, foaming & priming Boiler feed water and its treatment – Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange process. Desalination of water – Reverse osmosis. Numerical problems.

Module-3:**Unit-1: Electro Chemistry****(11L)**

Electrochemical cells – electrode potential, standard electrode potential, Nernst equation, Numerical problems. Types of electrodes – calomel, Quinhydrone and glass electrode. determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery).

Unit-2: Corrosion

Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current cathodic methods. techniques of coating (applications)-hot dipping, cementation and electroless plating of Nickel.

Module-4: Spectroscopic applications and techniques.**(9L)**

Principles of spectroscopy, molar-extinction co-efficient, types of transitions in UV, selection rules, important terms in UV spectra and applications of electronic spectroscopy. Vibrational spectroscopy-principle, stretching and bending vibrations in IR, selection rule and applications. Basic concepts of Nuclear magnetic resonance Spectroscopy, chemical shift-factors effecting chemical shift (Electronegativity, Anisotropic effect, Hydrogen Bonding) and spin-spin splitting, coupling constant. Introduction to Magnetic resonance imaging.

Module-5:**Reaction Mechanism And Synthesis Of Drug Molecules:****(7L)**

Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN1, SN2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule. Oxidation reactions: Oxidation of alcohols using KMnO₄ and chromic acid. Reduction reactions: reduction of carbonyl compounds using LiAlH₄ & NaBH₄.

Unit-2: Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

Text Books:

1. P. C. Jain & M. Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
2. C.N. Banwell, "Fundamentals of Molecular Spectroscopy".
3. K.P.C. Volhardt and N. E. Schore, Organic Chemistry: Structure and Function 5th Edition.
4. B.M. Mahan, Pearson, "University Chemistry", Narosa Publishing house, New Delhi, IV Edition.
5. P.W. Atkins, J.D. Paula, "Physical Chemistry", Oxford 8th edition.

References Books:

1. M.Thirumalacharyand Laxminarayan, “Engineering Chemistry” by Scitech Publications.
2. B. L. Tembe, Kamaluddin and M.S.Krishnan “Engineering Chemistry” NPTEL web book).
3. Stereochemistry of organic compounds by D.Narsipuri published by New age international publishers.

E-Resources:

1. <https://www.imnh.isu.edu/digitalatlas/hydr/basics/main/chmtxt>
2. https://chem.libretexts.org/Core/.../Electrochemistry/Basics_of_Electrochemistry
3. <https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/polymers.htm>
4. <https://www.scribd.com/document/6668739/Chemical-Energy-Source>
5. <https://sengerandu.wordpress.com/tutorials/physical-metallurgy/engineering-materials>

Course outcome:

1. Acquire the knowledge of atomic, molecular and electronic changes.
2. Apply the various methods used in treatment of water for domestic and industrial purposes.
3. Understand the concepts of electrochemistry and corrosion.
4. Understand the basic concepts of spectroscopy.
5. Learn the major chemical reactions and implement the synthesis of drug molecules

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	1	-	-	-	-	-	2	-	-
CO3	3	-	-	-	-	1	-	-	-	-	-	2	-	-
CO4	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	-	-	-	2	-	-	-	-	-	-	-	-	-
Average	2.2	-	-	-	2.0	1.0	-	-	-	-	-	2.0	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – I Sem			
Course Code: J112A	BASIC ELECTRICAL ENGINEERING (COMMON TO CE, ME, CSE, IT & MIE)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. Introduce the concept of electrical circuits using network laws and theorems.
2. Outline and analyse single phase A.C and three phase A.C circuits.
3. Study and understand magnetic circuits and transformers.
4. Understand the different types of D.C and A.C rotating electrical machine.
5. Import the knowledge of protection of electrical components and Measuring Instruments.

Module 1:

DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff's 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.

Module 2:

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

Module 3:

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

Module 4:

Rotating Electrical Machines: D.C Motors - principle of operation, characteristics, speed control and application of series and shunt motor. Three-phase induction motor - construction, generation of rotating magnetic fields, principle of operation, torque-slip characteristics. Single-phase induction motor - construction, working, torque-speed characteristic.

Module 5:

Electrical Installations: Components of LT switchgear: Switch fuse unit (SFU), MCB, ELCB, MCCB, types of wires and cables, earthing. Types of batteries, important characteristics for batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Text 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,

Reference Books:

1. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
2. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.

E - Resources:

1. <https://nptel.ac.in/courses/108/108/108108076/>
2. <https://nptel.ac.in/courses/108/105/108105112/>
3. <https://www.electrical4u.com/>

Course outcomes:**The student will be able to:**

1. Illustrate and solve electrical circuits using network laws and theorems.
2. Acquire knowledge about the single phase and three phase electrical circuits.
3. Get exposure of magnetic circuits and transformers.
4. Demonstrate the working principle of electrical machines.
5. Introduce components of low voltage electrical installation and applications of Measuring Instruments.

CO-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
3 – Strong; 2 – Medium; 1 - Weak

Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	2	1	2	1	-	-	-	-	-	1	1	-
CO2	3	2	2	-	1	-	-	-	-	-	-	1	1	-
CO3	3	1	1	-	1	1	-	-	-	-	-	1	1	-
CO4	3	1	1	-	2		-	-	-	-	-	1	1	-
CO5	3	-	-	1	3	2	-	-	-	-	-	1	1	-
Average	3	1.5	1.5	1	1.8	1.3	-	-	-	-	-	1	1	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – I Sem			
Course Code: J1103	CHEMISTRY LAB (Common to All Branches)	L	T	P	D
Credits: 1		0	0	2	0

Pre-Requisites: Intermediate basic concepts.

Course objectives:

The Student will:

1. Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
2. Determine the rate constant of reactions from concentrations as a function of time.
3. The measurement of physical properties like adsorption and viscosity.
4. Synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.
5. Measure the conductance and EMF values of solutions

Experiments:

1. Determination of total hardness of water by complex metric method using EDTA
2. Determination of chloride content of water by Argentometry
3. Estimation of an HCl by Conductometric titrations
4. Estimation of Acetic acid by Conduct metric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe^{2+} by Potentiometry using KMnO_4
7. Estimation of amount of Cu^{+2} by Colorimetry
8. Estimation of amount of KMnO_4 by Colorimetry
9. Synthesis of Aspirin and Paracetamol
10. Determination of acid value of coconut oil
11. Thin layer chromatography calculation of R_f values. egortho and para nitro phenols
12. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
13. Determination of partition coefficient of acetic acid between n- butanol and water.
14. Determination of surface tension of a give liquid using stalagmometer.

Course outcomes:**The student will be able to:**

1. Determination of parameters like hardness and chloride content in water.
2. Estimation of rate constant of a reaction from concentration – time relationships.
3. Determination of physical properties like surface tension and viscosity.
4. Calculation of R_f values of some organic molecules by TLC technique
5. Determine the partition coefficient of organic compound in two immiscible liquids.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	-	-	-	-	2	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	1.2	-	-	-	-	2.0	-	-	-	-	-	2.0	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – I Sem			
Course Code: J1121	BASIC ELECTRICAL ENGINEERING LAB (COMMON TO CE, ME, CSE, IT & MIE)	L	T	P	D
Credits: 1		0	0	2	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. Analyse a given network by applying various electrical laws and network theorems.
2. Know the response of electrical circuits for different excitations.
3. Calculate, measure and know the relation between basic electrical parameters.
4. Analyse the performance characteristics of DC and AC electrical machines.

Choice of 10-12 experiments from the following

Experiments:

1. Verification of Ohms Law.
2. Verification of KVL and KCL.
3. Transient response of series RL and RC circuits using DC excitation.
4. Transient response of RLC series circuit using DC excitation.
5. Resonance in series RLC circuit.
6. Calculations and verification of impedance and current of RL, RC and RLC series circuits.
7. B-H loop for single phase transformers.
8. Measurement of voltage, current and real power in primary and secondary circuits of a single phase transformer.
9. Load test on single phase transformer (Calculate Efficiency and Regulation).
10. Three phase transformer: Verification of relationship between voltages and currents (Star-Delta, Delta-Delta, Delta-star, and Star-Star).
11. Measurement of active and reactive power in a balanced three-phase circuit.
12. Performance Characteristics of a DC Shunt Motor.
13. Torque-Speed Characteristics of a DC Shunt Motor.
14. Performance Characteristics of a Three-phase Induction Motor.
15. Torque-speed Characteristics of a Three-phase Induction Motor.

Course outcomes:**The student will be able to:**

1. Get an exposure to basic electrical laws.
2. Relate the response of different types of electrical circuits to different excitations.
3. Understand the measurement, calculation and relation between the basic electrical parameters.
4. Inspect the basic characteristics of transformers and electrical machines.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	1	1	1	1	-	-	-	2	2	-	-	1	-
CO2	3	1	1	1	1	-	-	-	2	2	-	-	1	-
CO3	3	1	-	1	1	-	-	-	2	2	-	-	-	-
CO4	3	1	-	1	1	-	-	-	2	2	-	-	-	-
CO5	3	1	1	1	1	-	-	-	2	2	-	-	1	-
Average	3.0	1.0	1.0	1.0	1.0	-	-	-	2.0	2.0	-	-	1.0	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – I Sem			
Course Code: J1191	ENGINEERING AND IT WORKSHOP (COMMON TO EEE, CSE & IT)	L	T	P	D
Credits: 2		0	0	4	0

Pre-Requisites: Basic knowledge about tools and different trades

Course objectives:

The Student will:

1. Develop understanding of various Engineering materials and Manufacturing processes
2. Know different tools used in Carpentry, fitting, tin smithy, house wiring, welding, foundry, machine shop and black smithy.
3. Develop Engineering Skill in making components, system integration and assembly to form a useful product.
4. Study/demonstrate the concepts of computer w.r.t. it's hardware.
5. Install the operating system and perform various tasks.

Trades for Practice (Minimum 1 Exercise from each category)

1. Carpentry
2. Fitting shop
3. Tin Smithy
4. Electrical house wiring
5. Foundry practices – mould preparation
6. Welding (Arc Welding)

Trades for Demonstration

1. Black Smithy
2. Machine shop

IT Workshop

1. a. Computer Hardware: Identification of Peripherals
b. Study of UPS and SMPS
2. a. Assembling and disassembling of a PC
b. Simple diagnostic exercises – Related to hardware
3. a. Installation of Windows Operating System
b. Installation of Linux Operating System
4. a. Basic Windows and Linux Commands
b. Simple diagnostic exercises –Related to Operating System.

Course outcomes:

The student will be able to:

1. Understand trades and techniques used in Workshop, chooses the best material/ manufacturing process
2. Use Apt tools for different engineering applications following precautionary measures.
3. Gain different skills of manufacturing and importance of dimensional accuracies and dimensional tolerances in assembling of various components.
4. Identify, assemble and disassemble the given configuration of a computer.
5. Install the operating system in the given configuration of a computer and execute commands for LINUX Operating System.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	-	-	-	-	-	-	-	-	2	2	2	3	-	-
CO2	-	-	-	-	-	-	-	-	2	2	2	3	-	-
CO3	-	-	-	-	-	-	-	-	2	2	2	3	-	-
CO4	-	-	-	-	-	-	-	-	2	2	2	3	-	-
CO5	-	-	-	-	-	-	-	-	2	2	2	3	-	-
Average	-	-	-	-	-	-	-	-	2.0	2.0	2.0	3.0	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: ME I Year – I Sem			
Course Code: J1131	ENGINEERING DRAWING (Common to ECE, CSE, IT, ECM)	L	T	P	D
Credits: 3		0	0	0	6

Pre-requisite: Engineering Mathematics.

Course Objectives:

This course will enable students to:

1. Learn how to prepare Engineering Drawings by Manual Drafting and Computer-Aided Drawings and Practice various methods of drawing Conic Sections & Curves.
2. Learn the principles of Orthographic Projections to show the projections of points, lines and planes effectively.
3. Learn to use the various methods for drawing the projections of solids.
4. Learn to use various methods for drawing the projections of sections of solids and surface developments of solids.
5. Learn to convert orthographic views into isometric views and vice versa.

Module 1

Unit 1: Principles of Engineering Drawing: Introduction to Engineering Drawings, Significance, Introduction to AutoCAD.

Unit 2: Conic Sections: Ellipse – Eccentric Method, Arcs Method, Concentric, Circle Method, Rectangular Method; Parabola – Eccentric Method, Rectangular Method, Tangent Method; Hyperbola – Eccentric Method, Rectangular Hyperbola.

Unit 3: Curves: Cycloid – Epicycloid, Hypocycloid, Involute of Circles.

Unit 4: Scales: Construction of Plain, Diagonal Scales.

Module 2

Unit 1: Principles of Orthographic Projections: Introduction to Orthographic Projections, Conventions.

Unit 2: Projections of Points and Lines: Projections of Points in four Quadrants, Projection of Lines in first quadrant, Inclined to both Principle Planes.

Unit 3: Projections of Planes: Projections of Planes in first quadrant and inclined to both Principle Planes for Regular Geometrical Figures – Circle, Square, Rectangle, Triangle, Pentagon, Hexagon.

Module 3

Unit 1: Projections of Solids: Projections of Right Regular Solids – Prisms and Pyramids of Square, Rectangle, Pentagon, Hexagon; Projections of Generated Solids – Cone, Cylinder.

Module 4

Unit 1: Sections of Solids: Sectional and Auxiliary Views of Right Regular Solids – Prisms and Pyramids of Pentagon, Hexagon; Generated solids – Cylinder and Cone.

Unit 2: Development of Surfaces of Solids: Surfaces of Right Regular solids – Prism, cylinder pyramid and cone

Module 5

Unit 1: Isometric Projections and Views: Principles of Isometric Projections, Isometric Scale, Isometric Views of Simple and Compound Solids; Conversion of Orthographic Views of simple objects to Isometric Views.

Unit 2: Orthographic Views: Conversion of Isometric Views to Orthographic Views.

(First Angle Projection Convention to be followed)

Note: Practice of few exercises from Unit I to Unit V using open source AutoCAD software to be considered for Internal Evaluation only.

Text Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., “Engineering Drawing”, Charotar Publishing House, 2014.
2. K. Venugopal & V. Prabhu Raja, “Engineering Drawing + Auto CAD”, New Age International Publishers. Fifth Edition, 2011.
3. AutoCAD Software Theory and User Manuals

Reference Books:

1. Narayana, K.L. & P Kannaiah, “Text book on Engineering Drawing”, Scitech Publishers, 2008
2. Agrawal B. & Agrawal C. M., “Engineering Graphics”, TMH Publication, 2012.

E - Resources:

1. <https://nptel.ac.in/courses/112/103/112103019/>
2. <http://www.autocadtutorials.net/>
3. <https://urlzs.com/fLJ3T>
4. <https://urlzs.com/zky46>

Course Outcomes:**the students will be able to:**

1. Equipped with the basic knowledge of using the drawing instruments and dimensioning practice.
2. Represent any three-dimensional object with two-dimensional drawings and exposed to the visual aspects of lines and planes.
3. Visualize of solids inclined to both the planes.
4. Visualization of sections of solids and their developments.
5. Representation of 3D objects through isometric and orthographic views

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	2	1	2	-	-	-	-	-	-	3	-	-
CO2	3	3	2	1	2	-	-	-	-	-	-	3	-	-
CO3	3	3	2	1	2	-	-	-	-	-	-	3	-	-
CO4	3	3	3	1	2	-	-	-	-	-	-	3	-	-
CO5	3	3	3	1	2	-	-	-	-	-	-	3	-	-
Average	3.0	3.0	2.4	1.0	2.0	-	-	-	-	-	-	3.0	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – II Sem			
Course Code: J120B	ENGLISH (Common to CE, ME, MIE& EEE)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Course Objectives:

The Students will:

1. To improve the language proficiency of students in English with an emphasis on LSRW skills
2. To enrich Vocabulary and Grammar.
3. To equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
4. To develop study skills
5. To enhance the communication skills in formal and informal situations.

Module 1:

‘The Raman Effect’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes.

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions. **Reading:** Reading and Its Importance- Techniques for Effective Reading.

Basic Writing Skills: Sentence Structures -Use of Phrases and Clauses in Sentences-Importance of Proper Punctuation- Techniques for writing precisely – **Paragraph writing** – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

Module 2:

‘Ancient Architecture in India’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms, Homophones, Homonyms, and Homographs.

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Improving Comprehension Skills – Techniques for Good Comprehension

Writing: Format of a Formal Letter-**Writing Formal Letters** E.g., Letter of Complaint, Letter of Requisition, and Job Application with Resume.

Module 3:

‘Blue Jeans’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-skills of Reading- Skimming and Scanning

Writing: Nature and Style of Sensible Writing- **Defining- Describing** Objects, Places and Events – **Classifying-** Providing Examples or Evidence and Essay Writing

Module 4:

‘What Should You Be Eating’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Comprehension- Intensive Reading and Extensive Reading

Writing: Writing Practices--Writing Introduction and Conclusion -Précis Writing.

Module 5:

‘How a Chinese Billionaire Built Her Fortune’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Technical Vocabulary and their usage

Grammar: Common Errors in English

Reading: Reading Comprehension-Exercises for Practice

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports

Text Books:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

Reference Books:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P. (2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006). Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

Course outcomes:**The student will be able to:**

1. Use English Language effectively in spoken and written forms.
2. Comprehend the given texts and respond appropriately.
3. Use the proper vocabulary and grammatically correct sentences.
4. Communicate confidently in various contexts and different cultures.
5. Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	2	-	-	-
CO3	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	2	-	-	-	-
Average	-	-	-	-	-	-	-	-	-	2.0	2.0	-	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – II Sem			
Course Code: J120A	LINEAR ALGEBRA AND ADVANCED CALCULUS (Common to CE, EEE, ME, ECE, CSE, IT, ECM & MIE)	L	T	P	D
Credits: 4		3	1	0	0

Pre-Requisites: Nil

Course Objectives:

The Students will:

1. Rank of the matrix and its application to consistency of system of linear equations
2. Eigen Values and Eigen Vectors and Nature of Quadratic forms
3. Evaluation of multiple integrals and their applications
4. Basic properties of vector point functions
5. Vector Integration like line, surface and volume integrals

Module 1:

Matrices and System of Equations: (10L)

Matrices: Types of Matrices, Symmetric, Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations.

Module 2:

Eigen values, Eigen vectors and Matrix of Transforms: (12L)

Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms using Linear Transformation and Orthogonal Transformations

Module 3:

Multiple Integrals: (10L)

Evaluation of double integrals, change of order of integration, Change of variables (Cartesian & Polar coordinates), evaluation of triple integrals, change of variables (Cartesian to Spherical and Cylindrical polar coordinates) Applications: computation of Areas and volumes.

Module 4:**Vector Differential Calculus: (8L)**

Scalar and vector fields, vector differentiation, level surfaces, directional derivative, gradient of a scalar field, divergence and curl of a vector field, Laplacian, Scalar potential functions, Tangent plane and normal line. Vector Identities (without proofs)

Module 5:**Vector Integral Calculus: (8L)**

Line, Surface and Volume Integrals, Green's theorem in a plane, Gauss-Divergence theorem and Stokes theorem (without proofs)

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2015
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. R.K.Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2015.

Reference Books:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

E-Resources:

1. <https://nptel.ac.in/courses/122/104/122104018/>
2. https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors
3. <https://nptel.ac.in/courses/111/107/111107108/>
4. <https://www.cheric.org/files/education/cyberlecture/e200303/e200303-301.pdf>
5. https://www.whitman.edu/mathematics/calculus_online/chapter16.html

Course outcomes:**At the end of this course students will be able to**

1. solve the consistent system of linear equations
2. apply orthogonal congruent Transformations to a quadratic form
3. evaluate multiple integrals in various coordinate system
4. apply the concept of gradient, divergence and curl to formulate engineering problems
5. convert line integrals to surface integrals and surface integrals to volume integrals

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	1	3	-	-	-	-	-	-	-	2	-	-
CO2	3	3	2	3	-	-	-	-	-	-	-	3	-	-
CO3	3	3	2	3	-	-	-	-	-	-	-	3	-	-
CO4	3	3	1	3	-	-	-	-	-	-	-	2	-	-
CO5	3	3	2	3	-	-	-	-	-	-	-	3	-	-
Average	3.0	3.0	1.6	3.0	-	-	-	-	-	-	-	2.0	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – II Sem			
Course Code: J120E	SEMICONDUCTOR PHYSICS (Common to EEE, ECE, CSE, IT & ECM)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. To illustrate the phenomena of old quantum theory and derive Heisenberg Uncertainty principle and Schrödinger's equations.
2. Learns the fundamental concepts of solids and semiconductors.
3. Develop strong fundamentals of electronic and optoelectronic materials.
4. To understand basic lasing action, study various types of lasers and to have basic idea of fiber optics.
5. To construct Maxwell's equations from basic principles and use it to solve electromagnetic plane wave equations.

Module 1:

Quantum Mechanics: (9L)

Introduction to Quantum mechanics, Black body radiation, Planck's law, Compton effect, Photoelectric effect -Einstein's photoelectric equation. de Broglie's concept of matter waves, Davisson and Germer's experiment, Heisenberg's Uncertainty Principle, Schrödinger's Time dependent and Independent Wave Equation; Physical Significance of the Wave Function, Energy of a particle in One Dimensional Infinite Potential well.

Module 2:

Electronic Materials & Semiconductors (9L)

UNIT-I: Electronic Materials: Free electron theory, Fermi Energy level, Fermi distribution function, Density of states, Bloch's theorem, Kronig-Penny model (Qualitative treatment), E-K diagram, Effective mass of electrons, origin of energy bands, Classification of materials on the basis of energy bands.

UNIT-II: Semiconductors: Intrinsic and extrinsic semiconductors, Carrier concentration, Dependence of Fermi level on carrier concentration and temperature, Hall effect.

Module 3:**Semi-conductor Devices: (9L)**

UNIT-I: Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction diode: I-V Characteristics, Zener diode: I-V Characteristics, Bipolar Junction Transistor (BJT): Construction and Principle of operation. PIN, Avalanche photodiode, LED – working principle and characteristics, Solar Cell and Photo diode.

Module 4:**Lasers & Fibre Optics: 9L**

UNIT-I: Lasers: Introduction, absorption, spontaneous emission, Stimulated emission, calculation of Einstein co-efficient of A & B, Population inversion, Pumping, Lasing action, Types of Lasers: Ruby laser, He-Ne laser, Semiconductor laser, Applications of laser.

UNIT-II: Fibre Optics: Introduction, Construction and working principle of Optical fibres, Acceptance angle, Acceptance cone and Numerical aperture, Types of optical fibres, Applications of optical fibres.

Module 5:**Electromagnetism & Dielectric Properties 9L**

UNIT-I: Electromagnetism: Laws of electrostatics, Electric current and the continuity equation, Ampere's and Faraday's laws, Maxwell's equations .

UNIT-II: Dielectric Properties: Electric dipole, dipole moment, dielectric constant, polarizability, electric susceptibility, displacement vector, electronic, ionic and orientation polarizations (quantitative treatment), Internal fields in a solid, Clausius-Mossotti equation, Applications – Piezo electricity and Ferro-electricity.

Text Books:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learning.
2. Physics, Halliday and Resnick, - Wiley.
3. A textbook of Engineering Physics, Dr. TVS ArunMurthy, Dr. M.N. Avadhanulu, Dr. P.G. Kshirsagar – Chand.

Reference Books:

1. Richard Robinett, Quantum Mechanics.
2. Semiconductor Optoelectronics: Physics and Technology, J. Singh, Mc Graw-Hill inc. (1995).
3. Online Course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL.
4. P.K. Palanisamy, "Engineering Physics", Scitech Publications, Fourth edition.

E - Resources:

1. <https://www.researchgate.net/publication/259574083> Lecture Notes on Engineering Physics.
2. <https://www.researchgate.net/publication/292607115> Applied Physics
3. <http://www.springer.com/physics/theoretical%2C+mathematical+%26+computational+physics/journal/40094>
4. <http://www.springer.com/physics/journal/340>.
5. <http://nptel.ac.in/courses/113104012/>
6. https://www.youtube.com/watch?v=jnjjWI1s9_s&list=PLzJaFd3A7DZse2tQ2qUFChSiCj7jBidO0.
7. <https://www.youtube.com/watch?v=4a0FbQdH3dY>.

Course outcomes:

The student will be able to:

1. Realize the concept of uncertainty principle and to compute quantized energy levels.
2. Analyze the formation the bands thereby classification of materials on the basis of transport properties.
3. Identify the semiconductors for engineering applications.
4. Analyze working principle of lasers and to summarize its applications.
5. Formulate and solve the engineering problems on electromagnetism and dielectrics.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	2	1	-	-	-	-	-	-	-	-	-	1	-
CO2	3	1	2	-	-	-	-	-	-	-	-	-	1	-
CO3	2	2	2	-	-	-	-	-	-	-	-	-	1	-
CO4	2	2	1	-	-	-	-	-	-	-	-	-	1	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	2	-
Average	2.4	1.8	1.6	-	-	-	-	-	-	-	-	-	1.2	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – II Sem			
Course Code: J125A	PROGRAMMING FOR PROBLEM SOLVING (Common to ECE, CSE, IT & ECM)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Mathematical Knowledge.
2. Analytical Skills.

Course objectives:

The Student will:

1. Learn the fundamentals of computers.
2. Understand the various steps in program development.
3. Understand the syntax and semantics of C programming language.
4. Learn the usage of structured programming approach in solving problems.
5. Gain the knowledge on searching and sorting methods.

Module 1:

INTRODUCTION TO PROGRAMMING:

Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems.

Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming.

Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments

Bitwise operations: Bitwise AND, OR, XOR and NOT operators Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do- while loops.I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.

Module 2:

ARRAYS, STRINGS, STRUCTURES AND PREPROCESSOR:

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays.

Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

Structures: Defining structures, initializing structures, unions, Array of structures.

Preprocessor: Commonly used Preprocessor commands like include, define, undef, If, ifdef, ifndef.

Module 3:

POINTERS AND FILE HANDLING IN C:

Pointers: Idea of pointers, defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self-referential structures in linked list (no implementation) Enumeration data type.

Files: Text and Binary files, Creating and Reading and writing text and binary files, appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

Module 4:

FUNCTION AND DYNAMIC MEMORY ALLOCATION:

Functions: Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries.

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions.

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types.

Module 5:

INTRODUCTION TO ALGORITHMS:

Basic searching algorithms (linear and binary search techniques), Basic sorting algorithms (Bubble, Insertion, Quick, Merge and Selection sort algorithms) Basic concept of order of complexity through the example programs

Text Books:

1. Ream Thareja, Programming in C, Oxford university press.
2. B.A. Forouzan and R.F. Gilberg, C Programming and Data Structures, Cengage Learning, (3rd Edition).

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
2. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
3. Stephen G. Kochan, Programming in C, Fourth Edition, Pearson Education.
4. Herbert Schildt, C: The Complete Reference, McGraw Hill, 4th Edition
5. Byron Gottfried, Schaum’s Outline of Programming with C, McGraw-Hill

E - Resources:

1. <https://fresh2refresh.com/c-programming/>
2. <https://www.studytonight.com/c/>
3. <https://beginnersbook.com/2014/01/c-tutorial-for-beginners-with-examples/>
4. <https://www.programiz.com/c-programming>
5. http://www.gtucampus.com/uploads/studymaterials/Degree%20EngineeringSandipFundamentals_of_C.pdf
6. http://cs.indstate.edu/~cbasavaraj/cs559/the_c_programming_language_2.pdf

Course outcomes:

The student will be able to:

1. Design the algorithms/flowcharts of C-programs.
2. Write the Code and test a given logic in C programming language.
3. Decompose a problem into functions and to develop modular reusable code.
4. Make Use of arrays, pointers, strings and structures to write C Programs.
5. Apply searching and sorting algorithms.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	-	-	-	-	-	-	-	-	-	1	2	2
CO2	2	2	3	2	2	-	-	-	-	-	-	-	2	-
CO3	3	2	2	-	-	-	-	-	-	-	-	1	-	3
CO4	3	2	2	2	-	-	-	-	-	-	-	1	-	3
CO5	3	2	2	-	-	-	-	-	-	-	-	1	2	3
Average	2.8	2.0	2.3	2.0	2.0	-	-	-	-	-	-	1.0	2.0	2.8

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – II Sem			
Course Code: J124A	BASIC ELECTRONIC ENGINEERING (COMMON TO ECE, ECM, EEE)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. Understand PN junction diode operation, characteristics and applications.
2. Learn Transistor characteristics in various configurations.
3. Gain knowledge on FET & MOSFET operations & Characteristics.
4. Understand the biasing of BJT & FET in various models.
5. Understand fabrication of integrated circuits.

Module 1:

UNIT-1: P-N Junction diode: (8 hours)

Construction and working of a P-N junction diode, V-I relationship of a P-N junction diode. (Qualitative analysis only, No Derivation) V-I characteristics of a P-N Junction diode, static and dynamic resistance of a diode , ideal diode, Zener Diode, Avalanche and Zener Breakdowns , V-I characteristics of Zener Diode

UNIT-2: Rectifiers:

The PN- Junction as a Rectifier Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, rectifier with Capacitor filter and π - Section filter, zener diode as a voltage regulator.

Module 2:

UNIT-I: Special Diodes: (10 hours)

Tunnel diode construction and working (using Energy Band diagram) , V-I Characteristics of tunnel diode .Photo diode construction, working and V-I Characteristics, UJT construction, working and V-I Characteristics, SCR construction, working and V-I Characteristics.

UNIT-II: Transistor (BJT) Characteristics

Construction and operation of Bi-Polar Junction Transistor (BJT), Different configurations, current components in a junction Transistor ,V-I characteristics in CB and CE configurations, determination of “ α ” and “ β ” of a transistor from the V-I characteristics , relation between “ α ” and “ β ” of a transistor .

Module 3:**Field Effect Transistors (FET): (6 hours)**

Comparison of BJT & JFET, Construction & Operation of JFET, V-I Characteristics of JFET, Determination of FET Parameters from the V-I characteristics. derivation for pinchoff voltage, MOSFET Construction & Operation in Enhancement and Depletion modes, V-I Characteristics of MOSFET.

Module 4:**Biasing and Analysis of Transistor amplifiers: (10 hours)**

Need for Biasing of transistors, Determination of Quiescent point from the CE characteristics, stability factors S, fixed bias, Self bias, and collector to base bias, quiescent point $Q (V_{ce}, I_c)$ and stability factor S calculations . H -Parameter equivalent circuit for BJT , Definition & Determination of h-Parameters from CE V-I Characteristics, Analysis of single stage transistor amplifiers (A_i , R_i , A_v , R_o Calculations) for CE,CB,CC Amplifiers Small Signal model for JFET, Self- Bias circuit for FET.

Module 5:**Integrated circuit fabrication process: (6 hours)**

Basic Monolithic Integrated Circuits, Integrated Resistors, Capacitors & inductors Epitaxial growth Masking and Etching oxidation, diffusion, ion implantation, photolithography.

Monolithic circuit layout, chemical vapor deposition, sputtering, twin-tub CMOS process.

Text Books:

1. Electronic devices and circuits, Millman & Halkias, McGraw Hill.(mandatory).
2. Integrated Electronics, Millman & Halkias, McGraw Hill.

Reference Books:

1. G.Streetman, and S.K.Banerjee, "Solid State Electronic Devices," 7th edition, Pearson,2014.
2. D.Neamen, D. Biswas "Semiconductor Physics and Devices," McGraw-Hill Education
3. S. M. Sze and K. N. Kwok, "Physics of Semiconductor Devices," 3rd edition, John Wiley & Sons, 2006.
4. C.T.Sah, "Fundamentals of solid state electronics," World Scientific Publishing Co. Inc,1991.
5. Y. Tsvetkov and M. Colin, "Operation and Modeling of the MOS Transistor," Oxford Univ.Press, 2011.
6. Electronic Devices and Circuits, BOYLESTAD.

E - Resources:

1. [en.wikipedia.org/wiki/Electronic Devices & Circuits](http://en.wikipedia.org/wiki/Electronic_Devices_&_Circuits)
2. www.modernelectronics.org
3. www.electronicstoday.com
4. www.npteliitm.ac.in
5. <http://books.google.co.in/books?id=sxswmJgMbEsC&pg=PA118&lpg=PR16&ots=DXZAEip uZB&focus=viewport&dq=Electronics+Devices +Circuits -Millman +Halkias #v=onepage&q= %-%20J.%20Millman%20and%20H.%20Halkias&f=false>
6. <http://www.youtube.com/watch?v=aO6tA1z9>.

Course outcomes:**The student will be able to:**

1. Construct different circuits using PN-Junction diode.
2. Analyze working of transistor in different configurations.
3. Operate and study the characteristics of JFET, MOSFET in Enhancement and Depletion Modes.
4. Apply BJT & MOSFET for biasing and analysis using small signal models.
5. Analyze the fabrication process of Integrated circuits.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	3	2	2							2	2	
CO2	3	3	3	2	2							2	2	
CO3	3	3	3	2	2							2	2	
CO4	3	3	3	2	2							2	2	
CO5	2	3	3	2	2							2	2	
Average	2.0	3.0	3.0	2.0	2.0							2.0	2.0	

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – II Sem			
Course Code: J12M2	GENDER SENSITIZATION (Common to CSE, IT, ECE, & ECM)	L	T	P	D
Credits: 0		2	0	0	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. To develop students' sensibility with regard to issues of gender in contemporary India.
2. To provide a critical perspective on the socialization of men and women.
3. To introduce students to information about some key biological aspects of genders.
4. To expose the students to debates on the politics and economics of work.
5. To help students reflect critically on gender violence.

Module 1:

UNDERSTANDING GENDER AND BIOLOGY-1

Gender: Why Should We Study It? (*Towards a World of Equals: Unit -1*)

Socialization: Making Women, Making Men (*Towards a World of Equals: Unit -2*)

Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

Module 2:

UNDERSTANDING GENDER AND BIOLOGY-2

Missing Women: Sex Selection and Its Consequences (*Towards a World of Equals: Unit -4*)

Declining Sex Ratio. Demographic Consequences.

Gender Spectrum: Beyond the Binary (*Towards a World of Equals: Unit -10*)

Two or Many? Struggles with Discrimination.

Module 3:

GENDER AND LABOUR

Housework: The Invisible Labour (*Towards a World of Equals: Unit -3*)

“My Mother doesn't Work.” “Share the Load.”

Women's Work: Its Politics and Economics (*Towards a World of Equals: Unit -7*)

Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

Module 4:

ISSUES OF VIOLENCE-1

Sexual Harassment: Say No! (*Towards a World of Equals*: Unit -6)

Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: “*Chupulu*”.

Domestic Violence: Speaking Out (*Towards a World of Equals*: Unit -8)

Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice.

Thinking about Sexual Violence (*Towards a World of Equals*: Unit -11)

Blaming the Victim- “I Fought for my Life....” - Additional Reading: The Caste Face of Violence.

Module 5:

JUST RELATIONSHIPS: BEING TOGETHER AS EQUALS

Mary Kom and Onler, love and acid just do not mix, love letters, mothers and fathers- further reading: Rosa Parks-The braveheart.

Course outcomes:

The student will be able to:

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	2	-	-	-
CO3	-	-	-	-	-	-	-	-	-	2	-	1	-	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	2	-	-	-	-
Average	-	-	-	-	-	-	-	-	-	2.0	2.0	1.0	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – II Sem			
Course Code: J1202	ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB (COMMON TO CE, ME, MIE & EEE)	L	T	P	D
Credits: 1		0	0	2	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm
2. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
3. To improve the fluency of students in spoken English and neutralize their mother tongue influence
4. To train students to use language appropriately for public speaking.
5. To train students to face the interviews.

SYLABUS:

English Language and Communication Skills Lab (ELCS) will have two parts:

- a) Computer Assisted Language Learning (CALL) Lab:
- b) Interactive Communication Skills (ICS) Lab:

Exercise – I:

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening. **Practice:** Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab:

Understand: Communication at Work Place- Spoken vs. Written language.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II:

CALL Lab:

Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab:

Understand: Features of Good Conversation – Non-verbal Communication.

Practice: Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise – III:

CALL Lab:

Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab:

Understand: How to make Formal Presentations.

Practice: Formal Presentations.

Exercise – IV:

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks.

Practice: Making a Short Speech – Extempore.

Exercise – V:

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Interview Skills.

Practice: Mock Interviews.

Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 30 students with 30 systems, with one Master Console, LAN facility and English language learning software for self- study by students. **System Requirement (Hardware component):** *Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:*

- i) Computers with Suitable Configuration
- ii) High Fidelity Headphones

Course outcomes:**The student will be able to:**

1. Better understanding of nuances of English language through audio- visual experience and group activities
2. Neutralization of accent for intelligibility
3. Speaking skills with clarity and confidence which in turn enhances their employability skills
4. The public speaking skills and facing the interviews
5. Good communication skills and use them at workplace.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	-	-	-	-	2	-	-	-	-	..	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	1	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	1	-	-	-	-
CO4	-	-	-	-	-	-	-	-	1	2	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	2	-	-	-	-
Average	-	-	-	-	2.0	-	-	-	1.0	1.49	-	-	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – II Sem			
Course Code: J1203	PHYSICS LAB (COMMON TOEEE, ECE, CSE, IT & ECM)	L	T	P	D
Credits: 1		0	0	2	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. Demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
3. Demonstrate competency and understanding of the concepts found in LED, Electric and Electronic materials a broad base of knowledge in physics.
4. Solve Experimental problems that potentially draw an experimental knowledge in multiple Areas of physics.
5. Study applications in engineering like Hall effect, and magnetic properties.
6. Study applications in engineering like Optical fiber, Lasers, Photodiode and Solar cell.

List of Experiments:

- 1. Energy gap of P-N junction diode:**
To determine the energy gap of a semiconductor diode.
- 2. Solar Cell:**
To study the V-I Characteristics of solar cell.
- 3. Light emitting diode:**
Plot V-I characteristics of light emitting diode.
- 4. Optical fiber:**
Determination of Numerical Aperture and Bending losses of an optical fibre.
- 5. Hall effect:**
To determine Hall co-efficient of a given semiconductor.
- 6. Photoelectric effect:**
To determine work function of a given material.
- 7. LASER:**
To study the Wave length of LASER Source.
- 8. Dielectric Constant:**
To determine the Dielectric constant of the given material.
- 9. LCR Circuit:**
To determine the Quality factor of LCR Circuit (Series & Parallel).

10. R-C Circuit:

To determine the time constant of R-C circuit (Growth and Decay).

Note: Any 8 experiments are to be performed.

Course outcomes:

The student will be able to:

1. Learn the experimental concepts on in LED, Electric and Electronic materials.
2. Get the knowledge of fundamentals of Semiconductor physics.
3. Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications.
4. Be exposed to the phenomena of electromagnetism and also to have exposure on magnetic materials and dielectric materials.
5. Lasers and fibre optics enable the students to apply to various systems like communications, solar cell, photo cells and so on.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	1	-	-	-	-	-	-	-	-	-	-	1	-
CO2	3	1	-	-	-	-	-	-	-	-	-	-	1	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-	1	-
CO4	3	1	1	-	-	-	-	-	-	-	-	-	1	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	1	-
Average	3.0	1.4	1.33	-	-	-	-	-	-	-	-	-	1.0	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – II Sem			
Course Code: J1251	PROGRAMMING FOR PROBLEM SOLVING LAB (common to ECE, CSE, IT & ECM)	L	T	P	D
Credits: 2		0	0	4	0

Pre-Requisites:

1. Mathematical Knowledge.
2. Analytical Skills.

Course objectives:

The Student will:

1. Work with an IDE to create, edit, compile, run and debug programs
2. Analyze the various steps in program development.
3. Develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. Develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
5. Write programs using the Dynamic Memory Allocation concept, files

1. SIMPLE NUMERIC PROBLEMS:

- a) Write a program for find the max and min from the three numbers.
- b) Write the program for the simple, compound interest.
- c) Write program that declares Class awarded for a given percentage of marks, where mark<40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >=70% = Distinction. Read percentage from standard input.

2. EXPRESSION EVALUATION:

- a) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result.
(Consider the operators +,-,*,/, % and use Switch Statement)
- b) Write a program that finds if a given number is a prime number
A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

3. ARRAYS AND POINTERS AND FUNCTIONS:

- a) Write a C program to find the minimum, maximum and average in an array of integers.
- b) Write a C program to find Addition of Two Matrices
- c) Write a C program to find Multiplication of Two Matrices.
- d) Write C programs that use both recursive and non-recursive functions
- e) Write a program for reading elements using pointer into array and display the values using array.

4.FILES:

- a) Write a C program to display the contents of a file to standard output device.
- b) Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents
- c) Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.

5. STRINGS:

- a) Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
- b) Write a C program to count the lines, words and characters in a given text.

6. SORTING AND SEARCHING:

- a) Write a C program for using binary search method.
- b) Write a C program for linear search.
- c) Write a C program that implements the Bubble sort method.
- d) Write a C program that implements the Insertion sort method.
- e) Write a C program that implements the Quick sort method.
- f) Write a C program that implements the Merge sort method.

ADDITIONAL PROGRAMS (Given to Student as Assignment):

- 1) Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:
 - a. $5 \times 1 = 5$
 - b. $5 \times 2 = 10$
 - c. $5 \times 3 = 15$
- 2) Write a program that shows the binary equivalent of a given positive number between 0 to 255.
- 3) Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.

- 4) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
- 5) Write a C program to calculate the following, where x is a fractional value.

$$1-x/2+x^2/4-x^3/6.$$
- 6) Write a C program to read in two numbers, x and n, and then compute the sum of this Geometric progression: $1+x+x^2+x^3+ \dots +x^n$. For example: if n is 3 and x is 5, then the program computes $1+5+25+125$.
- 7) Write a C program to find the minimum, maximum and average in an array of integers.
- 8) Write a functions to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.
- 9) Write a C program that uses functions to perform the following:
 - (a) Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.
 - (b) To find the factorial of a given integer.
 - (c) To find the GCD (greatest common divisor) of two given integers.
- 10) Write a C program that does the following:
 - (a) It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function) Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function). The program should then read all 10 values and print them back.
 - (b) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).
- 11) Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
- 12) Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
- 13) Write a C program that uses functions to perform the following operations:
 - (a) To insert a sub-string in to a given main string from a given position.
 - (b) To delete n Characters from a given position in a given string.
- 14) Write a C program to construct a pyramid of numbers as follows:


```

1          *          1          1          *
1 2        **        2 3        2 2        **
1 2 3      ***       4 5 6      3 3 3      ***
                                     4 4 4 4    **
                                             *
```
- 15) Write a C program that sorts a given array of names.

Course outcomes:**The student will be able to:**

1. Formulate the algorithms for simple problems
2. Examine syntax errors as reported by the compilers
3. Define and manipulate data with arrays, strings and structures
4. Make use of pointers of different functions types
5. Create, read and write to and from simple text and binary files

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	-	-	-	-	-	-	2	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	2	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	2	-	-	-	-	2
CO4	3	2	-	-	-	-	-	-	2	-	-	-	-	2
CO5	3	2	-	-	-	-	-	-	2	-	-	-	-	2
Average	3.0	2.0	-	-	-	-	-	-	2.0	-	-	-	-	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – II Sem			
Course Code: J1241	BASIC ELECTRONICS ENGINEERING LAB (COMMON FOR CSE, ECE, EEE, ECM)	L	T	P	D
Credits: 1		0	0	2	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. Learn Color coding of different components like Resistor, capacitor and Inductor.
2. Study basic electronic equipment like CRO, RPS, Function generator etc
3. Observe characteristics of electronic devices
4. Calculate various parameter of rectifier circuits
5. Get the Knowledge Frequency Response of various Amplifier circuits

PART A: (Only for Viva-voce Examination)

ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions) :

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCB's
2. Identification, Specifications and Testing of Active Devices, Diodes, BJT's, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR, UJT.
3. Study and operation of
Multimeters (Analog and Digital)
Function Generator
Regulated Power Supplies .CRO.

PART B: (For Laboratory Examination – Minimum of 10 experiments)

1. Forward & Reverse Bias Characteristics of PN Junction Diode.
2. Zener diode characteristics and Zener as voltage Regulator.
3. Input & Output Characteristics of Transistor in CB Configuration.
4. Input & Output Characteristics of Transistor in CE Configuration.
5. Half Wave Rectifier with & without filters
6. Full Wave Rectifier with & without filters
7. FET characteristics
8. Measurement of h parameters of transistor in CB, CE, CC configurations
9. Frequency Response of CC Amplifier.

10. Frequency Response of CE Amplifier.
11. Frequency Response of Common Source FET amplifier
12. SCR characteristics.
13. UJT Characteristics

Equipment required for Laboratories:

1. Regulated Power supplies (RPS) - 0-30 V
2. CRO's - 0-20 MHz.
3. Function Generators - 0-1 MHz.
4. Multimeters
5. Decade Resistance Boxes.
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital) - 0-20 μ A, 0-50 μ A, 0-100 μ A, 0-200 μ A, 0-10 mA.
8. Voltmeters (Analog or Digital) -0-50V, 0-100V, 0-250V
9. Electronic Components - Resistors, Capacitors, BJTs, LCDs, SCRs, UJTs,FETs, LEDs, MOSFETs,diodes Ge& Sitype,Transistors – npn,pnp type).

Course outcomes:

The student will be able to:

1. Calculate value of Resistor, capacitor and Inductor using colour coding
2. Measure voltage, frequency and phase of any waveform using CRO.
3. Generate sine, square and triangular waveforms with required frequency and amplitude using function generator
4. Analyze the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits like rectifiers, amplifiers , etc
5. Analyze Frequency Response of various Amplifier circuits

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	-	-	2	-	-	-	-	-	-	-	2	2	-
CO2	2	-	-	2	-	-	-	-	-	-	-	2	2	-
CO3	3	3	3	3	2	-	-	-	-	-	-	2	2	-
CO4	3	3	3	3	2	-	-	-	-	-	-	2	2	-
CO5	3	3	3	2	2	-	-	-	-	-	-	2	2	-
Average	2.6	3.0	3.0	3.0	2.0	-	-	-	-	-	-	2.0	2.0	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – I Sem			
Course Code: J210B	PROBABILITY AND STATISTICS (Common to CSE & IT)	L	T	P	D
Credits: 4		3	1	0	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. The concepts of discrete and continuous random variables, the probability distribution and density function.
2. Evaluation of marginal and conditional distribution of multiple random variables.
3. The concept of correlation and regression to find covariance.
4. Evaluation of the given data for appropriate test of hypothesis.
5. Analyzing the data for variance.

Module 1:

Single Random Variables: (9L)

Introduction to probability, Random Variables, Discrete and Continuous. Probability distributions, mass function/ density function of a probability distribution, mathematical expectation, moments about origin, central moments. Moment generating function of probability distribution.

Module 2:

Probability Distributions: (10L)

Binomial, Poisson, Normal, exponential distributions -their Properties. Moment generating functions of the above distributions and hence find the mean and variance. Joint probability distributions- Joint probability mass /density function, Marginal probability, mass / density functions.

Module 3:

Correlation & Regression Sampling Distributions (10L)

UNIT I : Correlation: Types of Correlation, Coefficient of correlation, the rank correlation, Covariance of two random variables. Regression- Regression Coefficient, The lines of regression and multiple correlation & regression

UNIT II: Sampling: Definitions of population, sampling, statistic, parameter. Types of sampling, Expected values of Sample mean and variance, sampling distribution, Standard error, Sampling distribution of means ,sampling distribution of variance and sampling distribution of proportions Parameter estimation- Point estimation and interval estimation

Module 4:

Testing of Hypothesis – I

(10L)

UNIT I: Testing of hypothesis: Null hypothesis, Alternate hypothesis, Type I & Type II errors – critical region, confidence interval, and Level of significance. One sided test, Two sided test.

UNIT II: Large sample tests:

- (i) Test of Equality of means of two samples, equality of sample mean and population mean (cases of known variance & unknown variance, equal and unequal variances)
- (ii) Tests of significance of difference between sample S.D and population S.D.
- (iii) Tests of significance difference between sample proportion and population proportion, difference between two sample proportions

Module 5:

Testing of Hypothesis – II:

(9L)

Student t-distribution, its properties and applications, test of significance sample mean and population mean, difference between means of two small samples. Snedecor's F-distribution and its properties. Test of equality of two population variances. Chi-square distribution, its properties, Chi-square test of goodness of fit, Chi-square test for independence & applications of attributes

Text Books:

1. S.C.Gupta and V.K.Kapoor : Fundamentals of Mathematical Statistics, 2006
2. Kantiswarup, P.K.Gupta and Manmohan Singh : Operations Research, S.Chand & Co, 2010.

Reference Books:

1. R. A. Johnson: Miller and Freund's Probability and Statistics for Engineers, Pearson Publishers, 9th Edition, 2017
2. Freund: Modern elementary statistics, PHI, 2006
3. Probability and Statistics for Engineers by Richard Arnold Johnson, Irwin Miller and John E. Freund, New Delhi, Prentice Hall

E-resources:

1. <https://nptel.ac.in/courses/117/104/117104117/>
2. https://en.wikipedia.org/wiki/Probability_distribution
3. <http://www.randomservices.org/random/sample/Covariance.html>
4. https://nptel.ac.in/content/storage2/courses/103106120/LectureNotes/Lec3_1.pdf
5. <https://www.smartbugmedia.com/blog/hypotheses-worth-testing-on-your-website>

Course outcomes:

The students will be able to

1. Understand the concept of probability and statistics.
2. Find the mean and variance of a given probability distribution.
3. Find the coefficient of correlation and lines of regression.
4. Test the hypothesis for large samples.
5. Test the hypothesis for small samples.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	1	2	2	-	-	-	-	-	-	-	1	-	-
CO2	3	1	2	2	-	-	-	-	-	-	-	1	-	-
CO3	3	1	2	2	-	-	-	-	-	-	-	1	-	-
CO4	3	1	2	2	-	-	-	-	-	-	-	1	-	-
CO5	3	1	2	2	-	-	-	-	-	-	-	1	-	-
Average	3.0	1.0	2.0	2.0	-	-	-	-	-	-	-	1.0	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE II Year – I Sem			
Course Code: J215A	DATA STRUCTURES (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. The Algorithmic Design and Techniques.
2. One programming language like C.

Course objectives:

The Student will:

1. Define the basic data structures like linked list.
2. Understand the fundamentals and applications of linked list, stacks and queues.
3. Classify different types of tree data structures
4. Understand the concepts of graph data structures.
5. Know the fundamentals of basic searching, sorting and pattern matching algorithms.

Module 1:

Basic concepts - Algorithm Specification, Data Abstraction, Performance analysis - time complexity and space complexity, Asymptotic Notation - Big O, Omega and Theta notations, Introduction to Linear and Non Linear data structures.

Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, circular linked list implementation, doubly linked list implementation, insertion, deletion and searching operations. Applications of linked lists.

Module 2:

Stacks-Operations, array and linked representations of stacks, stack applications-infix to postfix conversion, postfix expression evaluation, recursion implementation.

Queues-operations, array and linked representations. Circular Queue operations, Dequeue, applications of queue.

Module 3:

Trees – Terminology, Representation of Trees, Binary tree ADT, Properties of Binary Trees, Binary Tree Representations-array and linked representations, Binary Tree traversals, Threaded binary trees, Binary Heap-Properties, Max and Min Heap, Operations-Insertion and Deletion.

Search Trees-Binary Search tree, Tree traversals, AVL tree – operations, B-tree – operations, B+ trees, Red Black tree.

Module 4:

Graphs-Terminology, sequential and linked representation, graph traversals: Depth First Search & Breadth First Search implementation. Spanning trees, Prims and Kruskals method.

Searching and Sorting - Linear Search, Binary Search, Insertion Sort, Selection Sort, Merge Sort, Quick sort, Heap Sort.

Module 5:

Hashing-Hash table, Hash table representations, hash functions, collision resolution techniques-separate chaining, open addressing-linear probing, quadratic probing, double hashing, Re hashing, Extendible hashing,

Pattern matching : Introduction, Brute force, the Boyer –Moore algorithm, Knuth-Morris-Pratt algorithm.

Textbooks:

1. Data Structures Using C, Reema Thareja, Oxford University Press, 2011 Learning.
2. Introduction to Algorithms, TH Cormen, PHI

Reference Books:

1. Data Structures & Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education.
2. Design methods and analysis of Algorithms, SK Basu, PHI.
3. Fundamentals of Computer Algorithms, 2nd Edition, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Universities Press.

E - Resources:

1. <http://masterraghu.com/subjects/Datastructures/ebooks/rema%20thareja.pdf>.
2. <https://www.slideshare.net/adishesha12/data-structure-ppt-138483078>
3. <https://lecturenotes.in/subject/81/data-structure-using-c-ds>
4. http://www.tutorialspoint.com/data_structures_algorithms
4. <http://www.geeksforgeeks.org/data-structures/>
5. <http://www.coursera.org/specializations/data-structures-algorithms>

Course outcomes:**The student will be able to:**

1. Demonstrate operations like searching, insertion, deletion, traversing mechanism using linked list.
2. Use linear and non-linear data structures like stacks, queues etc.
3. Implement different types of tree data structures.
4. Implement the concepts of graph data structures.
5. Apply the basic searching, sorting and pattern matching Techniques.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	2	-	-	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	2
CO3	3	1	-	-	-	-	-	-	-	-	-	-	-	2
CO4	3	1	-	-	-	-	-	-	-	-	-	-	-	2
CO5	3	1	-	-	-	-	-	-	-	-	-	-	-	2
Average	2.8	1.4	-	-	-	-	-	-	-	-	-	-	-	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – I Sem			
Course Code: J216A	DATABASE MANAGEMENT SYSTEMS (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. Understanding of the architecture and functioning of database management systems as well as associated tools and techniques.
2. Understand and apply the principles of data modeling using entity relationship and develop a good database design.
3. Understand the use of structured query language (SQL) and its syntax.
4. Apply normalization techniques to normalize a database.
5. Understand the need of database processing and learn techniques for controlling the consequences of concurrent data access.

Module 1:

Unit I: Introduction

Database System Applications, Database Systems Vs File Systems, View of Data-Data Abstraction, Instances and Schemas.Data Models – The ER Model, Relational Model, Other Data Models. Database Languages – DDL, DML. Database Access for Applications Programs, Data Base Users and Administrator, Transaction Management, Data Base System Structure, Storage Manager, The Query Processor.

Unit 2: Database Design and ER-Diagrams

Beyond ER Design, Entities, Attributes and Entity Sets,Relationships and Relationship Sets, Additional Features of ERModel, Conceptual Design with the ER Model.

Module 2:

Unit 1: The Relational Model

Introduction to the Relational Model,Integrity Constraints Over Relations, Enforcing Integrity Constraints, Querying Relational Data,Logical Database Design,Introduction to Views, Destroying /Altering Tables and Views.

Unit 2: Relational Algebra and Calculus

Relation Algebra-Selection and Projection, Set Operations, Renaming, Joins, Division, More Examples of Algebra Queries.Relational Calculus – Tuple Relational Calculus, Domain Relational Calculus, Expressive Power of Algebra and Calculus.

Module 3:

Unit 1: SQL Queries

Form of Basic SQL Query, Examples of Basic SQL Queries, Union, Intersect and Except. Introduction to Nested Queries, Correlated Nested Queries, Set-Comparison Operators. Aggregative Operators, Null Values, Comparison Using Null Values, Logical Connectives AND, OR and NOT, Impact on SQL Constructs, Outer Joins, Disallowing Null Values. Complex Integrity Constraints in SQL, Triggers and Active Databases.

Unit 2: Schema Refinement: Problems Caused by Redundancy, Decompositions, Problem Related to Decomposition, Reasoning about FDs. Normal Forms-First, Second, Third Normal Forms, BCNF. Lossless Join Decomposition – Dependency Preserving Decomposition, Schema Refinement in Data Base Design, Multi Valued Dependencies, Forth Normal Form.

Module 4:

Unit 1: Transaction Management

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

Unit 2: Recovery System

Failure Classification, Storage Structure, Recovery and Atomicity, Log- Based Recovery, Recovery with Concurrent Transactions, Buffer Management, Failure with Loss of Nonvolatile Storage, Advance Recovery Techniques, Remote Backup Systems.

Module 5

Unit 1: Storage and Indexing

Data On External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index Data Structures, Hash Based Indexing, Tree Base Indexing, Comparison of File Organizations, Indexes and Performance.

Unit 2: Tree Structured Indexing

Intuitions for Tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

Text Books:

1. **Data Base Management Systems**, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
2. **Data base System Concepts**, Silberschatz, Korth, McGraw hill, V edition.

Reference Books:

1. **Data base Systems design**, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. **Fundamentals of Database Systems**, Elmasri Navrate Pearson Education
3. **Introduction to Database Systems**, C.J.Date Pearson Education.

E - Resources:

1. <https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-cs15/>
2. <https://www.alljntuworld.in/download/database-management-system-dbms-materials-notes/>

Course outcomes:

The Students will be able to:

1. Describe basic concepts of database system.
2. Design a data model and schemas in RDBMS.
3. Use RDBMS for developing industry applications.
4. Be competent in use of structured query language SQL.
5. Analyze functional dependencies for designing a robust database

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	2	-	-	-	-	-	-	-	-	3	-
CO3	-	2	3	2	-	-	-	-	-	-	-	-	-	-
CO4	-	2	-	3	3	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	3	-	-	-	-	-	-	-	3	-
Average	2.5	2.0	3.0	2.3	3.0	-	-	-	-	-	-	-	3.0	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE II Year – I Sem			
Course Code: J215B	DIGITAL LOGIC DESIGN AND COMPUTER ORGANIZATION	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Including basic design concepts and implementation technology
2. Number representation,
3. Synthesis of combinational and sequential logic
4. Foundations of Computer Systems Design

Course objectives:

The Student will:

1. Get the fundamental knowledge of the basic structure and operation of a digital computer.
2. Solve logic expression and design combinational circuits.
3. Discuss operation of arithmetic unit including implementation of fixed-point and floating-point addition, subtraction, multiplication and division.
4. Classify different hierarchical memory systems including cache memory and virtual memory.
5. Recognize different ways of communicating with input/output devices and standard i/o interfaces.

Module 1:

Basic Structure of Computers

Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations. Data Representation: Binary Numbers Fixed Point Representation. Floating – Point Representation. Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes.

Module 2:

Digital Logic Circuits - I

Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. Flip-flops, Combinational Circuits. Digital Logic Circuits -II: Registers, Shift Registers, Binary counters, Decoders, Multiplexers, Programmable Logic Devices.

Module 3:

Computer Arithmetic

Algorithms for fixed point and floating point addition, subtraction, multiplication and division operations. Hardware Implementation of arithmetic and logic operations, High performance arithmetic. Instruction Set & Addressing: Memory Locations and Addresses, Machine addresses and sequencing, Various Addressing Modes, Instruction Formats, Basic Machine Instructions. IA-32 Pentium example.

Module 4:

Processor Organization

Introduction to CPU, Register Transfers, Execution of Instructions, Multiple Bus Organization, Hardwired Control, Micro programmed Control Memory Organization: Concept of Memory, RAM, ROM memories, memory hierarchy, cache memories, virtual memory, secondary storage, memory management requirements.

Module 5:

Input/ Output Organization

Introduction to I/O, Interrupts- Hardware, Enabling and disabling Interrupts, Device Control, Direct memory access, buses, interface circuits, standard I/O Interfaces.

Text Books:

1. Computer Organization – Carl Hamacher, Zvonko Vranesic, Safwat Zaky, fifth edition, McGraw Hill.
2. Computer Architecture and Organization- An Integrated Approach, Miles Murdocca, Vincent Heuring, Second Edition, Wiley India.

Reference Books:

1. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson
3. Digital Logic Design & Computer Organization with Computer Architecture for Security-Nikrouz Faroughi, McGrawHill Education

E - Resources:

1. www.wjec.co.uk/uploads/publications/4891.doc?language_id
2. <http://www.ece.rutgers.edu/~marsic/Teaching/DLD/slides/lec-12.pdfW3>
3. <http://web2.uwindsor.ca/courses/cs/aggarwal/cs60265/Multiplexer.ppt>
4. <http://nptel.ac.in/pdf/nptel/NPTEL%20Local%20Chapter%20PPT%20-%20Jan%202017.pptx>
5. <https://www.slideshare.net/foyezahammad1/digital-logic-design- dld-presentation>

Course outcomes:

The Student will be able to:

1. Illustrate basic structure of digital computer.
2. Apply knowledge of different digital logic circuits.
3. Apply arithmetic operations of binary number systems.
4. Show organization of control unit and arithmetic logic unit.
5. Recognize different ways of communicating with input/output devices and standard i/o interfaces.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3											2		
CO2	2	3	3									2	3	2
CO3	3	2	3									2		2
CO4	3	3												
CO5	3											2		
Average	2.8	2.7	3.0									2.0	2.3	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – I Sem			
Course Code: J215C	OBJECT ORIENTED PROGRAMMING THROUGH JAVA (Common to CSE & ECM)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

1. Knowledge on C programming language.
2. Fundamental knowledge on Data structures

Course objectives:

The Student will:

1. Familiar with OOPs, constructors and string handling functions
2. Understand inheritance and polymorphism
3. Gain knowledge of with packages and interfaces
4. Understand the with exception handling and multithreading
5. Know the applet programming, event handling and scripting.

Module 1:

Introduction: OOP concepts, history of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program.

Classes and Objects: concepts of classes, objects, constructors, methods, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion.

String handling: String, String Buffer, String Tokenize.

Module 2:

Inheritance: base class object, subclass, member access rules, super uses, using final with inheritance, method overriding, abstract classes

Interfaces: defining an interface, implementing interface, differences between classes and interfaces and extending interfaces.

Packages: Defining, creating and accessing a package, importing packages, access control, exploring package - java.io

Module 3:

Exception handling: concepts of exception handling, benefits of exception handling, exception hierarchy, checked and unchecked exceptions, usage of-try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.

Multithreading: differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

Module 4:

Applets: concepts of applets, differences between applets and applications, life cycle of applet, types of applets, creating applets, passing parameters to applets.

Event Handling: events, event sources, event classes, event listeners, delegation event model, handling mouse and key board events, adapter classes. The AWT class hierarchy, user interface components-labels, buttons, canvas, scrollbars, text components, checkbox, checkbox groups, choices, lists

Module 5:

Layout manager: layout manager types-border, grid, flow, card and grid bag.

Swing: Introduction, limitations of AWT, components, containers,

Exploring swing- JApplet, JFrame and JComponent, Icons and Labels, Text fields, buttons – The JButton class, Checkboxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees and Tables.

Text Books:

1. Java The complete reference, 8th editon, Herbert Schildt, TMH.
2. Under tanding OOP with Java, up dated edition, T.Budd, Pears on education.

Reference Books:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons.
2. An Introduction to OOP, second edition, T. Budd, pearson education.
3. Introduction to Java programming 6th edition, Y. Daniel Liang, pearson education.

E - Resources:

1. www.javasoft.com
2. www.w3schools.com
3. www.tutorialpoint.com
4. www.oracle.com

Course outcomes:**The Student will be able to:**

1. Use OOP concepts in problem solving.
2. Demonstrate Inheritance and Polymorphism
3. Create user defined Packages and Interfaces
4. Illustrate the concept of Exception handling and Multithreading
5. Design GUI based applications using Applet Programming and Event Handling.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	-	3	-	3	3	-	3	-	-	2	-	-	3	-
CO2	-	-	2	-	-	3	-	3	-	-	3	-	-	3
CO3	3	-	-	3	-	2	-	-	3	-	-	3	-	-
CO4	3	-	-	-	3	-	-	3	3	3	-	-	3	-
CO5	-	3	-	-	-	-	2	-	-	-	3	-	-	3
Average	3.0	3.0	2.0	3.0	3.0	2.5	2.5	3.0	3.0	2.5	3.0	3.0	3.0	3.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – I Sem			
Course Code: J21M2	ENVIRONMENTAL SCIENCES (Common to CSE,ECE,ECM,EEE&IT)	L	T	P	D
Credits: 0		2	0	0	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. Study about the different natural resources available and how to use them.
2. Explain about biodiversity.
3. Discuss about Global Environmental Problems and Global Efforts.
4. Identify the global environmental problems.
5. Explain about sustainable development.

Module 1:

Unit 1: Ecosystems & Natural Resources, Biodiversity: Concept, Classification of Resources: Water resources, Land resources, land degradation, Forest resources, Mineral resources, Energy resources. Concept of ecosystem, Classification of ecosystem, Functions of ecosystem. Biodiversity, Level, values, hotspots of biodiversity, Threats To Biodiversity, Conservation Of Biodiversity.

Module 2:

Unit 1: Global Environmental Problems and Global Efforts: Deforestation, Green house effect, Global Warming, Sea level rise, Ozone depletion. International conventions/protocols: green-belt-development, Concept of Green Building, Clean Development Mechanism (CDM).

Unit 2: Environmental Impact Assessment (EIA) And Environmental Management Plan: Definition of Impact, classification of impacts, methods of baseline data acquisition. Impacts on different components: such as human health resources, air, water, flora, fauna and society, impact assessment methodologies. Environmental management plan (EMP).

Module 3:

Unit 1: Environmental Policy, Legislation, Rules And Regulations: Environmental Protection Act: Air (Prevention and control of pollution) Act-1981, Water (Prevention and control of pollution) Act-1974, Forest Conservation Act.

Unit 2: Towards Sustainable Future: Concept of Sustainable Development, Threats to Sustainability, Strategies for achieving Sustainable development, Environmental Ethics, Environmental Economics, Concept of Green Computing.

Text Books:

1. Text Book Of Environmental Science and Technology by M.Anji Reddy 2007
2. Principles of Environmental Science and Engineering by P.Venugopal Rao.
3. Introduction to Environmental Studies by K.Mukkanti
4. Text book of Environmental studies by Kaushik&Anubha kaushik

Reference Books:

1. Tata McgrawHill : Introduction to Environmental Studies by Benny Joseph
2. Environmental Studies by Erach Bharucha 2005, University Grants Commission, University Press.

E - Resources:

1. <https://nptel.ac.in/courses/120/108/120108004/>

Course outcomes:**The Student will be able to:**

1. Compare the different natural resources available and how to use them.
2. Describe about biodiversity.
3. Analyze the Global Environmental Problems and Global Efforts.
4. Categorize the global environmental problems.
5. Prioritize the Sustainable development.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	2	2	-	-	1	-	-	-	-	1	2	1
CO2	-	-	-	-	-	3	3	-	-	-	-	2	1	1
CO3	3	3	2	2	-	-	1	-	-	-	-	1	2	1
CO4	3	3	2	2	-	-	1	-	-	-	-	1	2	1
CO5	-	-	-	-	-	3	3	-	-	-	-	2	2	1
Average	1.8	1.8	1.2	1.2	-	1.2	1.8	-	-	-	-	1.4	1.8	1

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech:CSE II Year – I Sem			
Course Code: J2151	DATA STRUCTURES LAB (Common to CSE & IT)	L	T	P	D
Credits: 1		0	0	2	0

Pre-Requisites:

1. The Algorithmic Design and Techniques.
2. One programming language like C.

Course objectives:

The Student will:

1. Define the basic data structures like linked list.
2. Understand the fundamentals and applications of linked list, stacks and queues.
3. Classify different types of tree data structures
4. Understand the concepts of graph data structures.
5. Know the fundamentals of basic searching, sorting and pattern matching algorithms.

Experiment 1:

Write a C program that uses functions to perform the following operations on singly linked list:

- I) Creation II) Insertion III) Deletion IV) Traversal V) merge two single linked lists

Experiment 2:

Write a C program that uses functions to perform the following operations on doubly linked list.

- I) Creation II) Insertion III) Deletion IV) Traversal

Experiment 3:

Write a C program that implement stack operations using

- I) Arrays II) Linked Lists

Experiment 4:

I) Write a C program to convert infix expression to postfix expression using stack

II) Write a C program to evaluate postfix expression

Experiment 5:

I) Programs using recursion

II) Write a C program to convert infix expression to prefix expression using stack

Experiment 6:

Write a C program to implement Linear queue using

- I) Arrays II) Linked Lists

Experiment 7:

Write a C program to perform following operations on a circular Queue

I) insertion II) deletion III) search and count

Experiment 8:

Write a C program to perform following operations on a circular DeQueue

I)insertion II) deletion III) search and count

Experiment 9:

I)Write a C Program to implement binary tree traversals

II) Write a C Program to implement AVL tree operations

Experiment 10:

I) Implementation of a Graph representation using Adjacency Matrix

II) Write a C program to implement graph traversals.

Experiment 11:

I)Write a C program to implement Linear search

II) Write a C program to implement Binary Search

Experiment 12:

I) Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:

I) Bubble sort II) Selection sort III) Insertion Sort

Experiment 13:

Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:

I) Merge sort II) Quick sort

Experiment 14:

I)Write a C Program to Implement the Hashing technique

II)Write a C Program to Implement the KMP Pattern Searching Algorithm

Course outcomes:**The Student will be able to:**

1. Demonstrate operations like searching, insertion, deletion, traversing mechanism using linked list.
2. Use linear and non-linear data structures like stacks, queues etc.
3. Implement different types of tree data structures.
4. Implement the concepts of graph data structures.
5. Apply the basic searching, sorting and pattern matching Techniques.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	-	-	-	-	-	-	2	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	1	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	1	-	-	-	-	2
CO4	3	2	-	-	-	-	-	-	1	-	-	-	-	2
CO5	3	2	-	-	-	-	-	-	1	-	-	-	-	2
Average	3.0	2.0	-	-	-	-	-	-	1.2	-	-	-	-	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – I Sem			
Course Code: J2161	DATABASE MANAGEMENT SYSTEMS LAB (Common to CSE & IT)	L	T	P	D
Credits: 1.5		0	0	3	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. Familiarize with the nuances of database environments towards an information-oriented data-processing oriented framework.
2. Gain a good formal foundation on the relational model of data present sql and procedural interfaces to Sql comprehensively.
3. Gain an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design and to motivate the Student to relate all these to one or more commercial product environments as they relate to the developer tasks.
4. Present the concepts and techniques relating to query processing by sql engines and present the concepts and techniques relating to ODBC and its implementations.
5. Introduce the concepts of transactions and transaction processing and to present the issues and techniques relating to concurrency and recovery in multi-user database environments.

This lab enables the **Student** to practice the concepts learnt in the subject DBMS by developing a database for an example company named "Roadway Travels" whose description is as follows. The student is expected to practice the designing, developing and querying a database in the context of example database "Roadway travels". **Student** are expected to use "Oracle" database. Roadway Travels "Roadway Travels" is in business since 1997 with several buses connecting different places in India. Its main office is located in Hyderabad.

The company wants to computerize its operations in the following areas:

- Reservations and Ticketing
- Cancellations Reservations & Cancellation: Reservations are directly handled by booking office. Reservations can be made 30 days in advance and tickets issued to passenger. One Passenger/person can book many tickets (to his/her family). Cancellations are also directly handed at the booking office. In the process of computerization of Roadway Travels you have to design and develop a Database which consists the data of Buses, Passengers, Tickets, and Reservation and

cancellation details. You should also develop query's using SQL to retrieve the data from the database.

The above process involves many steps like

1. Analyzing the problem and identifying the Entities and Relationships
2. E-R Model
3. Relational Model
4. Normalization
5. Creating the database
6. Querying. **Student** are supposed to work on these steps week wise and finally create a complete "Database System" to Roadway Travels.

Examples are given at every experiment for guidance to **Student**.

Experiment – 1.

E-R Model

Analyze the problem carefully and come up with the entities in it. Identify what data has to be persisted in the database. This contains the entities, attributes etc.

Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any

Example: Entities:

1. BUS
2. Ticket
3. Passenger

Relationships:

1. Reservation
2. Cancellation

PRIMARY KEY ATTRIBUTES:

1. Ticket ID (Ticket Entity)
2. Passport ID (Passenger Entity)
3. Bus_NO (Bus Entity)

Apart from the above mentioned entities you can identify more. The above mentioned are few.

Note:

The student is required to submit a document by writing the Entities and Keys to the lab teacher.

Experiment – 2.

Concept design with E-R Model

Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any). Indicate the type of relationships (total / partial). Try to incorporate generalization, aggregation, specialization etc wherever required.

This lab enables the **Student** to practice the concepts learnt in the subject DBMS by developing a database for an example company named "Roadway Travels" whose description is as follows. The student is expected to practice the designing, developing and querying a database in the context of example database "Roadway travels". **Student** are expected to use "Oracle" database. Roadway Travels "Roadway Travels" is in business since 1997 with several buses connecting different places in India. Its main office is located in Hyderabad.

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The above process involves many steps like

7. Analyzing the problem and identifying the Entities and Relationships
8. E-R Model
9. Relational Model
10. Normalization
11. Creating the database
12. Querying. **Student** are supposed to work on these steps week wise and finally create a complete "Database System" to Roadway Travels.

Examples are given at every experiment for guidance to **Student**.

Experiment – 1.

E-R Model

Analyze the problem carefully and come up with the entities in it. Identify what data has to be persisted in the database. This contains the entities, attributes etc.

Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any

Example: Entities:

4. BUS
5. Ticket
6. Passenger

Relationships:

3. Reservation
4. Cancellation

PRIMARY KEY ATTRIBUTES:

4. Ticket ID (Ticket Entity)
5. Passport ID (Passenger Entity)
6. Bus_NO (Bus Entity)

Apart from the above mentioned entities you can identify more. The above mentioned are few.

Note:

The student is required to submit a document by writing the Entities and Keys to the lab teacher.

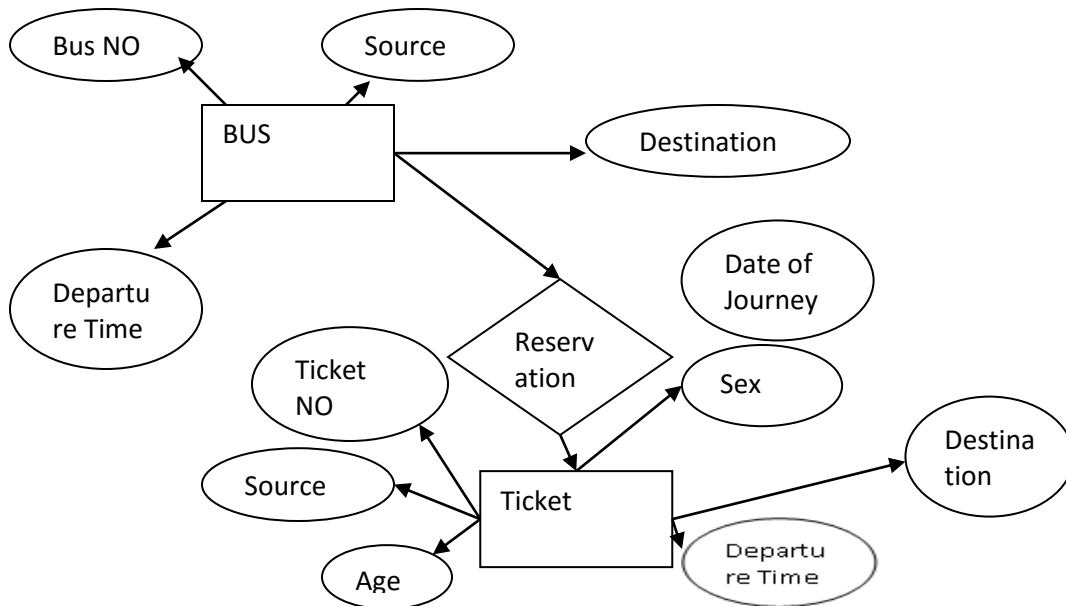
Experiment – 2.

Concept design with E-R Model

Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any). Indicate the type of relationships (total / partial). Try to incorporate generalization, aggregation, specialization etc wherever required.

Example:

E-R diagram for bus



Note: The student is required to submit a document by drawing the E-R Diagram to the lab teacher.

Experiment – 3.

Relational Model

Represent all the entities (Strong, Weak) in tabular fashion. Represent relationships in a tabular fashion. There are different ways of representing relationships as tables based on the cardinality. Represent attributes as columns in tables or as tables based on the requirement. Different types of attributes (Composite, Multi-valued, and Derived) have different way of representation.

Example:

The passenger tables look as below. This is an example. You can add more attributes based on your E-R model. This is not a normalized table.

Passenger

Name	Age	Sex	Address	<u>Passport ID</u>
				Ticket_id

Note:

The student is required to submit a document by Represent relationships in a tabular fashion to the lab teacher.

Experiment – 4.

Normalization

Database normalization is a technique for designing relational database tables to minimize duplication of information and, in so doing, to safeguard the database against certain types of logical or structural problems, namely data anomalies. For example, when multiple instances of a given piece of information occur in a table, the possibility exists that these instances will not be kept consistent when the data within the table is updated, leading to a loss of data integrity. A table that is sufficiently normalized is less vulnerable to problems of this kind, because its structure reflects the basic assumptions for when multiple instances of the same information should be represented by a single instance only.

For the above table in the First normalization we can remove the multi valued attribute Ticket_id and place it in another table along with the primary key of passenger.

First Normal Form: The above table can be divided into two tables as shown below.

Passenger

Name	Age	Sex	Address	<u>Passport ID</u>

<u>Passport ID</u>	Ticket_id

You can do the second and third normal forms if required. Any how Normalized tables are given at the end.

Experiment - 5.

Installation of Mysql and Practicing DDL and DML commands

Installation of MySQL. In this week you will learn Creating databases, How to create tables, altering the database, dropping tables and databases if not required. You will also try truncate, rename commands etc.

Example for creation of a normalized “Passenger” table.

```
CREATE TABLE Passenger (Passport_id INTEGER PRIMARY KEY,  
Name VARCHAR (50) Not NULL,  
Age Integer Not NULL,  
Sex Char,  
Address VARCHAR (50) Not NULL);
```

Similarly create all other tables.

Note: Detailed creation of tables is given at the end.

Insert data into the above tables.

DML commands are used to for managing data within schema objects. Some examples:

- SELECT - retrieve data from the a database
- INSERT - insert data into a table
- UPDATE - updates existing data within a table
- DELETE - deletes all records from a table, the space for the records remain

Inserting values into “Bus” table

Insert into Bus values (1234,'hyderabad', 'tirupathi');

Insert into Bus values (2345,'hyderabad', 'Banglore');

Insert into Bus values (23,'hyderabad', 'Kolkata');

Insert into Bus values (45,'Tirupathi', 'Banglore');

Insert into Bus values (34,'hyderabad', 'Chennai');

Inserting values into “Passenger” table:

Insert into Passenger values (1, 45,'ramesh', 45,'M', 'abc123');

Insert into Passenger values (2, 78,'geetha', 36,'F', 'abc124');

Insert into Passenger values (45, 90,'ram', 30,'M', 'abc12');

Insert into Passenger values (67, 89,'ravi', 50,'M', 'abc14');

Insert into Passenger values (56, 22,'seetha', 32,'F', 'abc55');

Few more Examples of DML commands

Select * from Bus; (selects all the attributes and display)

UPDATE BUS SET Bus No = 1 WHERE BUS NO=2;

Experiment 6. Querying

In this week you are going to practice queries (along with sub queries) using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.

Practice the following Queries:

1. Display unique PNR_no of all passengers.
2. Display all the names of male passengers.
3. Display the ticket numbers and names of all the passengers.
4. Find the ticket numbers of the passengers whose name start with 'r' and ends with 'h'.
5. Find the names of passengers whose age is between 30 and 45.
6. Display all the passengers names beginning with 'A'
7. Display the sorted list of passengers names

Experiment – 7. Querying (continued...)

You are going to practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN),

GROUP BY, HAVING and Creation and dropping of Views.

1. Write a Query to display the Information present in the Passenger and cancellation tables. **Hint:** Use UNION Operator.
2. Display the number of days in a week on which the 9W01 bus is available.
3. Find number of tickets booked for each PNR_no using GROUP BY CLAUSE.
Hint: Use GROUP BY on PNR_No.
4. Find the distinct PNR numbers that are present.
5. Find the number of tickets booked by a passenger where the number of seats is greater than 1.
Hint: Use GROUP BY, WHERE and HAVING CLAUSES.
6. Find the total number of cancelled seats.
7. Display the details of passengers who travelled within the last 3 months.
8. Create a view for the details of passengers who cancelled their tickets.

Experiment – 8.

Create tables for the following schema. Student(snum: integer, sname: string, major: string, level: string, age: integer) Class(name: string, meets at: time, room: string, fid: integer) Enrolled(snum: integer, cname: string) Faculty(fid: integer, fname: string, deptid: integer)

Experiment – 9. Querying

1. Find the names of all Juniors (Level = JR) who are enrolled in a class taught by I. Teacher.
2. Find the age of the oldest student who is either a History major or is enrolled in a course taught by I. Teacher.
3. Find the names of all classes that either meet in room R128 or have 5 or more **Student** enrolled.
7. Find the names of all **Student** who are enrolled in two classes that meet at the same time.
8. Find the names of faculty members who teach in every room in which some class is taught.
9. Find the names of faculty members for whom the combined enrollment of the courses that they teach is less than 5
10. Print the Level and the average age of **Student** for that Level, for each Level.
11. Print the Level and the average age of **Student** for that Level, for all Levels except JR. 9
12. Print the Level and the average age of **Student** for that Level, whose average age is greater than 20.
13. Find the names of **Student** who are enrolled in the maximum number of classes.

14. Find the names of **Student** who are not enrolled in any class.
15. Count the number of junior level **Student**.
16. Display all the **Student** whose names starts with the letter “p”.
17. Display all the teachers whose names contain letter ‘a’ or ‘I’ in their names.

Experiment – 10.Procedures

In this session you are going to learn Creation of stored procedure, Execution of procedure and modification of procedure. Practice procedures using the above database.

**Eg: CREATE PROCEDURE myProc()
BEGIN
SELECT COUNT(Tickets) FROM Ticket WHERE age>=40;
End;**

Course outcomes:

The student will be able to:

1. Understand, appreciate and effectively explain the underlying concepts of database technologies
2. Design and implement a database schema for a given problem-domain
3. Normalize a database.
4. Populate and query a database using SQL DML/DDI commands.
5. Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	3	2	3	1	-	-	-	-	-	2	2	-
CO2	3	3	2	2	2	1	-	-	-	-	-	2	-	-
CO3	3	3	2	3	3	1	-	-	-	-	-	-	2	-
CO4	2	3	3	2	2	-	-	-	-	-	-	2	2	-
CO5	2	2	2	2	2	-	-	-	-	-	-	2	2	-
Average	2.6	2.6	2.4	2.2	2.4	1.0	-	-	-	-	-	2.0	2.0	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech:CSE II Year – I Sem			
Course Code: J2152	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB (Common to CSE & ECM)	L	T	P	D
Credits: 1.5		0	0	3	0

Pre-Requisites:

1. Knowledge on C programming language.
2. Fundamental knowledge on Data structures.

Course objectives:

The Student will:

1. Learn the concepts of operators, control statements, type conversion, constructors and string handling
2. Understand the implementation of inheritance and polymorphism
3. Gain the knowledge of creation of user defined packages and interfaces
4. Familiar with exception handling, multithreading and event handling
5. Understand the concepts of applets, Swings in Java.

Experiment 1:

Write java programs that implement the following

- a) Constructor
- b) Parameterized constructor
- c) Method overloading
- d) Constructor overloading.

Experiment 2:

- a) Write a Java program that checks whether a given string is a palindrome or not.

Ex: MADAM is a palindrome.

- b) Write a Java program for sorting a given list of names in ascending order.
- c) Write a Java Program that reads a line of integers, and then displays each integer and the sum of all the integers (Use String Tokenizer class of java.util)

Experiment 3:

Write java programs that uses the following keywords

- a) this
- b) super
- c) static
- d) final

Experiment 4:

- a) Write a java program to implement method overriding
- b) Write a java program to implement dynamic method dispatch.
- c) Write a Java program to implement multiple inheritance.
- d) Write a java program that uses access specifiers

Experiment 5:

- a) Write a Java program that reads a file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
- b) Write a Java program that reads a file and displays the file on the screen, with a line number before each line.
- c) Write a Java program that displays the number of characters, lines and words in a text file

Experiment 6:

- a) Write a Java program for handling Checked Exceptions.
- b) Write a Java program for handling Unchecked Exceptions

Experiment 7:

- a) Write a Java program that creates three threads. First thread displays “Good Morning” every one second, the second thread displays “Hello” every two seconds and the third thread displays “Welcome” every three seconds.
- b) Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication

Experiment 8:

- a) Develop an applet that displays a simple message.
- b) Develop an applet that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named “Compute” is clicked

Experiment 9:

Write a Java program that works as a simple calculator. Use a grid layout to arrange button for the digits and for the +, -, *, % operations. Add a text field to display the result

Experiment 10:

- a) Write a Java program for handling mouse events.
- b) Write a Java program for handling key events.

Experiment 11:

1. Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields Num1 and Num 2.

The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception and display the exception in a message dialog box.

Experiment 12:

- a) Write a java program that simulates traffic light. The program lets the user select one of three lights: red, yellow or green. When a radio button is selected, the light is turned on, and only one light can be on at a time No 1 Light is on when the program starts.

b) Write a Java program that allows the user to draw lines, rectangles and ovals

Experiment 13:

Create a table in Table.txt file such that the first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using JTable component.

Course outcomes:

The Student will be able to:

1. Implement arithmetic operators, control statements, type conversion, constructors and string handling.
2. Apply the OOP concepts using java.
3. Create user defined Packages and Interfaces
4. Implement Exception handling and Multithreading
5. Design GUI using Applets and AWT.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	-	-	3	-	3	-	-	-	-	-	3	-	-	2
CO2	-	-	2	-	2	-	-	-	-	-	3	-	-	2
CO3	-	-	2	-	3	-	-	-	-	-	2	-	-	3
CO4	-	-	2	-	3	-	-	-	-	-	2	-	-	3
CO5	-	-	3	-	3	-	-	-	-	-	2	-	-	3
Average	-	-	2.4	-	2.8	-	-	-	-	-	2.4	-	-	2.6

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – II Sem			
Course Code: J225B	OPERATING SYSTEMS (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Programming for Problem solving, Data structures and Algorithms (not mandatory).
2. Computer Organization

Course objectives:

The Student will:

1. Understand the basic concepts and functions of computer operating systems.
2. Apply the concurrency control among the operating system programs execution.
3. Demonstrate the techniques used to manage the memory during program execution.
4. Explain the various storage management methods and functions of operating systems.
5. Design the security features against attacks on operating system.

Module 1:

Basic Concepts

Overview: OS Introduction, Computer Systems Organization, Computer System Architecture, Operating System Architecture, Resource Management, Virtualization, Distributed Systems, Open-source operating system.

Operating System Structures: Systems Calls, System services, Linkers and Loaders, Operating System Design and Implementation, Operating System structure, Building and Booting an Operating System.

Module 2:

Process Management

Process Concepts: Introduction, Process Scheduling, Interprocess Communication, Communication in Client- Server systems, Thread concepts, Multithreading Model, Scheduling Criteria, Scheduling Algorithms, Algorithm Evaluation.

Process Synchronization: Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Mutex Locks, Semaphores, Monitors, Classic Problems of Synchronization, System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Module 3:

Memory Management

Main Memory: Background, Contiguous Memory Allocation, Paging, Page-Table Structure, Swapping, Segmentation.

Virtual Memory: Background, Demand Paging, Page Replacement Algorithms, Frames Allocation, Thrashing.

Module 4:

Storage Management

File system Management: File Concepts, Access Methods and Directory Structure, File Protection, File System Structure, File System Operations, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery

Mass-Storage Structure: Overview, Disk Scheduling, Storage Device Management, Swap-Space Management, Storage Attachment, RAID Structure.

Module 5:

Security and Protection

Security: Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication, Implementing Security Defenses, Case Studies: Windows 10.

Protection: Goals of Protection, Principles of Protection, Protection Rings, Domain of Protection, Access Matrix, Implementation of Access Matrix, Revocation of Access Rights, Role-based Access Control, Capability-Based Systems, Language Based Protection.

Text Books:

1. **Operating System Concepts-Abraham Silberchatz**, Peter B. Galvin, Greg Gagne, 7th Edition, John Wiley.
2. **Operating Systems- A Concept based Approach-D.M.Dhamdhare**, 2nd Edition, TMH.

Reference Books:

1. **Principles of Operating Systems-Naresh Chauhan**, Oxford Higher Education.
2. **Operating System A Design Approach-Crowley**, TMH.
3. **Modern Operating Systems-Andrew S Tanenbaum**, 2nd Edition Pearson, PHI.

E - Resources:

1. https://www.tutorialspoint.com/operating_system/
2. <https://www.studytonight.com/operating-system/>
3. <https://learn.saylor.com/course/view.php?id=948§ioned=967>
4. <https://nptel.ac.in/courses/106/105/106105214/>
5. <https://www.edx.org/course/computer-hardware-and-operating-systems>

Course outcomes:

The student will be able to:

1. Compare differing structures of operating systems including process management.
2. Apply different CPU scheduling algorithms and various Memory management techniques.
3. Illustrate the use of Bankers algorithm for deadlock avoidance and File system organization.
4. Demonstrate various mass storage management techniques.
5. Analyze different aspects of protection and security concepts.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO2	3	2	2	-	-	-	-	-	-	-	-	-	-	3
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	2
CO4	2	2	2	-	-	-	-	-	-	-	-	-	-	2
CO5	3	3	2	-	-	-	-	-	-	-	-	-	-	2
Average	2.8	2.2	2.2	-	-	-	-	-	-	-	-	-	-	2.2

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – II Sem			
Course Code: J225D	COMPUTER NETWORKS (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Knowledge on Digital Logic Design.
2. Knowledge on Computer Organization.

Course objectives:

The Student will:

1. Recognize various layering approaches for networking and understand the functionalities of physical layer.
2. Identify the data link layer protocols, multi access protocols, Ethernet technologies and various internetworking devices.
3. Examine design issues of network layer, services provided to above layer and routing, and congestion control protocols.
4. Examine IP protocol, addressing, various protocols like CIDR, ICMP, ARP and RARP of internet Layer and examination of transport layer services.
5. Examine Transport layer protocols like TCP, UDP, RPC and various congestion controlling mechanisms, including application layer services, protocols like HTTP, FTP, E-Mail etc.

Module 1:

Overview of the Internet: Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparison of the OSI and TCP/IP reference model.

Physical Layer: Guided transmission media, wireless transmission media.

Module 2:

Data Link Layer: design issues, Framing, Error Detection and Error Correction, Block Coding, Hamming Distance, CRC, Flow control and error Control.

Protocols: Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols.

Connecting Devices: Repeaters, Hubs, Switches, Gateways and **Bridges** - Learning and Spanning tree bridges.

Multi Access protocols- Random access - ALOHA, CSMA, CSMA/CD and CSMA/CA, Controlled access, Channelization. Ethernet IEEE 802.3, IEEE 802.5, IEEE 802.11

Module 3:

Network Layer: Network layer design issues, Store and forward packet switching, connection less and connection oriented network services.

Internetworking: Protocols-IPV4 and IPV6, Logical Addressing-IPV4, IPV6, Tunneling and Packet Fragmentation.

Address Mapping: ARP, RARP, DHCP, ICMP and IGMP.

Routing Algorithms: Shortest Path Finding and Distance Vector Routing Algorithms.

Module 4:

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), The TCP Connection Establishment, The TCP Connection Release, Crash recovery, The TCP sliding window, The TCP congestion control, Improving Quality of Service Techniques: Leaky Bucket Algorithm.

Module 5:

Application Layer: Introduction, services, Application layer paradigms.

Applications: DNS, WWW, HTTP, FTP, E-MAIL, TELNET, SNMP, SSH.

Text Books:

1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.

Reference Books:

1. "Computer Networks", 5E, Peterson, Davie, Elsevier
2. "Introduction to Computer Networks and Cyber Security", Chawan -HwaWu, Irwin, CRC Publications.
3. "Computer Networks and Internets with Internet Applications", Comer.

E - Resources:

1. https://lecturenotes.in/subject/2234/Computer_Network
2. <http://nptel.ac.in/courses/106102234/>
3. <https://www.iitg.ernet.in/dgoswami/CN-Notes.pdf>
4. <http://www.coursera.org/>
5. <http://ocw.mit.edu/index.htm>.

Course outcomes:

The Student will be able to:

1. Demonstrate the networking concepts, various Layering approaches, functionalities and some protocols of Link layer.
2. Identify how a medium can be shared among multiple devices, Ethernet technologies and internetworking devices used.
3. Identify how to do fragmentation, assigning of logical address and judge on routing, congestion.
4. Illustrate the working of IP Protocol, other protocols of internet layer and services of transport layer.
5. Explain the transport layer and application layer protocols, their working.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	2	2	-	-	-	-	-	-	-	-	-	-	2
CO2	3	2	2	-	-	-	-	-	-	-	-	-	2	2
CO3	3	2	2	-	-	-	-	-	-	-	-	-	2	2
CO4	2	2	2	-	-	-	-	-	-	-	-	-	2	2
CO5	2	2	2	-	-	-	-	-	-	-	-	-	2	2
Average	2.4	2.0	2.0	-	-	-	-	-	-	-	-	-	2.0	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – II Sem			
Course Code: J226A	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE (Common to ECM, CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. Know the basic terminology of functions, relations and sets and to demonstrate the knowledge of their associated operations.
2. Understand the principles of permutations, combinations, inclusion/exclusion principle and the pigeonhole methodology.
3. Know how to solve advanced mathematical problems, apply various methods of mathematical proof, and communicate solutions in writing.
4. Understand about the recurrence relation
5. Select graph theory basics in solving computer science problems.

Module 1:

Mathematical Logic:

Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Quantifiers, universal quantifiers.

Predicates:

Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

Module 2:

Relations:

Properties of Binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Lattices, Hasse diagram.

Functions:

Inverse Function Composition of functions, recursive Functions, Lattice and its Properties.

Algebraic structures:

Algebraic systems Examples and general properties, Semi groups and monoids, groups, sub groups, homomorphism, Isomorphism.

Module 3:

Elementary Combinatorics:

Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems,

The principles of Inclusion – Exclusion: The principles of Inclusion – Exclusion. Pigeon hole principles and its application.

Module 4:

Generating Functions: Generating Functions, Function of Sequences Calculating Coefficient of generating function,

Recurrence relations: solving recurrence relation by substitution and Generating funds. Characteristics roots solution of In homogeneous Recurrence Relation.

Module 5:

Graph Theory:

Representation of Graph, DFS, BFS, Spanning Trees, planar Graphs.

Applications of Graph Theory: Basic Concepts Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

Text Books:

1. Elements of DISCRETE MATHEMATICS- A computer Oriented Approach- C L Liu, D P Mohapatra. Third Edition, Tata McGraw Hill.
2. Discrete Mathematics by RK Bisht, HS Dhama, Oxford University Press.

Reference Books:

1. Discrete Mathematics for Computer Scientists & Mathematicians, J.L. Mott, A. Kandel, T.P. Baker, PHI.
2. Discrete and Combinational Mathematics- An Applied Introduction-5th Edition – Ralph. P.Grimaldi.Pearson Education
3. Discrete Mathematics and its Applications, Kenneth H. Rosen, Fifth Edition. TMH.

E-Resources:

1. <https://www.smartzworld.com/notes/mfcs-notes-pdf-mathematical-foundation-of-computer-science/>
2. <https://www.pdfdrive.com/elements-of-discrete-mathematics-liu-mohapatra-3rd-e136110192.html>
3. <https://www.iare.ac.in/sites/default/files/PPT/MFCS%20PPT.pdf>
4. <https://nptel.ac.in/courses/111/107/111107058/>

Course outcomes:

1. Use the notions of propositions and predicate formulae, satisfiability and formal proof.
2. Identify the properties of relations, functions and algebraic structures.
3. Apply the Permutations and combinations in problem solving
4. Solve recurrence relations using different methods.
5. Apply graph theory in solving computer science problems.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	-	3	-	-	-	-	-	-	-	1	3	-
CO2	3	2	2	2	-	-	-	-	-	-	-	-	3	-
CO3	3	2	-	1	-	-	-	-	-	-	-	-	2	-
CO4	3	2	-	1	-	-	-	-	-	-	-	-	3	-
CO5	3	2	3	3	-	-	-	-	-	-	-	1	3	-
Average	3.0	2.0	2.5	2.0	-	-	-	-	-	-	-	1.0	2.8	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – II Sem			
Course Code: J225C	DESIGN AND ANALYSIS OF ALGORITHMS (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Knowledge on data structures.

Course objectives:

The Student will:

1. Know about on time and space complexity and learning asymptotic notations
2. Understand union and find algorithms, connected components and bi-connected components.
3. Gain knowledge in divide and conquer methods
4. Familiar with greedy method and dynamic programming
5. Understand the back tracking and can application

Module 1:

Introduction to algorithms

Algorithm, Pseudo Code for expressing Algorithms, Performance Analysis: Space Complexity, Time Complexity, asymptotic Notations: Big-oh Notation, Omega Notation, Theta Notation, Little-oh Notation.

Disjoint Sets: Disjoint Set Operations, Union and Find Algorithms, Spanning Trees, Connected Components and Biconnected Components.

Module 2:

Divide and Conquer

General Method, Applications: Binary Search, Quick Sort, Merge Sort, Stassen's Matrix Multiplication.

Greedy Method

General Method Applications: Job Sequencing with Deadlines, 0/1 Knapsack Problem, Minimum Cost Spanning Trees: Prim's and Kruskal's Algorithms, Single Source Shortest Path Problem, Huffman Codes.

Module 3:

Dynamic Programming

General Method, Principle of Optimality, Applications: Multistage Graphs, Matrix Chain Multiplication, Optimal Binary Search Trees, 0/1 Knapsack Problem, All Pairs Shortest Path Problem, Travelling Sales Person Problem, Reliability Design.

Module 4:

Backtracking

General Method, Applications: Nqueen Problem, Recursive Permutation Generator, Sum of Subsets Problem, Graph Coloring, Hamiltonian Cycles.

Module 5:

Branch and Bound

General Method, Applications: Travelling Sales Person Problem, 0/1 Knapsack Problem, LC Branch and Bound Solution, FIFO Branch and Bound Solution.

NP-Hard and NP-Complete Problems: Basic Concepts, Non-Deterministic Algorithms, NP-Hard and NP-Complete Classes, Cook's Theorem.

Text Books:

1. Fundamentals of Computer Algorithms-Ellis Horowitz, Satraj Sahni and Rajasekharam, Galgotia Publications Pvt. Ltd.
2. Introduction to Algorithms-T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, 2nd Edition, Pearson Education, PHI Pvt. Ltd.

Reference Books:

1. Algorithm Design: Foundations, Analysis and Internet Examples-M.T.Goodrich and R.Tomassia, John Wiley and Sons.
2. Introduction to Design and Analysis of Algorithms A strategic Approach-R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc-Graw Hill.
3. Design and analysis of Algorithms-S. Sridhar, Oxford Higher Education.

E - Resources:

1. <https://nptel.ac.in/courses/106/106/106106131/>
2. https://onlinecourses.nptel.ac.in/noc19_cs47/preview
3. <http://www.cse.iitd.ernet.in/~ssen/csl356/notes/root.pdf>
4. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/design_and_analysis_of_algorithms_tutorial.pdf
5. https://mrcet.com/downloads/digital_notes/IT/Design%20and%20Analysis%20Algorithms.pdf

Course outcomes:

The Student will be able to:

1. Calculate time complexity and space complexity for given algorithm.
2. Describe union and find algorithms, connected components and bi-connected components
3. Apply divide and conquer method for solving sorting and searching problems.
4. Use greedy method and dynamic programming to solve variety of problems.
5. Apply back tracking and branch and bound to solve different types of problems.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	2	3	-	-	-	-	-	-	-	-	2	2
CO2	2	3	3	3	-	-	-	-	-	-	-	-	2	2
CO3	3	3	3	3	-	-	-	-	-	-	-	-	2	2
CO4	2	3	3	3	-	-	-	-	-	-	-	-	2	2
CO5	2	3	3	3	-	-	-	-	-	-	-	-	2	2
Average	2.4	2.8	2.8	3.0	-	-	-	-	-	-	-	-	2.0	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – II Sem			
Course Code: J225E	FORMAL LANGUAGES AND AUTOMATA THEORY (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Knowledge on “Mathematical Foundations of Computer Science”:

Course objectives:

The Student will:

1. Classify machines by their power to recognize languages.
2. Describe the concepts of regular languages and regular grammars.
3. Discuss the concepts of context free grammars and minimization of CFG.
4. Recognize deterministic and non-deterministic push down automata.
5. Determine the decidability and intractability of computational problems.

Module 1:

Fundamentals and Finite Automata: Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, DFA and NFA, transition diagrams and Language recognizers.

NFA with \hat{I} transitions - Significance, acceptance of languages. Equivalence between NFA with and without \hat{I} transitions, NFA to DFA conversion, minimization of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Melay machines.

Module 2:

Regular Languages: Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expression, Conversion of Finite Automata to Regular expressions. Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, Pumping lemma of regular sets, closure properties of regular sets (proofs not required).

Module 3:

Context Free Grammars: Context free grammar, derivation trees, sentential forms, Right most and leftmost derivation of strings. Ambiguity in context free grammars. Minimization of Context Free Grammars. Chomsky normal form, Greiback normal form, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted).

Module 4:

Push Down Automata: Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, inter conversion. (Proofs not required). Introduction to DCFL and DPDA.

Module 5:

Turing Machine and Computability Theory: Turing Machine, definition, model, design of TM, Computable functions, recursively enumerable languages. Church's hypothesis, counter machine, types of Turing machines (proofs not required).

Chomsky hierarchy of languages, linear bounded automata and context sensitive language, LR(0) grammar, decidability of, problems, Universal Turing Machine, undecidability of posts. Correspondence problem, Turing reducibility, Definition of P and NP problems, NP complete and NP hard problems.

Text Books:

1. "Introduction to Automata Theory Languages and Computation". Hopcroft H.E. and Ullman J. D. Pearson Education
2. Theory of Computer Science – Automata languages and computation -Mishra and Chandrashekar, 2nd edition, PHI

Reference Books:

1. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
2. Formal Language and Automata Theory, K V N Sunitha, N Kalayani, TMH
3. Introduction to languages and the Theory of Computation, John C Martin, TMH.

E - Resources:

1. <https://www.youtube.com/watch?v=58N2N7zJGrQ>
2. <https://nptel.ac.in/courses/111/103/111103016/>
3. <https://nptel.ac.in/courses/106/106/106106049>
4. https://www.youtube.com/playlist?list=PLEbnTDJUr_IdM_FmDFBz0zCsOFxf
5. https://www.tutorialspoint.com/automata_theory/index.htm
6. <https://books.google.co.in/books?id=oBqh1G17tokC&printsec=frontcover>

Course outcomes:**The Student will be able to:**

1. Describe the concept of abstract machines and their power to recognize the Languages.
2. Demonstrate Regular Languages and Regular Grammars.
3. Design of Context free grammars for formal languages.
4. Construct deterministic and non-deterministic machines.
5. Distinguish between decidability and undecidability.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	2	2	-	-	-	-	-	-	-	-	3	2
CO2	3	3	2	-	-	-	-	-	-	-	-	-	2	2
CO3	2	2	2	-	-	-	-	-	-	-	-	-	3	2
CO4	2	2	2	-	-	-	-	-	-	-	-	-	3	2
CO5	3	2	2	-	-	-	-	-	-	-	-	-	2	2
Average	2.6	2.4	2.0	-	-	-	-	-	-	-	-	-	2.6	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – II Sem			
Course Code: J225A	PYTHON PROGRAMMING (Common to CSE & ECM)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Need basic knowledge about computer.
2. Need Basic understanding of Programming language.

Course objectives:

The Student will:

1. Design and program Python applications.
2. Use lists, tuples, and dictionaries in Python programs.
3. Learn to identify Python object types, Components, decision statements, pass arguments in Python.
4. Build and package Python modules for reusability, design object oriented programs with Python classes, use class inheritance in Python for reusability.
5. Use exception handling in Python applications for error handling.

Module 1:

Programming paradigms; Structured programming vs object oriented programming, OOPs fundamentals- class, object, abstraction, encapsulation, polymorphism, and inheritance; Introduction to Python Getting started to Python- an interpreted high level language, interactive mode and script mode. Variables, Expressions and Statements Values and types, Variables and keywords, statements, evaluating expressions, operators and operands, order of operations, composition. Functions function calls, type conversion, type coercion, pre-defined functions, composition, user define functions, flow of execution, passing parameters, function parameters and scope. Conditionals and recursion modulus operator, Boolean expression, logical operators, conditional execution, alternative execution, chained and nested conditionals, return statement; Recursion, infinite recursion.

Module 2:

Python data structures Strings Creating, initializing and accessing the elements; String operators, comparing strings using relational operators; String functions and methods. **Lists:** Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements; List operations; List functions and Methods, list parameters, nested lists, Matrices.

Dictionaries

Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, dictionary operations traversing, appending, updating and deleting elements, Dictionary functions and methods.

Tuples

Mutability and tuples, Immutable concept, creating, initializing and accessing the elements in a tuple, Tuple functions.

Set: operations and methods, **Frozenset:** operations and methods

Module 3:

Object oriented programming using Python: creating python classes, classes and objects: user defined compound types, objects are mutable, copying; Access modifiers, classes and functions: pure function, modifiers, Classes and methods: object oriented features, optional arguments, initialization method, operator overloading and polymorphism.

Inheritance: Basic Inheritance: extending built-ins, overriding and super; Multiple inheritance: the diamond problem;

Module 4:

Exceptions: raising exceptions, handling exceptions, exception hierarchy.

Regular Expressions, match, search & replace function, Regular Expression modifiers, Special Character Classes, Repetition Cases, Non-greedy repetition grouping with Parentheses Back-references Anchors.

Module 5:

Files handling and Exceptions: Text files, writing variables, Directories, Pickling;

Database Programming in Python: Connection module, connect MySQL Data base, perform DDL, DML and DQL operations.

Introduction to Machine Learning With Python ,Tasks in Machine Learning Using Python, Applications of Python Machine Learning.

Text Books:

1. **Python 3 Object Oriented Programming**, Dusty Phillips, Packet Publishing, 2010.
2. **Programming in Python 3** - A complete Introduction to the Python Language- Second Edition, Mark Summerfield, Addison-Wesley 2010.
3. Introduction to Machine Learning with Python: A Guide for Data Scientists Book by Andreas C. Müller and Sarah Guido Publisher(s): O'Reilly Media, Inc.

Reference Books:

1. **Programming Python- 4th Edition**, Mark Lutz, O'Reilly, 2011.
2. **Object-Oriented Programming in Python**, Michael H, Goldwasser, David Letscher, Pearson Prentice Hall, 2008.

E - Resources:

1. <https://www.youtube.com/watch?v=MLP1v80yU14>
2. <https://pythonprogramming.net/functions-python-3-basics-tutorial/>
3. <https://www.youtube.com/watch?v=QGLNQwfTO2w>
4. <https://www.youtube.com/watch?v=ZDa-Z5JzLYM>
5. <https://www.youtube.com/watch?v=M-t4ILRHnxE>

Course outcomes:**The Student will be able to:**

1. Explain basic principles of Python programming language
2. Analyze the use of lists, tuples, and dictionaries in Python programs.
3. Implement object oriented concepts in Python, and how to use exception handling in Python applications for error handling.
4. Demonstrates how to achieve reusability using inheritance, interfaces and packages.
5. Explain how to read and write files in Python and evaluate different database operations.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	2	1	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	3	-	-	-	-	-	-	-	-	2	2
CO3	3	2	2	3	-	-	-	-	-	-	-	-	1	2
CO4	3	2	1	2	-	-	-	-	-	-	-	-	-	3
CO5	3	2	2	2	-	-	-	-	-	-	-	-	-	3
Average	3.0	2.0	1.8	2.2	-	-	-	-	-	-	-	-	1.5	2.4

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – II Sem			
Course Code: J22M1	PROFESSIONAL ETHICS (Common For All Branches)	L	T	P	D
Credits: 0		2	0	0	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. To know the importance of corporate social responsibility and values.
2. To understand ethics as a professional responsibility.
3. Corporate ethical course and ethical audit.
4. To understand importance of values and ethical living.
5. To ensure safety at work place.

Module 1:

Introduction to Ethics

Corporate Governance – importance of Corporate Governance, Ethics & CSR (Corporate Social Responsibility)

Indian and western thoughts on ethics, value education, dimensions of ethics, goal setting importance of morality and ethics, basic ethical principles, moral developments theories, classification of ethical theories.

Module 2:

Professional and professionalism

Introduction to profession, professional associations, professional's roles and professional risks.

Professional accountability, successful professional, ethics and profession, engineering as social experimentation, engineering ethics, roles of engineers, professional responsibilities, professional rights. Professional etiquettes- Dress code, Telephone call, Email writing.

Module 3:

Ethical codes and audits

Introduction, need for ethical codes, sample codes, corporate codes, limitations of the codes. Need for Ethical Audit, Sustainability, Ethical standards, Ethical audit.

Module 4:**Human values and ethical living**

Introduction, terminology, domains of learning, human values, attitudes, Behaviour values, attitudes and professionals. Needs of life, harmony in life, what is ethical living, case studies.

Module 5:**Global issues and safety**

Introduction, current scenario, business ethics, environmental ethics, computer ethics, media ethics, war ethics, bio-ethics, research ethics, intellectual property right.

Safety and risk, assessment of risk, risk and cost, engineers responsibility for safety, risk benefit, analysis, risk cause and management, case studies, providing for safe exit, ethical issues of safety.

Text Books:

1. Professional ethics by R. Subramanian, Oxford press.
2. Text book on Professional ethics and human values by R.S.Nagarajan, New age international.

Reference Books:

1. Professional ethics and human value by D.R.Kiran, Tata McGraw Hills education.
2. Ethics in engineering by Mike W. Martin and Roland Schinzinger, Tata McGraw Hills education.
3. Fundamental of Ethics by Edmund G Seebauer and Robert L.Barry, Oxford

E-Resources:

1. http://jits.ac.in/humanvalues_professional-ethics/
2. https://www.tutorialspoint.com/engineering_ethics/engineering_ethics_introduction.htm
3. <https://www.onlineethics.org/>
4. https://onlinecourses.nptel.ac.in/noc19_hs35/preview

Course outcomes:**The student will be able to:**

1. Use of ethical values and attitudes in their life.
2. Implement once he/she becomes a professional.
3. Solve the issues related with environment and technology
4. Apply the different types of professional ethical codes in their organization.
5. Use of the rules framed by the auditors.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	1	-	-	-	-	-	-	3	2	1	-	3	-	-
CO2	1	-	-	-	-	-	-	3	2	-	-	3	-	-
CO3	-	1	-	-	-	-	-	3	2	-	-	3	-	-
CO4	1	-	-	-	-	-	-	3	2	1	-	3	-	-
CO5	1	-	-	-	-	-	-	3	2	1	-	3	-	-
Average	1.0	1.0	-	-	-	-	-	3.0	2.0	1.0	-	3.0	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – II Sem			
Course Code: J2201	SOFT SKILLS (Audit Course)	L	T	P	D
Credits: 0		2	0	0	0

Pre-Requisites: Nil

Course Objectives:

This course will enable students to:

1. Understand the importance of advanced communication skills.
2. Obtain knowledge on intra personal skills and inter personal skills.
3. Gain knowledge on design thinking.
4. Know about the neuro linguistic programming.
5. Learn about self- concept and self- reliance.

Module 1:

Advanced Communication:

Barriers of Communication Skills – Real-life case studies, Intra personal skills & Inter personal skills-Practical sessions, Adjustability, Adaptability, Change Planning & Management- For Self, Communication skills-debates, practical sessions & public speaking skills, Body language through NLP (neuro linguistic programming) communication.

Module 2:

Design Thinking:

Introduction of Design Thinking, Digitization & Data – Latest Trends in Human Resource,

Thinking Out-of-the Box – Case-study & Activity Based, Dealing with Criticism & Conflict Resolution & Management, Diversity, Social Responsibility, Positive Attitude & Power of Positive Energy.

Module 3:

Self-concept & Self-reliance:

Wheel of Life – Self-assessment & Activities, SWOT Analysis, Johari Window tool, developing a Vision & Action-plan, Emotional Intelligence, Stress & Anger Management, Empathy- Practice Sessions & Role-plays, Time management & Prioritization, Problem solving & Decision-making skills.

Reference books:

1. Dr Alex. K, Soft Skills, New Delhi: S.Chand, 2009.
2. DrRavikanth Rao. K, Dr P. Dinakar. Life Skills Education Paperback, 2016.

E - Resources:

1. https://www.youtube.com/watch?v=Bhf35YngKl4&ab_channel=DanielAlly
2. https://www.youtube.com/watch?v=gHGN6hs2gZY&ab_channel=AJ%26Smart
3. https://www.youtube.com/watch?v=r0VX-aU_T8&ab_channel=Sprouts.
4. https://www.youtube.com/watch?v=aKGm3nprVA0&t=465s&ab_channel=DreamsArroundTheWorld
5. https://www.youtube.com/watch?v=JXXHqM6RzZQ&ab_channel=SmartDraw
6. https://www.youtube.com/watch?v=Zi4SvpAFRmY&t=309s&ab_channel=CommunicationCoachAlexLyon
7. https://www.youtube.com/watch?v=LgUCyWhJf6s&ab_channel=TheSchoolofLife
8. https://www.youtube.com/watch?v=BsVq5R_F6RA&ab_channel=watchwellcast
9. https://www.youtube.com/watch?v=czh4rmk75jc&ab_channel=WaysToGrow

Course outcomes:**The students will be able to:**

1. Use the advance communication skills in daily life.
2. Utilize the importance of positive energy and positive attitude.
3. Handle criticism in a positive way.
4. Use knowledge to take proper decision in life
5. Acquire knowledge on Self-awareness and time management.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	-	-	3	-	-	-	-	3	3	-	3	3	-	-
CO2	-	-	2	-	-	-	-	3	3	-	3	3	-	-
CO3	-	-	2	-	-	-	-	3	2	-	3	2	-	-
CO4	-	-	2	-	-	-	-	2	2	-	3	2	-	-
CO5	-	-	2	-	-	-	-	2	2	-	2	1	-	-
Average	-	-	2.2					2.6	2.4		2.8	2.2	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – II Sem			
Course Code: J2252	OPERATING SYSTEMS AND COMPUTER NETWORKS LAB (Common to CSE & IT)	L	T	P	D
Credits: 1.5		0	0	3	0

Pre-Requisites:

1. Programming for Problem solving, Data Structures (not Mandatory)
2. Computer Networks
3. Computer Organization

Course objectives:

The Student will:

1. Identify Error control technique such as CRC-12 CRC-16 CRC-32.
2. Demonstrate Hamming Code error control algorithm and simulation of stop and wait protocol and Client-Server program.
3. Implement network layer routing algorithms such as: Dijkstra's, Distance Vector and Broadcast routing techniques.
4. This course will introduce the basic principles in Operating System and providing error detection methods.
5. It will cover all the management modules present in the OS like process management, Memory management, File management, Disk management, Network management, I/O management.

OPERATING SYSTEMS

Experiment 1: Simulate the following CPU scheduling algorithms

- a) Round Robin b) SJF c) FCFS d) Priority

Experiment 2: Simulate all file allocation strategies

- a) Sequential b) Indexed c) Linked

Experiment 3: Simulate MVT and MFT

Experiment 4: Simulate all File Organization Techniques

- a) Single level directory b) Two level c) Hierarchical d) DAG

Experiment 5: Simulate Bankers Algorithm for Dead Lock Avoidance

Experiment 6: Simulate Bankers Algorithm for Dead Lock Prevention

Experiment 7: Simulate all page replacement algorithms

- a) FIFO b) LRU c) LFU Etc. ...

Experiment 8: Simulate Paging Technique of memory management.

Experiment 9: Experiments on fork, shared memory and semaphores.

COMPUTER NETWORKS

Experiment 1: Implement the data link layer framing methods such as character, character stuffing and bit stuffing.

Experiment 2: Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.

Experiment 3: Implement Dijkstra 's algorithm to compute the Shortest path thru a graph.

Experiment 4: Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table at each node using distance vector routing algorithm

Experiment 5: Take an example subnet of hosts. Obtain broadcast tree for it.

Experiment 6: Take a 64 bit playing text and encrypt the same using DES algorithm.

Experiment 7: Using RSA algorithm Encrypt a text data and Decrypt the same.

Text Books:

1. Principles of Operating Systems-Naresh Chauhan, Oxford Higher Education.
2. Operating Systems A Design Approach-Crowley, TMH.
3. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
4. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.

Reference Books:

1. Operating System Concepts-Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 7th Edition, John Wiley.
2. Operating Systems- A Concept based Approach- D.M.Dhamdhare, 2nd Edition, TMH.
3. Computer Networks, 5E, Peterson, Davie, Elsevier
4. Introduction to Computer Networks and Cyber Security ,Chawan -HwaWu, Irwin, CRC Publications.
5. Computer Networks and Internets with Internet Applications, Comer.

E - Resources:

1. https://www.tutorialspoint.com/web_developers_guide/web_basic_concepts.htm
2. <https://courses.lumenlearning.com/computerapps/chapter/reading-the-internet/>
3. https://www.tutorialspoint.com/operating_system/
4. <https://www.studytonight.com/operating-system/>
5. <https://learn.saylor.com/course/view.php?id=948§ioned=967>
6. <https://www.edx.org/course/computer-hardware-and-operating-systems>

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	3	2	-	-	-	-	-	2	-	-	-	2	-
CO2	3	2	-	2	-	-	-	-	-	-	-	-	2	2
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	2
CO4	3	2	3	-	-	-	-	-	-	-	-	-	-	2
CO5	2	2	2	-	-	-	-	-	-	-	-	-	-	2
Average	2.6	2.2	2.5	2.0	-	-	-	-	-	-	-	-	2.0	2.0

Y 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – II Sem			
Course Code: J2251	PYTHON PROGRAMMING LAB (Common to CSE & ECM)	L	T	P	D
Credits: 1.5		0	0	3	0

Pre-Requisites:

1. Need basic knowledge about how to operate computer.
2. Need Basic understanding of how to write code for Programming language.

Course objectives:

The Student will:

1. Implement Basic input /output operations with various Data Types supported by python.
2. Develop functions for code reusability and experiment string manipulation operations with the use of inbuilt functions.
3. Create a python program for experimenting list, tuple and dictionary
4. Demonstrate Class and objects to make use of object oriented programming concepts.
5. Implement File handling operations to access the contents of file

Experiment 1.

- i. Write a python program to obtain user input data (int, float, string) and display.
- ii. Write a python program to find the roots of a quadratic equation
- iii. Write a python program to perform arithmetic operations (+, -, *, /, %) for given input values and printout the result values.

Experiment 2.

- i. Write a python programs that use both recursive and non-recursive functions to find the factorial of a given integer
- ii. Operators and Operands in Python: (Arithmetic, relational and logical operators), operator precedence, Expressions and Statements.
- iii. (Assignment statement); Taking input (using raw input () and input ()) and displaying output (print statement); Putting Comments.

Experiment 3.

- i. Write python programs to perform operation on Strings using following functions: len, capitalize, find, isalnum, isalpha, isdigit, lower, islower, isupper, upper, lstrip, rstrip, isspace, istitle, partition, replace, join, split, count, decode, encode, swapcase.
- ii. Enter the details of 5 **Student** and display the details sequentially.

Experiment 4.

- i. Write python programs to perform List operators: (joining, list slices)
- ii. Write python programs to perform List functions: len, insert, append, extend, sort, remove, and reverse, pop.
- iii. Write python programs to check whether the string is palindrome or not?

Experiment 5.

- i. Write python programs to perform Tuple functions: cmp(), len(), max(), min(), tuple()
- ii. Write python programs to check whether the word is present in the tuple or not?
- iii. Write python programs to Take a string as (“1234567890”) and create a pair {(1,2),(3,4),(5,6),(7,8),(9,0)} using tuple.

Experiment 6.

- i. Write python programs to perform Dictionary functions & Methods: cmp, len, clear (), get(), has_key(), items(),keys(), update(), values() .
- ii. Write python programs to Create a list of animal using dictionary variable “animal” and find out if the specific animal present in the list or not?

Experiment 7.

- i. Write a python program to create a class, its objects and accessing attributes.
- ii. Create a Customer class and check the balance and withdraw and deposit some amount.

Experiment 8. Write a python script to implement exception handling.

- i. Check whether the input no is integer or not.
- ii. Handel the exceptions that are come at the time of division.

Experiment 9. Write a python script to perform inheritance.**Experiment 10.** Write a python script to perform various FILE handling operations.
Open, close, read, write, copy.**Experiment 11.**

- i. Write a python script to connect to the database and perform DDL operations.
- ii. Create table, insert data into table and display the table data.

Experiment 12. Write a python script to connect to the database and perform various DML and DQL operations.**Text Books:**

1. **Programming in Python 3-** A complete Introduction to the Python Language- Second Edition, Mark Summerfiels, Addison-Wesley 2010.
2. **Programming Python-** 4th Edition, Mark Lutz, O'Reilly, 2011.

Reference books:

1. **Object-Oriented Programming in Python**, Michael H, Goldwasser, David Letscher, Pearson Prentice Hall, 2008.

E - Resources:

1. https://www.tutorialspoint.com/python3/python_strings.htm
2. <https://www.youtube.com/watch?v=yCH9CUiXrP0>
3. <https://www.youtube.com/watch?v=RSI87lqOXDE>
4. <https://www.youtube.com/watch?v=bSZtsYYwFS0>

Course outcomes:**The Student will be able to:**

2. Apply Basic input /output operations for working with different data types in python.
3. Design functions for achieving code reusability and string manipulations.
4. Create a python program for implementing list, tuple dictionary.
5. Demonstrate Class and objects
6. Implement File handling operation

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	2	1	2	-	-	-	-	-	-	-	-	2
CO2	3	2	-	3	-	-	-	-	-	-	-	-	2	2
CO3	3	2	2	3	-	-	-	-	-	-	-	-	1	2
CO4	3	2	1	2	-	-	-	-	-	-	-	-	-	3
CO5	3	2	2	2	-	-	-	-	-	-	-	-	-	3
Average	3.0	2.0	1.8	2.2	2.0	-	-	-	-	-	-	-	1.5	2.4

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – I Sem			
Course Code: J31EA	MANAGERIAL ECONOMICS AND MANAGEMENT SCIENCE (CE, ME, MIE & EEE)	L	T	P	D
Credits: 4		3	1	0	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. Learn principles and practices of the organization.
2. Learn preparation of balance sheet and accounting standards.
3. Understand the principles of management.
4. Gain knowledge on graphical presentation of improving the quality.
5. Understand the importance of inventory control in the organization.

Module 1:

Introduction to managerial economics, concepts of Managerial Economics: Demand Analysis: Law of Demand, Elasticity of demand & Demand forecasting.

Production & cost Analysis: Production functions, Law of returns, Economies of scale.

Cost concepts: Variable cost, fixed cost, Marginal cost, Semi-variable cost. Break – even analysis.

Module 2:

Market Structures: Different types of Markets.

Pricing: Methods of pricing and Strategies, Skimming and Penetration pricing.

Capital Budgeting: Estimation of fixed and working capital, methods & sources of raising capital. Methods of capital budgeting, Traditional & Discounted Techniques.

Financial Accounting & Financial Analysis: Overview of financial Accounts, Journal, Subsidiary books, Ledger, Trial Balance and preparation of Trading Account, Profit & Loss Account and Balance Sheet. Financial Analysis with the help of Ratios.

Module 3:

Management: Functions of Management, Taylor's scientific management, Fayol's principles of management.

Designing of organization structures: Different methods with merits and demerits and their suitability.

Human Resource Management: Recruitment, Selection, Training and Development and Performance.

Module 4:

Operation Management: Types of plant layout, Methods of production, Work study – procedure involved in Methods study and work Measurement. Statistical quality control. X, R, C & P charts.

Project Management: Program Evaluation & Review Technique (PERT), Critical Path Method (CPM), Identification of critical path.

Module 5:

Material Management: objectives, need for inventory control, EQC, ABC Analysis, VED Analysis, Purchase procedure, Store Management.

Marketing: Functions, Marketing Mix, Marketing strategies based on product life cycle, channels of distribution.

Text books:

1. Managerial Economics & Financial Accounting – Prentice Hall of Inadia: Dr. M. Kasi Reddy, Dr. S. Saraswathi
2. Varshney&Maheswari: Managerial Economics, Sulthan Chand, 2009.
3. P. Subba Rao: Human Recourse Management.

Reference books:

1. AmbrishGuptha, Financial Accounting for Management, Pearson Education, New Delhi, 2009.
2. Naraanaswamy: Financial Accounting – A Managerial Perspective, PHI, 2008.
3. S. N. Maheswari& S. K. Maheswari, Financial Accounting, Vikas, 2008.

E-resources:

1. <https://nptel.ac.in/courses/110/101/110101005/>
2. <https://sites.google.com/site/economicsbasics/>
3. <http://www.whatishumanresource.com/system/app/pages/search?scope=search-site&q=Compensation+and+Reward+Management>

Course outcomes:**The Student will be able to:**

1. Develop analytical skills for investigating and analyzing quality management issues in the industry and suggest implement able solutions to those.
2. Develop in-depth understanding on continuous process improvement & benchmarking process
3. Learn the applications of quality tools and techniques in both manufacturing and service Industry.
4. Develop in-depth knowledge on various tools and techniques of quality management.
5. Develop analytical skills for investigating and analyzing quality management issues in the industry and suggest implement able solutions to those.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	3	-	-	-	-	-	-	-	-	-	-
CO4	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	3	-	-	-	-	-	-	-	-	-	-
Average	2.4	2.0	2.5	2.67	-	-	-	-	-	-	-	-	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – I Sem			
Course Code: J315B	COMPILER DESIGN (Common to CSE & IT)	L	T	P	D
Credits: 4		3	1	0	0

Pre-Requisites:

1. Formal Languages and Automata theory.

Course objectives:

The Student will:

1. Understand the major concept areas of language translation and compiler design.
2. Enrich the knowledge in various phases of compiler ant its use, code optimization techniques, machine code generation, and use of symbol table.
3. Extend the knowledge of parser by parsing LL parser and LR parser.
4. Implement the concepts of semantic analysis using semantic rules.
5. Apply the knowledge of data flow analysis and object code generation.

Module 1:

Overview of Compilation:

Phases of Compilation – Lexical Analysis, Regular Grammar and regular expression for common programming language features, pass and Phases of translation, interpretation, bootstrapping, data structures in compilation – LEX lexical analyzer generator.

Module 2:

Top down Parsing: Context free grammars, Top down parsing – Backtracking, LL (1), recursive descent parsing, Predictive parsing, Preprocessing steps required for predictive parsing.

Bottom up parsing: Shift Reduce parsing, operator precedence parser, SLR,CLR and LALR parsing, Error recovery in parsing, handling ambiguous grammar, YACC – automatic parser generator.

Module 3:

Semantic analysis: Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes. Attributed grammars, Syntax directed translation, Conversion of popular Programming languages language Constructs into Intermediate code forms, Type checker.

Module 4:

Symbol Tables: Symbol table format, organization for block structures languages,

hashing, tree structures representation of scope information. Block structures and non block structure storage allocation: static, Runtime stack and heap storage allocation, storage allocation for arrays, strings and records.

Code optimization: Consideration for Optimization, Scope of Optimization, local optimization, loop optimization, frequency reduction, folding, DAG representation.

Module 5:

Data flow analysis: Flow graph, data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation.

Object code generation: Object code forms, machine dependent code optimization, register allocation and assignment generic code generation algorithms, DAG for register allocation.

Text Books:

1. Principles of compiler design -A.V. Aho . J.D.Ullman; Pearson Education.
2. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press.

Reference Books:

1. lex &yacc – John R. Levine, Tony Mason, Doug Brown, O’reilly
2. Modern Compiler Design- Dick Grune, Henry E. Bal, Criel T. H. Jacobs, Wiley dreamtech.
3. Engineering a Compiler-Cooper & Linda, Elsevier.

E - Resources:

1. https://www.tutorialspoint.com/compiler_design/compiler_design_tutorial.pdf
2. <https://nptel.ac.in/courses/106/105/106105190/>
3. <https://www.slideshare.net/IffatAnjum/lecture-01-introduction-to-compiler>
4. <https://www.pdfdrive.com/compiler-principles-techniques-and-tools-e6708003.html>
5. <https://www.alljntuworld.in/download/compiler-design-cd-materials-notes/>

Course outcomes:

The Student will be able to:

1. Design a Lexical Analyzer.
2. Compare different types of parsing techniques
3. Describe the concepts of Semantic analysis and type checking.
4. Derive a Intermediate code from source code.
5. Apply different code optimization and code generation techniques.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO2	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO3	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO5	3	2	2	-	-	-	-	-	-	-	-	-	-	2
Average	3.0	2.0	2.0	-	-	-	-	-	-	-	-	-	-	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – I Sem			
Course Code: J315C	WEB TECHNOLOGIES (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Fundamental programming skills to look for in a web developer training program include HTML, CSS and JavaScript (the basic building blocks of most websites).
2. programming skills for back-end web development positions include PHP, XML and SQL.

Course objectives:

The Student will:

1. Get best technologies for solving web client/server problems
2. Solve and use JavaScript for dynamic effects and form input entry
3. Recognize appropriate client-side or server-side applications
4. Receive ability to adapt to changing web development and design skills and solid understanding of common design trends.
5. Develop web application software tools i.e. AJAX, PHP and xml etc. and identify the environments currently available on the market to design web sites

Module 1:

Basic Tags of HTML, Introduction HTML5, new HTML5 Form input Types. Cascading Style Sheets.

Introduction to javascript: declaring variables, functions, event handlers (onClick, onsubmit etc). Form validation.

Module 2:

Introduction to XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX. Introduction to web service solution stacks XAMPP: Introduction to content Management Systems Joomla, word press.

Module 3:

Introduction to Servlets: Common Gateway Interface (CGI), Lifecycle of a Servlet, Deploying Servlet, Servlet API, Reading Servlet parameters, Reading initialization parameters, handling Http Request & Responses. Session tracking, cookies. Connecting to a database using JDBC.

Module 4:

Introduction to JSP: The anatomy of a JSp page, JSP processing, Declarations, Directives, Expressions, code snippets, implicit objects. Using beans in JSP pages. Using cookies for session tracking. Connecting to database in JSP.

Module 5:

Introduction to PHP: Downloading, installing, configuring PHP, The anatomy of a PHP Page. Basic Security Guidelines, Variables, Data Types, Operators and Expressions, Constants, Flow Control Functions; Switching Flow, Loops, Code Blocks and Browser Output, Objects, Strings Processing, Form processing, Connecting to database, using cookies, dynamic contents.

Text books:

1. Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML and Ajax, Black Book
2. Web Technologies, Uttam K Roy, Oxford Press.

Reference books:

1. Chris Bates, “Web Programming, building internet applications”, 2ndEdition, WILEY, Dreamtech, 2008.
2. Herbert Schildt, “The complete Reference Java 2”, 8th Edition, TMH, 2011.
3. Hans Bergsten : “Java Server Pages”, 3rdEdition, O’Reilly publication, 2008.

E - Resources:

1. <https://www.w3schools.com/>
2. https://www.tutorialspoint.com/web_developers_guide/web_basic_concepts.htm
3. <https://www.javatpoint.com/>
4. <https://www.geeksforgeeks.org/web-technology/>
5. <https://www.coursera.org/learn/web-development>

Course outcomes:**The Student will be able to:**

1. Design web pages using HTML, Cascading Style Sheets and JavaScript
2. Write XML documents and Schemas .
3. Implement server-side programming using JDBC
4. Create dynamic web pages
5. Create web application development using bdk.jsp and servlets.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	2	3	-	2	-	-	-	-	-	-	-	-	3
CO2	2	2	3	3	2	-	-	-	-	-	-	-	-	2
CO3	2	2	3	-	2	-	-	-	-	-	-	-	-	3
CO4	2	2	2	-		-	-	-	-	-	-	-	-	2
CO5	3	2	2	3	2	-	-	-	-	-	-	-	-	2
Average	2.2	2.0	2.6	3.0	2.0	-	-	-	-	-	-	-	-	2.4

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – I Sem			
Course Code: J316A	LINUX PROGRAMMING (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

Computer Organization, Computer Networks, C Programming, etc.

Course Objectives:

The Student will:

1. Know the basic concept of Linux scripting
2. Control the resources with various commands.
3. Understand File systems and File structures.
4. Understand the usage of inter process communications (IPC).
5. Understand the concepts of multithreaded programming and socket programming.

Module 1:

Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities. Sed – scripts, operation, addresses, commands, applications, awk – execution, fields and records, scripts, operation, patterns, actions, functions, using system commands in awk.

Module 2:

Working with the Bourne-again-shell(bash): Introduction, shell responsibilities, pipes and input Redirection, output redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution. Shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

Module 3:

Files: File Concept, File System Structure, I-nodes, File Attributes, File types, Library functions, the standard I/O and formatted I/O in C, stream errors, kernel support for files, System calls, file descriptors, low level file access – File structure related system calls (File APIs), file and record locking, file and directory management – Directory file APIs, Symbolic links & hard links. **Process** – Process concept, Kernel support for process, process attributes, process control - process creation, waiting for a process, process termination, zombie process, orphan process, Process APIs.

Module 4:

Signals– Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise, alarm, pause, abort, sleep Functions, Intercrosses Communication: Introduction to IPC, Pipes and FIFOs, Introduction to three types of IPC-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, Shared Memory- Kernel support for shared memory, UNIX system V APIs for shared memory, semaphore and shared memory example.

Module 5:

Multithreaded Programming: Differences between threads and processes, Thread structure and uses, Threads and Lightweight Processes, POSIX Thread APIs, Creating Threads, Thread Attributes, Thread Synchronization with semaphores and with Mutexes, Example programs.

Sockets: Introduction to Sockets, Socket Addresses, Socket system calls for connection oriented protocol and connectionless protocol, example-client/server programs.

Text books:

1. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH
2. Unix System Programming using C++, T.Chan, PHI.

Reference books:

1. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition.
2. Linux System Programming, Robert Love, O'Reilly, SPD.
3. Advanced Programming in the Unix environment, 2nd Edition, W.R.Stevens, Pearson Education.

E-resources:

1. <https://www.edx.org/course/introduction-linux-linuxfoundationx-lfs101x-0>
2. <http://www.tutorialspoint.com/listtutorials/linux/1>
3. http://www.compsci.hunter.cuny.edu/~sweiss/course_materials/unix_lecture_notes.php

Course Outcomes:**Student will able to:**

1. Analyze all the Linux utilities, an implement shell scripting.
2. Explain pipes and redirection, Linux environment, signals, filter parameters, filter options and Regular Expressions.
3. Demonstrate the basic Linux process structure and the Linux file system.
4. Define Inter-process Communication using pipes, shared memory, semaphores and Messages.
5. Design various client server applications using TCP or UDP protocols.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	-	2	2	-	-	-	-	-	-	-	-	3
CO2	2	-	3	-	-	-	-	-	-	-	-	2	-	-
CO3	3	2	-	2	-	-	-	-	-	-	-	-	-	3
CO4	2	1	2	-	2	-	-	-	-	-	-	2	-	2
CO5	3	2	3	3	2	-	-	-	-	-	-		-	3
Average	2.6	2.0	2.7	2.3	2.0	-	-	-	-	-	-	2.0	-	2.8

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – I Sem			
Course Code: J31M1	ARTIFICIAL INTELLIGENCE (Common to CSE, IT, EEE& ECM in III-I) and (Common to ECE, CIVIL, ME & MIE in III-II)	L	T	P	D
Credits: 0		2	0	0	0

Pre-Requisites:

1. Mathematics, Probability and statistics
2. Knowledge in programming Language

Course objectives:

The Student will:

1. Know the AI based problems.
2. Illustrate AI techniques for representing the basic problem.
3. Illustrate Advanced AI techniques to solve the problem.
4. Define Learning and explain various learning techniques.
5. Understand the usage expert system.

Module 1:

Introduction: AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents

Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth-First, Depth-First Search, Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing, Generic Best-First, A*), Constraint Satisfaction (Backtracking, Local Search)

Module 2:

Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation, Minimax Search, Alpha-Beta Pruning

Basic Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Forward Chaining and Backward Chaining, Introduction to Probabilistic Reasoning, Bayes Theorem.

Module 3:

Advanced Knowledge Representation and Reasoning: Knowledge Representation Issues, Non- monotonic Reasoning, Other Knowledge Representation Schemes.

Reasoning Under Uncertainty: Basic probability, Acting Under Uncertainty, Bayes' Rule, Representing Knowledge in an Uncertain Domain, Bayesian Networks.

Module 4:

Learning: What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Winston's Learning Program, Decision Trees.

Module 5:

Expert Systems: Representing and Using Domain Knowledge, Shell, Explanation, Knowledge Acquisition.

Text Books:

1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, Prentice- Hall, 2010

References Books:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill publications, Third Edition, 2009.
2. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.

E - Resources:

1. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_pdf_version.htm
2. <https://www.alljntuworld.in/download/artificial-intelligence-ai-materials-notes/>
3. <https://drive.google.com/file/d/1mPiI4jy6YkJRDICT21xgzN0VDNkrW23X/view>
4. <https://nptel.ac.in/courses/106/105/106105077/>

Course outcomes:**The Student will be able to:**

1. Identify the AI based problems.
2. Apply AI techniques for representing the basic problem.
3. Apply Advanced AI techniques to solve the problem.
4. Analyze Learning and explain various learning techniques.
5. Illustrate the use of expert system.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	3
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	3	3
Average	3.0	3.0	3.0	-	-	-	-	-	-	-	-	-	3.0	3.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – I Sem			
Course Code: J3101	EMPLOYABILITY SKILLS (COMMON TO ALL)	L	T	P	D
Credits: 0		2	0	0	0

Pre-Requisites: Nil

Course Objectives:

The Students will:

1. Understand the importance of Listening skills.
2. Learn how reading skills help an individual.
3. Obtain knowledge and practice session on speaking effectively.
4. Understand why proper writing skills are important.
5. Implement business Etiquette in day to day life.

Module 1:

Listening Skills:

The Listening Process, Hearing and Listening, Types of Listening-Superficial Listening- Appreciative Listening-Focused Listening-Evaluative Listening- Attentive Listening- Empathetic Listening, listening with a purpose, Barriers to Listening-Physical Barriers- Psychological Barriers-Linguistic Barriers-Cultural Barriers.

Improving Listening Comprehension

Listening comprehension-Effective Listening Strategies- Listening in Conversational Interaction-Listening to structured talks, Team Listening.

Module 2:

Speaking Skills:

The Speech process-The Message-The Audience- The Speech Style-Encoding- Feedback Conversations and Oral Skills-Body Language-Types of Conversations: Formal and Informal-Strategies for Good Conversation, Improving Fluency and Self-expression- Articulation, good pronunciation-Voice quality- Accent and Intonation Speaking Techniques- Body Language-Eye Contact-Facial Expression-Gesture- Posture and Body Movements.

Speaking Techniques

Techniques to Develop Effective Word Accent- Word Stress, Using Correct Stress - Patterns – Developing Voice Quality-Rhythm in Corrected speech and developing correct tone.

Module 3:

Writing Skills and Business Etiquettes:

Effective Resume writing, Letter writing skills.

Business Etiquettes: Personal Grooming & Behavioural Etiquettes – Event Based Learning Activity, -Facial -Introduction & Role-plays. Personal Values, Developing Values, Cultivating Habits – Real-life cases, Activities.

Reference Books:

1. Rizvi, Ashraf M. Effective Technical communication, New Delhi: Tata McGraw-Hill, 2005.
2. Influencer: The new science of leading change by Joseph Grenny, Kerry Patterson, David Maxfield, Ron McMillan and Al Switzler.
3. Skill with people by Les Gibli

E- Links:

1. https://www.youtube.com/watch?v=JldPnUfr36g&ab_channel=LearnEnglishLab
2. https://www.youtube.com/watch?v=xrEq1UujOo&ab_channel=LearnEnglishLab
3. https://www.youtube.com/watch?v=srn5jgr9TZo&ab_channel=SimerjeetSingh
4. https://www.youtube.com/watch?v=O0qT4cKwt&ab_channel=LearnEnglishLab
5. https://www.youtube.com/watch?v=p6qVJ1KhHek&ab_channel=LearnEnglishwithLet%27sTalk-FreeEnglishLessons.
6. https://www.youtube.com/watch?v=I4uL5mkcAJc&ab_channel=LearnEnglishwithLet%27sTalk-FreeEnglishLessonsLearnEnglishwithLet%27sTalk-FreeEnglishLessonsVerified

Course Objectives:

The Student will be able to:

1. Understand the importance of Listening skills.
2. Learn how reading skills help an individual.
3. Obtain knowledge and practice session on speaking effectively.
4. Understand why proper writing skills are important.
5. Implement business Etiquette in day to day life.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	-	-	3	-	-	-	-	3	3	-	3	3	-	-
CO2	-	-	2	-	-	-	-	3	3	-	3	3	-	-
CO3	-	-	2	-	-	-	-	3	2	-	3	2	-	-
CO4	-	-	2	-	-	-	-	2	2	-	3	2	-	-
CO5	-	-	2	-	-	-	-	2	2	-	2	1	-	-
Average	-	-	2.2	-	-	-	-	2.6	2.4	-	2.8	2.2	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – I Sem			
Course Code: J3151	WEB TECHNOLOGIES LAB (Common to CSE & IT)	L	T	P	D
Credits: 1.5		0	0	3	0

Pre-Requisites:

1. Fundamental programming skills to look for in a web developer training program include HTML, CSS and JavaScript (the basic building blocks of most websites).
2. Programming skills for back-end web development positions include PHP, XML and SQL.

Course objectives:

The Student will:

1. Use the fundamental concepts and features of java programming language.
2. Recognize the basic principles of object oriented programming which includes inheritance, polymorphism, encapsulation and abstraction and also arrays, data and text file operations.
3. Gain (1) interaction, communication and collaboration, (2) knowledge creation, (3) ease of use and flexibility, and (4) writing and technology skills
4. Execute and incorporate best practices in navigation, usability and written content to design websites that give users easy access to the information they seek.
5. Demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Experiment 1. Create HOME PAGE for an online book store

Experiment 2. Login page for an online book store

Experiment 3. Create CATALOGUE PAGE

Experiment 4.

Create registration form with the following fields Name, Password, confirm password, E-mail id, Phone number, Sex, Date of birth, Address

Experiment 5.

Write JavaScript to validate the following fields of the above registration modify web page appearance using CSS

Experiment 6.

Write an XML file which will display all your subjects Books information such as title, author, isbn, name of the publisher. Create a DTD, XML Schemas to validate this XML document. Create CSS, XSL do display XML data

EXPERIMENT 7.

Install XAMPP and JOOMLA or Word Press and test.

Experiment 8.

Write Servlet Program to read data submitted from Registration form and store it into the MySql database.

Experiment 9.

Write a JSP program user validation web application to read username and password submitted by the user and return successful login if the data matches, otherwise failure login.

Experiment 10.

Write a PHP program to store current date-time in a COOKIE and display the “Last visited on” date-time on the web page upon reopening of the same page.

Experiment 11.

Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page. Apply web application development software tools i.e. AJAX, PHP and xml etc. and identify the environments currently available on the market to design web sites

Experiment 12.

Using PHP and MySQL, develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.

E- Resources:

1. <https://www.w3schools.com/>
2. https://www.tutorialspoint.com/web_developers_guide/web_basic_concepts.htm
3. <https://www.javatpoint.com/>
4. <https://www.geeksforgeeks.org/web-technology/>
5. <https://www.coursera.org/learn/web-development>

Course outcomes:

The Student will be able to:

1. Execute dynamic html with java script, methods in JAVASCRIPT, functions in JAVASCRIPT, events.
2. Solve JAVASCRIPT, MARKUP elements, style sheets, validation, accessibility, standards, and browsers. upon completion.
3. Develop hand- coded web pages using current MARKUP standards
4. Design and conduct experiments, as well as to analyze and interpret data.
5. identify the environments currently available on the market to design web sites

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	2	3	-	2	-	-	-	-	-	-	-	-	3
CO2	2	2	3	3	2	-	-	-	-	-	-	-	-	2
CO3	2	2	3	-	2	-	-	-	-	-	-	-	-	3
CO4	2	2	2	-	-	-	-	-	-	-	-	-	-	2
CO5	3	2	2	3	2	-	-	-	-	-	-	-	-	2
Average	2.2	2.0	2.6	3.0	2.0	-	-	-	-	-	-	-	-	2.4

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – I Sem			
Course Code: J3161	LINUX PROGRAMMING LAB	L	T	P	D
Credits: 1.5		0	0	3	0

Prerequisites:

Computer Organization, Computer Networks, C Programming, etc

Course Objectives:

The Student will:

1. Know about the Linux environment.
2. Understand the fundamentals of shell scripting/programming.
3. Describe various system calls and their usage.
4. Discuss about the Zombie process.
5. Discuss about the Inter Process Communication.

Note: Use Bash for Shell scripts.

EXPERIMENT 1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.

EXPERIMENT 2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.

EXPERIMENT 3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.

EXPERIMENT 4. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.

EXPERIMENT 5. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.

EXPERIMENT 6. Write a shell script to list all of the directory files in a directory.

EXPERIMENT 7. Write a shell script to find factorial of a given integer.

EXPERIMENT 8. Write an awk script to count the number of lines in a file that do not contain vowels.

EXPERIMENT 9. Write an awk script to find the number of characters, words and lines in a file.

EXPERIMENT 10. Write a c program that makes a copy of a file using standard I/O and system calls.

EXPERIMENT 11. Implement in C the following Unix commands using System calls
A.cat B.ls C.mv

EXPERIMENT 12. Write a program that takes one or more file/directory names as command line input and reports the following information on the file.

- A.Filetype.
- B. Number of links.
- C. Time of last access.
- D. Read, Write and Execute permissions.

EXPERIMENT 13. Write a C program to emulate the Unix ls -l command.

EXPERIMENT 14. Write a C program to list for every file in a directory, its inode number and file name.

EXPERIMENT 15. Write a C program that demonstrates redirection of standard output to a file.Ex: ls > f1.

EXPERIMENT 16. Write a C program to create a child process and allow the parent to display “parent” and the child to display “child” on the screen.

EXPERIMENT 17. Write a C program to create a Zombie process.

EXPERIMENT 18. Write a C program that illustrates how an orphan is created.

EXPERIMENT 19. Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex:- ls -l | sort

EXPERIMENT 20. Write C programs that illustrate communication between two unrelated processes using named pipe.

EXPERIMENT 21. Write a C program to create a message queue with read and write permissions to write 3 messages to it with different priority numbers.

EXPERIMENT 22. Write a C program that receives the messages (from the above message queue as specified in (21)) and displays them.

EXPERIMENT 23. Write a C program that illustrates suspending and resuming processes using signals.

EXPERIMENT 24. Write a C program that implements a producer-consumer system with two processes. (Using Semaphores).

EXPERIMENT 25. Write client and server programs (using c) for interaction between server and client processes using Unix Domain sockets.

EXPERIMENT 26. Write client and server programs (using c) for interaction between server and client processes using Internet Domain sockets.

EXPERIMENT 27. Write a C program that illustrates two processes communicating using shared memory.

Text Books:

1. Advanced Unix Programming, N.B.Venkateswarulu, BS Publications.
2. Unix and Shell programming, B.A.Forouzan and R.F.Gilberg, Cengage Learning.

Reference Books:

1. Unix and Shell Programming, M.G. Venkatesh Murthy, Pearson Education, 2005.
2. Unix Shells by Example, 4th Edition, Elllie Quigley, Pearson Education.
3. Sed and Awk, O.Dougherty&A.Robbins,2nd edition,SPD

E-Resources:

1. <https://www.edx.org/course/introduction-linux-linuxfoundationx-lfs101x-0>
2. <http://www.tutorialspoint.com/listtutorials/linux/1>
3. <https://www.tutorialspoint.com/unix/index.htm>

Course Outcomes:**The Student will able to:**

1. Use Linux environment efficiently.
2. Solve problems using bash for shell scripting.
3. Apply Linux commands and to develop Shell Scripts.
4. Create various processes.
5. Implement Inter-Process communication between processes.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	-	2	2	-	-	-	-	-	-	-	-	3
CO2	2	-	3	-	-	-	-	-	-	-	-	2	-	-
CO3	3	2		2	-	-	-	-	-	-	-	-	-	3
CO4	2	1	2	-	2	-	-	-	-	-	-	2	-	2
CO5	3	2	3	3	2	-	-	-	-	-	-	-	-	3
Average	2.6	2.0	2.7	2.3	2.0	-	-	-	-	-	-	2.0	-	2.8

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – II Sem			
Course Code: F326A	DATA SCIENCE THROUGH R (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. Know about the fundamental concepts of Data Science.
2. Explore Data Analysis and the Data Science Process and Linear Regression.
3. Investigate the various methods of Data Analysis.
4. Understand the Basics of R Environment.
5. Develop the Data Science analysis using R programming and Data Visualisation.

Module 1: Introduction to Data Science

Unit 1:

What is Data Science? - Big Data VS Data Science, Datafication, Current landscape of perspectives and Skill sets needed.

Unit 2:

Statistical Inference, Populations and samples, Statistical modeling, probability distributions, fitting a model.

Module 2: Exploratory Data Analysis and the Data Science Process.

Unit 1:

Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA, The Data Science Process.

Unit 2:

Simple Linear Regression, Multiple Linear Regression, other Considerations in the Regression Model, The Marketing Plan, Comparison of Linear Regression with K-Nearest Neighbours.

Module 3: Classification

Unit 1:

An Overview of Classification, Why Not Linear Regression? Logistic Regression, Linear Discriminant Analysis, A Comparison of Classification Methods.

Unit 2:

Cross- Validation and The Bootstrap.

Module 4: The R Environment:

Unit 1:

Command Line interface, R Studio, Installing R Packages. Basics of R: Basic math, variables, data types, vectors, calling function, missing data, data frames, lists, matrices, arrays.

Unit 2:

Reading CSVs, Excel Data.

Base Graphs, ggplot2. Writing R functions, control statements – if and else, switch, compound tests, for loops, while loops.

Module 5: Group manipulation and Data Reshaping

Unit 1:

Apply Family, aggregate, plyr, data.table. Data Reshaping: cbind, rbind, joins, reshape2. Strings: paste, sprint, extracting text, regular expressions.

Doing math and simulations in R: Math Functions: Calculating a Probability, cumulative sums and products, minima and maxima, calculus, sorting, set operations.

Unit 2:

Simulation Programming in R: Built-in-Random Variable generators, obtaining the same random stream in repeated runs, an example to a combinatorial simulation.

Text Books:

1. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani , “An Introduction to Statistical Learning-with Applications in R “,
2. Jared P. Lander, R for Everyone, Addison Wesley Data & Analytics Series, Pearson, 2014.

Reference Books:

1. Cathy O’Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O’Reilly. 2014.
2. Mark Gardener, “Beginning R: The statistical programming language”, 2012.
3. Norman Matloff, The Art of R Programming, No Strach Press, San Francisco 2011.

E-Links:

1. <https://nptel.ac.in/courses/106/106/106106179/>
2. <https://towardsdatascience.com/>
3. <https://www.r-bloggers.com/>

Course outcomes:**The Student will be able to:**

1. Analyze the fundamental concepts of Data Science.
2. Evaluate the Data analysis and Data Science Process and Linear Regression.
3. Analyze the various methods of Data Analysis.
4. Apply the Basics of R in its Environment.
5. Evaluate the Data Science analysis using R programming and Data Visualisation.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	3	-	2	2	-	-	-	-	-	-	-	1	2
CO2	3	2	-	2	2	-	-	-	-	-	-	-	2	2
CO3	2	2	-	1	2	-	-	-	-	-	-	-	1	2
CO4	1	2	-	1	1	-	-	-	-	-	-	-	1	1
CO5	2	2	-	2	1	-	-	-	-	-	-	-	1	1
Average	2	2.2		1.6	1.6								1.2	1.6

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – II Sem			
Course Code: F326C	SOFTWARE ENGINEERING (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Knowledge of Object Oriented Principles

Course objectives:

The Student will:

1. Analyze basic Software engineering methods.
2. Describe software engineering layered technology and Process frame work.
3. Design software architecture and UML modeling
4. Recognize testing approaches such as unit testing and integration testing.
5. Demonstrate software evolution and related issues such as version and risk management.

Module 1:

Introduction to Software Engineering: The evolving role of Software, changing nature of Software, Software Myths.

A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

Module 2:

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.

Requirements Engineering Process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

System Analysis Models: Context models, behavioral models, data models, object models, structured methods

Module 3:

Design Engineering: Design process and Design quality, Design concepts, the design model.

Creating an architectural design: Software architecture, Data design, Introduction to UML, Importance of modeling, Principle of modeling, Concepts of modeling and architecture.

Object-Oriented Design: Objects and object classes, An Object-Oriented design process, Design evolution.

Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

Module 4:

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

Product metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

Metrics for Process and Products: Software Measurement, Metrics for software quality.

Module 5:

Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

Text Books:

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

Reference Books:

1. The Unified Modeling Language, User Guide by Grady Booch, James Rumbaugh, Ivar Jaccobson.
2. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
3. Software Engineering: A Primer, Waman S Jawadkar, Tata McGraw-Hill, 2008.

E-Resources:

1. https://onlinecourses.nptel.ac.in/noc20_cs68/preview
2. <https://lecturenotes.in/subject/104/software-engineering-se>
3. <https://www2.cs.siu.edu/~mengxia/Courses%20PPT/435/435ppt.htm>

Course outcomes:

The Student will be able to:

1. Compare and Analyse the different Process models
2. Analyse the Requirement Engineering process and System Modeling
3. Apply the systematic procedure for Software design and deployment
4. Compare the various testing and maintenance methods.
5. Evaluate Projects with various Quality standards

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	3	-	-	-	-	-	-	2	-	-	-	-	3
CO2	3	3	-	-	-	-	-	-	2	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	2	-	-	3	-	3
CO4	3	2	-	-	-	-	-	-	2	-	-	-	-	2
CO5	3	2	-	-	-	-	-	-	2	-	-	-	-	3
Average	2.8	2.4	-	-	-	-	-	-	2.0	-	-	3.0	-	2.6

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – II Sem			
Course Code: F320A	INFORMATION SECURITY	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Computer Networks.

Course objectives:

The Student will:

1. Define about security goals, security attacks, security services and security mechanism.
2. Describe conventional encryption algorithms& public-key encryption algorithms, digital Signature and issues of key Management
3. Explain authentication application & discuss how PGP and S/MIME can provide security services for e-mail.
4. Discuss IP security, Web Security.
5. Discuss system level security issues include threats, Intruders, Intrusion detection system and firewalls.

Module 1:

Introduction: Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs.

Understanding Attacks: Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

Module 2:

Symmetric Encryption and Message Authentication: Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution.

Public-Key Cryptography and Message Authentication: Approaches of Message Authentication, Secure Hash Functions and HMAC Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management.

Module 3:

Authentication Applications: Kerberos, X.509 Directory Authentication Service.

Electronic Mail Security: Pretty Good Privacy (PGP) and Secure /Multipurpose Internet Mail Extension (S/MIME)

Module 4:

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

Web Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

Module 5:

Network Management Security: Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3.

System Security: Intruders, Viruses and related threats. Firewall Design principles, Trusted Systems. Intrusion Detection Systems.

Text Books:

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan Permech, Wiley Dreamtech

Reference Books:

1. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning.
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Cryptography and network Security, Third edition, Stallings, PHI/Pearson.

E - Resources:

1. WilliamStallings.com/Crypto3e.html
2. WilliamStallings.com/StudentSupport.html
3. <https://nptel.ac.in/courses/106/106/106106129/>
4. <https://notes.specworld.in/information-security-pdf-notes-is-pdf-notes/>

Course outcomes:

The Student will be able to:

1. Analyze the security goals, security attacks, security services and security mechanism, cryptography.
2. Compare how conventional encryption algorithms & public key cryptography can be used to ensure the Identity of the sender of an encrypted message.
3. Identify authentication application & discuss how PGP and S/MIME can provide security services for e-mail.
4. Identify IP security, Web security using Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).
5. Apply system level security includes threats, Intruders, Intrusion detection System and Firewalls.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	2	2	-	2	2	-	2	-	-	-	-	-	2
CO2	3	3	2	2	-	-	-	-	-	-	-	-	-	2
CO3	2	2	1	-	-	-	-	-	-	-	-	-	-	1
CO4	2	2	1	-	-	-	-	-	-	-	-	-	-	1
CO5	2	2	1	-	-	-	-	-	-	-	-	-	-	1
Average	2.2	2.2	1.4	2.0	2.0	2.0		2.0						1.4

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – II Sem			
Course Code: J326J	DATA WAREHOUSING AND DATA MINING (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

Basic knowledge in **DBMS**

Course objectives:

The Student will:

1. Introduce the basic concepts and techniques in building a Data Warehouse.
2. Apply preprocessing techniques for any given raw data.
3. Implement and apply basic algorithms for finding frequent patterns in transactional databases.
4. Implement and apply basic algorithms for supervised and unsupervised learning.
5. Discuss an overview of mining complex types of data.

Module 1:

Unit 1 Introduction:

Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining.

Unit 2 Data Preprocessing:

Need for preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Module 2:

Unit 1 Data Warehouse and OLAP Technology for Data Mining:

Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining.

Unit 2 Data Cube Computation and Data Generalization:

Efficient Methods for Data Cube Computation and Data Generalization, Attribute-Oriented Induction.

Module 3:

Unit 1 Mining Frequent Patterns:

Basic Concepts, Efficient and Scalable Frequent Item set Mining Methods

Unit 2 Associations and Correlations:

Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

Module 4:**Unit 1 Classification:**

Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Support Vector Machines.

Unit 2 Prediction:

Simple linear regression, Logistic Regression, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods.

Module 5:**Unit 1 Cluster Analysis Introduction:**

Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

Unit 2 Mining Complex Types of Data:

Mining Spatial Databases, Mining Multimedia Databases, Mining Time-Series and Sequence Data, Mining Text Data and Mining the World Wide Web.

Applications and Trends in Data Mining: Data Mining Applications, Data Mining System Products and Research Prototypes.

Text books:

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, 2nd Edition, 2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.

Reference book:

1. Data Mining Techniques – Arun K Pujari, 2nd edition, Universities Press.
2. Data Warehousing in the Real World – Sam Aanhory & Dennis Murray Pearson Edn Asia.
3. Insight into Data Mining, K.P.Soman, S.Diwakar, V.Ajay, PHI, 2008.

E-Resources:

1. <https://drive.google.com/file/d/1KwbqsdL-R3PoRyf8o4Ewdjm98MOKFJv/view>
2. <https://onlinecourses.nptel.ac.in/noc18>
3. www.vssut.ac.in/lecture_notes/lecture1428550844.pdf
4. www.vssut.ac.in/lecture_notes/lecture1428550844.pdf

Course outcomes:

The Student will be able to:

1. Assess raw input data, and process it to provide suitable input for a range of data mining algorithms.
2. Identify a data warehouse for an organization.
3. Apply Data mining techniques such as characterization, comparison, association.
4. Apply an appropriate data Mining algorithms for classification and clustering from large databases.
5. Demonstrate knowledge on mining complex types of data.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	2	2	2	2	-	-	-	-	-	-	-	2	-
CO2	2	2	3	2	2	-	-	-	-	-	-	-	3	-
CO3	2	3	2	1	1	-	-	-	-	-	-	-	-	1
CO4	2	3	2	2	1	-	-	-	-	-	-	-	-	-
CO5	3	2	2	1	2	-	-	-	-	-	-	-	2	-
Average	2.2	2.4	2.2	1.6	1.6	-	-	-	-	-	-	-	2.3	1.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – II Sem			
Course Code: J325D	SOFT COMPUTING (Professional Elective-I)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

Data mining, DAA, Probability & Statistics

Course objectives:

The Student will:

1. Classify the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications
2. Develop the understanding concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic.
3. Understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering.
4. Describe fuzzy systems with membership functions

Module 1:

Introduction: Neural Networks, Fuzzy Logic, Genetic Algorithms, Hybrid Systems, Soft Computing, Soft Computing Constituents, Soft Computing Characteristics. Artificial Neural Networks: Introduction, Fundamental Concept, Evolution of Neural Networks, Basic models of ANN, Important Terminologies.

Module 2:

Supervised Learning Networks: Introduction, Perceptron Networks, Adaptive Linear Neuron, Back propagation Network. Associative Memory Networks : Introduction, Training Algorithms for pattern association and Hopfield Networks.

Module 3:

Unsupervised Learning Network: Introduction, Fixed Weight Competitive Nets, Kohonen Self-Organizing Feature Maps, Counter Propagation Networks.

Fuzzy Sets : Introduction, Classical Sets, Fuzzy Sets, Classical Relations, Fuzzy Relations

Module 4:

Membership functions- Features, Fuzzification, Membership value assignments, Defuzzification Methods, Fuzzy Arithmetic, Fuzzy Measures, Fuzzy Inference Systems, Fuzzy Logic Control Systems.

Module 5:

Genetic Algorithms- Introduction, Basic operators and terminology, Traditional Algorithm vs Genetic Algorithm, Simple GA, General GA, Classification of GA, Genetic Programming, Applications of GA.

Applications of Soft Computing : Internet Search Technique, Hybrid Fuzzy Controllers.

Text Books:

1. Principles of Soft Computing- S N Sivanandam, S N Deepa, Wiley India, 2007
2. Neuro-Fuzzy and Soft Computing A Computational Approach to Learning and Machine Intelligence – J.S.R.Jang, C.T.Sun, E.Mizutani, PHI 177

Reference Books:

1. Artificial Intelligence and Soft Computing- Behavioral and Cognitive Modeling of the Human Brain- Amit Konar, CRC press, Taylor and Francis Group.
2. Soft Computing and Intelligent System Design -Fakhreddine O Karray, Clarence D Silva,, Pearson Edition, 2004.
3. Artificial Intelligence – Patric Henry Winston – Third Edition, Pearson Education.

E - Resources:

1. <https://www.smartworld.com/notes/soft-computing-pdf-vssut-sc/>
2. <https://www.slideshare.net/sandponia/soft-computing-72319911>
3. <https://nptel.ac.in/courses/106/105/106105173/>
4. <https://bharadwajakumar.files.wordpress.com/2019/06/soft-computing-ebook.pdf>

Course outcomes:**The Student will be able to:**

1. Learn about soft computing techniques and their applications
2. Analyze various neural network architectures
3. Apply perceptrons and counter propagation networks.
4. Define the fuzzy systems
5. Analyze the genetic algorithms and their applications

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	2	2	-	-	-	-	-	-	-	1	1	-
CO2	3	3	-	2	-	-	-	-	-	-	-	1	-	-
CO3	2	2	2	2	-	-	-	-	-	-	-	2	1	-
CO4	2	2	2	2	-	-	-	-	-	-	-	1	1	-
CO5	2	2	2	2	-	-	-	-	-	-	-	1	1	-
Average	2.4	2.4	2.0	2.0	-	-	-	-	-	-	-	1.2	1.0	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – II Sem			
Course Code: J325E	MOBILE COMPUTING (Professional Elective – I)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Knowledge on computer networking.
2. Programming experience on mobile devices.

Course objectives:

The Student will:

1. Gain the knowledge the Global System for Mobile communication
2. Understand about the medium access control layer and multiplexing techniques
3. Describe the mobile IP and transport layer protocols
4. Understand about various kind of database issues
5. illustrate about routing algorithms

Module 1:

GSM: Mobile Services, System Architecture, Radio Interface, Protocols, Localization and Calling, Handover, Security, and New Data Services.

Mobile computing (MC): Introduction to MC, Novel Applications, Limitations and Architecture.

Module 2:

(Wireless) Medium Access Control (MAC):

Motivation for a Specialized MAC (Hidden and Exposed Terminals, Near and Far Terminals), SDMA, FDMA, TDMA, CDMA, MAC Protocols for GSM.

Module 3:

Mobile IP Network Layer:

IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

Mobile Transport Layer:

Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Module 4:

Database Issues:

Database Hoarding & Caching Techniques, Client –Server Computing & Adaptation, Transactional Models, Query Processing, Data Recovery Process & QoS Issues.

Data Dissemination and Synchronization:

Communications Asymmetry Classification of Data Delivery Mechanisms , Data Dissemination Broadcast Models , Selective Tuning and Indexing Methods ,Digital Audio and Video Broadcasting (DAB & DVB).Data Synchronization –Introduction ,Software ,and Protocols.

Module 5:

Mobile Ad hoc Networks (MANETs):

Introduction, localization, MAC issues, Routing protocols, global state routing(GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, Applications & Challenges of a MANET.

Text Books:

1. “Mobile Communications”, Jochen Schiller, Addison-Wesley, Second Edition, 2004
2. Stojmenovic and Cacute, “Handbook of Wireless Networks and Mobile Computing”, Wiley, 2002.

E - Resources:

1. https://www.tutorialspoint.com/mobile_computing/index.htm
2. <https://www.sciencedirect.com/topics/engineering/medium-access-control>
3. <https://docs.oracle.com/cd/E19455-01/806-7600/6jgfbep0v/index.html>
4. <http://www.psnacet.edu.in/courses/CSE/Mobilecomputing/Lecture9.pdf>
5. <http://www.faadooengineers.com/online-study/post/cse/mobile-computing/185/database-hoarding>
6. <https://www.dauniv.ac.in/public/frontassets/coursematerial/mobilecomputing/MobileCompChap02DataDissSyncMobMgt.pdf>
7. <https://www.geeksforgeeks.org/introduction-of-mobile-ad-hoc-network-manet/>

Course outcomes:

The Student will be able to:

1. Analyze the basic concepts and principles in mobile computing on different platforms
2. Solve the structure and components for mobile ip, mobility management, and technologies for location-aware computing
3. Recognize positioning techniques and location-based services and applications
4. Conduct and implement mobile applications to realize location-aware computing
5. Design and construct to study and they will demonstrate the ability to design a system, component or process as per needs and specification.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	-	1	-	2	-	-	-	-	-	-	-	-	2
CO2	2	-	2	-	2	-	-	-	-	-	-	-	-	2
CO3	2	-	2	-	2	-	-	-	-	-	-	-	-	2
CO4	2	-	1	-	2	-	-	-	-	-	-	-	-	-
CO5	2	-	2	-	2	-	-	-	-	-	-	-	-	2
Average	2.0	-	1.6	-	2.0	-	-	-	-	-	-	-	-	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – II Sem			
Course Code: J325F	SOFTWARE TESTING METHODOLOGIES (Professional Elective-II) (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. A course on “Software Engineering”.

Course objectives:

The Student will:

1. Explain various software testing issues and solutions in software unit test, integration, regression, and system testing.
2. Discuss how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, and generate a testing report.
3. Explain the advanced software testing topics, such as object-oriented software testing methods, and component-based software testing issues, challenges, and solutions.
4. Recognize software test automation problems and solutions.
5. Identify how to write software testing documents, and communicate with engineers in various forms.

Module 1:

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs. Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

Module 2:

Transaction Flow Testing: Transaction flows, transaction flow testing techniques. Dataflow testing: - Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing. Domain Testing:-domains and paths, Nice & ugly domains, domain testing, domain and interface testing, domains and testability.

Module 3:

Paths, Path products and Regular expressions: Path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

Module 4:

Logic Based Testing: Overview, decision tables, path expressions, kv charts, specifications. State, State Graphs and Transition testing : State graphs, good & bad state graphs, state testing, Testability tips.

Module 5:

Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools.

Regression testing, Rapid testing, Performance testing of a data base application and HTTP connection for website access.

Text Books:

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

Reference Books:

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD (Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.

E - Resources:

1. <https://www.guru99.com/testing-methodology.html>
2. www.ieeexplore.ieee.org
3. www.tutorialspoint.com
4. www.edureca.com
5. www.Cludytutorial.com

Course outcomes:**The Student will be able to:**

1. Analyze and design test cases using black box testing technique which includes decision tables domain testing and transition testing.
2. Analyze and design test cases for a white box testing technique which includes path testing, data flow graphs and matrix representation for a given problem.
3. Compute the path product and construct regular expression which is used to identify the alternate paths from source node to destination node for any application.
4. Execute how to run test script wizard and execute how to do performance testing using testing tools including winrunner and jmeter respectively.
5. Demonstrate the importance of testing and its role in need of software development

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	3	-	2	3	-	-	-	-	-	-	-	-	3
CO2	2	3	-	3	3	-	-	-	-	-	-	-	-	3
CO3	2	2	-	2	2	-	-	-	-	-	-	-	-	2
CO4	2	2	-	2	2	-	-	-	-	-	-	-	-	3
CO5	2	2	-	2	3	-	-	-	-	-	-	-	-	2
Average	2.0	2.4	-	2.2	2.6	-	-	-	-	-	-	-	-	2.6

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – II Sem			
Course Code: J325G	COMPUTER GRAPHICS (Professional Elective-II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. A course on “Mathematical foundation in computer science”.

Course objectives:

The Student will:

1. Study the fundamental concepts and theory of computer graphics, input and output devices
2. Illustrate the line drawing, polygon filling algorithms and 2D geometric representations
3. Describe the 2D viewing.
4. Illustrate the 3D: object representation, geometric representation and viewing.
5. Understand the concept of visible surface detection method and computer animation.

Module 1:

Introduction, Application areas of Computer Graphics, overview of graphics systems, video- display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

Module 2:

Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.

2-D Geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

Module 3:

2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

Module 4:**3-D Object representation:**

Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B- spline curves, Bezier and B-spline surfaces. Basic illumination models, polygon rendering methods.

3-D Geometric transformations:

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

Module 5:**Visible surface detection methods:**

Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods

Computer animation:

Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications

Text Books:

1. “Computer Graphics C version”, Donald Hearn and M. Pauline Baker, Pearsoneducation.
2. “Computer Graphics Principles & practice”, second edition in C, Foley, VanDam, Feiner and Hughes, PearsonEducation.

Reference Books:

1. Procedural elements for Computer Graphics, David F Rogers, 2nd Edition, Tata Mc Graw Hill
2. Principles of Interactive Computer Graphics”, Neuman and Sproul, TMH
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer

E - Resources:

1. <https://www.pdfdrive.com/computer-graphics-c-version-2nd-ed-liaufc-d15986348.html>
2. <https://nptel.ac.in/courses/106/106/106106090/>
3. <https://www.alljntuworld.in/download/computer-graphics-cg-materials-notes/>
4. <https://csestudyzone.blogspot.com/2015/05/computer-graphics-study-material-jntu.html>

Course outcomes:**The student will be able to:**

1. Identify the fundamental concepts and theory of computer graphics, input and output devices
2. Distinguish the line drawing, polygon filling algorithms and 2D geometric representations
3. Acquire knowledge on the 2D viewing.
4. Implement the 3D: object representation, geometric representation and viewing.
5. Analyze the concept of visible surface detection method and computer animation

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	2	-	-	-	-	-	-	-	-	-	-	2	3
CO2	3	1	-	-	-	-	-	-	-	-	-	-	3	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	1	-	-	3	-	-	-	-	-	-	-	3	1
CO5	2	2	-	-	3	-	-	-	-	-	-	-	2	3
Average	2.4	1.6	-	-	3	-	-	-	-	-	-	-	2.6	2.33

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – II Sem			
Course Code: J325H	CLOUD COMOPUTING (Professional Elective-II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. A course on “Computer Networks”.
2. A course on “Operating Systems”.
3. A course on “Data base management systems”

Course objectives:

The Student will:

1. Understand the fundamentals of the Cloud Computing and strategies in the New Economy.
2. Provide a fundamental understanding of different types of cloud computing applications.
3. Provide insights to implement virtualization techniques.
4. Understand the design of cloud and its architecture.
5. Outlines the categories and multimedia in Cloud Computing.

Module 1:

Principles of Parallel and Distributed Computing, Introduction to cloud computing, Cloud computing Architecture, cloud concepts and technologies, cloud services and platforms, Cloud models, cloud as a service, cloud solutions, cloud offerings, introduction to Hadoop and Mapreduce.

Module 2:

Cloud Platforms in the Industry, Understanding Scientific Applications for Cloud Environments, cloud applications. Healthcare and education, Scientific Applications, Business and Consumer Applications.

Module 3:

Virtualization, cloud virtualization technology, deep dive: cloud virtualization, migrating in to cloud computing. Virtual Machines Provisioning and Virtual Machine Migration Services, On the Management of Virtual Machines for cloud Infrastructure, Comet cloud, T-Systems.

Module 4:

Enterprise cloud computing Paradigm, Federated cloud computing Architecture, SLA Management in Cloud Computing, Developing the cloud: cloud application Design.

Module 5:

Cloud management, Organizational Readiness and change management in the cloud age, Cloud Security, Data security in the cloud, Legal Issues in the Cloud , Achieving Production Readiness for the cloud Services.

Text Books:

1. Cloud Computing: Raj Kumar Buyya , James Broberg, andrzej Goscinski, 2013 Wiley.
2. Cloud computing: Dr Kumar Saurab Wiley India 2011.

Reference Books:

1. Cloud Computing: Arshdeep Bahga, Vijay Madiseti, 2014, University Press.
2. Mastering Cloud Computing: Raj Kumar buyya, Christian Vecchiola,selvi-2013.

E - Resources:

1. <https://nptel.ac.in/courses/106/105/106105167/>
2. <https://sjceodisha.in/wp-content/uploads/2019/09/CLOUD-COMPUTING-Principles-and-Paradigms.pdf>
3. <https://www.alljntuworld.in/download/cloud-computing-cc-materials-notes/>
4. <https://www.slideshare.net/jeetraj17/cloud-computing-it703-unit-1-5>

Course outcomes:**The Student will be able to:**

1. Identify different elements of cloud computing.
2. Examine the essential processes of a Cloud Computing system.
3. Analyze the impact of Cloud Computing on organizations and strategy.
4. Learns the various marketing strategies for an online business.
5. Explain the infrastructure and multimedia concepts.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	2	-	-	-	-	-	-	-	-	-	-	2	2
CO2	2	2	-	2	2	-	-	-	-	-	-	-	2	2
CO3	2	2	2	-	2	-	-	-	-	-	-	-	-	2
CO4	2	2	2	-	1	-	-	-	-	-	-	-	-	-
CO5	2	-	-	-	-	-	-	-	-	-	-	-	2	2
Average	2.0	2.0	2.0	2.0	1.7	-	-	-	-	-	-	-	2.0	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – II Sem			
Course Code: J32M2	CYBER SECURITY (Common to ECE, CIVIL, ME & MIE in III-I) and (Common to CSE, IT, EEE& ECM in III-II)	L	T	P	D
Credits: 0		2	0	0	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. Recognize cybercrimes and how they are planned
2. Identify the vulnerabilities of mobile and wireless devices
3. Examine the crimes in mobile and wireless devices and Acts.
4. Understand about Computer Forensics
5. Explored to Cyber Security- Organizational Implications

Module 1:

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

Module 2

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy.

Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

Module 3:

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for

Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

Module 4:

Cyber Security: Organizational Implications: Introduction cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

Module 5:

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.

Cybercrime: Examples and Mini-Cases

Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances.

Mini-Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

Text books:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

Reference Books:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.

E-Resources:

1. <https://lecturenotes.in/subject/611/cyber-security> .
2. <https://www.slideshare.net/AvaniPatel61/ppt-on-cyber-security> .
3. https://onlinecourses.swayam2.ac.in/ugc19_hs25/preview

Course outcomes:

The Student will be able to:

1. Demonstrate cybercrimes and how they are planned
2. Develop a framework to secure Mobile and wireless devices
3. Interpret crimes and Acts related to mobile and wireless devices
4. Memorize Computer Forensics and its related matters
5. Identify Cyber Security-Organizational Implications

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	3	-	2	-	1	-	-	-	-	-	-	-	-
CO2	2	-	3	2	-	-	-	-	-	-	-	-	3	1
CO3	-	2	-	2	-	-	-	-	-	-	-	-	-	2
CO4	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5		2	-	-	-	2	-	-	-	-	-	-	-	-
Average	2.0	2.3	3.0	2.0	-	1.5	-	-	-	-	-	-	3.0	1.5

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – II Sem			
Course Code: F3261	SOFTWARE ENGINEERING LAB (Common to CSE & IT)	L	T	P	D
Credits: 1		0	0	2	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. Analyze problem statement and develop software requirement sheet for system.
2. Describe the functional oriented diagrams: Data flow diagram
3. Design test plan document and specification of a system
4. Describe the test cases for web application
5. Demonstrate the use of selenium with different browsers.

Experiment 1.

Write down the problem statement for a suggested system of relevance

Experiment 2.

Do requirement analysis and develop software requirement specification sheet for any system.

Experiment 3.

Draw the e-r diagram for the suggested system

Experiment 4.

To perform the function-oriented diagram: Data Flow Diagram (DFD)

Experiment 5.

Create a test plan document for any application (e.g. Library Management System).

Experiment 6.

Study the specifications of ATM System and Draw UML diagrams(Structural and Behavioral Diagrams).

Experiment 7.

Study the specification of different type of insurance policies, write the functional test cases.

Experiment 8.

Write the test cases for any Web application.

Experiment 9.

- a) Write the test cases for java program using relational operators.
- b) Write the test cases for java program using string compressions.

Experiment 10.

- a) Write the test cases for java program using multi-dimensional array.
- b) Write the test cases for java program using method overloading.

Experiment 11.

Write a program to launch selenium tool with different browsers

- a) Firefox
- b) Google chrome
- C) IE Browser

Experiment 12.

Study any Web Application using Selenium ID.

Course outcomes:**The Student will be able to:**

1. Apply software principles and techniques for software requirement specification.
2. Design data flow diagram
3. Apply different test plan cases.
4. Write programs for various testing scenarios.
5. Use selenium for web applications.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	2	3	2				2	2			3	2
CO2	3	3	2	3	2				1	2			3	2
CO3	3	3	3	3	2				2	2			3	2
CO4	3	3	2	2	2				2	2			3	2
CO5	3	3	2	2	3				2	1			3	2
Average	3.0	3.0	2.2	2.6	2.2				1.8	1.8			3.0	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – II Sem			
Course Code: J3201	LIFE SKILLS & PROFESSIONAL SKILLS LAB (COMMON TO ALL)	L	T	P	D
Credits: 2		0	0	4	0

Pre requisites: Nil

Course Objectives:

Students will learn to:

1. Understand importance of self-assessment and awareness.
2. Recognize the emotional needs of themselves and others.
3. Define social skills and need of positive vibe.
4. Employ Leadership Traits and skills in day to day life.
5. Quantify the importance of Thinking out of Box, Creativity and Innovation.

Module 1:

Self-Introduction and Practice Session-Importance of Communication Skills-Advance communication skills needed for effective communication-Self-assessment and self-awareness with required tools and Activity based approach.

Module 2:

Empathy Practice Sessions & Role-plays -Assertive Behaviour-Emotional Intelligence-Conflict Resolution and Anger Management.

Module 3:

Social skills and how to handle criticism-Social Interaction Skills – Role-plays- Diversity & Social Responsibility- Positive Attitude- Power of Positive Energy.

Module 4:

Leadership-Traits & skill-Activities – Case Studies-Assessments - Team Building skills – Activities –Case studies on Interaction with industry people.

Module 5:

Thinking Out-of-the Box – Case-study & Activity Based- Creativity & Innovation-Developing a Vision & Action-plan - Thinking Skills – Various Types of Thinking - Power of Questioning Skills– Practice Sessions & Role plays

Reference Books:

1. Butterfield, Jeff. Soft Skills for Everyone. Delhi: Cenege., 2010.
2. Raman, Meenakshi and Sangeeta Sharma. Technical Communication-Principles and Practice. Third Edition, New Delhi: UP., 2015.

- Rizvi, M Ashraf. Effective Technical-Communication. New Delhi: Tata McGraw-Hill., 2005.

Course Outcomes:

On completion of the course, the students will be able to:

- Recognize importance of self-awareness and assessment.
- Translate the needs of others and themselves.
- Practice being social and possess positive energy.
- Employ leadership Traits and skills in day to day life.
- Understand the importance of Thinking- out- of - the-Box.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1									2	3		3		
CO2									2	3		3		
CO3									2	3		3		
CO4									2	3		3		
CO5									2	3		3		
Average									2	3		3		

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE IV Year – I Sem			
Course Code: J415A	MACHINE LEARNING (Common to CSE & ECM)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. A course on Linear Algebra and Advanced Calculus.
2. A course on “Probability and Statistics.”
3. A course on “Data structures”.

Course Objectives

The student will:

1. Use Models, methods and tools to solve regression, classification, feature selection, dimensionality reduction and density estimation problems.
2. Learn and adapt in supervised, unsupervised and semi-supervised modes of learning.
3. Gain knowledge of recognition, decision making and statistical learning problems.
4. Understand current research topics and issues in machine learning.
5. Conduct and present a literature review on a research topic.

Module 1:

Introduction - Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning

Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias

Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning

Module 2:

Artificial Neural Networks – Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition, Advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms.

Module 3:

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibbs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm, **Computational learning theory** – Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces, The mistake bound model of learning

Instance-Based Learning- Introduction, k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning, **Genetic Algorithms** –Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Paralleling Genetic Algorithms

Module 4:

Learning Sets of Rules –Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution

Analytical Learning - Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge

Module 5:

Combining Inductive and Analytical Learning –Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators,

Reinforcement Learning –Introduction, The Learning Task, Q Learning, Non-Deterministic, Rewards and actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming.

Text Books:

1. Machine Learning – Tom M.Mitchell, - MGH
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC).

Reference Books:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William whsieh, Cambridge Univ Press.
2. Richard O. Duda. Peter E. Hart and David G. Stork, Pattern classification, John Wiley & Sons Inc., 2001.
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.

E - Resources:

1. <https://www.slideshare.net/darshanharry/machine-learning-46440299>
2. <https://news.vidyaacademy.ac.in/wp-content/uploads/2018/10/NotesOnMachineLearningForBTech-1.pdf>
3. <https://nptel.ac.in/courses/106/106/106106202/>

Course Outcomes**The Student will be able to:**

1. Summaries on well posed problem, concept learning and various perspectives of machine learning
2. Apply machine learning algorithms such as Decision tree, Artificial Neural Networks to solve real world problems and formulate evaluation hypotheses.
3. Compare and contrast various machine learning methodologies such as Bayesian Learning, Computational learning theory, instance based learning and Genetic algorithms.
4. Implement rule based learning and analytical learning strategies to solve complex problems.
5. Combine inductive learning with analytical learning and deploy Reinforcement learning which supports dynamic programming.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	-	-	2	-	-	-	-	-	-	-	-	1	2
CO2	-	2	2	2	-	-	-	-	-	-	-	-	-	2
CO3	2	2	-	3	-	-	-	-	-	-	-	-	2	2
CO4	2	3	2	1	-	-	-	-	-	-	-	-	1	2
CO5	2	1	2	2	-	-	-	-	-	-	-	-	2	2
Average	2.0	2.0	2.0	2.0	-	-	-	-	-	-	-	-	1.5	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – II Sem			
Course Code: J417E	INTERNET OF THINGS (Professional Elective-III) (Common to CSE, IT & ECM)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Course Objectives

The Student will:

1. Understand the current vision of the Internet of Things and its impact on the world
2. Classify basic concepts of IoT and M2M & IoT system management
3. Describe concepts of python language and different python packages.
4. Explain how to design IoT Physical devices with built-ins of python Programs
5. Identify the advanced concepts of IoT physical servers, cloud offerings.

Module 1:

Introduction to Internet of Things –Introduction, Definition and Characteristics of IoT,
Physical Design of IoT – Things in IoT, IoT Protocols, Logical Design of IOT- IoT Functional Blocks, IoT Communication Models, IoT Communication APIs

IoT Enabling Technologies – Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems.

Domain Specific IoTs – Introduction, Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle.

Module 2:

IoT and M2M – Introduction, M2M, Difference between IOT and M2M, **SDN and NFV for IoT**-Software Defined Networking, Network Function Virtualization,

IoT System Management with NETCONF-YANG- Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Network Operator Requirements, NETCONF, YANG, NETOPEER.

Module 3:

IoT Systems-Logical Design Using Python-Introduction, Installing Python, Data types and Data Structures, Control Flow, Functions, Modules, Packages, File handling, Date/Time Operations, Classes.

Python Packages of Interest for IoT- JSON, XML, HTTPLib, URLLib, SMTPLib

Module 4:

IoT Physical Devices and Endpoints – What is an IoT Device, Exemplary Device: Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry PI-Interfaces (Serial, SPI, I2C), Programming

Raspberry Pi with Python-Controlling LED, Interfacing an LED and Switch and interfacing a light sensor with Raspberry Pi.

Module 5:

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage Models and communication APIs, WAMP-AutoBahn for IoT, Xively Cloud for IoT, Python web application framework Designing a RESTful web API.

Text book:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madiseti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

Reference Books:

1. Internet of Things by Jeeva Bose 1st edition, Khanna publishing.

E - Resources:

1. https://www.tutorialspoint.com/internet_of_things/internet_of_things_tutorial.pdf
2. <https://nptel.ac.in/courses/106/105/106105166/>
3. <https://www.slideshare.net/MohanKumarG/internetofthings-iot-aseminar-ppt-by-mohankumarg>

Course Outcomes

The Student will be able to:

1. Analyze current vision of the Internet of Things and its impact on the world.
2. Demonstrate basic concepts of IoT and M2M & IoT system management
3. Practice the concepts of python language using different python packages
4. Design IoT Physical devices using python Programming.
5. Categorize advanced concepts of IoT physical servers, cloud offerings and Hadoop.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	-	-	-	-	-	-	-	-	-	-	1	2
CO2	3	3	2	-	-	-	-	-	-	-	-	-	1	2
CO3	3	3	3	-	-	-	-	-	-	-	-	-	2	2
CO4	3	3	3	-	-	-	-	-	-	-	-	-	2	2
CO5	3	3	3	-	-	-	-	-	-	-	-	-	2	2
Average	3.0	3.0	2.8	-	-	-	-	-	-	-	-	-	1.6	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE IV Year – I Sem			
Course Code: J415D	INFORMATION RETRIEVAL SYSTEMS (Professional Elective – III) (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Database Management system, Probability and statistics.

Course Objectives:

The Student will:

1. Describe the domain of Information Retrieval is concerned with the extraction of relevant information from large collections of documents.
2. Select applications to proprietary retrieval systems as well as www, digital libraries and commercial recommendation systems.
3. Understand the main principles and methods underlying the domain of Information retrieval.
4. Discuss recent developments in IR such as collaborative filtering and Latent Semantic Indexing.
5. Know the concepts Multimedia Information Retrieval, Libraries.

Module 1:

Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses

Information Retrieval System Capabilities - Search, Browse, Miscellaneous.

Module 2:

Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction,

Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages.

Module 3:

Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.

User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the Internet and hypertext.

Module 4:

Information Visualization: Introduction, Cognition and perception, Information visualization technologies. **Text Search Algorithms-** Introduction, Software text search algorithms, Hardware text search systems.

Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.

Module 5:

Multimedia Information Retrieval – Models and Languages – Data Modeling, Query Languages, Indexing and Searching.

Libraries: Libraries and Bibliographical systems, online IR system, OPACs, Digital Libraries.

Text Books:

1. Information Storage and Retrieval Systems: Theory and Implementation By Kowalski, Gerald, Mark T Maybury ,Springer.
2. Modern Information Retrieval By Ricardo Baeza-Yates, Pearson Education, 2007.
3. Information Retrieval: Algorithms and Heuristics By David A Grossman and Ophir Frieder, 2nd Edition, Springer.

Reference Books:

1. Information Retrieval Data Structures and Algorithms By William B Frakes, Ricardo Baeza-Yates, Pearson Education, 1992.
2. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.
3. Introduction to Information Retrieval By Christopher D. Manning and Prabhakar Raghavan, Cambridge University Press, 2008.
4. Natural Language Processing and Information Retrieval, T.Siddiqui and U.S.Tiwary, Oxford Univ. Press.

E - Resources:

1. <https://cse.iitkgp.sc.in/~pabitra/course/ir06/ir06.htm>
2. <https://www.coursera.org/courses?query=information%20retrieval>
3. <https://www.udemy.com/course/information-retrieval-and-mining-massive-data-sets/>
4. [https:// web.stanford.edu/class/cs276/](https://web.stanford.edu/class/cs276/)
5. [http://www.cs.ox.ac.uk/teaching/courses/2011-2012/information retrieval](http://www.cs.ox.ac.uk/teaching/courses/2011-2012/information%20retrieval)

Course Outcomes:**At the end of the course, Student will be able to:**

1. Use different information retrieval techniques in various application areas.
2. Apply IR principles to locate relevant information large collections of data
3. Analyze performance of retrieval systems when dealing with unmanaged data sources
4. Choose retrieval systems for web search tasks.
5. Identify the concepts of Multimedia Information Retrieval and Libraries.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	2	-	-	-	-	-	-	2	-	-	-	3	2
CO2	-	-	2	2	-	-	-	-	-	-	-	-	-	2
CO3	2	2	2	-	2	-	-	-	-	-	-	-	-	2
CO4	2	2	2	2	2	-	-	-	-	-	-	-	-	-
CO5	2	2	2	-	2	-	-	-	-	-	-	-	-	2
Average	2.0	2.0	2.0	2.0	2.0	-	-	-	-	-	-	-	3.0	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE IV Year – I Sem			
Course Code: J415E	E-COMMERCE (Professional Elective-III)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Knowledge on “Mathematical and logical thinking skills”.
2. Knowledge on “Business and consumer behavior”.
3. Knowledge on “storage of customer information in database systems”.

Course objectives:

The Student will:

1. Gain knowledge of E Commerce Frame work. Applications, Business Models,
2. Learn about Consumer Oriented Applications, Electronic Payment Systems
3. Learn about EDI Applications, Supply Chain Managemnt
4. Know about Document Library, Advertising and Marketing
5. Know about Consumer Search and Resource Discovery, Key Multimedia concepts

Module 1:

Introduction, Electronic Commerce Framework, The Anatomy of E-Commerce applications, E-Commerce Business Models.

E-Commerce Consumer applications, E-Commerce organization applications.

Module 2:

Consumer Oriented Applications, mercantile process models, mercantile models from the consumer’s perspective, Mercantile from the merchant’s perspective.

Types of Electronic Payment Systems, Digital Token-Based Electronic Payment Systems, Smart Cards & Electronic Payment Systems, Credit Card- Based Electronic Payment Systems, Risk & Electronic Payment Systems, Designing Electronic Payment Systems.

Module 3:

Electronic Data Interchange, EDI Applications in Business, EDI implementation, MIME, and value added networks.

Intra organizational E-Commerce, Macro forces and Internal Commerce, Work flow automation and Coordination, Customization and Internal Commerce, Supply Chain Management(SCM).

Module 4:

Making a Business case for a Document Library: Digital document types, Corporate Data warehouses.

Advertising and Marketing: The new age of Information Based Marketing, advertising on Internet, charting the Online marketing process, Market Research.

Module 5:

Consumer Search and Resource Discovery, information search and Retrieval, Electronic commerce catalogs or directories, Information Filtering.

Multimedia and Digital video, Key Multimedia concepts, Digital Video & Electronic Commerce, Desktop Video Processing, Desktop Video Conferencing.

Text Books

1. "Frontiers of electronic commerce" – Kalakota, Whinston, Pearson
2. "E-Commerce", S.Jaiswal – Galgotia

References

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison-Wesley.
2. Goel, Ritendra "E-commerce", New Age International
3. Laudon, "E-Commerce: Business, Technology, Society", Pearson Education.

E - Resources:

1. https://www.tutorialspoint.com/e_commerce/index.htm
2. <https://www.toppr.com/guides/business-environment/emerging-trends-in-business/electronic-commerce/>
3. https://www.researchgate.net/publication/238522299_A_Reference_Model_for_E-Commerce
4. <https://www.edx.org/learn/ecommerce>
5. <https://irp-cdn.multiscreensite.com/1c74f035/files/uploaded/introduction-to-e-commerce.pdf>
6. <https://downloads.datainterchange.com/Brochures/WhitePaper-What-is-EDI.pdf>
7. <http://cruiserselite.co.in/downloads/btech/materials/second%20sem/4/e-com/UNIT-6.pdf>

Course outcomes:**The Student will be able to:**

1. Learn basic concepts of e-commerce and different elements.
2. Demonstrate an understanding of retailing in e-commerce.
3. Assessing the effects of disintermediation.
4. Analyze the impact of e-commerce on business models and strategy.
5. Describe internet trading relationships including business-to-business, intra-organizational.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	3
CO4	1	1	-	3	-	-	-	-	-	-	-	-	1	1
CO5	2	-	-	1	-	-	-	-	-	-	-	-	2	1
Average	1.8	2.0	-	2.0	-	-	-	-	-	-	-	-	-	1.7

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE IV Year – I Sem			
Course Code: J415F	WEB SERVICES (Professional Elective – IV)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Basic understanding of XML.
2. Basic understanding of HTML.
3. Basic understanding of TCP/IP.

Course objectives:

The Student will:

1. Understand distributed computing and Core distributed computing technologies
2. Describe the architecture and characteristics of web service.
3. Describe xml document structure and Core fundamentals of SOAP.
4. Define Web services technologies: WSDL, UDDI.
5. Implement security mechanism and overview of .Net and J2EE,SOA.

Module 1:

Evolution emergence of Web Services -Evolution of distributed computing, Core distributed computing technologies–client/server, CORBA, JAVA RMI, Micro Soft DCOM, MOM, Challenges in Distributed Computing, role of J2EE and XML in distributed computing, emergence of Web Services and Service Oriented Architecture (SOA).

Introduction to Web Services–The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services.

Module 2:

Web Service Architecture –Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, basic steps of implementing web services.

Describing Web Services –WSDL introduction, non functional service description, WSDL1.1 Vs WSDL 2.0, WSDL document, WSDL elements, WSDL binding, WSDL tools, WSDL port type, limitations of WSDL.

Module 3:

Brief Over View of XML -XML Document structure, XML namespaces, Defining structure in XML documents, Reuse of XML schemes, Document navigation and transformation.

SOAP: Simple Object Access Protocol- Inter-application communication and wire protocols, SOAP as a messaging protocol, Structure of a SOAP message, SOAP envelope, Encoding, Service Oriented Architectures -SOA revisited, Service roles in a SOA, Reliable messaging, The enterprise Service Bus, SOA Development Lifecycle, SOAP HTTP binding, SOAP communication model, Error handling in SOAP.

Module 4:

Registering and Discovering Services -The role of service registries, Service discovery, Universal Description, Discovery, and Integration, UDDI Architecture, UDDI Data Model, Interfaces, UDDI Implementation, UDDI with WSDL, UDDI specification

Service Addressing and Notification-Referencing and addressing Web Services, Web Services Notification.

Module 5:

Securing SOA and Web Services: SOA and web services security considerations, Network-level security mechanisms, Application-level security topologies, XML security standards,

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.

Text Books:

1. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India
2. Web Services & SOA Principles and Technology, Second Edition, Michael P. Papazoglou.

Reference Books:

1. Developing Enterprise Web Services, S. Chatterjee, J. Webber, Pearson Education.
2. XML, Web Services, and the Data Revolution, F.P.Coyle, Pearson Education.
3. Building web Services with Java, 2 nd Edition, S. Graham and others, Pearson Education.

E - Resources:

1. <https://www.tutorialspoint.com/webservices/index.htm>
2. <https://www.oracle.com/technical-resources/articles/javase/soa.html>
3. <https://www.javatpoint.com/restful-web-services-architecture-of-web-services>
4. https://www.w3schools.com/xml/xml_wsdL.asp
5. https://www.w3schools.com/xml/xml_tree.asp
6. https://docs.oracle.com/cd/A97335_02/integrate.102/a90297/overview.htm
7. https://www.cs.colorado.edu/~kena/classes/7818/f08/lectures/lecture_4_uddi.pdf

Course outcomes:

The Student will be able to:

1. Analyze the impact of e-commerce on business models and strategy.
2. Describe internet trading relationships including business-to-business, intra organizational.
3. Describe the infrastructure for E-Commerce.
4. Explain Web Services and service discovery mechanisms, UDDI.
5. Demonstrate Web Services Interoperability and Web Services Security

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	-	1	-	2	-	-	-	-	-	-	-	-	2
CO2	2	-	2	-	2	-	-	-	-	-	-	-	-	2
CO3	2	-	2	-	2	-	-	-	-	-	-	-	-	2
CO4	2	-	1	-	2	-	-	-	-	-	-	-	-	
CO5	2	-	2	-	2	-	-	-	-	-	-	-	-	2
Average	2.0	-	1.6	-	2.0	-	-	-	-	-	-	-	-	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE IV Year – I Sem			
Course Code: J415G	BIG DATA ANALYTICS (Professional Elective-IV) (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Database Management Systems, Cloud Computing.

Course objectives:

The Student will:

1. Understand the basics of Big Data and Big data Platform
2. Attain the knowledge of Big Data analytics, Approaches and Tools
3. Describe Map Reduce fundamentals and HDFS File system
4. Differentiate between Hadoop and RDBMS concepts
5. Apply analytics on Structured and Unstructured Data.

Module 1:

Big Data Analytics: What is big data, History of Data Management ; Structuring Big Data ; Elements of Big Data ; Big Data Analytics; Distributed and Parallel Computing for Big Data;

Big Data Analytics: What is Big Data Analytics, What Big Data Analytics Isn't, Why this sudden Hype Around Big Data Analytics, Classification of Analytics, Greatest Challenges that Prevent Business from Capitalizing Big Data; Top Challenges Facing Big Data; Why Big Data Analytics Important; Data Science; Data Scientist; Terminologies used in Big Data Environments; Basically Available Soft State Eventual Consistency (BASE); Open source Analytics Tools

Module 2:

Understanding Analytics and Big Data: Comparing Reporting and Analysis, Types of Analytics; Points to Consider during Analysis; Developing an Analytic Team; Understanding Text Analytics;

Analytical Approach and Tools to Analyze Data: Analytical Approaches; History of Analytical Tools; Introducing Popular Analytical Tools; Comparing Various Analytical Tools.

Module 3:

Understanding MapReduce Fundamentals and HBase : The MapReduce Framework; Techniques to Optimize MapReduce Jobs; Uses of MapReduce; Role of HBase in Big Data Processing; Storing Data in Hadoop

Introduction of HDFS: Architecture, HDFS Files, File system types, commands, org.apache.hadoop.io package, HDFS High Availability; Introducing HBase, Architecture, Storing Big Data with HBase , Interacting with the Hadoop Ecosystem; HBase in Operations-Programming with HBase; Installation, Combining HBase and HDFS

Module 4:

Big Data Technology Landscape and Hadoop : NoSQL, Hadoop; RDBMS versus Hadoop; Distributed Computing Challenges; History of Hadoop; Hadoop Overview; Use Case of Hadoop; Hadoop Distributors;

HDFS (Hadoop Distributed File System): HDFS Daemons, read,write, Replica Processing of Data with Hadoop; Managing Resources and Applications with Hadoop YARN

Module 5:

Social Media Analytics and Text Mining: Introducing Social Media; Key elements of Social Media; Text mining; Understanding Text Mining Process; Sentiment Analysis, Performing Social Media Analytics and Opinion Mining on Tweets;

Mobile Analytics: Introducing Mobile Analytics; Define Mobile Analytics; Mobile Analytics and Web Analytics; Types of Results from Mobile Analytics; Types of Applications for Mobile Analytics; Introducing Mobile Analytics Tools

Text Books:

1. BIG DATA and ANALYTICS, Seema Acharya, Subhasinin Chellappan, Wiley publications.
2. BIG DATA, Black Book™ , DreamTech Press, 2015 Edition.
3. BUSINESS ANALYTICS 5e , BY Albright |Winston

Reference Books:

1. Rajiv Sabherwal, Irma Becerra- Fernandez,” Business Intelligence –Practice, Technologies and Management”, John Wiley 2011.
2. Lariss T. Moss,ShakuAtre, “ Business Intelligence Roadmap”, Addison-Wesley It Service.
3. Yuli Vasiliev, “ Oracle Business Intelligence : The Condensed Guide to Analysis and Reporting”, SPD Shroff, 2012.

E - Resources:

1. <https://www.coursera.org/learn/big-data-introduction>
2. https://www.tutorialspoint.com/big_data_analytics/index.htm
3. www.upgrad.com/Big-Data
4. <https://www.javatpoint.com/what-is-big-data>
5. <https://www.edx.org/course/big-data-analytics-using-spark>

Course Outcomes:**The Student will be able to:**

1. Identify the basics of Big Data and its environment
2. Use Big Data analytics Tools and its Approaches
3. Define Map Reduce fundamentals and HDLC Architecture
4. Distinguish between Hadoop and RDBMS concepts
5. Illustrate analytics on Structured and Unstructured Data.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	1	-	-	3	-	-	-	-	-	-	-	-	-
CO3	1	2	2	1	2	-	-	-	-	-	1	-	2	2
CO4	1	-	1	1	-	-	-	-	-	-	-	-	-	-
CO5	1	-	1	1	-	-	-	-	-	-	-	-	-	-
Average	1.0	1.5	1.3	1.0	2.5	-	-	-	-	-	1.0	-	2.0	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE IV Year – I Sem			
Course Code: J416H	SOFTWARE ARCHITECTURE AND DESIGN PATTERN (Professional Elective-IV) (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Course Objectives

The Student will:

1. Understand that design patterns are standard solutions to common software design problems
2. Discuss to know how to use systematic approach that focus and describe that describe abstract systems of interaction between classes, objects and communication flow
3. Understand the architecture evaluation and design decision making
4. Understand how to apply these patterns on various platforms.
5. Understand the responsibilities for developing software.

Module 1:

Envisioning Architecture The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views. Creating an Architecture Quality Attributes, Achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

Module 2:

Analyzing Architectures Architecture Evaluation, Architecture design decision making, ATAM, CBAM. Moving from one system to many Software Product Lines, Building systems from off the shelf components, Software architecture in future.

Module 3:

Patterns Pattern Description, Organizing catalogs, role in solving design problems, Selection and usage. Creational and Structural patterns Abstract factory, builder, factory method, prototype, singleton, adapter, bridge, composite, façade, fly weight.

Module 4:

Behavioural patterns Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

Module 5:

Case Studies A-7E –A case study in utilizing architectural structures, The World Wide Web -a case study in interoperability, Air Traffic Control –a case study in designing for high availability, Celsius Tech –a case study in product line development.

Text books:

1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education, 2003.
2. Design Patterns, Erich Gamma, Pearson Education, 1995.

Reference books:

1. Architecture in Practice, Len Bass, Paul Clements, Rick Kazman.
2. Software Documenting Software Architectures: Views and Beyond Paul Clements, Felix Bachmann, Len Bass, David Garlen, James Ivers, Reed Little, Robert Nord, Judith Stafford.

E - Resources:

1. http://en.wikibooks.org/wiki/Introduction_to_Software_Engineering/Architecture/Design_Patterns.

Course Outcomes**The student will be able to:**

1. Apply a deeper knowledge of the principles of Object Oriented Design.
2. Show the knowledge of the design patterns that are common in software applications.
3. Illustrate the knowledge of these patterns that are related to object –oriented design.
4. Analyze various architectural patterns
5. Apply the Knowledge for developing a software.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	1	-	-	-	-	-	-	2	-	3	-	1	-	-
CO2	1	-	-	-	-	-	-	2	-	3	-	1	-	-
CO3	1	-	-	-	-	-	-	2	-	3	-	1	-	-
CO4	1	-	-	-	-	-	-	3	-	3	-	1	-	1
CO5	2	-	-	-	-	-	-	2	-	3	-	1	-	1
Average	1.2	-	-	-	-	-	-	2.2	-	3.0	-	1.0	-	1.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE IV Year – I Sem			
Course Code: J415H	DATABASE SECURITY (Professional Elective – V) (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. A course on “Database Management Systems”
2. A course on “Information Security”

Course Objectives:

The Student will:

1. Understand and implement security models and algorithms in database security.
2. Study the various security mechanisms.
3. Study different software design for data security
4. Learn the statistical database protection system.
5. Study the various protection models for new generation database systems.

Module 1:

Introduction

Introduction to Databases Security Problems in Databases Security Controls Conclusions

Security Models -1.

Introduction Access Matrix Model Take-Grant Model Action Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases

Module 2:

Security Models -2

Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model the Lattice Model for the Flow Control conclusion.

Security Mechanisms

Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria.

Module 3:

Security Software Design

Introduction A Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design.

Module 4:**Statistical Database Protection & Intrusion Detection Systems**

Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls Evaluation Criteria for Control Comparison. Introduction IDES System RETISS System ASES System Discovery

Module 5:**Models for The Protection of New Generation Database Systems -1**

Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object-oriented, Systems SORION Model for the Protection of Object-Oriented Databases

Models for The Protection of New Generation Database Systems -2

A Model for the Protection of New Generation Database Systems: the Orion Model Jajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions

Text Books:

1. Database Security and Auditing, Hassan A. Afyouni, India Edition, CENGAGE Learning,2009.
2. Database Security, Castano, Second edition, Pearson Education.

Reference Books:

1. Database security by alfredbasta, melissazgola, CENGAGE learning.

E - Resources:

1. <http://ce.sharif.edu/courses/9495/1/ce7341/resources/root/Books/Database%20Security%20-%20Chapter16.pdf>
2. https://docs.oracle.com/cd/B19306_01/server.102/b14220/security.htm
3. <https://resources.infosecinstitute.com/database-security/>
4. http://www.db-security.org/report/dbsec_guideline_ver2.0_e.pdf

Course Outcomes:**The student will be able to:**

1. Demonstrate the knowledge gained through solving problems to define security models in database security.
2. Evaluate the different security mechanisms over operating system.
3. Apply various software designs for database security.
4. Implement statistical database protection system.
5. Describe the developing areas of new generation database system with different protection models.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	2	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO4	-	2	-	3	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	3	3	-	-	-	-	-	-	-	-	-
Average	2.0	2.0	3.0	3.0	3.0	-	-	-	-	-	-	-	3.0	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE IV Year – I Sem			
Course Code: J415J	DEEP LEARNING (Professional Elective – V)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Probability Statistics, linear algebra. Machine learning .

Course Objectives:

The Student will:

1. Get introduced to various learning techniques of machine learning and understand differences between machine learning and deep learning
2. Understand and analyse optimization techniques and improvements in learning methods
3. Appreciate, understand and apply neural networks as tools for complete learning problems
4. Investigate and deploy/club multi-layer neural networks for learning related to images, text and speech sequences.
5. Appreciate, understand and implement Deep learning in real world practical problems

Module 1:

Introduction to Deep Learning

Introduction to Deep Learning, Brief History of Deep Learning, AI, Machine Learning and Deep Learning, Statistical Learning, Bayesian Learning, Decision Surfaces, Success stories of Deep Learning

Module 2:

Linear Classifiers

Linear Classifiers, Linear Machines with Hinge Loss, Optimization Techniques, Gradient Descent, Batch Optimization, Revisiting Gradient Descent, Momentum Optimizer, RMSProp, Adam.

Module 3:

Neural Network

Introduction to Neural Network, Multilayer Perceptron, Back Propagation Learning, Unsupervised Learning with Deep Network, Autoencoders, Convolutional Neural Network, Building blocks of CNN, Transfer Learning, LSTM Networks, NN in python

Module 4:**Deep Neural Net**

Effective training in Deep Net- early stopping, Dropout, Batch Normalization, Instance Normalization, Group Normalization,

Recent Trends in Deep Learning Architectures, Residual Network, Skip Connection Network, Fully Connected CNN, CNN in Python

Module 5:**Practical areas of Deep Learning**

Classical Supervised Tasks with Deep Learning, Image Denoising, Semantic Segmentation, Object Detection, Generative Modelling with Deep Learning,

Variational Autoencoder, Generative Adversarial Network, Object recognition with Python.

Text Books:

1. Deep Learning- Ian Goodfellow, YoshuaBenjio, Aaron Courville, The MIT Press
2. Pattern Classification- Richard O. Duda, Peter E. Hart, David G. Stork, John Wiley & Sons Inc.

Reference Books:

1. Deep Learning: A Practitioner's Approach by Josh Patterson & Adam Gibson, OReilly Press
2. Python Deep Learning: Exploring deep learning techniques and neural network architectures with PyTorch, Keras, and TensorFlow, 2nd Edition by Ivan Vasilev, Pakt Publication.

E - Resources:

1. <https://nptel.ac.in/courses/106/105/106105215/>
2. <https://www.slideshare.net/LuMa921/deep-learning-a-visual-introduction>
3. <https://yiqiaoyin.files.wordpress.com/2018/02/deep-learning-notes.pdf>

Course Outcomes:**The student will be able to:**

1. Identify tools of machine learning and deep learning, appropriate to any problems
2. Apply optimization techniques to improve the quality of various learning solutions.
3. Apply and investigate, neural network for complete learning problems.
4. Deploy deep learning methods in the area of multidimensional and sequential inputs.
5. Investigate the scope of implementation of various deep learning techniques in any real world problem.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	-	-	2	-	-	-	-	-	-	-	-	1	3
CO2	-	2	2	1	-	-	-	-	-	-	-	-	-	2
CO3	3	3	-	3	-	-	-	-	-	-	-	-	2	2
CO4	2	3	2	1	-	-	-	-	-	-	-	-	1	2
CO5	2	1	2	2	-	-	-	-	-	-	-	-	2	2
Average	2.3	2.3	2.0	1.8	-	-	-	-	-	-	-	-	1.5	2.2

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE IV Year – I Sem			
Course Code: J415K	COMPUTER FORENSICS (Professional Elective-V)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. Learn the fundamentals of computer forensics
2. Differentiate the rules of evidence and methods of collecting
3. Know what forensic data to collect and analyse
4. Understand the usage of computers in forensic, and how to use various forensic tools for a wide variety of investigations.
5. Learn e-mail investigations and mobile device forensics.

Module 1:

Computer Forensics Fundamentals: What is Computer Forensics? Use of Computer Forensics in Law Enforcement, Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of professional Forensics Methodology, Steps taken by computer Forensics Specialists. Types of Computer Forensics Technology: Types of Military Computer Forensics Technology, Types of Law Enforcement – Computer Forensic Technology – Types of Business Computer Forensics Technology. Computer Forensics Evidence and Capture: Data Recovery Defined- Data Back-up and Recovery the Role of Back-up in Data Recovery- The Data Recovery Solution.

Module 2:

Evidence Collection and Data Seizure: Why Collection Evidence? Collection Options – Obstacles – Types of Evidence – The Rules of Evidence- Volatile Evidence- General Procedure – Collection and Archiving – Methods of Collection – Artifacts – Collection Steps – Controlling Contamination: The chain of Custody. Duplication and preservation of Digital Evidence: Preserving the Digital Crime Scene – Computer Evidence Processing Steps – Legal Aspects of Collecting Preserving Computer Forensics Evidence. Computer Image Verification and Authentication: Special Needs of Evidential Authentication – Practical Consideration – Practical Implementation.

Module 3:

Computer Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data – hiding techniques, performing remote acquisitions. Network Forensics: Network Forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project

Module 4:

Processing crime and incident scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case. Current computer forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software.

Module 5:

E-Mail investigations: Exploring the role of E-mail in investigation, exploring the role of the client and server in E-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools. Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices. Working with windows and DOS Systems: Understanding file systems, exploring Microsoft File Structures, Examining NTFS Disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS Startup tasks, virtual machines.

Text Books:

1. Computer forensics, computer crime investigation by John R.Vacca, Firewall Media, New Delhi.
2. Computer forensics and investigations by Nelson, Phillips Enfinger Stuart, CENGAGE Learning

References Books:

1. Real Digital Forensics by Keith J.Jones, Rechar Bejtlich, Curtis W.Rose, Addison-Wesley Pearson Education.
2. Forensic compiling, A Tractitioneris Guide By Tony Sammes and Brain Jenkinson, Springer International Edition.
3. Computer Evidence Collection & Presentation by Christopher L.T.Brown, Firewall Media.

E – Resources:

1. <https://www.smartworld.com/downloads/download/cf-complete-pdf-notes/>
2. <https://www.cs.nmt.edu/~df/lectures.html>
3. <https://www.youtube.com/watch?v=2ESqwX3qb94>

Course outcomes:

The Student will be able to:

1. Identify the fundamentals of computer forensics
2. Classify the rules of evidence and methods of collecting
3. Describe what forensic data to collect and analyse
4. Appraise the usage of computers in forensic, and how to use various forensic tools for a wide variety of investigations
5. Summarize e-mail investigations and mobile device forensics.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 – Weak														
Course Outcomes (Cos)	Program Outcomes (Pos)												Program Specific Outcomes	
	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
CO1	2	3	-	2	-	1	-	-	-	-	-	-	-	-
CO2	2	-	3	2	-	-	-	-	-	-	-	-	3	1
CO3	-	2	-	2	-	-	-	-	-	-	-	-	-	2
CO4	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	2	-	-	-	2	-	-	-	-	-	-	-	-
Average	2.0	2.3	3.0	2.0	-	1.5	-	-	-	-	-	-	3.0	1.5

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE IV Year – I Sem			
Course Code: F4151	MACHINE LEARNING LAB	L	T	P	D
Credits: 1.5		0	0	3	0

Pre-Requisites:

1. Linear Algebra
2. Python
3. DAA

Course objectives:

The Student will:

1. Familiarize with ANACONDA framework and JUPYTER IDE.
2. Learn Python Packages like numpy, pandas and Matplotlib for data preprocessing and visualization
3. Practice inductive learning algorithms using python.
4. Understand the applications of neural networks and back propagation algorithm.
5. Apply machine learning concepts for Text mining.

Experiment 1: Familiarizing with Anaconda and Jupyter, for importing modules and dependencies for ML

Experiment 2: Familiarization with numpy, Panda and Matplotlib by Loading Dataset in Python.

Experiment 3: Find S algorithm in Python

Experiment 4: Candidate Elimination Algorithm in Python

Experiment 5: ID3 algorithm for Decision Tree in Python

Experiment 6: Demonstration of Logistic Regression using Python.

Experiment 7: Demonstration of Classification using Python.

Experiment 8: Demonstration of Clustering using Python.

Experiment 9: Implementation of SVM using Python.

Experiment 10: Implementation of XOR function using NN and Python.

Experiment 11: Implementation of Back propagation using Python.

Experiment 12: Sentiment Analysis using “Bag of Words” in Python

Experiment 13: Recommender System in Python.

Course objectives:**The Student will be able to:**

1. Effectively use ANACONDA framework and JUPYTER IDE.
2. Use Python Packages like numpy, pandas and Matplotlib for data preprocessing and visualization
3. Implement inductive learning algorithms using python.
4. Implement the applications of neural networks and back propagation algorithm.
5. Use machine learning concepts for Text mining.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	-	-	3	3	-	-	-	-	-	-	-	-	3	-
CO2	-	-	3	-	3	3	-	-	-	-	-	-	3	3
CO3	-	-	3	3	-	-	-	-	-	-	-	-	3	-
CO4	-	-	3	-	3	3	-	-	-	-	-	-	-	-
CO5	-	-	3	3	3	-	-	-	-	-	-	-	-	-
Average	-	-	3.0	3.0	3.0	3.0	-	-	-	-	-	-	3.0	3.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE IV Year – I Sem			
Course Code: F4161	DATA SCIENCE THROUGH R LAB (Common to CSE, IT & ECM)	L	T	P	D
Credits: 1.5		0	0	3	0

Pre-Requisites: Nil

Course objectives:

The Student will:

1. Know about the fundamental concepts of Data Science.
2. Explore Data Analysis and the Data Science Process and Linear Regression.
3. Investigate the various methods of Data Analysis.
4. Understand the Basics of R Environment.
5. Develop the Data Science analysis using R programming and Data Visualisation.

Experiment 1: R AS CALCULATOR APPLICATION

Write an R script, to create R objects for calculator application.

Experiment 2: DESCRIPTIVE STATISTICS IN R

- a. Write an R script to find basic descriptive statistics using summary, str, quartile function on mtcars & cars datasets.
- b. Write an R script to find subset of dataset by using subset (), aggregate () functions on iris dataset.

Experiment 3: READING AND WRITING DIFFERENT TYPES OF DATASETS

- a. Reading different types of data sets (.txt, .csv) from web and disk and writing in file in specific disk location.
- b. Reading Excel data sheet in R.

Experiment 4: VISUALIZATIONS

- a. Find the data distributions using box and scatter plot.
- b. Find the outliers using plot.
- c. Plot the histogram, bar chart and pie chart on sample data.

Experiment 5: CORRELATION AND COVARIANCE

- a. Find the correlation matrix.
- b. Plot the correlation plot on dataset and visualize giving an overview of relationships among data on iris data.
- c. Analysis of covariance: variance (ANOVA), if data have categorical variables on iris data.

Experiment 6: REGRESSION MODEL

Import a data from web storage. Name the dataset and now do Logistic Regression to find out relation between variables that are affecting the admission of a student in a

institute based on his or her GRE score, GPA obtained and rank of the student. Also check the model is fit or not. require (foreign), require (MASS).

Experiment 7: MULTIPLE REGRESSION MODEL

Apply multiple regressions, if data have a continuous independent variable. Apply on above dataset.

Experiment 8: REGRESSION MODEL FOR PREDICTION

Apply regression Model techniques to predict the data on above dataset.

Experiment 9: CLASSIFICATION MODEL

- a. Install relevant package for classification.
- b. Choose classifier for classification problem.
- c. Evaluate the performance of classifier.

Experiment 10: CLUSTERING MODEL

- a. Clustering algorithms for unsupervised classification.
- b. Plot the cluster data using R visualizations.

Course outcomes:

The Student will be able to:

- 1. Analyze the fundamental concepts of Data Science.
- 2. Evaluate the Data analysis and Data Science Process and Linear Regression.
- 3. Analyze the various methods of Data Analysis.
- 4. Apply the Basics of R in its Environment.
- 5. Evaluate the Data Science analysis using R programming and Data Visualisation.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	3	-	2	2	-	-	-	-	-	-	-	1	2
CO2	3	2	-	2	2	-	-	-	-	-	-	-	2	2
CO3	2	2	-	1	2	-	-	-	-	-	-	-	1	2
CO4	1	2	-	1	1	-	-	-	-	-	-	-	1	1
CO5	2	2	-	2	1	-	-	-	-	-	-	-	1	1
Average	2	2.2	-	1.6	1.6	-	-	-	-	-	-	-	1.2	1.6

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE IV Year – II Sem			
Course Code: J426D	BLOCKCHAIN TECHNOLOGY (Professional Elective-VI) (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Computer Networks
2. Cryptography
3. Linux commands.

Course objectives:

The Student will:

1. Learn the fundamentals of BlockChain Technology
2. Understand the History of Money and working with Bitcoin
3. Understand usage of cryptography in Block Chain Technology
4. Create smart account and decentralized Systems
5. Understand the applications of block chain technology.

Module 1:

Introduction: History, what is block chain, the structure of block chains, types of block chain, block chain applications, block chain lifecycle. Limitations and challenges of block chain.

Module 2:

Crypto currencies: Cryptography, the science behind crypto currencies, Symmetric key cryptography, cryptography hash functions, MAC and HMAC, asymmetric key cryptography Diffie-Hellman key exchange, symmetric vs asymmetric key cryptography, game theory Nash equilibrium, prisoners dilemma, byzantine Generals' problem, zero-sum games.

Module 3:

Bitcoin: History of Money, working with Bitcoins, the Bitcoin Block chain, Bitcoin network, bitcoin scripts, Full nodes vs SPVs, Bitcoin wallets.

Module 4:

Ethereum: Ethereum as Next-Gen Blockchain, Design Philosophy of Ethereum, Ethereum Blockchain, Ethereum Accounts, Trie Usage, RLP Encoding, Ethereum Transaction Message structure, Ethereum smart contracts, Ethereum Virtual Machine, Ethereum Eco System.

Module 5:

Block chain application development, Interacting with bitcoin blockchain, interacting programmatically with ethereum for sending transactions, creating smart account, executing smart contract functions, decentralized application structure. Building an ethereum Dapp.

Text Books:

1. Beginning Block chain: A Beginner's Guide to Building Block chain Solutions by Bikramaditya Singhal, Gautam Dhameja , Priyansu Sekhar Panda.
2. Block chain Technology Explained: The Ultimate Beginner's Guide About Block chain Wallet, Mining, Bitcoin, Ethereum, Litecoin, Zcash, Monero, Ripple, Dash

Reference Books:

1. Block chain Technology: Introduction to Block chain Technology and its impact on Business Ecosystem
2. Block chain: Bitcoin, Ethereum & Block chain: Beginners Guide to Understanding the Technology Behind Bitcoin & Cryptocurrency.

E - Resources:

1. <http://www.cs.tau.ac.il/~msagiv/courses/blockchain/overview.pdf>
2. <https://nvlpubs.nist.gov/nistpubs/ir/2018/NIST.IR.8202.pdf>
3. <https://nptel.ac.in/courses/106/104/106104220/>

Course outcomes:**The Student will be able to:**

1. Describe the block chain Technology and limitations
2. Analyse the history of money and working with Bitcoin and Bitcoin wallets
3. Use cryptography in bitcoin transactions
4. Explain the Design philosophy of Block Chain Technology and Virtual Machine
5. Develop Decentralized applications and Building ethereum Dapp

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO5	-	-	3	2	2	-	-	-	-	-	-	-	2	2
Average	1.5	2.0	3.0	2.0	2.0	-	-	-	-	-	1.0	-	2.0	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE IV Year – II Sem			
Course Code: J426E	QUANTUM COMPUTING (Professional Elective-VI)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Knowledge on “Machine Learning”.
2. Knowledge on “Probability and Statistics”.

Course objectives:

The Student will:

1. Interpret the fundamentals of quantum computing.
2. Know the how quantum Mechanics is applied in quantum computing.
3. Illustrate the Quantum information with architecture and algorithms.
4. Develop the quantum programming languages.
5. Explain the current status of quantum computing.

Module 1:

Introduction to Basic quantum Mathematics

Complex numbers and its geometrical representations, Complex vector spaces, inner products and Hilbert spaces, Hermitian and unitary matrices, Tensor products of vector spaces.

Module 2:

Basic Quantum Mechanics

Deterministic Systems, Probabilistic descriptions and Quantum systems, Basics of Quantum theory, Schrodinger’s time dependent equation, Wave nature of Particles, state vector, operators, postulates of quantum mechanics, Dirac formalism, Stern-Gerlach experiment, electron spin, superposition of states, entanglement.

Module 3:

Quantum Information

Bits and Qubits, Classical gates versus quantum gates, Deutsch’s Algorithm, Deutsch-Jozsa Algorithm, Simon’s periodicity algorithm, Grover’s search algorithm, Shor’s Factoring algorithm.

Module 4:**Quantum Programming**

Quantum programming languages, Probabilistic and Quantum computations, introduction to quantum cryptography and quantum information theory.

Module 5:**Current Status of Quantum Computing**

Multi Qubit Systems, why are qubits superior, Quantum computing and Security, Sycamore processors, IBM Quantum Computer, Quantum Simulations.

Text Books:

1. Quantum computing for computer scientists, Noson S. Yanofsky, Mirco A. Mannucci, Cambridge University Press 2008.

Reference Books:

1. Quantum computing explained, David McMahon, Wiley-interscience, John Wiley & Sons, Inc. Publication 2008.
2. Quantum computation and quantum information, Michael A. Nielsen and Isaac L. Chuang, Cambridge University Press 2010.
3. Introduction to Quantum Mechanics, 2nd Edition, David J. Griffiths, Prentice Hall New Jersey 1995.

E - Resources:

1. <http://patrickjmt.com/>
2. <https://homepages.cwi.nl/~rdewolf/qcnotes.pdf>
3. <https://homes.cs.washington.edu/~oskin/quantum-notes.pdf>
4. <https://nptel.ac.in/courses/104/104/104104082/>

Course outcomes:**The Student will be able to:**

1. Understand the Basics of complex vector spaces.
2. Analyze Quantum mechanics as applied in Quantum computing.
3. Analyze the quantum information with Architecture and algorithms.
4. Apply the quantum programming languages.
5. Understand the current status of quantum computing.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	3	-	-	-	-	-	-	-	-	-	3	-
CO3	3	-	-	3	3	-	-	-	-	-	-	-	-	3
CO4	-	3	3	3	-	-	-	-	-	-	-	-	-	-
CO5	-	-	3	3	-	-	-	-	-	-	-	-	-	3
Average	3.0	3.0	3.0	3.0	3.0	-	-	-	-	-	-	-	3.0	3.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE IV Year – II Sem			
Course Code: J426F	ANDROID APPLICATION DEVELOPMENT (Professional Elective-VI)	L	T	P	D
Credits: 3	(Common to CSE & IT)	3	0	0	0

Pre-Requisites:

1. Programming language JAVA.
2. Knowledge on SQL.
3. Knowledge on XML

Course objectives:

The Student will:

1. Understand Android platform and its architecture.
2. Learn activity creation and Android UI designing.
3. Familiarize with Intent, Broadcast receivers and Internet services.
4. Know how to work with SQLite Database and content providers.
5. Integrate multimedia, camera and Location based services in Android Application.

Module 1:

Introduction to Android Operating System: Android OS design and Features–Android development framework, SDK features, Installing and running applications on Eclipse platform, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools

Android application components – Android Manifest file, externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

Module 2:

Android User Interface: Measurements–Device and pixel density independent measuring units Layouts–Linear, Relative, Grid and Table Layouts User Interface (UI) Components – Editable and non-editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers

Event Handling – Handling clicks or changes of various UI components Fragments – Creating fragments, Lifecycle of fragments, Fragment states, adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities.

Module 3:

Intents and Broadcasts: Intent–Using intents to launch Activities, explicitly starting new Activity, Implicit Intents, passing data to Intents, getting results from Activities, Native Actions, using Intent to dial a number or to send SMS

Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity, Notifications – Creating and Displaying notifications, Displaying Toasts

Module 4:

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

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

Module 5:

Advanced Topics: Alarms–Creating and using alarms Using Internet Resources – Connecting to internet resource, using download manager

Location Based Services – Finding Current Location and showing location on the Map, updating location

Text Books:

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013

Reference Books:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	1	1	3	1	-	-	-	-	-	-	-	1	-	-
CO2	2	2	2	1	2	-	-	-	-	-	-	1	2	1
CO3	1	2	2	1	2	-	-	-	-	-	-	1	-	-
CO4	2	2	2	2	2	-	-	-	-	-	-	1	2	1
CO5	1	2	2	1	2	-	-	-	-	-	-	1	1	1
Average	1.4	1.8	2.2	1.2	2.0	-	-	-	-	-	-	1.0	1.7	1.0

AY 2020-21 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – I Sem			
Course Code: J31OA	ELEMENTS OF CIVIL ENGINEERING (Open Elective-I)	L	T	P	D
Credits:3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

This course will enable students to:

1. Study the basic requirements of civil engineering components.
2. Study the basic concepts of surveying.
3. Study the different types of building materials and components.
4. Study to deal with fire risk prevention and control.
5. Study about Highway development in India, Necessity for Highway planning, different road development plans

Module-1:

Unit-1: Introduction:

History of the civil engineering, sub – disciplines of civil engineering.

Module-2:

Unit-1: Surveying

Introduction, divisions of surveying, classification of surveying, principles of surveying. Linear measurements and errors–introduction, methods of linear measurements, chaining instruments, types of error and correction. Compass surveying – introduction, angular measurement using compass, whole circle bearing and reduced bearing, fore bearing, and back bearing. Traverse surveying –introduction, chain, and compass traversing, closing error and adjustments. Levelling– introduction, types of levelling instruments, dumpy level, adjustment of level, levelling staff

Module-3:

Unit-1: Building Materials and Construction

Materials: Introduction to construction materials like ferrous and nonferrous metals, alloys, Stones, Bricks, Lime, Cement, Timber, Sand, Aggregates, Mortar, Concrete, and bitumen. Construction: Types of building, different loads considered in building design, types of foundation in building, other developments, and constructions of buildings

Module-4:

Unit-1: Fire and Earthquake Protection in Building:

Introduction, fire protection in building, structural and architectural safety requirements of resistive structures, fire resistive properties of building materials, fire exit requirements, force and acceleration on building due to earthquake, building response characteristics, building drift.

Module-5:

Unit-1: Water Supply, Sanitary and Electrical Works in Building:

Introduction, water supply system, water supply layout of a building, house drainage, traps, electrical works in building.

Unit-2: Highway Engineering:

Introduction, historical background of road or highway, classification of roads, pavements and roads, traffic control mechanism.

TEXTBOOKS:

1. “Elements of Civil Engineering” by Mimi Das Saikia, Bhargab Mohan Das and Madan Mohan Das, PHI Learning Private Limited New Delhi.
2. “Elements of Civil Engineering” by Dr. R.K. Jain and Dr. P.P. Lodha, McGraw Hill Education, India Pvt. Ltd.
3. “Surveying Vol. I” by Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain 16th Edition Publisher: Laxmi Publication Delhi.
4. “Building drawing” by M.G.Shah, C.M.Kale and S.Y.Patki, Tata McGraw Hill.

REFERENCES:

1. “Surveying Theory and Practice” by James M Anderson and Edward M Mikhail McGraw Hill Education, India Pvt. Ltd. (7th Edition).
2. “Surveying and Leveling” by R. Subramanian, Oxford University.
3. “Building drawing” by M.G.Shah, C.M.Kale and S.Y.Patki, Tata McGraw Hill.
4. “Civil Engg. Drawing” by S. C. Rangwala, Charotar Pub. House Anand.

E-Resources:

1. <https://nptel.ac.in/courses/105/106/105106201/>

Course outcomes:

On completion of the course, students will be able to:

1. **Explain** the basic requirements of civil engineering components.
2. **Evaluate** area for irregular shaped bodies.
3. **Explain** the various building materials.
4. **Plan** the building against the fire.
5. **Discuss** the highway development in India.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 – Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	1	-	-	-	1	-	-	-	-	-	-	-	-
CO2	2	1	-	-	-	1	-	-	-	-	-	-	-	-
CO3	2	1	-	-	-	1	-	-	-	-	-	-	-	-
CO4	2	1	-	-	-	1	-	-	-	-	-	-	-	-
CO5	2	1	-	-	-	1	-	-	-	-	-	-	-	-
Average	2	1	-	-	-	1	-	-	-	-	-	-	-	-

AY 2020-21 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – I Sem			
Course Code: J31OB	ENVIRONMENTAL IMPACT ASSESSMENT (Open Elective-I)	L	T	P	D
Credits:3		3	0	0	0

Pre-requisite: Environmental Science.

Course Objectives:

This course will enable students to:

1. Study the need of environmental impact assessment.
2. Study the role of EIA and different methodologies of EIA.
3. Discuss the guidelines of EIA for the project.
4. Study the different approaches to mitigate the adverse impact on environment.
5. Identify the EIA for specific case studies.

Module 1:

Unit-1: Impact of developmental projects – sustainable development – Need for Environmental Impact Assessment (EIA), Rapid and Comprehensive EIA, Environmental Impact statement (EIS) – EIA capability and limitations – Legal provisions on EIA – stages of EIA.

Module 2:

Unit-1: Role of NEPA in EIA, CEQ, Environmental documents. EIA/ EIS& FONSI relationship, processing of EIA/EIS, Environmental attributes.

Methodologies: Criteria to be considered for the selection of EIA methodologies, Adhoc, overlays, Check lists – Matrices – Networks – Cost-benefit analysis with their advantages and limitations.

Module 3:

Unit-1: EIA guidelines for Development Projects, Rapid and Comprehensive EIA.

Prediction and Assessment: Assessment of Impact on land, water, air, and noise. Social and cultural activities and on flora and fauna – mathematical models – public participation. Forest act 1980.

Module 4:

Unit-1: Environment management plan:

Plan for mitigation of adverse impact on Environment – Options for mitigation of impact on water, air, land and on flora and fauna – Addressing the issues related to project affected people. Post project monitoring. ISO 9000, 14000 & 18000.

Module 5:

Unit-1:

EIA for Water resource developmental projects, Highway projects: Nuclear Power plant projects, Mining project (Coal, Iron ore), Thermal Power Plant, Infrastructure Construction Activities.

Text Books

1. “Environmental Impact Assessment” by S.R. Khandeshwar N.S. Raman, A.R. Gajbhiye, I k international house publishing, pvt ltd. 1st addition Sep 2019.
2. “Environmental Impact Assessment” by Barthwell, R. R. New Age International Publications. 3rd addition Oct 2017.

Reference Books

1. “Environmental Impact Analysis” by Jain R.K.-Van Nostrand Reinhold Co, H K E S international publication, 3rd addition oct 2014.
2. “Environment Impact Assessment” by Anjaneyulu, B S Publication, 2nd addition Jan 2010

Web Resources

1. <https://nptel.ac.in/courses/120/108/120108004/>

Course Outcomes

On completion of the course, the students will be able to:

1. **Explain** the stages and need for environmental impact assessment.
2. **Discuss** different methodologies for environmental impact prediction and assessment.
3. **Evaluate** the environmental management plans.
4. **Solve** the problems associated with adverse impact on environment.
5. **Apply** the knowledge of EIA on different construction projects.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	-	2	-	-	-	1	2	3	-	-	-	-	2	1
CO2	-	-	-	-	-	2	3	1	-	-	-	-	1	1
CO3	-	-	-	-	-	2	2	3	-	-	-	-	2	1
CO4	-	2	-	-	-	1	2	3	-	-	-	-	1	3
CO5	-	-	-	-	-	1	3	2	-	-	-	-	2	2
Average	-	0.8	-	-	-	1.4	2.4	2.4	-	-	-	-	1.6	1.6

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – I Sem			
Course Code: J31OC	Energy Engineering (Open Elective-I)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisites: Nil

Course Objectives:

This course will enable students to:

1. To provide basic knowledge about various types of energy resources.
2. To familiarize the students about conventional energy systems.
3. To understand the practical significance of hydro-electric technology, wind, solar and biomass energy technologies.
4. Illustrate how biomass is currently used as a source of energy, its Future potential both in providing energy and in producing alternative fuels.
5. To familiarize energy conservation and management.

MODULE-I: INTRODUCTION TO ENERGY RESOURCES

World Energy status – Indian scenario, Energy resources – conventional and renewable, fuel cells, hydrogen energy, small hydro resources; Need for energy storage, energy storage methods; Environmental aspects of energy – Economics.

MODULE-II: CONVENTIONAL ENERGY SYSTEMS

Unit-I: Coal fired steam thermal power plant – layout, working, T-S diagram of water and steam, rankine cycle for steam turbine, efficiency.

Unit-II: Gas turbine power plant – various options, layout, working and T-S diagram for simple and combined cycle power plant, comparison, efficiency.

Nuclear power plants: fuels, nuclear fuel cycle, reactors, nuclear power plant, nuclear waste management.

MODULE-III: HYDRO ELECTRIC TECHNOLOGY

Hydro Electric plants – Types, energy conversion schemes, power equation, environmental aspects – Hydro-Thermal coordination. Ocean Energy Technology, Wave and tidal energy - fundamentals - energy converters - power plant - limitations.

MODULE-IV: WIND, SOLAR AND BIOMASS ENERGY TECHNOLOGIES

Unit-I: Wind turbine types and construction – power equation – wind energy conversion systems grid connection - environmental aspects.

Unit-II: Solar energy basics – energy from the sun, solar constant, solar spectrum, clarity index, V-I characteristics of a solar cell – solar module –Solar PV plant – hybrid systems. Biomass energy resources – conversion technologies – urban waste to energy conversion –Biogas plant.

MODULE-V: ENERGY CONSERVATION AND MANAGEMENT

Unit-I: Principle of energy conservation - waste heat recovery - Heat pump – Economics of energy conservation, cogeneration, combined cycle plants, electrical energy conservation opportunities.

Unit-I: Definition and Objectives of Energy Management, Energy Management System, Top management support, Energy policy purpose, Roles and responsibilities of energy manager.

Energy Audit: Type and Methodology, Energy audit reporting format, Understanding Energy

Costs, Fuel and Energy Substitution, Energy Audit Instruments.

TEXT BOOKS

1. S.Rao and Dr.B.B.parulekar, “Energy Technology”, Khanna pub., Third edition, 1999.
2. Non-conventional energy resources by B.H.Khan, TMH, 2006.
3. Desai,AV, “Energy Demand: Analysis, Management and Conservation”, WileyEastern Limited, 1990.

REFERENCE BOOKS

1. G.D.Rai, “Non-conventional energy sources”, Khanna pub. Fourth Edition, 2002.
2. Pulfrey, D.L., Photovoltaic Power Generation, Van Nostrand Co., 1983.
3. Abbasik “Renewable Energy Sources and their Environment”, PHI, 2008.
4. B.Mohanty, R.S.Liu, U.V Krishna Mohan Rao, “Energy Audit Management for the Indian Industry”, Directorate the Institute of Chartered Accountants of India, New Delhi,2001.
5. Encyclopedia of Energy – McGraw Hill Publication.
6. Energy Management Handbook, John Wiley & Sons, Wayne C.Turner.
7. Kothari et al. “Renewable Energy Sources and Emerging Technologies”, PHI, 2008.

E-Resources:

1. <http://nptel.ac.in/courses/112105051/>
2. https://www.youtube.com/watch?v=Ota2_LUuar0
3. https://www.youtube.com/watch?v=Ota2_LUuar0
4. <https://www.youtube.com/watch?v=3dJAtHaSQ98>
5. <https://www.youtube.com/watch?v=xokHLFE96h8>
6. <http://www.tatapower.com/businesses/renewable-energy.aspx>
7. <http://www.cleanlineenergy.com/technology/wind-and-solar>

Course Outcomes:

On completion of the course, the students will be able to:

1. **Provide** basic knowledge about various types of energy resources.
2. **Familiarize** the students about conventional energy systems.

3. **Understand** the practical significance of hydro-electric technology, wind, solar and biomass energy technologies.
4. **Know** how biomass is currently used as a source of energy, its Future potential both in providing energy and in producing alternative fuels.
5. **Familiarize** energy conservation and management.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	-	-	2	-	-	3	2	3	-	-	-	-	-	2
CO2	-	-	3	-	-	2	3	2	-	-	-	-	-	3
CO3	-	-	3	-	-	3	3	3	-	-	-	-	-	2
CO4	-	-	3	-	-	3	3	2	-	-	-	-	-	3
CO5	-	-	3	-	-	2	3	3	-	-	-	-	-	2
Average	-	-	2.8	-	-	2.6	2.8	2.6	-	-	-	-	-	2.4

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – I Sem			
Course Code: J31OD	SENSORS AND TRANSDUCERS (Open Elective-I)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisites: Nil

Course Objectives:

1. To make students familiar with the constructions and working principle of different types of sensors and transducers
2. To make students aware about the measuring instruments and the methods of measurement and the use of different transducers.
3. To make students familiar with the Potentiometer, Loading effect, Strain gauge
4. To make students aware about Linear Variable Differential Transformer, LVDT Accelerometer
5. To make students aware piezoelectric and pyro-electric transducers

MODULE – I

Measurements and Instrumentation of Transducers: Measurements – Basic method of measurement – Generalized scheme for measurement systems – Units and standards – Errors
– Classification of errors, error analysis – Statistical methods – Sensor – Transducer – Classification of transducers – Basic requirement of transducers.

MODULE – II

Characteristics of Transducers: Static characteristics – Dynamic characteristics – Mathematical model of transducer – Zero, first order and second order transducers – Response to impulse, step, ramp and sinusoidal inputs.

MODULE– III

Resistive Transducers: Potentiometer –Loading effect – Strain gauge – Theory, types, temperature compensation – Applications – Torque measurement – Proving Ring – Load Cell
– Resistance thermometer – Thermistors materials – Constructions, Characteristics – Hot wire anemometer.

MODULE – IV

Inductive and Capacitive Transducer: Self inductive transducer – Mutual inductive transducers – Linear Variable Differential Transformer – LVDT Accelerometer – RVDT – Synchros – Microsyn – Capacitive transducer – Variable Area Type – Variable Air Gap type – Variable Permittivity type – Capacitor microphone.

MODULE – V

Miscellaneous Transducers: Piezoelectric transducer – Hall Effect transducers – Smart sensors – Fiber optic sensors – Film sensors – MEMS – Nano sensors, Digital transducers.

TEXT BOOKS:

1. Sawhney. A.K, “A Course in Electrical and Electronics Measurements and Instrumentation”, 18th Edition, Dhanpat Rai & Company Private Limited, 2007.
2. Patranabis. D, “Sensors and Transducers”, Prentice Hall of India, 2003.

REFERENCE BOOKS:

1. Renganathan. S, “Transducer Engineering”, Allied Publishers, Chennai, 2003.
2. Doebelin. E.A, “Measurement Systems – Applications and Design”, Tata McGrawHill, New York, 2000.
3. John. P, Bentley, “Principles of Measurement Systems”, III Edition, Pearson Education, 2000.
4. Murthy. D. V. S, “Transducers and Instrumentation”, Prentice Hall of India, 2001.
5. Sensor Technology Hand Book – Jon Wilson, Newne 2004.
6. Instrument Transducers – An Introduction to their Performance and design – by Herman K. P. Neubrat, Oxford University Press.

E-Resources:

1. <http://cas.ee.ic.ac.uk/people/dario/files/E302/1-Sensors.pdf>

Course Outcomes:

On completion of the course, the students will be able to:

1. **Concept** behind working of measurement systems and different types of sensors and transducers.
2. **Sensor** to measure various physical parameters used in Industry and normal measurement applications
3. **Working** principle of resistive, inductive and capacitive transducers and their applications.
4. **Understanding** of digital and proximity sensors and their applications.
5. **Understanding** of thermocouples, piezoelectric and pyro-electric transducers and their applications.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	-	-	-	-	1	-	-	-	-	-	-	2	-
CO2	2	1	-	-	-	-	-	-	-	-	-	-	2	-
CO3	2	2	1	1	1	-	-	-	1	-	-	-	2	1
CO4	2	-	-	-	1	-	2	-	-	-	-	-	2	-
CO5	1	-	-	-	1	-	-	-	-	-	-	-	1	-
Average	1.6	1.5	1	1	1	1	2		1	-	-	-	1.6	1

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – I Sem			
Course Code: J31OE	AUTOMOTIVE TECHNOLOGY (Open Elective-I)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Engineering Chemistry, Engineering Physics.

Course Objectives:

This course will enable students to:

6. Provide an overview on automobile engineering
7. Learn different fuels and advanced control systems
8. Study the concepts and drive train configurations of electric and hybrid electric vehicles
9. Understand use of intelligent vehicle technologies like navigation in automobiles
10. Provide awareness of safety security and regulations

Module 1

Unit-1: Structural systems of automobile– chassis and body, power unit, transmission system, Steering System, Suspension System, Braking System.

Unit-2: Other systems of automobile- Ignition systems, Fuel System, Cooling System, Electrical System.

Module 2

Unit-1: Fuels: Types of Fuels-Gasoline fuels, CNG, Biofuels, advantages and limitations.

Unit-2: Advanced Engine Controls: Concept of an electronic engine control system, electronic fuel injection - throttle body fuel injection, multi-point fuel injection, gasoline direct injection, common rail direct injection, electronic ignition control.

Module 3

Unit-1: Fuel Cell and Solar Vehicles: Fuel cell vehicle – Operating principle, types of fuel cells, fuel cell options for fuel cell vehicle and fuel cell hybrid vehicle. Solar vehicle - Solar photovoltaic cell, solar array, solar car electrical system and drive train.

Unit-2: Electric and Hybrid Vehicles: Electric vehicles - Layout of an electric vehicle, performance, energy consumption, advantage and limitations. Hybrid electric vehicles - Concepts, types of hybrid drive train architecture, merits and demerits.

Module 4

Unit-1: Telematics Systems: Global positioning system, geographical information systems, navigation system.

Unit-2: Comfort Systems: Automotive vision system, adaptive cruise control system, active suspension system, power steering and power windows.

Module 5

Unit-1: Safety and Security Systems: Active and passive safety, airbags, seat belt tightening system, collision warning systems, anti-lock braking systems, traction control system, electronic immobilizers, remote keyless entry, smart card system, number plate coding.

Unit-2: Emission and noise control regulations- Pollution standards, National and international – Pollution Control – Techniques – Noise Pollution & control.

Text Books:

1. William B Riddens, “Understanding Automotive Electronics”, 5th edition, Butterworth Heinemann Woburn, 1998.
2. Mehrdad Ehsani, Yimin Gao, Sebastien E. Gay and Ali Emadi, “Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design”, CRC Press, 2005.
3. Kripal Singh, “Automobile Engineering”, Standard Publishers, Vol. 1 & 2, 2007

Reference Books:

1. Automotive Hand Book” Robert Bosch, SAE, 5th edition, 2000.
2. LjuboVlacic, Michel Parent and Fumio Harashima, “Intelligent Vehicle Technologies”, Butterworth-Heinemann publications, Oxford, 2001.
3. Iqbal Husain, “Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
4. “Navigation and Intelligent Transportation Systems – Progress in Technology”, Ronald K Jurgen, Automotive Electronics Series, SAE, USA, 1998.

E - Resources:

1. <https://rb.gy/zm8le8>
2. <https://rb.gy/ceck4k>
3. <https://nptel.ac.in/courses/107/106/107106088/>
4. <https://nptel.ac.in/courses/108/102/108102121/>

Course Outcomes:

On completion of the course, the students will be able to:

1. **Outline** the overview of automobile engineering
2. **Identify** the different fuels and advanced control systems
3. **Develop** the concepts and drive train configurations of electric and hybrid electric vehicles
4. **Apply** the use of intelligent vehicle technologies like navigation in automobiles
5. **Aware** of safety security and regulations

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	-	3	3	3	-	-	-	-	-	-	2		
CO2	3	-	3	3	3	-	-	-	-	-	-	2		
CO3	3	-	3	3	3	-	-	-	-	-	-	2		
CO4	3	-	3	3	3	-	-	-	-	-	-	2		
CO5	3	-	3	3	3	-	-	-	-	-	-	2		
Average	3	-	3	3	3	-	-	-	-	-	-	2		

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – I Sem			
Course Code: J31OG	PRINCIPLES OF SENSORS AND THEIR APPLICATIONS (Open Elective-I)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

This course will enable students to:

1. To understand the concepts of measurement technology.
2. To learn the different sensors used to measure various physical parameters.
3. To Acquire knowledge on Optical sensors.
4. To understand the concepts Acoustic sensors.
5. To learn the fundamentals of signal conditioning, data acquisition and communication systems used in mechatronics system development.

Module 1:

Unit 1: INTRODUCTION

Basics of Measurement – Classification of errors – Error analysis – Static and dynamic characteristics of transducers .

Unit 2: Performance measures of sensors – Classification of sensors – Sensor calibration techniques – Sensor Output Signal Types.

Module 2:

Unit 1: MOTION, PROXIMITY AND RANGING SENSORS

Motion Sensors – Potentiometers, Resolver, Encoders – Optical, Magnetic, Inductive, Capacitive.

Unit 2: LVDT – RVDT – Synchro – Microsyn, Accelerometer., – GPS, Bluetooth, Range Sensors – RF beacons, Ultrasonic Ranging, Reflective beacons, Laser Range Sensor (LIDAR).

Module 3:

Unit 1: FORCE, MAGNETIC AND HEADING SENSORS

Strain Gage, Load Cell, Magnetic Sensors – types, principle, requirement and advantages:

Unit 2: Magneto resistive – Hall Effect – Current sensor Heading Sensors – Compass, Gyroscope, Inclometers.

Module 4:

Unit 1: OPTICAL, PRESSURE AND TEMPERATURE SENSORS⁹

Photo conductive cell, photo voltaic, Photo resistive, LDR – Fiber optic sensors – Pressure – Diaphragm, Bellows, Piezoelectric – Tactile sensors, Temperature – IC, Thermistor, RTD.

Unit 2: Thermocouple. Acoustic Sensors – flow and level measurement, Radiation Sensors - Smart Sensors Film sensor, MEMS & Nano Sensors, LASER sensors.

Module 5 :

Unit 1: SIGNAL CONDITIONING and DAQ SYSTEMS⁹

Amplification – Filtering – Sample and Hold circuits – Data Acquisition: Single channel and multi-channel data acquisition .

Unit 2: Data logging - applications - Automobile, Aerospace, Home appliances, Manufacturing, Environmental monitoring.

TEXT BOOKS:

1. Ernest O Doebelin, “Measurement Systems – Applications and Design”, Tata McGraw-Hill, 2009.
2. Sawney A K and Puneet Sawney, “A Course in Mechanical Measurements and Instrumentation and Control”, 12th edition, Dhanpat Rai & Co, New Delhi, 2013.

REFERENCES

1. Patranabis D, “Sensors and Transducers”, 2nd Edition, PHI, New Delhi, 2010.
2. John Turner and Martyn Hill, “Instrumentation for Engineers and Scientists”, Oxford Science Publications, 1999.
3. Richard Zurawski, “Industrial Communication Technology Handbook” 2nd edition, CRC Press, 2015.

E-RESOURCES:

1. <https://www.sciencelearn.org.nz/resources/1602-electricity-and-sensors>
2. <https://predictabledesigns.com/introduction-to-electronic-sensors/>

OUTCOMES:

The students will be able to

1. **Expertise** in various calibration techniques and signal types for sensors.
2. **Apply** the various sensors in the Automotive and Mechatronics applications
3. **Study** the basic principles of various smart sensors.
4. **Apply** Optical and Acoustic sensors in Home Appliances.
5. **Implement** the DAQ systems with different sensors for real time applications

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	3	2											
CO2	2	2		2										
CO3	3	2		3										
CO4	3	1												
CO5	2	2	3	3										
Average	2.4	2.0	2.5	2.67										

2020-21	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – I Sem			
Course Code: J31OH	PRINCIPLES OF COMMUNICATIONS (Open Elective-I)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Communication systems

Course Objectives:

The Student will

1. provide the basic concepts of communication systems.
2. gain knowledge about Amplitude modulation and Angle Modulation.
3. study sampling and pulse modulation methods.
4. study and compare different binary digital modulation techniques.
5. understand the basic concepts of information theory.

Module 1: Introduction

Unit 1: Block diagram of Electrical communication system, Radio communication: Types of communications, Analog, pulse and digital types of signals,

Unit 2: Noise – Types of noise, sources of noise, calculation of noise in Linear systems and noise figure.

Module 2: Amplitude Modulation

Unit 1: Need for modulation, Types of Amplitude modulation, AM, DSB SC, SSB SC, Power and BW requirements, generation of AM, DSB SC, SSB SC, Demodulation of AM: Diode detector, Product demodulation for DSB SC & SSB SC.

Unit 2: Angle Modulation: Frequency & Phase modulations, advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, Comparison of FM & PM.

Module 3: Pulse Modulations

Unit 1: Sampling, Nyquist rate of sampling, Sampling theorem for Band limited signals, PAM, regeneration of base band signal, PWM and PPM.

Unit 2: Time Division Multiplexing, Frequency Division Multiplexing, Asynchronous Multiplexing.

Module 4: Digital Communication

Unit 1: Advantages, Block diagram of PCM, Quantization, effect of quantization, quantization error, Base band digital signal, DM, ADM, ADPCM and comparison.

Unit 2: Digital Modulation: ASK, FSK, PSK, DPSK, QPSK demodulation, coherent and incoherent reception, Modems.

Module 5: Information Theory

Unit 1: Concept of information, rate of information and entropy, Source coding for optimum rate of information, Coding efficiency, Shannon-Fano and Huffman coding

Unit 2: Error control coding: Introduction, Error detection and correction codes, block codes, convolution codes

TEXT BOOKS :

1. Communication Systems Analog and Digital – R.P. Singh and SD Sapre, TMH, 20th reprint, 2004.
2. Principles of Communications – H. Taub and D. Schilling, TMH, 2003.

REFERENCES:

1. Electronic Communication Systems – Kennedy and Davis, TMH , 4th edition, 2004.
2. Communication Systems Engineering -John. G. Proakis and Masoud Salehi, PHS, 2nd ed.2004.

E - Resources:

1. <https://nptel.ac.in/courses/Nanoelectronics/Madras/ab1011/102/111102111/> IIT

Course Outcomes:

The student will be able to:

1. **illustrate** the main concepts of analog and digital communication systems.
2. **analyze** and design an AM and FM modulator/demodulator.
3. **explain**, discuss, and compare different binary digital modulation techniques.
4. **distinguish** different types of noise and explain the effects of noise on communication system.
5. **use** the basic concepts of information theory.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	1	-	-	-	-	-	-	-	-	-	1	1	-
CO2	2	2	1	-	-	-	-	-	-	-	-	-	2	-
CO3	1	1	-	-	-	-	-	-	-	-	-	-	1	-
CO4	1	1	-	-	-	-	-	-	-	-	-	-	2	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	1	-
Average	2	2	1	-	-	-	-	-	-	-	-	1	1.2	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – I Sem			
Course Code: J31OI	FUNDAMENTALS OF DATA BASE MANAGEMENT SYSTEM (Open Elective-I)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: A course on “Data Structures”

Course objectives:

The Student will

1. Understanding of the architecture and functioning of database management systems.
2. Understand and apply the principles of data modeling using relational model and
3. develop a good database design.
4. Understand the use of structured query language (SQL) and its syntax.
5. Apply normalization techniques to normalize a database.
6. Understand the need of database processing and learn techniques for controlling the Consequences of concurrent data access.

Module 1:

Introduction to Data Base Systems

Data base System Applications, data base System VS file System – View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML.

Database Access for applications Programs

data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor.

Module 2:

Introduction to the Relational Model

Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views.

Relational Algebra

Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus.

Module 3:

Form of Basic SQL Query

Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested

Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values.

Schema refinement

Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.

Module 4:

Transaction Concept

Transaction State- Implementation of Atomicity and Durability – Concurrent Executions – Serializability- Recoverability– Implementation of Isolation – Lock –Based Protocols – Timestamp Based Protocols- Validation- Based Protocols.

Recovery and Atomicity

Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.

Module 5:

Data on External Storage

-File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM).

Advanced Database Management System

Introduction to Distributed Database-Reference Architecture, fragmentation, Allocation, Joins.

Text Books:

1. Data Base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
2. Data base System Concepts, Silberschatz, Korth, McGraw hill, V edition.

Reference Books:

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
3. Introduction to Database Systems, C.J.Date Pearson Education.

E - Resources:

1. <http://www.iran-lms.com/images/images/Books/PDF/Fundamentals-of-Database-Systems-Pearson-2015-Ramez-Elmasri-Shamkant-B.-Navathe.pdf>
2. <https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fcs.gmu.e>

du%2F~aobaidi%2Ffall_05%2Findex_files%2FLectures%2FENCh10.ppt

3. <https://www.youtube.com/watch?v=T7AxM7Vqvaw>
4. https://cs.ulb.ac.be/public/_media/teaching/infh303/dbmsnotes.pdf
5. <https://www.w3schools.in/dbms/intro/>

Course outcomes:

The Student will be able to

1. **Identify** the underlying concepts of database technologies.
2. **Design** a database schema for a given problem domain.
3. **Formulate** SQL queries and integrity constraints over relations.
4. **Apply** normalization on database for eliminating redundancy.
5. **Summarize** transaction properties, concurrency control and recovery techniques and learn various data storage and security mechanisms.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	2	-	1	-	-	-	-	-	-	-	-	2
CO2	3	3	3	2	2	-	-	-	-	-	-	-	-	2
CO3	3	3	2	2	2	-	-	-	-	-	-	-	-	2
CO4	3	2	3	3	2	-	-	-	-	-	-	-	-	3
CO5	2	2	3	1	3	-	-	-	-	-	-	-	-	1
Average	2.8	2.6	2.6	2.0	2.0	-	-	-	-	-	-	-	-	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – I Sem			
Course Code: J31OJ	PRINCIPLES OF OPERATING SYSTEMS (Open Elective-I)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Programming for Problem solving, Data structures and Algorithms (not mandatory).
2. Computer Organization.

Course objectives:

The Student will

1. Understand the basic concepts and functions of computer operating systems.
2. Apply the concurrency control among the operating system programs execution.
3. Demonstrate the techniques used to manage the memory during program execution.
4. Explain the various storage management methods and functions of operating systems.
5. Design the security features against attacks on operating system.

Module 1:

Background

Overview: Basic Elements, Evolution of the Microprocessor, Instruction Execution, Interrupts, Cache Memory, Direct Access Memory.

System Structures: Computer Systems Organization, Computer System Architecture, Operating System Architecture, Systems Calls, Operating System structure, Building and Booting an Operating System.

Module 2:

Process Management

Process Concepts: Introduction, Process Scheduling, Scheduling Criteria, Scheduling Algorithms, Critical-Section Problem, Peterson’s Solution, Synchronization Hardware, Semaphores, Mutex Locks, Semaphores, Monitors, Classic Problems of Synchronization.

Deadlock: Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Module 3:

Main Memory: Background, Contiguous Memory Allocation, Paging, Page-Table Structure, Swapping, Segmentation.

Virtual Memory: Background, Demand Paging, Page Replacement Algorithms, Frames Allocation, Thrashing.

Module 4:

Mass-Storage Structure: Overview, Disk Structure, Disk Attachment, Disk Scheduling, Swap-Space Management, RAID Structure.

File system Management: File Concepts, File System Structure, File System Operations, Directory Implementation, Allocation Methods, Free-Space Management.

Module 5:

Mass-Storage Structure: Overview, Disk Structure, Disk Attachment, Disk Scheduling, Swap-Space Management, RAID Structure.

File system Management: File Concepts, File System Structure, File System Operations, Directory Implementation, Allocation Methods, Free-Space Management.

Text Books:

1. Operating System Concepts-A. Silberschatz, Peter B. Galvin, Greg Gagne, 10th Edition, John Wiley& Sons inc.
2. Operating Systems Internals and Design Principles – William Stallings, 7th Edition, Prentice Hall.

Reference Books:

1. Principles of Operating Systems-Naresh Chauhan, Oxford Higher Education.
2. Operating System A Design Approach-Crowley, TMH.
3. Modern Operating Systems-Andrew S Tanenbaum, 2nd Edition Pearson, PHI.

E - Resources:

1. https://www.tutorialspoint.com/operating_system/
2. <https://www.studytonight.com/operating-system/>
3. <https://learn.saylor.com/course/view.php?id=948§ioned=967>
4. <https://nptel.ac.in/courses/106/105/106105214/>
5. <https://www.edx.org/course/computer-hardware-and-operating-systems>

Course outcomes:

The Student will be able to

1. **Compare** differing structures of operating systems including process management.
2. **Apply** different CPU scheduling algorithms and various Memory management techniques.
3. **Illustrate** the use of Bankers algorithm for deadlock avoidance and File system organization.
4. **Demonstrate** various mass storage management techniques
5. **Analyze** different aspects of protection and security concepts

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO2	3	2	2	-	-	-	-	-	-	-	-	-	-	3
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	2
CO4	2	2	2	-	-	-	-	-	-	-	-	-	-	2
CO5	3	3	2	-	-	-	-	-	-	-	-	-	-	2
Average	2.8	2.2	2.2	-	-	-	-	-	-	-	-	-	-	2.2

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech III Year – I Sem.			
Course Code: J31OK	INTRODUCTION TO DATA STRUCTURES through PYTHON (Open Elective-I)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Programming in C

Course Objectives:

This course will enable students to:

1. Understand fundamentals of programming.
2. Adapt Basic taxonomy of python.
3. Familiarize with OOP.
4. Understand Data Structure in Python.
5. Design Solutions with OOP Paradigm.

Module I: Introduction

Unit 1:

Relationship between computers and programs, Basic principles of computers, Fundamentals of Programming and File systems,

Unit 2:

Using the Python interpreter, Introduction to binary computation, Input / Output.

Module II: Data types and control structures

Unit 1:

Keywords, Operators (unary, arithmetic, etc.), Data types, variables, expressions, and statements, Assignment statements, Strings and string operations.

Unit 2:

Control Structures: loops and decision

Module III: Modularization and Classes

Unit 1:

Standard modules, Packages and using of Packages.

Unit 2:

Defining Classes, Defining functions, Functions and arguments.

Module IV: Data Structures and Exceptions

Unit 1:

Data Structures (array, List, Tuples and Dictionary).

Unit 2:

Error processing, Exception Raising and Handling.

Module V: Object oriented design

Unit 1:

Programming types, Object Oriented Programming, Object Oriented Design.

Unit 2:

Inheritance and Polymorphism.

Text Books:

1. Data Structures and Algorithms in Python. Michael T. Goodrich , Roberto Tamassia , Michael H. Goldwasser, Wiley, 2013.

Reference Books:

1. Data Structures and Algorithms Using Python Rance D. Necaie, JOHN WILEY & SONS.

E - Resources:

1. <https://www.my-mooc.com/en/mooc/introduction-to-python-programming/>

Course Outcomes:

On completion of the course, the students will be able to:

1. **Recall** fundamentals of programming.
2. **summarize** Basic taxonomy of python.
3. **Get** Familiarity with OOP.
4. **Apply** Data Structure in Python.
5. **Solve** Problems with OOP Paradigm.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	2	1	1	-	-	-	-	-	-	-	-	2	1
CO2	1	2	2	1	-	-	-	-	-	-	-	-	1	2
CO3	2	2	2	2	-	-	-	-	-	-	-	-	1	1
CO4	2	2	2	2	-	-	-	-	-	-	-	-	2	2
CO5	1	2	2	2	-	-	-	-	-	-	-	-	2	1
Average	1.6	2	1.8	1.6	-	-	-	-	-	-	-	-	1.6	1.4

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech III Year – I Sem.			
Course Code: J31OL	INTRODUCTION TO WEB DESIGN (Open Elective-I)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

This course will enable students to:

1. Know regarding internet related technologies.
2. Understanding of the current industry support for web technologies.
3. Explain the basic concepts of CSS.
4. Visualize the basic concepts of PHP.
5. Understanding PHP functions and Methods

Module I:

UNIT-I: Basics in Web Design: Brief History of Internet, what is World Wide Web, why create a web site, Web Standards, Audience requirement.

UNIT -II: Web Design Principles: Basic principles involved in developing a web site, Planning process, Five Golden rules of web designing, Designing navigation bar page design, Home Page Layout, Design Concept.

Module II:

UNIT-I: What is HTML, HTML Documents, Basic structure of an HTML document, creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags, HTML Tables, HTML Forms.

UNIT II: Introduction to elements of HTML, working with Text Working with Lists, Tables and Frames, working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

Module III:

UNIT-I: Concept of CSS, Creating Style Sheet and types of CSS, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties).

UNIT-II: Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Colors, Creating page Layout and Site Designs.

Module IV:

UNIT-I: Downloading, installing, configuring PHP, The anatomy of a PHP Page. Basic Security Guidelines, Variables, Data Types, Operators and Expressions, Constants, Flow Control Functions; Switching Flow, Loops.

UNIT II: Code Blocks and Browser Output, Objects, Strings Processing, Form

processing, connecting to database, using cookies, dynamic contents.

Module V:

UNIT I: Creating the Web Site, Saving the site, working on the web site, Creating web site structure, Creating Titles for web pages, Themes-Publishing web sites.

Text Books:

1. Dietel and Dietel : —Internet and World Wide Web - How to Program, 5th Edition, PHI/Pearson Education,2011
2. Web Technologies: HTML,CSS, XML,Php BlackBook.

Reference Books:

1. Chris Bates, —Web Programming, building internet applications, 2ndEdition, WILEY, Dreamtech,2008.
2. HTML 5 in simple steps Kogent Learning Solutions Inc, DreamtechPress.
3. Beginning CSS: Cascading Style Sheets for Web Design Ian Pouncey, ichard York Wiley India

E - Resources:

1. <https://nptel.ac.in/courses/106/105/106105084/>
2. <http://www.nptelvideos.in/2012/11/internet-technologies.html>
3. http://www.nptelvideos.com/php/php_video_tutorials.php

Course Outcomes:

At the end of the course , students will be able to

1. **Develop** the application of the HTML for document structure.
2. **Develop** the skills in analyzing the usable of a website.
3. **Create** dynamic webpage, using PHP.
4. **Using** PHP to manipulate Files.
5. **Develop** the concept of web publishing.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	3	-	-	-	-	-	-	-	-	-	3	3
CO2	3	2	3	-	-	-	-	-	-	-	-	-	3	3
CO3	3	2	3	-	-	-	-	-	-	-	-	-	3	3
CO4	3	2	3	-	-	-	-	-	-	-	-	-	3	3
CO5	3	3	3	-	-	-	-	-	-	-	-	-	3	3
Average	3	2.4	3	-	-	-	-	-	-	-	-	-	3	3

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – I Sem		
Course Code: J31OM	BASICS OF OBJECT ORIENTED PROGRAMMING (Open Elective-I)	L	T	P/D
Credits: 3		3	0	0

Pre-requisite: Basic Knowledge of C and C++

Course Objectives:

The Students will

1. Familiar with concepts of OOP
2. Explain inheritance and polymorphism
3. Familiar with packages and interfaces
4. Familiar with exception handling and multithreading
5. Familiar with applet programming and event handling.

Module I:

Unit 1: Introduction: Concepts of Object Oriented Programming, Encapsulation and Polymorphism, history of Java.

Unit 2 : Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program.

Module II:

Unit 1: Classes and Objects: Concepts of classes, objects, constructors, methods, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion. String handling.

Unit 2 : Inheritance 1: Base class object, subclass, member access rules, super uses, using final with inheritance, method overriding, abstract classes

Module III:

Unit 1: Interfaces 2: Defining an interface, implementing interface, differences between classes and interfaces and extending interfaces.

Unit 2 : Packages: Defining, creating and accessing a package, importing packages, access control, exploring package - java.io.

Module IV:

Unit 1 : Exception handling: Concepts of exception handling, benefits of exception handling, exception hierarchy, checked and unchecked exceptions, usage of-try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.

Unit 2 : Multithreading: Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

Module V:

Unit 1: Applets: Concepts of applets, differences between applets and applications, life cycle of applet, types of applets, creating applets, passing parameters to applets.

Unit 2: Event Handling: Events, event sources, event classes, event listeners, delegation event model, handling mouse and key board events, adapter classes. The AWT class hierarchy, user interface components-labels, buttons, canvas, scrollbars, text components, checkbox, checkbox groups, choices, lists

Text Books:

1. Java The complete reference, 8th editon, Herbert Schildt, TMH.
2. Understanding OOP with Java, up dated edition, T.Budd, Pears on education.

Reference Books:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons.
2. An Introduction to OOP, second edition, T. Budd, Pearson education.
3. Introduction to Java programming 6th edition, Y. Daniel Liang, Pearson education.

E-Resources:

1. www.javasoft.com
2. www.w3schools.com
3. www.tutorialpoint.com
4. www.oracle.com
5. https://www.youtube.com/watch?v=-HafzawNIUo&ab_channel=SundeepSaradhiKanthety.
6. https://www.youtube.com/watch?v=7WhnYwoBY24&list=PLlhM4lkb2sEhf5NIWeYh_gdcN49pHjVP0&ab_channel=SmartProgramming.
7. https://www.youtube.com/watch?v=G_t6BbZeyUU&ab_channel=VoidRealms

Course Outcomes:

Students will be able to

1. **Familiar** with constructors and string handling
2. **Understand** inheritance and polymorphism
3. **Understand** packages and interfaces
4. **Understand** exception handling and multithreading
5. **Understand** applet programming

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)											Program Specific Outcomes*		
	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 O 1	PS O 2
CO1	-	3	-	3	3	-	3	-	-	2	-	-	3	-
CO2	-	-	2	-	-	3	-	3	-	-	3	-	-	3
CO3	3	-	-	3	-	2	-	-	3	-	-	3	-	-
CO4	3	-	-	-	3	-	-	3	3	3	-	-	3	-
CO5	-	3	-	-	-	-	2	-	-	-	3	-	-	3
Average	3.0	3.0	2.0	3.0	3.0	2.5	2.5	3.0	3.0	2.5	3.0	3.0	3.0	3.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – I Sem		
Course Code: J31ON	FUNDAMENTALS OF DIGITAL LOGIC DESIGN (Open Elective-I)	L	T	P/D
Credits: 3		3	0	0

Pre-requisite: Basics of Boolean algebra

Course Objectives:

Students will learn to

1. Understand basic tools for the design of digital circuits and fundamental concepts used in the design of digital systems.
2. Understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
3. Implement simple logical operations using combinational logic circuits.
4. Design combinational logic circuits, sequential logic circuits.
5. Impart the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.

Module I:

Unit 1: Binary systems : digital systems, binary numbers, number base conversions, octal and hexadecimal numbers, complements, signed binary numbers, binary codes, binary storage and registers, binary logic.

Module II:

Unit 1: Boolean algebra and logic gates : basic definitions, axiomatic definition of boolean algebra, basic theorems and properties of boolean algebra, boolean functions canonical and standard forms, other logic operations, digital logic gates, integrated circuits.

Module III:

Unit 1: Gate – level minimization: the map method, four-variable map, five-variable map, product of sums simplification don't-care conditions, nand and nor implementation other two-level implementations, exclusive – or function, hardware description language (hdl).

Module IV:

Unit 1 : Combinational logic : combinational circuits, analysis procedure design procedure, binary adder-subtractor decimal adder, binary multiplier, magnitude comparator, decoders, encoders, multiplexers, hdl for combinational circuits.

Module V:

Unit 1: Registers, shift registers, ripple counters synchronous counters, other counters, hdl for registers and counters.

Text Books:

1. Digital design – third edition , m.morris mano, pearson education/phi.
2. Fundamentals of logic design, roth, 5th edition,thomson.

Reference Books:

1. Switching and finite automata theory by zvi. Kohavi, tata mcgraw hill.
2. Switching and logic design, c.v.s. rao, pearson education
3. Digital principles and design – donald d.givone, tata mcgraw hill, edition.
4. Fundamentals of digital logic & micro computer design , 5th edition, m. Rafiquzzaman john wiley

E-Resources:

1. <https://nptel.ac.in/courses/106/105/106105185/>
2. <https://www.coursera.org/learn/digital-systems>

Course Outcomes:

Students will be able to

1. **Manipulate** numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, gray, and BCD.
2. **Build** Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
3. **Design** and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
4. **Analyze** small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.
5. **Construct** digital systems by Algorithmic State Machine Charts

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)											Program Specific Outcomes*		
	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 O 1	PS O 2
CO1	3	2	1									2	2	
CO2	3	2			1							2	1	2
CO3	3		2	2	1								2	2
CO4	3	2	2	2	1								2	
CO5	2	2	2	1	1									2
Average	2.4	2	1.75	1.67	1								1.75	2

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – I Sem			
Course Code: J31OP	INTRODUCTION TO MINING TECHNOLOGY (Open Elective-I)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Nil

Course objectives:

1. To introduce the distribution of mineral deposits in India
2. To acquaint with different stages of mining process
3. To get idea about Drilling and its machinery
4. To get idea about Explosives and blasting in mines
5. To know about shaft sinking methods, precaution & lining during shaft sinking

Module 1

Unit - I: Introduction: Distribution of mineral deposits in India and other countries, mining contributions to civilization, mining terminology

Module 2

Unit - I: Stages in the life of the mine - prospecting, exploration, development, exploitation, and reclamation.

Unit - II: Access to mineral deposit- selection, location, size, and shape (incline, shaft and Adit), brief overview of underground and surface mining methods.

Module 3

Unit - I: Drilling: Types of drills, drilling methods, electric, pneumatic, and hydraulic drills, drill steels and bits, drilling rigs, and jumbos.

Module 4

Unit - I: Explosives: Classification, composition, properties and tests, fuses, detonators, blasting devices and accessories, substitutes for explosives, handling and storage, transportation of explosives.

Unit - II: Rock blasting: Mechanism of rock blasting, blasting procedure, and pattern of shot holes.

Module 5

Unit - I: Shaft sinking: Ordinary and special methods, problems, and precautions, shaft supports and lining.

Textbooks:

1. R. P. Pal, Rock blasting effect and operation, A. A. Balkema, 1st Ed, 2005.
2. D. J. Deshmukh, Elements of mining technology, Vol. 1, Central techno, 7th Ed, 2001.

Reference books:

1. C. P. Chugh, Drilling technology handbook, Oxford and IBH, 1st Ed, 1977.
2. R. D. Singh, Principles and practices of modern coal mining, New age international, 1st Ed, 1997.

E-resources:

1. <https://www.cienciaviva.pt/img/upload/Introduction%20to%20mining.pdf>
2. https://www.researchgate.net/publication/282572490_Basic_concept_of_mining_technology

Course outcomes:

The student will be able to:

1. **Learn** about distribution of mineral deposits in India
2. **Learn** about stages on mining process
3. **Learn** about drilling and its machinery
4. **Understand** about explosives, blasting and blasting mechanism
5. **Understand** about shaft sinking methods, precautions, and lining of shafts

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO4	2	2	1	-	-	-	-	-	-	-	-	-	-	-
CO5	3	1	2	-	-	-	-	-	-	-	-	-	-	-
Average	3	2	1.6	-	-	-	-	-	-	-	-	-	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – I Sem			
Course Code: J310R	Numerical Solution of Ordinary Differential Equations (Common to EEE, ECE, CSE, IT&ECM) (Open Elective-I)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

This course will enable students to:

1. To solve algebraic, transcendental equations and system of linear equation by various methods and find Eigen value by iteration method.
2. To Interpolate and approximate equal and unequal intervals by various formulae.
3. To discuss approximation of numerical differentiation and integration(single &double).
4. To solve Ordinary Differential Equations (ODEs) in Initial value Problems (IVPs) by various methods.
5. To solving ODEs & Partial Differential Equations (PDEs) in boundary value Problems(IVPs) by various methods

Module 1: Solution of Equations and Eigen value Problems

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Matrix Inversion by Gauss Jordan method - Eigen values of a matrix by Power method.

Module 2 : Interpolation and Approximation

Interpolation with unequal intervals - Lagrange's interpolation – Newton's divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton's forward and backward difference formulae.

Module 3: Numerical Differentiation and Integration

Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 rule – Romberg's method - Two point and three point Gaussian quadrature formulae Evaluation of double integrals by Trapezoidal and Simpson's 1/3rules.

Module 4 : Initial Value Problems for Ordinary Differential Equations

Single Step methods - Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order equations - Multi step methods - Milne's and AdamsBash forth predictor corrector methods for solving first order equations.

Module 5 : Boundary Value Problems in Ordinary Differential Equations

Finite difference methods for solving two-point linear boundary value problems - Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods – One dimensional wave equation by explicit method.

Text Books:

1. "Higher Engineering Mathematics", B.S. Grewal ,Khanna Publications, 2017
2. "Numerical Methods for Engineers", Chapra. S.C., and Canale.R.P., Tata McGraw Hill, 5 th Edition, New Delhi,2007.

Reference Books:

1. "Advanced Engineering Mathematics", R.K.Jain& S.R.K. Iyengar, Narosa Publications, 5th Edition, 2015.
2. "Higher Engineering Mathematics", Ramana B.V., Tata McGraw Hill New Delhi,11thReprint, 2010

E - Resources:

1. http://www.brainkart.com/article/Solution-of-Equations-and-Eigenvalue-Problems_6462/
2. <http://www.cs.nthu.edu.tw/~cchen/CS3331/ch6.pdf>
3. <http://www.vbspu.ac.in/wp-content/uploads/2016/02/Differentiation-and-Integration.pdf>
4. https://link.springer.com/chapter/10.1007/978-1-4612-6390-6_4
5. http://ramanujan.math.trinity.edu/wtrench/texts/TRENCH_FREE_DIFFEQ_II.PDF

Course Outcomes:

On completion of the course, the students will be able to:

1. **understand** the basic knowledge on solution of Eigenvalues
2. **use** interpolation and approximation to solve engineering problems.
3. **discuss** the numerical differentiation and integration.
4. **apply** initial value problems for solving first order differential equation.
5. **apply** the boundary value problems in ordinary and partial differential equations.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO2	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO3	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO4	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO5	3	3	2	3	-	-	-	-	-	-	-	2	-	-
Average	3	3	2	3	-	-	-	-	-	-	-	2	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – I Sem			
Course Code: J310R	Number Theory & Cryptography (Common to CE, EEE, ME, ECE, CSE, IT, ECM& MIE)	L	T	P	D
Credits: 3	(Open Elective-I)	3	0	0	0

Pre-requisite: Nil

Course Objectives:

This course will enable students to:

1. The basic definitions and theorems in number theory
2. The concept of a congruence and use various results related to congruence's including the Chinese Remainder Theorem
3. Number theory algorithms and procedures to basic problems.
4. The fundamentals of Cryptography how number theory is related to and used in cryptograph

Module 1 : Divisibility Theory And Canonical Decompositions

Division algorithm – Base – b representations – Number patterns – Prime and composite numbers – GCD – Euclidean algorithm – Fundamental theorem of arithmetic – LCM.

Module 2 : Diophantine Equations And Congruence's

Linear Diophantine equations – Congruence's – Linear Congruence's – Applications: Divisibility tests – Modular exponentiation-Chinese remainder theorem – 2 x 2 linear systems.

Module 3: Classical Theorems And Multiplicative Functions :

Wilson's theorem – Fermat's little theorem – Euler's theorem – Euler's Phifunctions.

Module 4: Classical Encryption Techniques

Classical encryption techniques: Symmetric chipper model – Substitution techniques – Transposition techniques – Steganography.

Module 5: Block Chippers and Public Key Encryption

Block chipper principles – block chipper modes and operations – advanced encryption standards (AES) – Public key cryptography – Principles of public key cryptosystem – The RSA algorithm – Elliptic curve arithmetic – Elliptic curve cryptosystem.

Text Books:

1. "Course on Number Theory and Cryptography", Koblitz, N. Springer Verlag, 1986
2. "Handbook of Applied Cryptography", Menezes, A, et.al. CRC Press,1996

Reference Books:

1. "An Introduction to the Theory of Numbers", Ivan Niven, Herbert S. Zuckerman, Hugh L. Montgomery.

E - Resources:

1. <https://people.maths.bris.ac.uk/~mazag/nt/lecture1.pdf>
2. <https://www.diva-portal.org/smash/get/diva2:530204/FULLTEXT01.pdf>
3. https://en.wikipedia.org/wiki/Multiplicative_function
4. <https://www.slideshare.net/PrachiGulihar/elementary-cryptography>
5. https://en.wikipedia.org/wiki/Public-key_cryptography

Course Outcomes:

On completion of the course, the students will be able to:

1. **Ability** to think and reason about abstract mathematics
2. **Analyze** the vulnerabilities in any computing system and hence be able to design a security solution
3. **Evaluate** security mechanisms using rigorous approaches, including theoretical
4. **Solve** problems in elementary number theory
5. **Apply** elementary number theory to cryptography

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	3	3	-	-	-	-	-	-	-	2	-	-
CO2	3	2	3	3	-	-	-	-	-	-	-	2	-	-
CO3	3	2	3	3	-	-	-	-	-	-	-	2	-	-
CO4	3	2	3	3	-	-	-	-	-	-	-	2	-	-
CO5	3	2	3	3	-	-	-	-	-	-	-	2	-	-
Average	3	2	3	3	-	-	-	-	-	-	-	2	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – I Sem			
Course Code: J310S	NANOMATERIALS (Common to CE, EEE, ME, ECE, CSE, IT& MIE)	L	T	P	D
Credits: 3	(Open Elective-I)	3	0	0	0

Pre-requisite: Nil

Course Objectives:

This course will enable students to:

1. To familiarize about the various properties of nanostructures.
2. Utilizing the different physical and chemical methods in preparing nanomaterials.
3. Provide different methods of synthesis of Nano materials.
4. Bring out the distinct Quantum Structure properties of nanostructures.
5. Find out the particle size of a crystal by XRD technique.

Module 1: Introduction to Nanomaterials

Introduction to nanotechnology and materials, Nano materials, Introduction to nano sizes and properties comparison with the bulk materials, Different Shapes and Sizes and Morphology. Classification of nanomaterials. Fullerene, carbon, Nanotubes (CNT's), Nanoparticles. Physical, Chemical, Electrical, Optical, Magnetic and mechanical properties of nanomaterials.

Module 2:

Unit-1: Physical Methods: Bottom-up approach and Top-down approach, Inert gas condensation, Arc Discharge, lasers ablation, laser pyrolysis, ball milling, and electro deposition.

Unit - 2: Chemical Methods: Nanocrystals by chemical reduction, photochemical synthesis, electrochemical synthesis, Nano crystals of semiconductors.

Module 3: Synthesis of Nanomaterials

Thermolysis route – spray pyrolysis and solvated metal atom dispersion, sol-gel method solvothermal and hydrothermal routes, solution combustion synthesis, CVD method, PVD method.

Module 4: Properties of Nanomaterials

Quantum Structure: 3D-Potential Wells (Spherical & Rectangular Parallelepiped), 2D (Circular & Square, Quantum Corrals), 1D (Quantum Wires), 0D (Quantum Dots).

Module-5: X-RAY Characterization techniques

X-Ray Photoelectron Spectroscopy (XPS), Energy Dispersive X-Ray Analysis (EDAX), Principles and applications of X-Ray Diffraction, Electron Diffraction, and Electron probe microanalysis(EPMA), SEM and TEM method.

Text Books:

1. “The chemistry of Nano materials: Synthesis, Properties and Applications”, C N R Rao, A Muller and A K Cheetham , John Wiley, First Edition, 2004
2. “Nano structured Materials and Nanotechnology”, Hari Singh Nalwa, Academic Press, First Edition, 2002.

Reference Books:

1. “Introduction to Nanotechnology”, Charles P Poole Jr, John Willey & Sons, 1st Edition, 2003
2. Nanoscience: “Nanotechnologies and Nano physics”, C Dupas, P Houdy, M Lahmani, Springer-Verlag Berlin Heidelberg, 1st Edition, 2007.

E - Resources:

1. <http://nptel.ac.in/courses/103103033/module9/lecture1.pdf>
[http://courses.washington.edu/overney/NME498_Material/NME498_Periods/Lecture4-Overney- NP-Synthesis.pdf](http://courses.washington.edu/overney/NME498_Material/NME498_Periods/Lecture4-Overney-NP-Synthesis.pdf).
3. <http://www.materialstoday.com/nanomaterials/journals/>
4. <https://www.journals.elsevier.com/nanoimpact>
5. <http://www.springer.com/materials/nanotechnology/journal/12274>
6. <http://nptel.ac.in/courses/118104008/>
7. <http://nptel.ac.in/courses/118102003/>

Course Outcomes:

On completion of the course, the students will be able to:

1. **Understand** the properties of Nano-structured materials.
2. **Get** the knowledge of different physical and chemical methods of synthesis of Nano materials.
3. **Develop** basic knowledge on the properties and applications of few nanomaterials.
4. **Understand** different thermal methods of synthesis of nano materials and to learn different surface characterization techniques.
5. **Acquire** the different compositional and structural characterization techniques.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	1	-	-	-	-	-	-	-	-	-	-	1	-
CO2	2	1	-	-	-	-	-	-	-	-	-	-	1	-
CO3	2	1	-	-	-	-	-	-	-	-	-	-	1	-
CO4	3	2	2	-	2	-	-	-	-	-	-	-	1	-
CO5	3	2	2	-	2	-	-	-	-	-	-	-	1	-
Average	2.6	1.4	2	-	2	-	-	-	-	-	-	--	1	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – I Sem			
Course Code: J310T	Chemistry of Engineering Materials (Common to CE, EEE, ME, ECE, CSE, IT& MIE) (Open Elective-I)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

This course will enable students to

1. Learn the concept of phase rule and alloys, phase diagrams of different systems.
2. Gain the knowledge on abrasives, glass, ceramics, and adhesives.
3. Understand the basic concepts of chemistry to develop futuristic materials for high-tech. applications in the area of engineering.
4. Know the concepts of glass, ceramics and Refractories.
5. Analyze the different types of solutions.

Module 1: Phase Rule and alloys:

Phase Rule: Definition of terms: Phase, component, degree of freedom, phase rule equation. Phase diagrams-one component system-water system. Two component system Lead-Silver, cooling curves, heat treatment based on iron-carbon phase diagram - hardening, annealing and normalization. Introduction to alloys-fabrication of alloys-ferrous alloys-nonferrous alloys-industrial applications.

Module 2: Composites, Abrasives and Adhesives:

Composites: Basics of composites, composition and characteristics-types of composites – particle and fiber reinforced composites and their applications. Abrasives- natural and artificial abrasives-grinding wheels-abrasive paper and cloth. Adhesives- classification - action of adhesives- factors influencing adhesive action development of adhesive strength.

Module 3: Cement and Concrete:

Introduction-Classification of cement-natural-chemical composition of cement-Portland cement-chemical reactions involved in setting and hardening of cement-additives for cement-mortars and concretes-pre stressed concrete-post tensioning-curing-overall scenario of cement industry-Reinforced concrete, constructions-testing and decaying of cement-prevention of cement decay.

Module 4: Glass, Ceramics and Refractories:

Structure of glass-properties-Manufacturing of glass-Types of glasses-uses Ceramics-clays-methods for fabrication of ceramic ware plasticity of clays. Ceramic products-glazes. Porcelain and vitreous enamels. Requisites of a good refractory-classification, properties and applications of refractories.

Module-5: Colloids and surfactants:

Introduction to solution-types of colloids-characteristics of lyophilic and lyophobic solutions-preparation of colloids (Dispersion methods & Aggregation methods)-purification of colloids (Dialysis, Electro dialysis and Ultrafiltration).Characteristics of colloidal solutions-coagulation of colloids-origin of charge on colloids-protective colloids-emulsions-gels-applications of colloids. Introduction to surfactants-classification of surfactants-CMC (critical micelle concentration)-HLB scale-detergents-cleaning action.

Text Books:

1. "A text Book of Engineering Chemistry", P.C.Jain and Monica Jain, Dhanpat Rai Publications, New Delhi, 12th Edition 2006.
2. "Text Book of Engineering chemistry", B.Rama Devi, Ch.VenkataRamana Reddy and PrasanthaRath, Cengage Learning India Pvt. Ltd, 2016.
3. "Colloids and Interfaces with Surfactants and Polymers", J. Goodwin, 2nd Edition 2009.

Reference Books:

1. "Principles of Physical Chemistry", B.R.Puri, L.R.Sharmaand M.S.Pathania, S.Nagin Chand &Co., New Delhi, 23rd Edition, 1993.
2. "Engineering Chemistry",M.ThirumalaChary and E.Laxminarayana, SciTech publications(INDIA) PVT Ltd, Third Edition,2016

E - Resources:

1. <https://www.acs.org/content/acs/en/careers/college-to-career/chemistry-careers/materials-science.html>
2. <https://www.sciencedirect.com/science/article/pii/S1369702110701875>
3. <https://engineering.purdue.edu/MSE/aboutus/whatsmaterials>
4. <https://www.engineergirl.org/32721/Difference-between-chemical-and-materials-engineering>
5. <https://www.webpages.uidaho.edu/catalog/2013/chemical-and-materials-engineering.htm>

Course Outcomes:

On completion of the course, the students will be able to:

1. **Interpret** the vitality of phase rule in metallurgy and application of phase rule to one and two component systems.
2. **Understand** the concepts of abrasives, adhesives and liquid.
3. **Know** the importance of basic constructional material, Portland cement in Civil Engineering works.
4. **Acquire** the knowledge about properties and applications of glass, ceramics and refractories.
5. **Understand** the relationships between macroscopic material properties and microscopic structures.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	-	2	1	-	-	-	-	-	-	-	2	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	2	-	-
CO3	2	-	-	-	2	-	-	-	-	-	-	2	-	-
CO4	3	1	1	-	-	-	-	-	-	-	-	1	-	-
CO5	2	2	-	-	1	-	-	-	-	-	-	2	-	-
Average	2.4	1.4	1	1	-	-	-	-	-	-	-	1.8	-	-

AY 2020-21 onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B.Tech III Year – I Sem			
Course Code: J310U	TECHNICAL COMMUNICATION SKILLS (COMMON TO ALL)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Course Objectives:

The students will

1. Understand the role of language as a communication
2. Employ the role of presentation skills in public speaking
3. Know the importance of body language
4. Examine the role of group discussion for getting jobs
5. Understand the importance of interview skills for getting jobs

Module -I Language as a Communication

Introduction-definition-the process of communication-types of communication-barriers of communication; language and communication-properties of language.

Module -II Presentation Skills

Nature and importance of oral presentation-planning the presentation-preparing the presentation-organizing the presentation-rehearsing the presentation and checklist for making oral presentation

Module -III Body Language

Introduction-definition-eye contact- facial expressions-gesture and posture.

Module -IV Group Discussion

Nature of GD- Characteristics and Strategies of GD-Techniques for Individual Contribution-Group Interaction Strategies.

Module -V Interview Skills

The Interview Process-Characteristics of Interview-Pre-interview preparation Techniques-interview questions-FAQ- Projecting a Positive Image and Alternative Interview Format.

References:

- 1) Raman, Meenakshi and Sangeeta Sharma. Technical Communication-Principles and Practice. Third Edition, New Delhi: UP., 2015.
- 2) Rizvi, M Ashraf. Effective Technical-Communication. New Delhi: Tata McGraw-Hill., 2005.

E-Resources:

1. <https://www.ilstranslations.com/blog/language-vs-communication-theyre-not-the-same-thing/#:~:text=Language%20is%20a%20system%20of,is%20a%20tool%20of%20communication.>

Course outcomes:

The students will be able to

2. Use the language skills in order to better communication
3. Learn the presentation skills and use them in conferences and seminars
4. Identify the role of presentation skills in expressing our feelings and emotions
5. Understand the role of group discussion for getting jobs
6. Know the importance of interview skills for getting jobs

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	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
CO1	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO2	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO5	-	-	-	-	-	-	-	-	2	3	-	3	-	-
Total	-	-	-	-	-	-	-	-	2	3	-	3	-	-

AY 2020-21 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – I Sem			
Course Code: J310V	ENTREPRENEURSHIP (Open Elective - I)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Course Objective:

The students will

1. To imploye an understanding of the dimensions and traits required to become an entrepreneur.
2. To understand the Entrepreneurial process and also inspire them to be Entrepreneurs
3. To understand the Entrepreneurship and its role in the society
4. To understand the process of Entrepreneurship & preparing business plans
5. To gain knowledge about the Entrepreneurship Development Institutions of Government

Module 1:

UNIT - I:

Understanding Entrepreneurial Mindset- The revolution impact of entrepreneurship- The evolution of entrepreneurship - Functions of Entrepreneurs – types of entrepreneurs.

UNIT - II:

Approaches to entrepreneurship- Process approach- Role of entrepreneurship in economic development- Twenty first century trends in entrepreneurship.

Module 2:

UNIT - I:

The individual entrepreneurial mind-set and Personality- The entrepreneurial journey-Stress and the entrepreneur - the entrepreneurial ego - Entrepreneurial motivations- Motivational cycle – Entrepreneurial motivational behavior – Entrepreneurial competencies.

UNIT - II:

Corporate Entrepreneurial Mindset, the nature of corporate entrepreneur-conceptualization of corporate entrepreneurship Strategy-sustaining corporate entrepreneurship.

Module 3:

UNIT - I:

Launching Entrepreneurial Ventures - opportunities identification- Finding gaps in the market place – techniques for generating ideas- entrepreneurial Imagination and Creativity- the nature of the creativity process - Innovation and entrepreneurship.

UNIT - II:

Methods to initiate Ventures- Creating new ventures-Acquiring an Established

entrepreneurial venture- Franchising- advantage and disadvantages of Franchising.

Module 4:

UNIT - I:

Legal challenges of Entrepreneurship - Intellectual property protection - Patents, Copyrights - Trademarks and Trade secrets - Avoiding trademark pitfalls

Feasibility Analysis - Industry and competitor analysis –

UNIT - II:

Formulation of the entrepreneurial Plan- The challenges of new venture start-ups, developing an effective business model – Sources of finance - Critical factors for new venture development - The Evaluation process.

Module 5:

UNIT - I:

Strategic perspectives in entrepreneurship - Strategic planning - Strategic actions-strategic positioning- Business stabilization - Building the adaptive firms - Understanding the growth stage – Internal growth strategies and external growth strategies, Unique managerial concern of growing ventures.

UNIT - II:

Initiatives by the Government of India to promote entrepreneurship, Social and women entrepreneurship -T-hub, J-hub

Text Books:

1. D F Kuratko and T V Rao, Entrepreneurship- A South-Asian Perspective, Cengage Learning, 2012.
2. Bruce R. Barringer/ R. Duane Ireland, Entrepreneurship Successfully launching new ventures, 4e, Pearson, 2015
3. S. S.Khanka, Entrepreneurship Development, S. Chand Publications, 2015. Stuart Read, Effectual Entrepreneurship, Routledge, 2013.

Reference Books:

1. Rajeev Roy, Entrepreneurship, 2e, Oxford publications, 2012
2. Nandan .H, Fundamentals of Entrepreneurship, PHI, 2013
3. Madhurima Lal Shikha Sahai – Entrepreneurship, Excel Books.
4. S.K Mohanthy, Fundamentals of Entrepreneurship, Prentice Hall of India, New Delhi.

E-Resources:

1. Entrepreneur.com
2. BusinessOwnersToolKit.com
3. YourStory.com
4. ASmartBear.com

Course outcomes:

Upon successful completion of the course, the students should be able to

1. Understand the need and significance of Entrepreneurship in the Economy
2. Develop Entrepreneurial Competencies
3. Develop Business Plan with the required contents.
4. Understand contribution of family business and Social Entrepreneurship in the Economy.
5. Plan Strategic perspectives in entrepreneurship

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	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
CO1	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO2	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO5	-	-	-	-	-	-	-	-	2	3	-	3	-	-
Total	-	-	-	-	-	-	-	-	2	3	-	3	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – II Sem			
Course Code: J32OA	CONSTRUCTION MANAGEMENT, CONTRACTS AND VALUATION (Open Elective-II)	L	T	P	D
Credits:3		3	0	0	0

Pre-requisite: Construction Technology and Project Management, Estimation and Costing.

Course Objectives:

This course will enable students to:

1. Study the different tools and techniques for project management.
2. Explain the various types of organization and their impact on and suitability to construction projects.
3. Study the various safety concepts and requirements applied to construction industry.
4. Differentiate the different types of contracts.
5. Study purpose of valuation and types of valuation.

Module 1:

Unit 1: Concept of a Project

Characteristic features – Project Life cycle – Phases – Project Management – tools and techniques for project management – role of project managers.

Module 2:

Unit 1: Project Management Plan and Objectives

Programming – scheduling – project organization – organization and project team – role of communication in project management – controlling systems.

Module 3:

Unit 1: Safety Management Function

Importance of safety in construction industry, Line versus staff authority, Safety responsibility and accountability in construction industry, Safety organizations, Role of various parties, duties, responsibilities of top management, site managers, supervisors etc., Role of safety officers, Responsibilities of general employees, Safety administration.

Module 4:

Unit 1: Types of contract documents

Essentials of contract agreement – legal aspects, penal provisions on breach of contract.

Definition of the terms – Tender, earnest money deposit, security deposit, tender forms, documents, and types. Acceptance of contract documents. Termination of contract, completion certificate, quality control, right of contractor, refund of deposit. Administrative approval – Technical sanction. Nominal muster roll, measurement books – procedure for recording and checking measurements – preparation of bills.

Module 5:

Unit 1: Valuation

Types of value, purposes of valuation factors affecting value. Different methods of valuation for different types of assets such as land and building, horticulture, historical places. Valuation Report, contents, standard formats, Case study of any one Report.

Text Books:

1. "Construction Technology" by Subira K. Sarkar, Subhajit Saraswathi / Oxford University Press, 3rd edition, Apr 2009.
2. "Project management- strategic Financial Planning, Evaluation and Control" by B M Patel, Vikas Publishing House Pvt. Ltd. New Delhi, 2nd edition oct 2000.

Reference Books:

1. "Total Construction Project Management" by George J.Ritz , McGraw-Hill Inc, 2nd edition Jan 2013.
2. "Construction Project Management Planning, Scheduling and Control" by K K Chitkara

E-Resources:

1. <https://nptel.ac.in/courses/105/103/105103093/>
2. <https://nptel.ac.in/courses/105/103/105103023/>

Course Outcomes:

On completion of the course, the students will be able to:

1. **Describe** the different approaches for successful handling of the project.
2. **Apply** different plans and schedules for the development of the project.
3. **Describe** the importance of safety management in construction industry.
4. **List** out the different tenders and contract document for a construction project.
5. **Evaluate** the different types of reports for different construction projects.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	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
CO1	2	1	-	-	2	1	-	-	2	-	3	1	1	-
CO2	2	1	2	-	-	-	-	-	-	-	2	2	2	-
CO3	2	1	-	-	-	3	-	-	-	-	-	1	1	-
CO4	2	1	-	-	-	2	-	-	-	-	3	-	1	-
CO5	2	2	-	-	-	-	-	-	-	-	2	-	1	-
Average	2	1.4	0.4	-	0.4	1.2	-	-	0.4	-	2	0.8	1.4	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – II Sem			
Course Code: J32OB	ENERGY AUDIT & GREEN BUILDINGS (Open Elective-II)	L	T	P	D
Credits:3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

This course will enable students to:

1. Study the various energy scenarios and energy auditing methodology.
2. Explain various renewable and non-renewable sources of energy.
3. Describe the best green building practices adopted along with cost/benefit and life-cycle analysis of green buildings.
4. Explain the efficient use of waste materials in construction industry
5. Create awareness about the principles of green building technology and to have insight about the criteria for rating systems.

Module 1:

Unit 1: Energy Scenarios:

Energy Conservation-Energy Audit-Energy Consumption-Energy Security-Energy Strategy-Clean Development Mechanism.

Unit 2: Types of Energy Audits and Energy-Audit Methodology:

Definition of Energy Audit-Place of Audit-Energy- Audit Methodology-Financial Analysis-Sensitivity Analysis-Project Financing Options-Energy Monitoring and Training.

Module 2:

Unit 1: Environmental Audit:

Environmental Audit; Introduction-Necessity-Norms. Types: Objectives-Bases types; Liabilities Audit-Management Audit-Activities Audit-Client drive and types; regulatory external audits-independent external audit-internal environmental audit-third party audit.

Unit 2: Environmental Impact Assessment:

Introduction-EIA regulations-Steps in Environmental impact assessment process-benefits of EIA-limitations of EIA-Environmental Clearance for Civil Engineering Projects.

Module 3:

Unit 1: Energy Sources:

Renewable and Non-renewable sources of energy - Coal, Petroleum, Nuclear, Wind,

Solar, Hydro, Geothermal sources, potential of these sources, hazards.

Unit 2: Energy Conservation:

Introduction-Specific objectives-need of energy conservation-LEED India rating system and Energy Efficiency.

Module 4:

Unit 1: Green Building:

Introduction-Definition-Benefits-Principles; Planning concept of Green Building-Salient features of Green Building-Environmental Design-Strategies for Building Construction-Process; Improvement in Environmental Quality in Civil Structure. Materials; Bamboo, Rice Husk Ash, Concrete, Plastic Bricks-Reuse of waste materials- Plastic, Rubber, News Paper, Wood, Non-Toxic paint, Green roofing.

Module 5:

Unit 1: Rating system for Green Building:

Leadership in Energy and Environmental Design (LEED) Criteria-Indian Green Building Council (IGBC) Green Rating-Green Rating for Integrated Habitat Assessment (GRIHA) criteria-HVAC unit in Green Building-Certification Programs (including GEM and ECBC Certifications).

Text Books:

1. “Sustainable construction: Green Building design and delivery” by Kibert, C.J.(John Wiley Hoboken, New Jersey).
2. “Non-Conventional Energy resources” by Chauhan, D S Sreevasthava, S K (New Age International Publishers, New Delhi).
3. “Alternative Building Materials and Technologies” by Jagadeesh, K S, Reddy Venkatta Rama, Nanjunda Rao K S (New Age International Publishers, New Delhi).
4. “Green Buildings” by Gevorkian (McGraw hill publication).

Reference Books:

1. “Handbook of Green Building Design and Construction” by Sam Kubba (Butterworth-Heinemann).
2. Emerald Architecture: case studies in green buildings, The Magazine of Sustainable Design.
3. Energy Conservation Building Code 2017.

E-Resources:

1. <https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ce06>
2. <https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ce40>

Course Outcomes:

On completion of the course, the students will be able to:

1. **Differentiate** and select best of various energy scenarios and energy auditing methodology.
2. **Identify** various Renewable and Non-renewable sources of energy.
3. **Justify** others to use the waste materials efficiently and effectively.
4. **Explain** the application of design guidelines of Green Building considering the Energy Conservation Measures.
5. **Discuss** the building codes, relevant legislation governing the consumption of resources.

CO-PO/PSO Mapping Chart (Draft) (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	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
CO1	1	2	1	1	-	1	2	-	-	-	-	-	1	1
CO2	1	2	1	1	-	2	2	-	-	-	-	-	1	-
CO3	2	1	2	1	-	1	2	-	-	-	-	-	-	1
CO4	1	1	1	1	-	2	2	-	-	-	-	-	1	1
CO5	-	1	1	1	-	1	2	-	-	-	-	-	1	-
Average	1	1.4	1.2	1	-	1.4	2	-	-	-	-	-	0.8	0.6

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – II Sem			
Course Code: J320C	HYBRID ELECTRIC VEHICLES (Open Elective-II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

This course will enable students to:

1. Understand working of different configurations of electric vehicles, and its components
2. Understand hybrid vehicle configuration and performance analysis.
3. Introduce the transmission configuration and its analyze the characteristics
4. Analyze the different speed control techniques
5. Design and evaluate the sizing of components in hybrid vehicles.

MODULE -I: History of hybrid and electric vehicles – social and environmental importance of hybrid and electric vehicles – impact of modern drive-trains on energy supplies – Basics of vehicle performance, vehicle power source characterization transmission characteristics – Mathematical models to describe vehicle performance.

MODULE -II: Basic concept of hybrid traction – Introduction to various hybrid drive train topologies – power flow control in hybrid drive – train topologies-Fuel efficiency analysis.

MODULE -III: Introduction to electric components used in hybrid and electric vehicles- Configuration and control of DC motor drives-Configuration and control of introduction motor drive configuration and control of permanent magnet motor drives configuration and control of switch reluctance- motor drives, drive system efficiency.

MODULE -IV: Matching the electric machine and the internal combustion engine (ICE) Sizing the propulsion-motor, sizing the power electronics selection the energy storage technology – Communications, supporting subsystems.

MODULE -V: Introduction to energy management and their strategies used in hybrid and electric vehicle-Classification of different energy management strategies comparison of different energy management strategies implementation issues of energy strategies.

TEXT BOOKS:

1. Iqbal Husain, "Electric and Hybrid Electric Vehicles", CRC Press, 2011.
2. Wei Liu, "Hybrid Electric Vehicle System Modeling and Control", Second Edition, WILEY, 2017.
3. Sira – Rameez ,R.SilvaOrtigoza, control Design techniques in power electronics Devices, Springer.
4. Siew – Chong tan, Yuk-Ming lai Chi Kong Tse, “Sliding mode control of switching power Converters”.

REFERENCE BOOKS:

1. James Larminie and John Lowry, "Electric Vehicle Technology Explained", Second Edition 2012.
2. Christopher D Rahn, Chao-Yang Wang, "Battery Systems Engineering", Wiley, 2013.

E - Resources:

1. <https://nptel.ac.in/courses/108/103/108103009/>

Course Outcomes:

The students will be able to

1. **Understand** the working of different configurations of electric vehicles, hybrid vehicles and its components.
2. **Apply** the basic concepts of batteries and Motors in the design of Electric and Hybrid Vehicles.
3. **Differentiate** the modes of operation of Hybrid Vehicles.
4. **Analyze** the performance of hybrid vehicles.
5. **Design** the basic parameters of Electric and Hybrid Electric Vehicles.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3		2	-	-	-	2	-	-	-	-	-	3	2
CO2	3	2	3	2	-	-	2	-	-	-	-	-	2	2
CO3	3	2	3	-	-	-	-	-	-	-	-	2	2	2
CO4	2	3	2	-	-	-	-	-	-	-	-	2	3	3
CO5	2	3	3	-	-	-		2	-	-	-		2	2
Average	2.6	2.5	2.6	-	-	-	2	2	-	-	-	2	2.4	2..2

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – II Sem			
Course Code: J32OD	ENERGY AUDITING CONSERVATION AND MANAGEMENTS (Open Elective-II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

The students will

1. To understand the need of Energy Audit and Energy Conservation Schemes.
2. To know the necessity of conservation of energy.
3. To generalize the methods of energy management.
4. To illustrate the factors to increase the efficiency of electrical equipment.
5. To detect the benefits of carrying out energy audits.

MODULE -I: Basic Principles of Energy Audit: Energy Audit-

Unit-I: Definitions, Concept, Types of audit, Energy index, Cost index, Pie charts, Sankey diagrams.

Unit-II: Load profiles, Energy conservation schemes- Energy audit of industries- Energy saving potential, Building energy audit.

MODULE -II: Energy Management

Principles of energy management, organizing energy management program, Initiating, Planning, Controlling, Promoting, Monitoring, Reporting, Energy manger, Qualities and functions, Language, Questionnaire – Check list for top management.

MODULE -III: Energy Efficient Motors

Energy efficient motors, Factors affecting efficiency, Loss distribution, Constructional details, Characteristics - Variable speed, Variable duty cycle systems, RMS HP- Voltage variation-Voltage unbalance- Over motoring- Motor energy audit.

MODULE -IV: Power Factor Improvement, Lighting and Energy Instruments

Unit-I: Power factor – Methods of improvement, Location of capacitors, Pf with non-linear loads, Effect of harmonics on power factor.

Unit-II: Power factor motor controllers - Good lighting system design and practice, Lighting control , Lighting energy audit - Energy instruments- Wattmeter, Data loggers, Thermocouples, Pyrometers, Lux meters, Tongue testers ,Application of PLC's.

MODULE -V: Economic Aspects and Analysis

Economics analysis-Depreciation methods, Time value of money, Rate of return, Present worth method, Replacement analysis, Life cycle costing analysis- Energy efficient motors- Calculation of simple payback method, Net present worth method- Power factor correction, Lighting -Applications of life cycle costing analysis, Return on investment.

TEXT BOOKS

1. W.R. Murphy & G. Mckay, “Energy Management”, Butter worth, Heinemann Publications, Second Edition, 2009.
2. Paul o’ Callaghan, “Energy Management”, Tata Mc-Graw Hill Book Company- First Edition, 1998.
3. W.C.Turner, “Energy Management Hand Book”, CRC Press, First Edition, 2004.

REFERENCE BOOKS

1. John .C. Andreas, “Energy Efficient Electric Motors”, CRC Press, Third Edition, 1992.
2. Great Britain, “Energy Management and Good Lighting Practice: Fuel Efficiency- Booklet Volume 12-EEO, 1989.

E-Resources:

1. www.beeindia.gov.in

Course Outcomes:

On completion of the course, the students will be able to:

1. **Tell** energy audit of industries.
2. **Predict** management of energy systems.
3. **Sequence** the methods of improving efficiency of electric motor.
4. **Analyze** the power factor and to design a good illumination system.
5. **Determine** pay back periods for energy saving equipment.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	-	-	-	-	3	3	-	3	-	-	2	-	-
CO2		-	-	-	-	2	2	-	3	-	3	3	3	-
CO3	2	-	-	-	-	-	2	-	2	-	3		2	-
CO4	3	-	-	-	-	-	3	-		-	2	2	2	-
CO5	3	-	-	-	-	-	-	-	2	-	2	3	3	-
Average	2.2	-	-	-	-	1.2	2	-	2	-	2	2	2	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – II Sem			
Course Code: J32OE	FUNDAMENTALS OF OPERATIONS RESEARCH (Open Elective-II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Engineering Mathematics

Course Objectives:

This course will enable students to

1. Get the basic knowledge of Linear Programming and its applications to engineering problems and able to formulate a problem in LP model, and solve it using graphical method and Simplex method.
2. Be taught about the variants of the LP problem such as Transportation, Assignment, and Sequencing problems
3. Learn to find the optimal replacement time of capital cost equipment, and application of Group Replacement strategy
4. Learn the importance of maintaining optimal inventory in any industry, and be familiarized with the intricacies of waiting line models faced in real world situations
5. Understand the basics of Network analysis (CPM and PERT) and Project Cost Analysis; Learn Simulation and its applications.

Module 1

Unit 1: Introduction: Development – Definition – Scope, Characteristics and Phases – Types of Operations Research models – applications.

Unit 2: Allocation: Linear Programming Problem - Formulation – Graphical solution – Simplex method – Artificial variables techniques: Two-phase method, Big-M method; Duality Principle.

Module 2

Unit 1: Transportation Models: Formulation – Optimal solution, unbalanced transportation problem – Degeneracy

Unit 2: Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem; Traveling Salesman problem.

Module 3

Unit 1: Sequencing: Introduction – Flow-Shop sequencing – ‘n’ jobs through two machines – ‘n’ jobs through three machines – Job-shop sequencing – two jobs through ‘m’ machines

Unit 2: Replacement: Introduction – Replacement of capital cost items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail suddenly and completely- Group Replacement.

Module 4

Unit 1: Inventory: Introduction – Single item, Deterministic models – Types - Purchase inventory models with one price break and multiple price breaks – inventory models with and without shortage cost. Stochastic models – demand discrete variable or continuous variable – Single Period model with no setup cost.

Unit 2: Waiting lines: Introduction – Terminology - Single Channel – Poisson arrivals and Exponential Service times – with infinite population and finite population models.

Module 5

Unit 1: Network analysis (CPM and PERT): Basic Concepts of Network Analysis - Network diagram - Critical Path Method - Terminology in CPM 804 – Float – Limitations of CPM - PERT - Project Cost Analysis - Comparison between CPM and PERT.

Unit 2: Simulation: Definition – types of simulation models- applications, advantages and disadvantages - Brief introduction of simulation languages – simple problems on inventory and queuing using random numbers.

Text Books:

1. J. K. Sharma, “Operations Research”, MacMillan Publishers India Ltd, 4th Edition 2009.
2. A.C.S. Kumar, “Operations Research (Quantitative Analysis for Business Decisions)”, Yes Dee Publishers, 1st Edition, 2015.

Reference Books:

1. Maurice Saseini, ArhurYaspan, and Lawrence Friedman, “Operations Research: Methods and Problems”, Literary Licensing Publisher, 2013
2. A. M. Natarajan, P. BalaSubramani and A. Tamilarasi “Operations Research” Pearson Education, 4th Edition, 2009.
3. Wagner H. M, “Principles of Operations Research”, PHI Publications, 2nd Edition, 2006.
4. Hillier / Libermann “Introduction to Operations Research”, MacMillan Publishers, 10th Edition, 2017.

E - Resources:

1. <https://rb.gy/1ckbxh>
2. <https://rb.gy/gev0g5>
3. <https://nptel.ac.in/courses/112/106/112106134/>
4. <https://nptel.ac.in/courses/111/107/111107128/>

Course Outcomes:

On completion of the course, the students will be able to:

1. **Allocate** optimally the resources in any industry to maximize the overall effectiveness parameter, determine the number of each item to be produced
2. **Find** the optimal number of units to be transported such that the total transportation cost will be minimum, and Assign the required men / machines to perform the given tasks in an optimal way
3. **Schedule** and sequence production runs by proper allocation of machines and men to get maximum gain and Compute the economic order quantity. Find the optimal replacement period for capital cost items
4. **Decide** the optimal inventory to be maintained under different situations involving different types of demand and inventory costs, find how to strike a balance between the waiting time cost and service facility cost for different waiting line models
5. **Apply** the techniques of Network Analysis like CPM and Pert for Project Cost Analysis. Apply Simulation methods to inventory and queuing problems

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	3	2	-	-	2	-	-	-	-	-	2		
CO2	3	3	3	-	-	2	-	-	-	-	-	2		
CO3	2	3	2	-	-	1	-	-	-	-	-	2		
CO4	3	3	2	-	-	2	-	-	-	-	-	2		
CO5	2	3	1	-	-	1	-	-	-	-	-	2		
Average	2.4	3	2	-	-	1.6	-	-	-	-	-	2		

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: III Year – II Sem			
Course Code: J32OG	SOFTWARE DEFINED RADIO (Open Elective-II)	L	T	P	D
Credits: 3		3	0	0	0

Prerequisite: Digital Signal Processing, TCP / IP

Course Objectives:

The objectives of this course is

1. To provide fundamentals and state of the art concepts in software defined radio.
2. To Analyze the analog RF components as front end block in implementation of SDR.
3. To Visualize digital hardware architectures and development methods.
4. To Understand the radio resource management in heterogeneous networks.
5. To Remember the object oriented representation of radio and network resources.

Module -I:

Unit-1

Introduction: The Need for Software Radios, what is Software Radio, Characteristics and benefits of software radio- Design Principles of Software Radio, RF Implementation issues the Purpose of RF Front – End, Dynamic Range- The Principal Challenge of Receiver Design

Unit-2

RF Receiver Front- End Topologies- Enhanced Flexibility of the RF Chain with Software Radios- Importance of the Components to Overall Performance- Transmitter Architectures and Their Issues- Noise and Distortion in the RF Chain, ADC and DAC Distortion.

Module -II:

Unit-1

Profile and Radio Resource Management: Communication Profiles- Introduction, Communication Profiles, Terminal Profile, Service Profile, Network Profile, User Profile, Communication Profile Architecture, Profile Data Structure

Unit-2

XML Structure, Distribution of Profile Data, Access to Profile Data, Management of Communication Profiles, Communication Class marks, Dynamic Class marks for Reconfigurable Terminals, Compression and Coding, Meta Profile Data

Module -III:

Unit-1

Radio Resource Management in Heterogeneous Networks: Introduction, Definition of Radio Resource Management, Radio Resource Units over RRM Phases, RRM Challenges and Approaches, RRM Modelling and Investigation Approaches, Investigations of JRRM in Heterogeneous Networks

Unit-2

Measuring Gain in the Upper Bound Due to JRRM, Circuit Switched System, Packet-Switched System, Functions and Principles of JRRM, General Architecture of JRRM, Detailed RRM Functions in Sub-Networks and Overall Systems

Module -IV:

Unit-1

Reconfiguration of the Network Elements: Introduction, Reconfiguration of Base Stations and Mobile Terminals, Abstract Modelling of Reconfigurable Devices, the Role of Local Intelligence in Reconfiguration, Performance Issues, Classification and Rating of Reconfigurable Hardware, Processing Elements, Connection Elements, Global Interconnect Networks, Hierarchical Interconnect Networks

Unit-2

Installing a New Configuration, Applying Reconfiguration Strategies, Reconfiguration Based on Comparison, Resource Recycling, Flexible Workload Management at the Physical Layer, Optimized Reconfiguration, Optimization Parameters and Algorithms, Optimization Algorithms, Specific Reconfiguration Requirements, Reconfiguring Base Stations, Reconfiguring Mobile Terminals

Module -V:

Unit-1

Object – Oriented Representation of Radios and Network Resources: Networks- Object-oriented Programming- Object Brokers- Mobile Application Environments- Joint Tactical Radio System.

Unit-2

Case Studies in Software Radio Design: Introduction and Historical Perspective, SPEAKeasy- JTRS, Wireless Information Transfer System, SDR-3000 Digital Transceiver Subsystem, Spectrum Ware, CHARIOT.

TEXT BOOKS:

1. Software Defined Radio Architecture System and Functions- Markus Dillinger, Kambiz Madani, WILEY 2003
2. Software Defined Radio: Enabling Technologies- Walter Tuttle Bee, 2002, Wiley Publications.

REFERENCE BOOKS:

1. Software Radio: A Modern Approach to Radio Engineering - Jeffrey H. Reed, 2002, PEA Publication.
2. Software Defined Radio for 3G - Paul Burns, 2002, Artech House.
3. Software Defined Radio: Architectures, Systems and Functions - Markus Dillinger, Kambiz Madani, Nancy Alonistioti, 2003, Wiley.
4. Software Radio Architecture: Object Oriented Approaches to wireless System Engineering– Joseph Mitola, III, 2000, John Wiley & Sons.

Course Outcomes:

On completion of this course, the students:

1. **Understand** the design principles of software defined radio.
2. **Analyze** the analog RF components as front end block in implementation of SDR.
3. **Visualize** digital hardware architectures and development methods.
4. **Understand** the radio resource management in heterogeneous networks.
5. **Remember** the object oriented representation of radio and network resources.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	1	1	-	-	-	-	-	-	-	-	-	2	-	1
CO2	3	2	1	1	-	-	-	-	-	2	2	2	-	2
CO3	2	1	-	-	-	-	-	-	-	-	-	2	-	1
CO4	2	2	2	-	-	2	-	-	-	-	2	3	-	2
CO5	2	1	-	-	-	-	-	-	-	-	-	2	-	1
Average	2	1.4	0.6	0.2	-	0.4	-	-	-	0.4	0.8	2.2	-	1.4

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: III Year – II Sem			
Course Code: J320H	BASICS OF IC TECHNOLOGY (Open Elective-II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Electronic devices and circuits Switching Theory & Logic Design, Pulse & Digital Circuits

Course Objectives:

The students will

1. To introduce the basic building blocks of linear integrated circuits.
2. To teach the linear and non – linear applications of operational amplifiers.
3. To introduce the theory and applications of analog multipliers and PLL.
4. To introduce the concepts of waveform generation and introduce some special function ICs.
5. To understand and implement the working of basic digital circuits

MODULE 1:

Unit 1: Introduction to Linear Integrated Circuits

Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting.

Unit 2: Non-Linear Applications of OP-AMP

Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator.

MODULE 2:

Unit 1: Introduction to Filters

Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters

Unit 2: wave form generators

Waveform Generators – Triangular, Saw tooth, Square Wave, IC555 Timer -Functional Diagram, Monostable, and Astable Operations.

MODULE 3:

Unit 1: Converters of DAC

Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC

Unit 2: Converters of ADC

Different Types of ADCs – Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

MODULE 4:**Unit 1: Digital Integrated Circuits**

Classification of Integrated Circuits, Comparison of Various Logic Families
Combinational Logic ICs – Specifications.

Unit 2: Applications of Digital ICs

Code Converters, Decoders, Demultiplexers, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers.

MODULE 5:**Unit 1: Combinational Circuits Using TTL 74XX ICs**

Familiarity with commonly available 74XX & CMOS 40XX Series ICs – All Types of Flip-flops, Synchronous Counters, Decade Counters.

Unit 2: Memories

Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

Textbooks:

1. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.
2. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition, 2005

Reference Books:

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2ndEd., 2003.
2. Op Amps and Linear Integrated Circuits-Concepts and Applications James M. Fiore,Cengage Learning/ Jaico, 2009.
3. Operational Amplifiers with Linear Integrated Circuits by K. Lal Kishore – Pearson,2009.
4. Linear Integrated Circuits and Applications – Salivahanan, MC GRAW HILL EDUCATION.
5. Modern Digital Electronics – RP Jain – 4/e – MC GRAW HILL EDUCATION, 2010.

E - Resources:

1. http://fmcet.in/ECE/EC6404_uw.pdf
2. https://www.iare.ac.in/sites/default/files/lecture_notes/LDIC%20Lecture%20Notes.pdf
3. [http://smec.ac.in/sites/default/files/lecture_notes/Course%20File%20of%20LDIC \(Linear%20 and%20Digital%20IC%20Applications\).pdf](http://smec.ac.in/sites/default/files/lecture_notes/Course%20File%20of%20LDIC%20(Linear%20and%20Digital%20IC%20Applications).pdf)
4. http://cretirupati.com/sites/default/files/lecture_notes/LDICA%20Lecture%20notes%20y%20A.Mounika.pdf
5. <http://www.springer.com/engineering/electronics/journal/10470>.
6. <https://www.journals.elsevier.com/microelectronics-journal>
7. <http://nptel.ac.in/courses/117107094/>
8. https://www.youtube.com/watch?v=Nvj_Eu3sJL4
9. <http://freevideolectures.com/Course/2915/Linear-Integrated-Circuits>
10. Analog Electronic Circuits: https://swayam.gov.in/nd1_noc19_ee38/preview
11. Op-amp practical Applications: Design, Simulation and Implementation: https://onlinecourses.nptel.ac.in/noc18_ee10/preview
12. Integrated Circuits, MOSFETS, Op-Amps and their Applications: <https://archive.swayam.gov.in/courses/4441-integrated-circuits-mosfets-op-amps-andtheir-applications>

Course Outcomes:

On completion of the course, the students will be able to:

1. **understanding** of operational amplifiers with linear integrated circuits.
2. **Apply** the knowledge of the different families of digital integrated circuits and their characteristics.
3. **Analyse** the functioning of various design circuits using operational amplifiers for various applications.
4. **Design** various techniques to develop A/D and D/A convertors.
5. **Acquire** hands-on laboratory experience on IC based project kits in above areas according to specifications.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	-	-	-	-	-	-	-	-	-	-	2	2	2
CO2	2	-	-	-	-	-	-	-	-	-	-	-	2	-
CO3	2	2	-	2	-	-	-	-	-	-	-	2	2	-
CO4	2	2	2	2	-	-	-	-	-	-	-	2	2	2
CO5	2	-	2		-	-	-	-	-	-	-	-	2	-
Average	2.2	2	2	2	-	-	-	-	-	-	-	2	2	2

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – II Sem			
Course Code: J32OI	FUNDAMENTALS OF COMPUTER NETWORKS (Open Elective-II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Knowledge on “Digital Logic Design”.
2. Knowledge on “Computer Organization”.

Course objectives:

The Student will:

1. Recognize various layering approaches for networking and understand the functionalities of physical layer.
2. Identify the data link layer protocols, multi access protocols and various internetworking devices.
3. Examine design issues of network layer, services provided to above layer and routing, and congestion control protocols.
4. Examine IP protocol, addressing, various protocols like CIDR, ICMP, ARP and RARP of internet Layer and examination of transport layer services.
5. Examine Transport layer protocols like TCP, UDP and various congestion controlling mechanisms, including application layer services, protocols like HTTP, FTP, E-Mail etc.

Module 1:

Overview of the Internet: Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Comparison of the OSI and TCP/IP reference model.

Physical Layer: Guided transmission media, wireless transmission media.

Connecting Devices: Repeaters, Hubs, Switches, Gateways and Bridges.

Module 2:

Data Link Layer: Design issues, Framing, Error Detection and Error Correction, Hamming Distance, CRC, Flow control and error Control.

Protocols: Noiseless Channels, Noisy Channels,

Multi Access protocols- Random access - ALOHA, CSMA, CSMA/CD and CSMA/CA, Controlled access, Channelization.

Module 3:

Network Layer: Network layer design issues, Store and forward packet switching, connection less and connection oriented network services.

Internetworking: Protocols-IPV4 and IPV6, Logical Addressing-IPV4, IPV6, Tunneling and Packet Fragmentation.

Address Mapping: ARP, RARP, DHCP, ICMP and IGMP.

Routing Algorithms: Shortest Path Finding and Distance Vector Routing Algorithms.

Module 4:

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), The TCP Connection Establishment, The TCP Connection Release, The TCP sliding window, The TCP congestion control

Module 5:

Application Layer: Introduction, services, Application layer paradigms.

Applications: DNS, WWW, HTTP, FTP, E-MAIL, TELNET, SNMP, SSH.

Text Books:

1. Computer Networks, 5E, Peterson, Davie, Elsevier
2. Introduction to Computer Networks and CyberSecurity, Chawan -HwaWu, Irwin, CRC Publications.
3. Computer Networks and Internets with Internet Applications, Comer .

Reference Books:

1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education

E - Resources:

1. https://lecturenotes.in/subject/2234/Computer_Network
2. <http://nptel.ac.in/courses/106102234/>
3. <https://www.iitg.ernet.in/dgoswami/CN-Notes.pdf>
4. <http://www.coursera.org/http://ocw.mit.edu/index.htm>.

Course outcomes:

The Student will be able to

1. **Demonstrate** the networking concepts, various Layering approaches and their functionalities.
2. **Understand** the protocols of Data Link layer, how a medium can be shared among multiple devices and internetworking devices used.
3. **Work** on fragmentation, assigning of logical address and judge on routing, congestion.
4. **Demonstrate** the working of IP Protocol, other protocols of internet layer and services of transport layer.
5. **Explain** the transport layer and application layer protocols, their working

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	2	2	-	-	-	-	-	-	-	-	-	-	2
CO2	3	2	2	-	-	-	-	-	-	-	-	-	2	2
CO3	3	2	2	-	-	-	-	-	-	-	-	-	2	2
CO4	2	2	2	-	-	-	-	-	-	-	-	-	2	2
CO5	2	2	2	-	-	-	-	-	-	-	-	-	2	2
Average	2.4	2.0	2.0	-	-	-	-	-	-	-	-	-	2.0	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – II Sem			
Course Code: J32OJ	INTRODUCTION TO JAVA PROGRAMMING (Open Elective-II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Knowledge on Programming Language.

Course objectives:

The Student will:

1. Familiar with constructors and string handling functions
2. Explain inheritance and polymorphism
3. Familiar with packages and interfaces
4. Familiar with exception handling and multithreading
5. Familiar with applet programming and event handling.

Module 1:

Introduction: OOP concepts, history of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program.

Classes and Objects: concepts of classes, objects, constructors, methods, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion.

String handling: String, String Buffer, String Tokenize.

Module 2:

Inheritance: base class object, subclass, member access rules, super uses, using final with inheritance, method overriding, abstract classes

Interfaces: defining an interface, implementing interface, differences between classes and interfaces and extending interfaces.

Packages: Defining, creating and accessing a package, importing packages, access control, exploring package - java.io

Module 3:

Exception handling: concepts of exception handling, benefits of exception handling, exception hierarchy, checked and unchecked exceptions, usage of-try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.

Module 4:

Multithreading: differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

Applets: concepts of applets, differences between applets and applications, life cycle of applet, types of applets, creating applets, passing parameters to applets.

Module 5:

Event Handling: events, event sources, event classes, event listeners, delegation event model, handling mouse and key board events, adapter classes. The AWT class hierarchy, user interface components-labels, buttons, canvas, scrollbars, text components, checkbox, checkbox groups, choices, lists

Text Books:

1. Java The complete reference, 8th editon, Herbert Schildt, TMH.
2. Under tanding OOP with Java, up dated edition, T.Budd, Pears on education.

Reference Books:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons.
2. An Introduction to OOP, second edition, T. Budd, pearson education.
3. Introduction to Java programming 6th edition, Y. Daniel Liang, pearson education.

E- Resources:

1. www.javasoft.com
2. www.w3schools.com
3. www.tutorialpoint.com
4. www.oracle.com

Course outcomes:

At the end of the course, students will be able to

1. **Familiar** with constructors and string handling
2. **Understand** inheritance and polymorphism
3. **Understand** packages and interfaces
4. **Understand** exception handling and multithreading
5. **Understand** applet programming

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	-	3	-	3	3	-	3	-	-	2	-	-	3	-
CO2	-	-	2	-	-	3	-	3	-	-	3	-	-	3
CO3	3	-	-	3	-	2	-	-	3	-	-	3	-	-
CO4	3	-	-	-	3	-	-	3	3	3	-	-	3	-
CO5	-	3	-	-	-	-	2	-	-	-	3	-	-	3
Average	3.0	3.0	2.0	3.0	3.0	2.5	2.5	3.0	3.0	2.5	3.0	3.0	3.0	3.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – II Sem			
Course Code: J32OK	COMPUTER ORGANIZATION (Open Elective-II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: NIL

Course Objectives:

This course will enable students to:

1. To understand the basic operations of the computer system.
2. To know the functioning of CPU and the control unit.
3. To Analyse various algorithms for arithmetic operations in the computer.
4. To understand different hierarchical memory systems including cache memory and virtual memory.
5. Recognize different ways of communicating with input/output devices and standard I/O interfaces.

Module I

Unit 1 Basic structures of Computers

Computer Types, Functional unit, Basic operational concepts, Bus structures, software, Performance, multiprocessors and multi computers.

Unit 2 Data Representation

Fixed point representation, Floating point representation, Error detection codes.

Module II:

Unit 1 Register Transfer and Micro operations

Register transfer language, Register transfer, Bus and memory transfers, Arithmetic micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

Unit 2 Basic computer organization and Design

Instruction codes, computer registers, computer instructions, Timing and control, instruction cycle

Module III:

Unit 1 Computer Arithmetic

Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-point arithmetic operations, Decimal arithmetic unit, Decimal arithmetic operations.

Module IV:**Unit 1 The Memory System**

Basic concepts, Semiconductor RAM memories, Read-Only memories, speed, Size and Cost, Cache memories, performance considerations, Virtual memories, Secondary storage.

Module V:**Unit 1 Input/output Organization**

Accessing I/O Devices Interrupts, Interrupt hardware, Enabling and disabling interrupts, Direct memory access, Buses, interface circuits, Standard I/O interfaces.

Text Books:

1. Computer Organization-Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Vth Edition, McGraw Hill.
2. Computer System Architecture-M.Moris Mano, IIIrd Edition, Pearson/PHI

Reference Books:

1. Computer Organization and Architecture-William Stallings, Sixth Edition, Pearson/PHI
2. Structures Computer Organization-Andrew S.Tanebaum, 4th Edition PHI/Pearson.

E - Resources:

1. <https://nptel.ac.in/courses/106/103/106103180/>
2. <https://nptel.ac.in/courses/117/105/117105078/>
3. <https://nptel.ac.in/courses/106/105/106105163/>

Course Outcomes:

On completion of the course, the students will be able to:

1. **Illustrate** basic operations of the computer system.
2. **Apply** knowledge of CPU and the control unit.
3. **Apply** various algorithms for arithmetic operations in the computer.
4. **classify** different memory systems.
5. **Produce** knowledge on input/output organization.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	2	-	-	-	-	-	-	-	-	-	2	-
CO4	-	2	3	-	-	-	-	-	-	-	-	-	3	-
CO5	3	-	-	2	-	-	-	-	-	-	-	-	-	-
Average	3.0	2.0	2.5	2.0	-	-	-	-	-	-	-	-	2.5	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech III Year–II Sem.			
Course Code: J32OL	FUNDAMENTALS OF HUMAN COMPUTER INTERACTION (Open Elective-II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: GUI(Windows) Working Knowledge

Course Objectives:

This course will enable students to:

1. Demonstrate an understanding of guidelines, principles, and theories influencing human computer interaction.
2. Design, implement and evaluate effective and usable graphical computer interfaces.
3. Describe and apply core theories, models and methodologies from the field of HCI.
4. Able to apply HCI principles, guidelines, methods, and techniques for human-centred information systems development.
5. Use the information sources available and be aware of the methodologies and technologies supporting advances in HCI.

Module I:

Unit 1:

Introduction: Importance of user Interface – definition, importance of good design.

Benefits of good design. A brief history of Screen design.

Unit 2:

The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics-Principles of user interface.

Module II:

Unit 1:

Design process – Human interaction with computers, importance of human characteristics human consideration.

Unit 2:

Human interaction speeds, understanding business junctions

Module III:**Unit 1:**

Screen Designing: Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition.

Unit 2:

amount of information – focus and emphasis, presentation of information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

Module IV:**Unit 1:**

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls Components – text and messages, Icons and increases.

Unit 2:

Multimedia, colors, uses problems, choosing colors.

Module V:**Unit 1:**

Software tools – Specification methods, interface – Building Tools. Interaction Devices – Keyboard and function keys – pointing devices.

Unit 2:

speech recognition digitization and generation – image and video displays – drivers.

Text Books:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.

Reference Books:

1. Human – Computer Interaction. Alan Dix, Janet Finckay, Gre Goryd, Abowd, Russell Bealg, Pearson Education
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.

E - Resources:

1. <https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/human-computer-interaction-brief-intro>
2. <https://www.interaction-design.org/literature/topics/human-computer-interaction>
3. <https://www.udacity.com/course/human-computer-interaction--ud400>

Course Outcomes:

On completion of the course, the students will be able to:

1. **Explain** the human computer components functions regarding interaction with computer.
2. **Describe** the key design principles for user interfaces.
3. **Apply** an interactive design process and universal design principles to designing HCI systems.
4. **Use** Paradigms, HCI in the software process.
5. **Implement** Interaction design basics.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	2	1	2	2	-	1	-	-	-	-	-	1	-
CO2	1	1	2	2	2	-	1	-	-	-	-	-	2	-
CO3	1	3	3	3	3	-	2	-	-	-	-	-	2	-
CO4	-	2	2	2	1	-	1	-	-	-	-	-	-	-
CO5	1	2	1	1	1	-	1	-	-	-	-	-	2	-
Average	1	2	1.8	2	1.8	-	1.2	-	-	-	-	-	1.4	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – II Sem		
Course Code: J32OM	INTRODUCTION TO MICROPROCESSORS AND MICRO CONTROLLERS (Open Elective-II)	L	T	P/D
Credits: 3		3	0	0

Pre-requisite: Basic Knowledge in IC 's

Course Objectives:

Students will learn to:

1. Study the Architecture of 8085&8086 microprocessor
2. Learn the design aspects of I/O and Memory Interfacing circuits.
3. Study the Architecture of 8051 microcontroller

Module 1:

Unit 1: 8086 Introduction: 8086 Architecture Functional diagrams, Register organization, memory segmentation, programming model, memory addresses, physical memory organization

Unit 2: 8086 Architecture: Architecture of 8086, signal descriptions of 8086- common function signals, Timing diagrams, interrupts of 8086.

Module 2:

Unit 1: Instruction set of 8086: Instruction formats, addressing modes, instruction set, assembler directives, macros.

Unit 2: Assembly language programming of 8086: Simple programs involving logical, branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

Module 3:

Unit 1: I/O Interface: 8255 PPI, Various modes of operation and interfacing to 8086, interfacing keyboard, Display, D/A and A/D converter.

Unit 2: Interfacing with advanced devices: Memory Interfacing to 8086, Interrupt Structure of 8086, Vector Interrupt Table, Interrupt Service Routine.

Module 4:

Unit 1: Introduction to Microcontrollers: Overview of 8051 microcontrollers, architecture, I/O ports, memory organization.

Unit 2: Addressing Modes: Addressing modes and instruction set of 8051, simple programs.

Module 5:

Unit 1: 8051 Real Time control 1: Programming Time Interrupts, Programming

External Hardware Interrupts.

Unit 2: 8051 Real Time control 2: Programming the serial communication interrupts, programming 8051 Timers and counters

Text Books:

1. D.V.Hall, Microprocessors and interfacing, TMGH, 2 Edition 2006.
2. Kenneth.J.Ayala, The 8051 Microcontroller, 3rd Ed., Cengage Learning.

Reference Books:

1. Advanced Microprocessors and Peripherals-A. K. Ray and K.M Bhurchandi, TMH, 2nd Edition 2006.
2. The 8051 Microcontrollers. Architecture and programming and applications- K.Uma Rao, Andhe Pallavi, Pearson, 2009.
3. Microcomputer system 8086/8088 family architecture. Programming and design- Du and GA Gibson, PHI 2nd Edition.

E-Resources:

1. <https://nptel.ac.in/courses/106/108/106108100/>
2. <https://www.youtube.com/watch?v=o6W0opScrKY&list=PLuv3GM6-gsE01L9yDO0e5UhQapkCPGnY3>
3. <https://www.youtube.com/watch?v=liRPtvj7bFU&list=PL0E131A78ABFBFDD0>

Course Outcomes:

Students will be able to:

1. **Design** programs on 8085 microprocessors.
2. **Implement** programs on 8086 microprocessors.
3. **Design** interfacing circuits with 8086.
4. **Design** and implement 8051 microcontroller based systems
5. **Understand** the concepts related to I/O and memory interfacing

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)											Program Specific Outcomes*		
	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 O 1	PS O 2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	1	-	-	-	-	-	-	-	-	-	-
CO3	2	-	2	2	-	-	-	-	-	1	1	-	-	2
CO4	2	-		2	-	-	-	-	-	-	-	-	-	-
CO5	2	-	2	1	-	-	-	-	-	-	-	-	-	-
Average	2	2	2	1.5	-	-	-	-	-	1	1	-	-	2

AY 2020-21 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech III Year – II Sem		
Course Code: J32ON	INTERNET OF THINGS (Open Elective – II)	L	T	P/D
Credits: 3		3	0	0

Pre-Requisites: Nil

Course Objectives:

Students will learn to

1. Understand the basic building blocks of IoT.
2. Analyze the difference between M2M and IoT along with IoT system Management
3. Extend the knowledge in Logical Design of IoT System using Python.
4. Acquire knowledge about IoT Physical Devices and End points.
5. Identify the IoT Physical Servers and cloud offerings.

Module 1:

Unit 1 Introduction to Internet of Things:

Definition and Characteristics of IoT, Physical Design of IoT –IoT Protocols, IoT communication models, IoT Communication APIs

Unit 2 IoT enabled Technologies:

Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

Module 2:

Unit 1 IoT and M2M:

Software defined networks, network function virtualization, difference between SDN and NFV for IoT

Unit 2 Basics of IoT System:

Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER.

Module 3:

Unit 1 Introduction to Python:

Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling.

Unit 2 Python packages:

JSON, XML, HTTPLib, URLLib, SMTPLib.

Module 4:**Unit 1 IoT Physical Devices and Endpoints:**

Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming.

Unit 2 Python program with Raspberry PI-1:

Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

Module 5:**Unit 1 Python program with Raspberry PI-2:**

Python program with Raspberry PI with focus of interfacing external gadgets.

Unit 2: Controlling output, reading input from pins.

Text Books:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

References:

1. Internet of Things by Jeeva Bose 1st edition, Khanna publishing.

Course Outcomes:

Students will be able to

1. **Understand** the basic building blocks of IoT.
2. **Analyze** the difference between M2M and IoT along with IoT system Management
3. **Extend** the knowledge in Logical Design of IoT System using Python.
4. **Acquire** knowledge about IoT Physical Devices and End points.
5. **Identify** the IoT Physical Servers and cloud offerings

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcome s (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	PO 1	PO 2	PO 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	PSO 1	PSO 2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	1	2
CO2	3	3	2	-	-	-	-	-	-	-	-	-	1	2
CO3	3	3	3	-	-	-	-	-	-	-	-	-	2	2
CO4	3	3	3	-	-	-	-	-	-	-	-	-	2	2
CO5	3	3	3	-	-	-	-	-	-	-	-	-	2	2
Average	3.0	3.0	2.8	-	-	-	-	-	-	-	-	-	1.6	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech. III Year – II Sem			
Course Code: J32OP	INTRODUCTION TO SURFACE MINING (Open Elective-II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

The students will

1. To introduce surface mining terms and applicable conditions
2. To acquaint with different machinery used in surface mining
3. To get idea about Drilling and blasting of surface ore bodies.
4. To get idea about lighting, dust, and slopes in surface mines.
5. To know about ore and waste transportation.

Module 1

Unit - 1: Definition, Terminology, Applicability and limitations of surface mining, Classification, Advantages, and dis-advantages of surface mining.

Module 2

Unit - 1: Introduction to surface mining machinery: Equipment selection; Working with rippers, shovels, draglines, shovel-dragline combination; bucket wheel excavator. Disposal of OB/waste material

Module 3

Unit - 1: Drilling & blasting: Drilling mechanism, drilling patters, Drill bits Explosives, Blasting accessories, Bulk explosives, problems in blasting.

Module 4

Unit -1: Basics of Mine lighting, Sources of dust in surface mining, dust control, and slope stabilization

Module 5

Unit - 1: Methods of excavation & transportation – shovel-dumper combination, draglines, surface miner, bucket wheel excavator. Impacts on environment due to surface mining

Textbooks:

1. D.J. Deshmukh, Elements of Mining Technology, Vol 1, Central Techno, 7th Edition, 2001.
2. Principles & Practices of Coal Mining, R.D. Singh

Reference Books:

1. Surface Mining Technology, by Prof S.K. Das, Lovely Prakashan, Dhanbad

E-Resources:

1. https://www.researchgate.net/publication/282572490_Basic_concept_of_mining_technology
2. <http://www.eolss.net/sample-chapters/c05/e6-37-06-01.pdf>

Course Outcomes:

The student will be able to:

1. **Understand** about surface mining terms and conditions of applicability
2. **Learn** about different machinery used in surface mining
3. **Learn** drilling and blasting in surface mining
4. **Understand** mine lighting, dust, and slopes in surface mining
5. **Understand** the transportation of ore and waste in surface mining.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO4	2	2	1	-	-	-	-	-	-	-	-	-	-	-
CO5	3	1	2	-	-	-	-	-	-	-	-	-	-	-
Average	3	2	1.6	-	-	-	-	-	-	-	-	-	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – II Sem			
Course Code: J32OP	Numerical Solution of Partial Differential Equations (Common to CE, EEE,ME,ECE,CSE,IT, ECM& MIE) (Open Elective-II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

This course will enable students to:

1. solve large number of algebraic linear equation by various methods
2. solve one Dimensional Parabolic Equations by numerical methods.
3. solve two Dimensional Parabolic Equations by numerical methods.
4. solve hyperbolic equations by numerical methods by using various methods.
5. solve elliptic equations by numerical methods by various methods

Module 1 : Linear Systems of Equations

Iterative methods for solving large linear systems of algebraic equations: Jacobi, Gauss-seidel and S.O.R methods - Conditions for convergence of them - Methods for accelerating convergence: Lyusternite's& Aitken's methods - Optimum acceleration parameter for S.O.R method.

Module 2 : One Dimensional Parabolic Equations

Explicit and Crank-Nicolson Schemes for - Weighted average approximation - Derivative boundary conditions - Truncation errors - Consistency, Stability and convergence - Lax Equivalence theorem

Module 3: Matrix Norms & Two Dimensional Parabolic Equation

Vector and matrix norms - Eigenvalues of a common tridiagonal matrix - Gerischgorin's theorems- Stability by matrix and Fourier-series methods - A.D.I. methods.

Module 4: Hyperbolic Equations

First order quasi-linear equations and characteristics - Numerical integration along a characteristic - Lax- Wendroff explicit method - Second order quasi-linear hyperbolic equation - Characteristics - Solution by the method of characteristics.

Module 5: Elliptic Equations

Solution of Laplace and Poisson equations in a rectangular region - Finite difference in Polar coordinate Formulas for derivatives near a curved boundary when using a square mesh - Discretisation error - Mixed Boundary value problems.

Text Books:

1. "Numerical Methods for Engineers", Chapra. S.C., and Canale.R.P., Tata McGraw Hill, 5 th Edition, New Delhi,2007.
2. "The Finite Difference Methods in Partial Differential Equations", Mitchel A.R. and Griffiths S.D.F., John Wiley and sons, New York,1980.

Reference Books:

1. "Numerical Solutions of Partial Differential Equations", Morton K.W., Mayers, D.F., Cambridge University Press, Cambridge,2002.
2. "Numerical Solution of P.D.E.",SmithG.D., Oxford University Press, New York,1995.
3. "A first course in the Numerical Analysis of Differential Equations", Iserles A., Cambridge University press, New Delhi, 2010. xx t u u□

E - Resources:

1. <https://www.purplemath.com/modules/systlin1.htm>
2. <https://nptel.ac.in/courses/111/107/111107063/>
3. https://www.researchgate.net/publication/227760098_Numerical_solution_of_two-dimensional_parabolic_equation_subject_to_nonstandard_boundary_specifications_using_the_pseudospectral_Legendre_method
4. https://link.springer.com/chapter/10.1007/978-3-662-09207-1_2
5. https://www.researchgate.net/publication/310744390_Numerical_Solutions_of_Elliptic_Partial_Differential_Equations_by_Using_Finite_Volume_Method

Course Outcomes:

On completion of the course, the students will be able to:

1. Know the knowledge of solving large number of algebraic linear equation.
2. Understand the knowledge of solving one dimensional parabolic equations by numerical methods
3. Recognize the knowledge of solving two dimensional parabolic equations by numerical methods.
4. Apply and understand the knowledge of solving hyperbolic equation by numerical methods.
5. Know the knowledge of solving elliptic equations by numerical methods.

CO-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
3 – Strong; 2 – Medium; 1 - Weak

Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	1	3	-	-	-	-	-	-	-	2	-	-
CO2	3	3	2	3	-	-	-	-	-	-	-	3	-	-
CO3	3	3	2	3	-	-	-	-	-	-	-	3	-	-
CO4	3	3	1	3	-	-	-	-	-	-	-	2	-	-
CO5	3	3	2	3	-	-	-	-	-	-	-	3	-	-
Average	3	3	2	3	-	-	-	-	-	-	-	2	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – II Sem			
Course Code: J32OS	ADVANCED PHYSICS FOR ENGINEERS (Common to CE, EEE, ME, ECE, CSE, IT, ECM&MIE)	L	T	P	D
Credits: 3	(Open Elective-II)	3	0	0	0

Pre-requisite: Nil

Course Objectives:

This course will enable students to:

1. To distinguish between Newtonian Mechanics and special theory of relativity and develop the relationship of length contraction, time dilation and Einstein energy mass relation and to apply the concepts of special theory of relativity in various field of physics and engineering.
2. To understand the importance of hologram.
3. To introduce the fundamental concepts of film deposition.
4. To make the students acquainted with the concepts of photonic crystals.
5. To understand the fundamental concepts of Solar cell Physics.

Module 1: Special Theory of Relativity

Introduction, Concept of theory of relativity, Frames of reference-Inertial, noninertial; Galilean transformation equations, Michelson-Morley experiment, Einstein theory of relativity, Lorentz transformation of space and time, Length contraction, Time dilation, Variation of mass with velocity, Relativistic relation between energy and momentum.

Module 2: Holography

Introduction, Basic principle, Construction and Reconstruction of Hologram, Properties of Hologram, Types of Holograms, Applications- Holographic Interferometry, Acoustic Holography, Holographic Microscopy.

Module 3: Thin films Synthesis

Introduction, Deposition techniques-Pulsed Laser Deposition (PLD), Spray Pyrolysis; Nucleation and growth of the thin films, properties (Mechanical, Electrical, Magnetic and Optical).

Module 4: Photonic Crystals

Important features of photonic crystals, Presence of photonic band gap, anomalous group velocity dispersion, Micro cavity, effects in Photonic Crystals, fabrication of photonic Crystals, Dielectric mirrors and interference filters, PBC based LEDs, Photonic crystal fibers (PCFs), Photonic crystal sensing.

Module-5: Solar cell Physics

Single, poly and amorphous silicon, GaAs, CdS, Cu₂S, CdTe; Origin of photovoltaic effect, Homo and hetero junction, working principle of solar cell, Evaluation of Solar cell parameters, I-V, C-V and C-f characteristics.

Text Books:

1. "Engineering Physics" ,R K Gaur and SL Gupta, Dhanpat Rai Publications, 8th revised Edition, 2006.
2. "Engineering Physics",B K Pandey and S Chaturvedi, Cengage Learning India, Revised Edition, 2014.

Reference Books:

1. "Hand Book of Technologies for Films and coating",R F Bun shah, Noyes publishers,1st Edition, 1996.
2. "Fundamentals of Photonics",B E A Saleh and A C Tech, John Wiley and Sons, New York, 1st Edition, 1993.

E - Resources:

1. <http://physics.mq.edu.au/~jresser/Phys378/LectureNotes/SpecialRelativityNotes.pdf>
2. <http://www.kfupm.edu.sa/centers/CENT/AnalyticsReports/KFUPM-TFSCDec20.pdf>
3. <https://www.journals.elsevier.com/solar-energy-materials-and-solar-cells>
4. <https://www.journals.elsevier.com/journal-of-alloys-and-compounds/>
5. <http://aip.scitation.org/journal/apl>
6. <http://nptel.ac.in/courses/115101011/>
7. [http://nptel.ac.in/courses/117103066/11.](http://nptel.ac.in/courses/117103066/11)

Course Outcomes:

On completion of the course, the students will be able to:

1. **Explain** special theory of relativity and apply its concepts in various fields of physics and engineering.
2. **Analyze** the basic concepts of Holography and applications.
3. **Identify** different concepts of film deposition.
4. **Develop** basic knowledge on the photonic crystals.
5. **Apply** the basic concepts of solar cell physics.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	1	-
CO3	3	1	1	-	1	1	-	-	-	-	-	-	1	-
CO4	2	1	1	-	-	-	-	-	-	-	-	-	1	-
CO5	3	2	1	-	3	2	2	-	-	-	-	-	2	-
Average	2.6	1.6	1	-	2	1.5	2	-	-	-	-	--	1.25	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – II Sem			
Course Code: J32OT	Green Chemistry (Common to CE, EEE, ME, ECE, CSE, IT, ECM& MIE) (Open Elective-II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

This course will enable students to:

1. Acquire knowledge of issues in sustainability as they relate to business and industry internationally and nationally.
2. Examine and evaluate case studies of sustainable practices in business and industry.
3. Knowledge on Non-conventional energy sources.
4. Study the Green synthetic method.
5. Understand and analyse the interconnectivity of global concerns.

Module 1: Green Chemistry - An Overview:

Introduction: Definition, the twelve basic principles of green chemistry. Green synthetic methods.

Module 2: Materials for green chemistry and technology:

Catalysis, environmental friendly catalysts, Biocatalysis, biodegradable polymers, alternative solvents, ionic liquids.

Module 3: Nonconventional energy sources:

Thermo-chemical conversion; direct combustion, gasification, pyrolysis and liquefaction, Bioenergy, Bio photolysis: Hydrogen generation from algae biological pathways; Storage and transportation; Applications.

Module 4: Green Synthetic Methods & Catalysis:

The design and development of environmentally friendly chemical pathways, Microwave synthesis, electro-organic synthesis, Supercritical fluids (SCFs): examples and properties, Extraction with SCFS.

Module-5: Green Chemistry & Sustainable development:

Green chemistry in batteries, production and recycling, Fuel cell and electric vehicles,

Solar energy and hydrogen production, biodiesel, bio-hydrogen, Anaerobic digestion, alcohol production from biomass; Chemical conversion process: hydrolysis and hydrogenation; Best practices in Green Chemistry for sustainable development with suitable examples.

Text Books:

1. "Green Chemistry an Introductory Text", Lancaster, M., Royal Society of Chemistry, Cambridge, UK 2002.
2. "Real World Cases in Green Chemistry", Cann M.C.; Connelly, M.E. American Chemical Society: Washington DC. 2000.

Reference Books:

1. "Green Chemistry: Theory and Practice", Anastas, P.; Warner, J. Oxford University Press: London, 1998.
2. "The 12 Principles of Green Engineering as a Foundation for Sustainability" in Sustainability Science and Engineering: Principles. Zimmerman, J.B.; Anastas, P.T. Ed. Martin Abraham, Elsevier Science. available 2005.
3. "Design through the Twelve Principles of Green Engineering," Anastas, P.; Zimmerman, J. Environmental Science and Technology, 37, 94A - 101A, 2003.
4. "Green Chemistry Challenging Perspectives" ,Tundro, P.; Anastas, P., Oxford Press, Oxford, 2000.
5. "Introduction to Green Chemistry", Matlack, A.S., Marcel Dekker, Inc., New York, 2001.

E - Resources:

1. <https://pubs.rsc.org/en/journals/journalissues/gc#!recentarticles&adv>
2. <https://www.sciencedirect.com/topics/chemistry/green-chemistry>
3. <https://www.intechopen.com/books/green-chemistry/introductory-chapter-principles-of-green-chemistry>
4. <https://www.sigmaaldrich.com/chemistry/greener-alternatives/green-chemistry.html>
5. <https://science.sciencemag.org/content/367/6476/397>

Course Outcomes:

On completion of the course, the students will be able to:

1. **Understand** of Green Chemistry & Green Eng. Principles.
2. **Know** the applications of green routes for synthesis of chemicals.
3. **Use** better awareness about global environmental concerns and green remedies to address these concerns.
4. **Appraise** about tenets of sustainable development and its integration with Green practices.

5. **Realise** about reflections of Green Chemistry on sustainable development initiatives.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 – Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	1	-	1	-	-	-	-	-	-	-	2	-	-
CO2	1	2	-	-	-	-	-	-	-	-	-	1	1	-
CO3	1	1	-	-	-	-	-	-	-	-	-	2	1	-
CO4	2	2	-	-	-	-	-	-	-	-	-	1	1	-
CO5	2	-	1	-	-	-	-	-	-	-	-	2	2	-
Average	1.6	1.2	1	1	-	-	-	-	-	-	-	1.2	1.25	-

AY 2020-21 onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B.Tech III Year – II Sem			
Course Code: J32OU	TECHNICAL WRITING SKILLS (Common to All) (Open Elective-II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Course Objectives:

The students will

1. Know the elements of effective writing
2. Understand the letter writing and resume writing
3. Classify the types and styles of report writing
4. Understand the proposal writings
5. Examine the research papers and research articles

Module-I Elements of Effective Writing

Introduction-Characteristics of Good Writing-words, phrases, sentences and developing effective paragraphs.

Module -II Academic Writing

Letter writing and Job Application: Introduction-types of letter writing-the seven C's of letter writing- significance- purpose-structure-layout-principles-planning a letter and cover letter.

Resume writing: Introduction-Resume design- parts of a Resume-Resume Styles and final tips.

Module -III Technical Report Writing

Introduction-importance of Reports-Objectives of Reports-Categories of Reports-Formats-prewriting-structures of reports-types of reports- short reports- long reports-research and writing the report-first draft-revising, editing, and proofreading.

Module -IV Technical Proposals

Introduction-definition and purpose-types-characteristics-structure of proposals-style and appearance-evaluation of proposals.

Module -V Writing Research Papers and Articles

Introduction-writing strategies-nature and significance-types of research papers and articles-journal articles-conference papers-review and research articles and elements of articles.

References:

1. Raman, Meenakshi and Sangeeta Sharma. Technical Communication-Principles and Practice. Third Edition, New Delhi: UP., 2015.
2. Rizvi, M Ashraf. Effective Technical-Communication. New Delhi: Tata McGraw-Hill., 2005.
3. Butterfield, Jeff. Soft Skills for Everyone. Delhi: Cenege., 2010.
4. Cooper, Donald R. Pamela S Schindler. Business Research Methods. New Delhi: Tata McGraw-Hill, 2006.

E-Resources:

1. <https://clickhelp.com/clickhelp-technical-writing-blog/11-skills-of-a-good-technical-writer/>

Course outcomes:

At the end of this course students will be able to

1. Use the characteristics of good writing like words, phrases, sentences and paragraphs.
2. Understand the role of letters and resumes getting jobs.
3. Utilize the report writing skills in business environment
4. Define the style, appearance, and evaluation of proposals.
5. Write the academic and research papers and articles

CO-Articulation Matrix														
CO-PO/PSO Mapping Chart														
3/2/1 indicates the strength of the calculation														
3-Strong, 2-Medium, 1-Low														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	PO 1	PO 2	P O3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PS O1	PSO2
CO1	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO2	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO5	-	-	-	-	-	-	-	-	2	3	-	3	-	-
Total	-	-	-	-	-	-	-	-	2	3	-	3	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech III Year – II Sem			
Course Code: J32OV	RESEARCH METHODOLOGY (Open Elective - II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Course Objectives: To Understand the

1. Concept / fundamentals of research and their types
2. Practical application of various research techniques
3. Importance of measurement techniques and sampling techniques
4. Importance of coding, editing, tabulation and analysis in doing research
5. Applying the concept of statistical analysis which includes various parametric test and non-parametric test and ANOVA technique and understand technique of report writing

Module 1:

Research— concepts – research methodology – approaches to business research – scientific methods – types of research – research design.

Module 2:

Formulation and planning of research - selection of research problem – literature review - setting of objectives - formulation of hypotheses – measurement of variables – research plan — conducting the research

Module 3:

Data collection— methods and techniques of primary data & secondary data – interviews – surveys – census and sample surveys – Editing, classification and codification of data – using computer packages.

Module 4:

Data Analysis – qualitative data analysis – descriptive quantitative data analysis – tests of measurement and quality – using computer packages

Module 5:

Writing and presenting the report—planning report writing —report format – footnotes and bibliography - references and citations presentation

Text Books:

1. Mathew David & Carole D. Sutton, Social Research: The Basics, Sage Publications, New Delhi
2. O.R. Krishnaswami, Methodology of Research in Social Sciences, Himalaya Publishing House, Mumbai.
3. Ajai S. Gaur and Sanjaya S. Gaur: Statistical methods for practice and Research, Sage Publishers.
4. Deepak Chawla & Neena Sondhi, Research Methodology, Vikas Publishers, 2011

Reference Books:

1. Naval Bajpai, Business Research Methods, Pearson, 2013
2. CR Kothari, Research Methods and Techniques, New Age International, New Delhi.

E-Resources:

1. <https://nptel.ac.in/courses/121/106/121106007/>

Course outcomes:

Students should be able to

1. **Gain** Knowledge of concept / fundamentals for different types of research
2. **Apply** relevant research techniques
3. **Basics** of Research Methodology and Research Design
4. **Apply** Data Collection methods and the tools for analysis and interpretation
5. **Know** the importance of presentation of data analysis and report writing including referencing style.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 – Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO2	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	3	-	-
CO5	-	-	-	-	-	-	-	-	2	3	-	3	-	-
Average	-	-	-	-	-	-	-	-	2	3	-	3	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – I Sem			
Course Code: J410A	WASTE MANAGEMENT (Open Elective-III)	L	T	P	D
Credits:3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

This course will enable students to:

1. Study about handling of solid waste from cradle to grave.
2. Explain the design and construction of the solid waste treatment system.
3. Study the residue disposed of in an environmentally sound way.
4. Study the design and maintenance of different techniques
5. Discuss about waste minimization.

Module 1:

Unit-1 Introduction

Definition of solid waste, garbage, rubbish-Sources and Types of solid wastes Municipal waste, industrial waste, plastic waste, electronic waste, bio-medical waste and hazardous waste - Characteristics of Solid Wastes: Physical, chemical and biological characteristics-Problems due to improper disposal of solid waste.

Module 2:

Unit 1: Functional Elements of Solid Waste Management

Waste generation and handling at source-onsite storage-Collection of solid wastes Collection methods and services-storage of solid waste- guidelines for collection route layout.

Module 3:

Unit 1: Transfer and Transport of Wastes

Transfer station-types of vehicles used for transportation of solid waste-Processing and segregation of the solid waste- various methods of material segregation. Processing and Transformation of Solid Wastes. Recycling and recovery principles of waste

Unit 2: Management- Composting: definition methods of composting-advantages of composting- Incineration: Definition, methods of Incineration, advantages and disadvantages of incineration.

Module 4:

Unit 1: Treatment and Disposal of Solid Waste

Volume reduction, Open dumping, land filling techniques, Landfills: Classification, Design and Operation of landfills, Land Farming, Deep well injection.

Module 5:

Unit 1: Waste Minimization

Introduction to waste minimization, waste minimization techniques-5R (refuse, reduce, reuse, recover, recycle), municipal waste minimization.

Text Books

1. “Integrated Solid Waste Management” by Tchobanogous, Theissen& Vigil
2. McGraw Hill Publication, 3rd Edition, 2014.
3. “Solid and hazardous waste management” by M.N.Rao and Razia sultana, BS publications.
4. Environmental Engineering by Howard S.Peavy, Donald R.Rowe and George Tchobanogous

Reference Books

1. Environmental engineering by Y.Anjaneyulu, B.Spublication.
2. Environmental Pollution Control Engineering by C.S. Rao; Wiley Eastern Ltd.,New Delhi.
3. Environmental engineering by Gerad Kiley, Tata Mc GrawHill

E-Resources

1. <https://nptel.ac.in/courses/105/105/105105160/>
2. <https://nptel.ac.in/courses/105/106/105106056/>
3. <https://nptel.ac.in/courses/105/103/105103205/>

Course Outcomes

On completion of the course, the students will be able to:

1. **Recall** the components of solid waste management and the laws governing it
2. **Discuss** design, operation and maintenance of landfills, incinerators and composting units.
3. **Explain** the waste minimization.
4. **Discuss** the Reuse of materials as practicable.
5. **Discuss** about Recycle of waste that cannot be used and recovery of resources.

CO-PO/PSO Mapping Chart (Draft) (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	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
CO1	-	-	-	-	-	2	2	3	-	-	-	-	2	1
CO2	-	3	3	-	-	-	2	1	-	-	-	-	2	1
CO3	-	-	-	-	-	2	3	2	-	-	-	-	1	1
CO4	-	-	-	-	-	2	3	2	-	-	-	-	2	2
CO5	-	1	-	-	-	3	2	1	-	-	-	-	2	2
Average	-	0.6	0.6	-	-	1.8	1.2	1.8	-	-	-	-	1.8	1.4

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – I Sem			
Course Code: J41OB	ROAD SAFETY ENGINEERING (Open Elective-III)	L	T	P	D
Credits:3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

This course will enable students to:

1. Study the Fundamentals of Traffic Engineering
2. Explain the Accident Situations
3. Discuss Statistical measures of accident data
4. Explain different parameters responsible for providing road safety
5. Study about Accident prevention.

Module 1:

Unit-1: Fundamentals of Traffic Engineering

Road User Characteristics, Vehicular Characteristics, Applications of Traffic Control Devices, Traffic signs, Road Marking,

Module 2:

Unit-1: Introduction to Road Safety:

Accident Situation in India, International Comparison of Accident Data, Standard Definitions by IRC, Collection of Accident Data, Collision and Condition Diagrams,

Module 3:

Unit-1: Statistical Methods and Analysis of Accident Data:

Methods in Analysis of accident Data, Regression Method, Poisson Distribution, Chi-Squared Distribution, Statistical Comparisons, Black Spot Identification & Investigations,

Module 4:

Unit-1: Road & its Effect on Accidents:

Factors Causing Accidents, Skidding, Factors Determining Skid Resistance, Pedestrian Safety, Measures to Increase Pedestrian Safety, Safety Improvement Strategies, Case Studies

Module 5:

Unit-1: Mitigation Measures:

Accident prevention by better planning, Accident prevention by Better design of roads, Highway operation and accident control measures, Highway Safety Measures during construction, Highway geometry and safety.

Text Books:

1. “Transport planning and Traffic Engineering” by Dr. L. R. Kadiyali, Khanna Publications 9th Edition (2017)
2. ‘Principles of Transportation Engineering’ by Partha Chakroborty & Aminesh Das; Prentice Hall of India, 2nd edition (October 2017).

Reference Books:

1. Fundamentals of Traffic Engineering, Richardo G Sigua
2. Road Safety by NCHRP.

E-Resources:

1. <https://nptel.ac.in/courses/105/101/105101087/>

Course Outcomes:

On completion of the course, students will be able to:

1. **Explain** the Traffic characteristics
2. **Analyze** Collision and Condition Diagrams.
3. **Analyze** Statistical Methods for accident data
4. **Describe** Road & its Effect on Accidents
5. **Explain** Accident preventions.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 – Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	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
CO1	1	1	1	-	-	-	-	-	-	-	-	-	1	1
CO2	1	1	1	-	-	3	2	-	-	-	-	-	2	2
CO3	1	1	1	-	-	3	1	-	-	2	-	2	1	1
CO4	1	1	1	-	-	2	-	-	-	-	-	2	1	2
CO5	1	1	1	-	-	2	-	-	-	-	-	2	1	1
Average	1	1	1	-	-	2	0.6	-	-	0.4	-	1.2	1.2	1.4

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – I Sem			
Course Code: J410C	ELECTRICAL ENGINEERING MATERIALS (Open Elective-III)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Basic Electrical and Electronics Engineering

Course Objectives:

The students will

1. To understand the importance of various materials used in electrical engineering.
2. To obtain a qualitative analysis of their behaviour and applications.
3. To understand Conducting and resistor materials, and their engineering application.
4. To understand Semiconducting materials, their properties and applications.
5. To understand Magnetic materials, Soft and hard magnetic materials and applications; Superconductors

MODULE - I

Unit-I: Dielectric Materials: Dielectric as Electric Field Medium, leakage currents, dielectric loss, dielectric strength, breakdown voltage, breakdown in solid dielectrics, flashover, liquid dielectrics, electric conductivity in solid, liquid and gaseous dielectrics.

Unit-II: Ferromagnetic materials, properties of ferromagnetic materials in static fields, spontaneous, polarization, curie point, anti-ferromagnetic materials, piezoelectric materials, pyro electric materials.

MODULE – II

Magnetic Materials: Classification of magnetic materials, spontaneous magnetization in ferromagnetic materials, magnetic Anisotropy, Magnetostriction, diamagnetism, magnetically soft and hard materials, special purpose materials, feebly magnetic materials, Ferrites, cast and cermet permanent magnets, ageing of magnets. Factors effecting permeability and hysteresis.

MODULE – III

Semiconductor Materials: Properties of semiconductors, Silicon wafers, integration techniques, Large and very large scale integration techniques (VLSI).

MODULE – IV

Unit-I:Materials for Electrical Applications: Materials used for Resistors, rheostats, heaters, transmission line structures, stranded conductors, bimetal fuses, soft and hard solders, electric contact materials, electric carbon materials, thermocouple materials.

Unit-I: Solid, Liquid and Gaseous insulating materials, Effect of moisture on insulation.

MODULE – V

Unit-I: Special Purpose Materials: Refractory Materials, Structural Materials, Radioactive Materials, Galvanization and Impregnation of materials, Processing of electronic materials.

Unit-II: Insulating varnishes and coolants, Properties and applications of mineral oils, Testing of Transformer oil as per ISI.

TEXT BOOKS:

1. “R K Rajput”, “A course in Electrical Engineering Materials”, Laxmi Publications, 2009.
2. “T K Basak”, “A course in Electrical Engineering Materials”, New Age Science Publications 2009.

REFERENCE BOOKS:

1. TTTI Madras, “Electrical Engineering Materials”, McGraw Hill Education, 2004.
2. “AdrianusJ.Dekker”, Electrical Engineering Materials, PHI Publication, 2006.
3. S. P. Seth, P. V. Gupta “A course in Electrical Engineering Materials”, Dhanpat Rai & Sons, 2011.

E - Resources:

1. <https://nptel.ac.in/courses/112/108/112108150/>

Course Outcomes:

After completion of this course, the student will be able to

1. **Understand** various types of dielectric materials, their properties in various conditions.
2. **Evaluate** magnetic materials and their behaviour.
3. **Evaluate** semiconductor materials and technologies.
4. **Acquire** Knowledge on Materials used in electrical engineering and applications
5. **Acquire** Knowledge on Smart materials: Sensors and actuators, piezoelectric, magnetostrictive and electrostrictive materials.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	-	-	-	-	2	3	-	-	-	-	3	-	3
CO2	2	3	3	-	-	-	2	-	-	-	-	2	-	3
CO3	2	3	3	-	-	-	2	-	-	-	-	2	-	2
CO4	2	2	2	-	-	-	2	-	-	-	-	3	-	3
CO5	3	2	2	-	-	-	2	-	-	-	-	2	-	3
Average	2.4	2.5	2.5	-	-	2	2.2	-	-	-	-	2.4	-	2.8

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – I Sem			
Course Code: J41OD	NON CONVENTIONAL ENERGY SOURCES (Open Elective-III)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

The students will

1. elucidate the fundamentals of various sources of Non-Conventional Energy such as Wind, Solar, Biomass, Geo thermal and other renewable energy sources.
2. impart a thorough knowledge about the application of different types of Non-Conventional Energy systems.
3. inculcate the students on feasibility and limitations of various Non-Conventional Energy Systems.
4. Analyze the principle and operation of direct energy conversion.
5. Apply the renewable energy sources to real world electrical and electronics problems.

MODULE –I: WIND ENERGY

Unit-I: Introduction to energy sources-Renewable and non-renewable energy sources – energy consumption as a measure of Nation’s development – Strategy for meeting the future energy requirement – Global and national level energy scenarios –Prospects of renewable energy sources.

Unit-II: Basic principles of wind energy conversion –site selection consideration – types of wind mills – basic components of wind energy conversion systems (WECS) – types of WECS – applications of wind energy – safety system – environmental aspects.

MODULE –II: SOLAR ENERGY

Solar radiation - Physical principles of conversion of solar radiation into heat –Solar constant – Solar energy collectors - flat plate collector – collector efficiency – concentrating collector: focusing type – advantages of focusing collectors – cylindrical parabolic concentrating collector – selective absorber coatings – central receiver tower solar power plant – solar energy storage systems –types – solar driers – solar water heaters - principle of solar photo voltaic cell – solar photo voltaic power generation – MPPT (Maximum Power Point Tracking) – solar pump – solar hydrogen energy.

MODULE –III: ENERGY FROM BIO-MASS

Bio mass conversion technologies - Bio gas generation principle – types of bio- gas

plants – applications of bio-gas plants – bio-mass as a source of energy – energy plantation – thermal gasification of bio mass – energy from agricultural waste – agro thermal power plant – Bio gas-based cogeneration programme – integrated waste management – advantages and disadvantages.

MODULE –IV: GEO-THERMAL AND OCEAN ENERGY

Unit-I: Nature of geo-thermal energy – geo-thermal sources – prime movers for geo- thermal energy conversion – advantages and disadvantages of geo-thermal energy – application of geo-thermal energy.

Unit-II: Principle of ocean thermal energy conversion (OTEC) – open cycle OTEC system – closed cycle – hybrid cycle – prospects of OTEC in India -applications – basic principle and components of tidal power plant – single basin and double basin tidal power plants -site requirements – storage –advantages and limitations of tidal power generation – ocean wave energy conversion devices.

MODULE –V: OTHER ENERGY SOURCES

Unit-I: Basic principle and components of a fuel cell – types of fuel cell – conversion efficiency of fuel cell - advantages and disadvantages of fuel cell – conversion energy and application of fuel cell – basic battery theory – batteries applied for bulk energy storage. **Unit-II:** Hydrogen fuel – hydrogen production – methods - storage – transportation and utilization – hydrogen as alternative fuel for motor vehicle – safety management.

TEXT BOOKS:

1. Rai, G.D., ‘Non-Conventional Energy Sources’, Khanna Publishers, New Delhi, 4th Edition, 2004.
2. Gupta, B.R., ‘Generation of Electrical Energy’, S.Chand & Co. Ltd, New Delhi, 5th Edition, 2014.

REFERENCE BOOKS:

1. Agarwal, M.P., ‘Future Sources of Electrical Power’, S.Chand & Co. Ltd, New Delhi, 1999.
2. Hassan and D.K. Sharma ‘Non-Conventional Energy Resources, S.K. Kataria and Sons Ltd, 2009
3. S.P. Sukhatme, ‘Solar Energy: Principles of Thermal Collection and Storage,’ Tata McGraw Hill, 2015.
4. B.K. Bansal ‘Non-Conventional Energy Resources’ Vikas Publishing Ltd, 2014.

E - Resources:

1. <https://nptel.ac.in/courses/121/106/121106014/>
2. <http://ethesis.nitrkl.ac.in/218/1/Thesis.pdf>

Course Outcomes:

The student will be able to

1. **Understand** the need of utilization of alternate energy resources & fundamentals of various non-conventional energy Systems.
2. **Analyse** the knowledge of Biomass and Geothermal energy sources
3. **Describe** the collection of solar energy, storage of solar energy and its applications.
4. **Illustrate** the potential of Wind and bio mass as a renewable source.
5. **Understand** the potential of geothermal energy and ocean energy as a renewable source.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	-	-	-	-	2	3	-	-	-	-	3	-	3
CO2	2	3	3	-	-	-	2	-	-	-	-	2	-	3
CO3	2	3	3	-	-	-	2	-	-	-	-	2	-	2
CO4	2	2	2	-	-	-	2	-	-	-	-	3	-	3
CO5	3	2	2	-	-	-	2	-	-	-	-	2	-	3
Average	2.4	2.5	2.5	-	-	2	2.2	-	-	-	-	2.4	-	2.8

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: IV Year – I Sem			
Course Code: J41OE	BASICS OF ROBOTICS (Open Elective-III)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Engineering Mathematics

Course Objectives:

This course will enable students to:

1. Understand the theoretical aspects of Robotics
2. Acquire practical experience in the field of Robotics through design projects and case studies.
3. Understand the importance of robots in various fields of engineering.
4. Understand trajectory planning and types of motion
5. Expose to various robots and their operational details.

Module 1:

Unit 1: Introduction: Robotics-Introduction-classification with respect to geometrical configuration (Anatomy), Controlled system & chain type: Serial manipulator & Parallel Manipulator.

Unit 2: Components of Industrial robotics - precession of movement - resolution, accuracy & repeatability – Dynamic characteristics- speed of motion, load carrying capacity & speed of response-Sensors-Internal sensors: Position sensors & Velocity sensors, External sensors: Proximity sensors, Tactile Sensors, & Force or Torque sensors.

Module 2:

Unit 1: Grippers - Mechanical Gripper-Grasping force – Engelberger-g-factors-mechanisms for actuation, Magnetic gripper, vacuum cup gripper-considerations in gripper selection & design. Industrial robots specifications. Selection based on the Application.

Module 3:

Unit 1: Kinematics-Manipulators Kinematics, Rotation Matrix, Homogenous Transformation Matrix, D-H transformation matrix, D-H method of assignment of frames. Direct and Inverse Kinematics for industrial robots

Module 4:

Unit 1: Trajectory planning: Joint space scheme- Cubic polynomial fit-Obstacle avoidance in operation space-cubic polynomial fit with via point, bleding scheme. Introduction Cartesian space scheme. Control- Interaction control, Rigid Body

mechanics, Control architecture- position, path velocity, and force control systems, computed torque control, adaptive control, and Servo system for robot control.

Module 5:

Unit 1: Programming of Robots and Vision System-Lead through programming methods- Teach pendent- overview of various textual programming languages like VAL etc.

Unit 2: Introduction to Mobile Robots: A brief history of mobile robotics, applications and market. Recent advances in the mobile robotics for RISE (Risky Intervention and Surveillance Environment) applications.

Text Books:

1. Industrial Robotics / Groover M P /Mc Graw Hill
2. Introduction to Robotics / John J. Craig/ Pearson

Reference Books:

1. Theory of Applied Robotics /Jazar/Springer.H. Asada and J. J. E. Slotine, “Robot Analysis and Intelligence”, Wiley Inter-Science. 1986
2. Robotics / Ghosal / Oxford

E - Resources:

1. <https://rb.gy/dw0rkv>
2. <https://rb.gy/iayh9d>
3. <https://nptel.ac.in/courses/112/105/112105249/>
4. <https://nptel.ac.in/courses/112/101/112101098/>

Course Outcomes:

On completion of the course, the students will be able to:

1. **Apply** the basic components of robots.
2. **Differentiate** types of robots and robot grippers.
3. **Model** forward and inverse kinematics of robot manipulators.
4. **Analyze** forces in links and joints of a robot.
5. **Programme** a robot to perform tasks in differential applications.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	1	2	2	2	-	-	-	-	-	-	2		
CO2	3	3	2	2	2	-	-	-	-	-	-	1		
CO3	3	2	2	2	2	-	-	-	-	-	-	1		
CO4	3	2	2	1	1	-	-	-	-	-	-	2		
CO5	1	2	1	2	2	-	-	-	-	-	-	2		
Average	2.6	2	1.8	1.8	1.8	-	-	-	-	-	-	1.6		

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – I Sem			
Course Code: J41OG	DIGITAL SYSTEMS USING VHDL (Open Elective-III)	L	T	P	D
Credits: 3		3	1	0	0

Prerequisites: Nil

Course Objectives:

The students will

1. Learn how a Hardware Description Language (HDL) is used to describe and implement hardware.
2. Learn how to simulate and test that hardware and optimise their designs.
3. Learn in-depth study of combinatorial and sequential hardware systems and the use of finite state machines in the design of sequential systems.
4. To understand concept of Programmable Devices, PLA, PAL, CPLD and FPGA and implement digital system using VHDL.
5. To implement combinational and sequential circuits using VHDL.

Module 1

Unit I

Review of Logic Design Fundamentals: Combinational Logic, Boolean Algebra and Algebraic Simplification, Karnaugh maps, Designing with NAND and NOR Gates, Hazards in Combinational Networks, Flip-flops and latches, Mealy Sequential Network, Equivalent States and reduction of State Tables, Sequential Network Timing, Setup and Hold Times, Synchronous Design, Tristate Logic and Buses.

Module 2

Unit I

Introduction to VHDL: VHDL Description of Combinational Networks, Modeling Flip-flops using VHDL Process, VHDL Models for a Multiplexer, Compilation and Simulation of VHDL Code, Modeling a Sequential Machine, Variables, Signals and Constants, Arrays, operators, Functions, Procedures, Packages and Libraries, VHDL Model for a 74163 Counter.

Module 3

Unit I

Designing with Programmable Logic Devices: Read-Only Memories, Programmable Logic Arrays (PLAs), Programmable Array Logic (PALs) , Other Sequential Programmable Logic devices(PLDs),Design of a Keypad Scanner.

Unit II

Design of Networks for Arithmetic Operations: Design of a Serial Adder with Accumulator, State Graphs for Control Networks, Design of a Binary Multiplier, Multiplication of Signed Binary Numbers, Design of a Binary Divider.

Module 4

Unit I

Digital Design with SM Charts: State Machine Charts, Derivation of SM Charts, Realization of SM Charts, Implementation of the Dice Game, Alternative Realizations for SM Charts using Microprogramming, Linked State Machine.

Unit II

Designing with Programmable gate Arrays and Complex Programmable Logic Devices: Xilinx 3000 Series FPGAs, Designing with FPGAs, Xilinx 4000 Series FPGAs, Using a One-Hot State Assignment, Altera Complex Programmable Logic Devices(CPLDs),Altera FLEX 10K Series CPLDs

Module 5

Unit I

Floating-Point Arithmetic: Representation of Floating-Point Numbers, Floating-point Multiplication, Other Floating-Point Operations.

Unit II

Hardware Testing and Design for Testability: Testing Combinational Logic, Testing Sequential Logic, Scan Testing, Boundary Scan, Build-In Self-Test.

Text Books:

1. Charles H,Roth ,“Digital system design using VHDL” , 2nd Edition, PWS publishing co.
2. ZainalabedinNavabi, “VHDL analysis and modeling of digital systems”,2nd Edition, MGH, 2004.

References Books:

1. Stphen Brown, "Fundamental of Digital logic with VHDL Design", Tata McGraw Hill, 2008.
2. J.Bhaskar ,“A VHDL primer”,3rd edition 2004, Prentice Hall of India Limited.
3. Michael D.Ciletti, “Advanced Digital design with Verilog HDL”, 2nd Edition, PHI Ltd, 2005.

E - Resources:

1. <https://nptel.ac.in/courses/111/102/111102111/>

Course Outcomes:

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

1. **develop** a digital logic and apply it to solve real life problems.
2. **practice** combinational and sequential digital circuits using different styles of modeling of VHDL.
3. **analyze**, design and implement sequential logic circuits.
4. **employ** digital system design using PLD.
5. **simulate and implement** combinational and sequential circuits using VHDL systems.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	1	-	-	-	-	-	-	-	-	-	1	1	-
CO2	2	2	2	-	-	-	-	-	-	-	-	-	2	-
CO3	2	1	-	-	-	-	-	-	-	-	-	-	1	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-	1	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	1	-
Average	2.2	2	2	-	-	-	-	-	-	-	-	1	1.2	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – I Sem			
Course Code: J41OH	MATLAB PROGRAMING LANGUAGE (Open Elective-III)	L	T	P	D
Credits: 3		3	0	0	0

Prerequisites: Nil

Course Objectives:

The students will

1. To understand the basic principles of programming and of implementing mathematical concepts in MATLAB.
2. To write numerical algorithms with MATLAB Programming language.
3. To evaluate the computational results using graphical representations.
4. To gain knowledge about advanced MATLAB Programming methods.
5. To gain knowledge on Simulink used in MATLAB.

Module-1

Unit-I: Introduction to MATLAB

Historical Background, Applications, Scope of MATLAB, Importance of MATLAB for Engineers, Features, MATLAB Windows (Editor, Work Space, Command History, Command Window).

Unit-2

Operations with Variables, Naming and Checking Existence, Clearing Operations, Commands, Data types, Operators.

Module-2

Unit-I: Data Flow in MATLAB

Vectors, Matrix Operations & Operators, Reshaping Matrices, Arrays, Colon Notations, Numbers, Strings, Functions, File Input-Output, Importing and Exporting of data.

Module-3

Unit-I: MATLAB Programming

Conditional Statements, Loops, Writing Script Files, Error Correction, Saving Files, Worked out Examples.

Module-4

Unit-I: MATLAB Advanced

Plotting, Graphics, Creating Plot & Editing Plot, GUI (Graphical User Interface).

Matlab- Algebra, Calculus, Differential, Integration, Polynomials, solving a system of linear equations.

Module-5

Unit-1: SIMULINK

Introduction, Importance, Model Based Design, Tools, Mathematical Modeling, Converting Mathematical Model into Simulink Model, Running Simulink Models, Importing Exporting Data, Solver Configuration, Masking Block/Model.

TEXT BOOKS:

1. Getting Started With Matlab: A Quick Introduction For Scientists And Engineers (English) by Rudra Pratap, OXFORD University Press.
2. MATLAB Programming by Y. Kirani Singh, B.B. Chaudhuri, PHI Publication.

REFERENCE BOOKS:

1. MATLAB® Programming For Engineers, Fourth edition by Stephen J. Chapman.
2. Applied Numerical Methods Using MATLAB 1st Edition by Won Y. Yang ,Wenwu Cao, Tae-Sang Chung, John Morris.

Course Outcomes:

By the end of this course, the student will be able to

1. **translate** mathematical methods to MATLAB code.
2. **generalize** results and represent data visually.
3. **apply** computer methods for solving a wide range of engineering problems.
4. **utilize** computer skills to enhance learning and performance in other engineering and science courses.
5. **acquire** knowledge of Advanced Matlab programming methods and Simulink.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	1	-	-	-	-	-	-	-	-	-	1	1	-
CO2	2	2	-	2	-	-	-	-	-	-	-	-	2	-
CO3	2	1	-	-	-	-	-	-	-	-	-	-	1	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-	1	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	1	-
Average	2.2	2	-	2	-	-	-	-	-	-	-	1	1.2	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – I Sem			
Course Code: J41OI	INTRODUCTION TO PYTHON PROGRAMMING (Open Elective-III)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Need basic knowledge about computer.
2. Need Basic understanding of Programming language.

Course objectives:

The Student will:

1. Design and program Python applications.
2. Use lists, tuples, and dictionaries in Python programs.
3. Learn to identify Python object types, Components, decision statements, pass arguments in Python.
4. Build and package Python modules for reusability, design object oriented programs with Python classes, use class inheritance in Python for reusability.
5. Use exception handling in Python applications for error handling.

Module:1

Programming paradigms; Structured programming vs object-oriented programming, OOPs fundamentals- class, object, abstraction, encapsulation, polymorphism, and inheritance; Introduction to Python Getting started to Python- an interpreted high-level language, interactive mode and script mode. Variables, Expressions and Statements Values and types, Variables and keywords, statements, evaluating expressions, operators and operands, order of operations, composition. Functions function calls, type conversion, type coercion, pre-defined functions, composition, user define functions, flow of execution, passing parameters, function parameters and scope. Conditionals and recursion modulus operator, Boolean expression, logical operators, conditional execution, alternative execution, chained and nested conditionals, return statement; Recursion, infinite recursion.

Module 2:

Python data structures Strings Creating, initializing, and accessing the elements; String operators, comparing strings using relational operators; String functions and methods. Lists: Concept of mutable lists, creating, initializing, and accessing the elements, traversing, appending, updating, and deleting elements; List operations; List functions and Methods, list parameters, nested lists, Matrices.

Dictionaries

Concept of key-value pair, creating, initializing, and accessing the elements in a dictionary, dictionary operations traversing, appending, updating, and deleting elements, Dictionary functions and methods.

Tuples

Mutability and tuples, Immutable concept, creating, initializing, and accessing the elements in a tuple, Tuple functions.

Module 3:

Object oriented programming using Python: creating python classes, classes and objects: user defined compound types, objects are mutable, copying; Access modifiers, classes and functions: pure function, modifiers, Classes and methods: object oriented features, optional arguments, initialization method, operator overloading and polymorphism.

Module 4:

Inheritance: Basic Inheritance: extending built-ins, overriding and super; Multiple inheritance: the diamond problem.

Module 5:

Files handling and Exceptions: Text files, writing variables, Directories, Pickling. Exceptions: raising exceptions, handling exceptions, exception hierarchy.

Text Books:

1. Python Object Oriented Programming, Dusty Phillips, Packet Publishing, 2010.
2. Programming in Python 3 - A complete Introduction to the Python Language- Second Edition, Mark Summerfields, Addison-Wesley 2010.

Reference Books:

1. Programming Python- 4th Edition, Mark Lutz, O'Reilly, 2011.
2. Object-Oriented Programming in Python, Michael H, Goldwasser, David Letscher, Pearson Prentice Hall, 2008.

E - Resources:

1. <https://www.youtube.com/watch?v=MLP1v80yU14>
2. <https://pythonprogramming.net/functions-python-3-basics-tutorial/>
3. <https://www.youtube.com/watch?v=QGLNQwftO2w>
4. <https://www.youtube.com/watch?v=ZDa-Z5JzLYM>
5. <https://www.youtube.com/watch?v=M-t4ILRHnxE>

Course Outcomes:

The students will be able to

1. Describe to design and program Python applications.
2. Analyse and conversion of to use lists, tuples, and dictionaries in Python programs.
3. Explain the concept to identify Python object types, Components, decision statements, pass arguments in Python.
4. Apply decision for building and package Python modules for reusability, design object- oriented programs with Python classes, use class inheritance in Python for reusability.
5. Apply file handling and Exception handling Concepts in real world using python.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	2	1	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	3	-	-	-	-	-	-	-	-	2	2
CO3	3	2	2	3	-	-	-	-	-	-	-	-	1	2
CO4	3	2	1	2	-	-	-	-	-	-	-	-	-	3
CO5	3	2	2	2	-	-	-	-	-	-	-	-	-	3
Average	3.0	2.0	1.8	2.2	-	-	-	-	-	-	-	-	1.5	2.4

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – I Sem			
Course Code: J410J	INTRODUCTION TO MOBILE APPLICATION DEVELOPMENT (Open Elective-III)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Basic Knowledge on Data base

Course objectives:

The Student will:

1. Evaluate a User Interface for a mobile application using J2ME.
2. Create a small but realistic working mobile application for small computing devices.
3. Categories the challenges posed by developing mobile applications and be able to propose and evaluate and select appropriate solutions.
4. Differentiate between high and low level display screens.
5. Familiar with record management systems.

Module 1:

J2ME Overview: Java 2 Micro Edition and the World of Java, Inside J2ME, J2ME and Wireless Devices

Small Computing Technology: Wireless Technology, Radio Data Networks, Microwave Technology, Mobile Radio Networks, Messaging, Personal Digital Assistants

Module 2:

J2ME Architecture and Development Environment: J2ME Architecture, Small Computing Device Requirements, Run-Time Environment, MIDlet Programming, Java Language for J2ME, J2ME Software Development Kits, Hello World J2ME Style, Multiple MIDlets in a MIDlet Suite, J2ME Wireless Toolkit J2ME Best Practices and Patterns: The Reality of Working in a J2ME World, Best Practices

Module 3:

Commands, Items, and Event Processing: J2ME User Interfaces, Display Class, The Palm OS Emulator, Command Class, Item Class, Exception Handling.

Module 4:

High-Level Display Screens: Screen Class, Alert Class, Form Class, Item Class, List Class, Text Box Class, Ticker Class. Low-Level Display Canvas: The Canvas, User Interactions, Graphics, Clipping Regions, Animation.

Module 5:

Record Management System- Record Storage, Writing and Reading Records, Record Enumeration, Sorting Records, Searching Records, Record Listener.

Text Books:

1. J2ME: The Complete Reference, James Keogh, Tata McGrawHill.
2. Programming for Mobile and Remote Computers, G.T.Thampi, drearntec press.

Reference Books:

1. Enterprise J2ME: Developing Mobile Java Applications — Michael Juntao Yuan, Pearson Education, 2004
2. Beginning Java ME Platform, Ray Rischpater, Apress, 2009
3. Beginning J2ME: From Novice to Professional, Third Edition, Sing Li, Jonathan B. Knudsen, Apress, 2005
4. Kicking Butt with MIDP and MSA: Creating Great Mobile Applications, I edition, J.Knudsen, Pearson.

E - Resources:

1. <https://www.smartzworld.com/notes/mobile-application-development-notes-pdf-mad-pdf-notes/>
2. <https://www.slideshare.net/ChromeInfotech/mobile-application-development-process>
3. <https://nptel.ac.in/courses/106/106/106106156/>
4. <http://w1236xz.website/j2ee-the-complete-reference-tata-mcgraw-hill.pdf>

Course outcomes:

The students will be able to

1. **Implement** a User Interface for a mobile application using J2ME.
2. **Design** a small but realistic working mobile application for small computing devices.
3. **Classify** the challenges posed by developing mobile applications and be able to propose and evaluate and select appropriate solutions.
4. **Classify** between high and low level display screens.
5. **Apply** the concepts on record management systems.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	2	-	-	-	-	-	-	-	-	2	3	2
CO2	3	2	2	-	-	-	-	-	-	-	-	2	3	2
CO3	3	2	2	-	-	-	-	-	-	-	-	2	3	2
CO4	3	2	2	-	-	-	-	-	-	-	-	2	3	2
CO5	3	2	2	-	-	-	-	-	-	-	-	2	3	2
Average	3.0	2.0	2.0	-	-	-	-	-	-	-	-	2.0	3.0	2.0

AY 2020-21 onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech IV Year – I Sem			
Course Code: J41OK	FUNDAMENTALS OF OBJECT ORIENTED PROGRAMMING THROUGH C++ (Open Elective-III)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Fundamental Knowledge of Programming in C.

Course Objectives:

The students will

1. Be able to explain the difference between object oriented programming and procedural programming.
2. Be able to program using more advanced C++ features such as composition of objects, operator overloads, inheritance
3. Be able to build C++ classes using appropriate encapsulation and design principles.
4. Improve problem solving skills.
5. Be able to apply object oriented or non-object oriented techniques to solve bigger computing problems

Module I: Introduction

Unit 1:

What is object oriented programming? Why do we need object oriented Programming characteristics of object-oriented languages

Unit 2:

C++ Programming basics: Output using cout. Directives. Input with cin. Type bool. The setw manipulator. Type conversions.

Module II: Functions and Pointers

Unit 1:

Returning values from functions. Reference arguments. Overloaded function. Inline function. Default arguments. Returning by reference.

Unit 2:

Addresses and pointers. The address of operator and pointer and arrays. Pointer and action pointer and C-types string. Memory management: New and Delete, pointers to objects, debugging pointers.

Module III: Classes and Objects

Unit 1:

Making sense of core object concepts (Encapsulation, Abstraction, Polymorphism, Classes, Messages Association, Interfaces) Implementation of class in C++, C++

Objects as physical object, C++ object as data types constructor.

Unit 2: Object as function arguments. The default copy constructor, returning object from function. Structures and classes. Classes objects and memory static class data. Const. and classes.

Module IV: Arrays and Strings

Unit 1:

Arrays and string arrays fundamentals. Arrays as class Member Data : Arrays of object, string, The standard C++ String class

Unit 2:

Operator overloading: Overloading unary operations. Overloading binary operators, data conversion, pitfalls of operators overloading and conversion keywords. Explicit and Mutable.

Module V: Inheritance

Unit 1:

Concept of inheritance. Derived class and based class. Derived class constructors, member function, class hierarchies.

Unit 2:

Virtual Function, friend function, Static function, Assignment and copy initialization, this pointer, dynamic type information.

Text Books:

1. Object Oriented Programming with C++ by E. Balagurusamy, McGraw-Hill Education (India)
2. ANSI and Turbo C++ by Ashoke N. Kamthane, Pearson Education.

Reference Books:

1. C++ and Object Oriented Programming – Jana, PHI Learning.
2. Object Oriented Programming with C++ - Rajiv Sahay, Oxford

E-Resources:

1. <https://nptel.ac.in/courses/106/105/106105151/>

Course Outcomes:

The students will be able to

1. Articulate the principles of object-oriented problem solving and programming.
2. Outline the essential features and elements of the C++ programming language.
3. Apply the concepts of class, method, constructor, instance, data abstraction, function abstraction, inheritance, overriding, overloading.
4. Program with basic data structures using array.
5. Analyze, write, debug, and test basic C++ codes using the approaches introduced in the course.

CO-Articulation Matrix														
CO-PO/PSO Mapping Chart 3/2/1 indicates the strength of the calculation 3-Strong, 2-Medium, 1-Low														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	2	1	3	-	2	-	-	-	-	-	-	-	2	2
CO2	1	2	3	-	2	-	-	-	-	-	-	-	2	2
CO3	-	2	2	-	1	-	-	-	-	-	-	-	1	1
CO4	2	1	2	-	1	-	-	-	-	-	-	-	1	1
CO5	1	2	1	-	2	-	-	-	-	-	-	-	2	1
Average	1.2	1.6	2.2	-	1.6	-	-	-	-	-	-	-	1.6	1.4

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IV Year – I Sem.			
Course Code: J41OL	FUNDAMENTALS OF DATA SCIENCE (Open Elective-III)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Good mathematical background and programming skills.

Course Objectives:

The students will

1. To explain how math and information sciences can contribute to building better algorithms and software.
2. To develop fundamental knowledge of concepts underlying data science projects.
3. To develop applied experience with data science software, programming, applications and processes.
4. To develop practical data analysis skills, which can be applied to practical problems.
5. To develop practical skills needed in modern analytics.

Module 1: Introduction to Data Science

What is Data Science? - Big Data VS Data Science, Datafication, Current landscape of perspectives and Skill sets needed.

Module 2: Statistics in Data Science

Statistical Inference, Populations and samples, Statistical modeling, probability distributions, fitting a model.

Module 3: Exploratory Data Analysis

Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA, The Data Science Process.

Module 4: Linear Regression for Data Science

Simple Linear Regression, Multiple Linear Regression, other Considerations in the Regression Model,

Module 5: Classification

An Overview of Classification, Why Not Linear Regression?, Logistic Regression, Linear Discriminant Analysis, A Comparison of Classification Methods.

Text Books:

1. Practical Data Science with R". Nina Zumel, John Mount. Manning, 2014.

Reference Books:

1. Data Science for business", F. Provost, T Fawcett, 2013.

E-Resources:

1. <https://www2.cs.duke.edu/courses/compsci190/fall18>

Course Outcomes:

1. **Know** basic notions and definitions in data analysis.
2. **Know** standard methods of data analysis
3. **Understand** and Apply Statistical Methods for Data Analysis.
4. **formulate** the problem of knowledge extraction.
5. **translate** a real-world problem into mathematical terms.

CO-Articulation Matrix														
CO-PO/PSO Mapping Chart														
3/2/1 indicates the strength of the calculation														
3-Strong, 2-Medium, 1-Low														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	PO 1	PO 2	P O3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	2	2	1	1									2	1
CO2	1	2	2	1									1	2
CO3	2	2	2	2									1	1
CO4	2	2	2	2									2	2
CO5	1	2	2	2									2	1
Average	1.6	2	1.8	1.6									1.6	1.4

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IV Year – I Sem.			
Course Code: J41OM	INTRODUCTION TO NEURAL NETWORKS (Open Elective-III)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

The students will

1. Understand the differences and similarities neural network, human brain and feedback systems
2. Learn the different learning techniques
3. Familiar with the concept of single layer perceptron and its algorithms.
4. Familiar with the concept of multilayer perceptron and its algorithms
5. Know the self-organization mapping techniques.

Module 1:

Unit 1: Introduction: What is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs.

Unit 2 : Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks.

Module 2:

Unit 1: Learning Process: Error Correction learning, Memory based learning, Hebbian learning, Competitive.

Unit 2 : Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process.

Module 3:

Unit 1: Single layer perceptron's: Adaptive filtering problem, Unconstrained Optimization Techniques, Linear least square filters, least mean square algorithm, learning curves.

Unit 2 : Learning rate annealing techniques, perception-convergence theorem, Relation between perception and Bayes classifier for a Gaussian Environment.

Module 4:

Unit 1 : Multilayer Perceptron's: Back propagation algorithm XOR problem.

Unit 2 : Heuristics, Output representation and decision rule, computer experiment, feature detection

Module 5:

Unit 1: Self –Organization Maps: Two basic feature mapping models, Self-Organization maps, SOM algorithm.

Unit 2: Hopfield models: Hopfield models, computer experiment.

Text Books:

1. Neural networks A comprehensive foundation, Simon Hhaykin, PHI edition.
2. Artificial neural networks-B.Vegnarayana Prentice Hall of India P Ltd 2005.

Reference Books:

1. Neural networks in Computer intelligence, Li Min Fu TMH 2003.
2. Neural networks James A Freeman David M S kapurapearson education 2004.

E-Resources:

1. <https://towardsai.net/p/machine-learning/main-types-of-neural-networks-and-its-applications-tutorial-734480d7ec8e>
2. <http://neuralnetworksanddeeplearning.com/index.html>
3. <http://neuralnetworksanddeeplearning.com/chap2.html>
4. <http://neuralnetworksanddeeplearning.com/chap3.html>
5. <http://neuralnetworksanddeeplearning.com/chap4.html>
6. <http://neuralnetworksanddeeplearning.com/chap5.html>
7. <http://neuralnetworksanddeeplearning.com/chap6.html>
8. <http://neuralnetworksanddeeplearning.com/chap1.html>

Course Outcomes:

Students will be able to:

1. **Know** differences and similarities between neural network, human brain and feedback systems
2. **Get** the knowledge of different learning techniques
3. **Describe** the concept of single layer perceptron and its algorithms.
4. **Describe** the concept of multilayer perceptron and its algorithms.
5. **Analyse** the self-organisation mapping techniques.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)											Program Specific Outcomes*		
	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 O 1	PS O 2
CO1	2	-	2	2	1	-	-	-	-	-	-	-	-	-
CO2	2	-	2	2	1	-	-	-	-	-	-	-	-	-
CO3	2	-	2	2	1	-	-	-	-	-	-	-	-	-
CO4	2	-	2	2	1	-	-	-	-	-	-	-	-	-
CO5	2	-	2	2	1	-	-	-	-	-	-	-	-	-
Average	2	-	2	2	1	-	-	-	-	-	-	-	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IV Year – I Sem.			
Course Code: J41ON	IC APPLICATIONS (Open Elective-III)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Electronic devices and circuits, Switching Theory & Logic Design, Pulse & Digital Circuits.

Course Objectives:

Students will learn to

1. Introduce the basic building blocks of linear integrated circuits.
2. Teach the linear and non – linear applications of operational amplifiers.
3. Introduce the theory and applications of analog multipliers and PLL.
4. Introduce the concepts of waveform generation and introduce some special function ICs.
5. Understand and implement the working of basic digital circuits

Module 1:

Unit 1: Introduction to Linear Integrated Circuits

Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting, Differential

Unit 2: Non-Linear Applications of OP-AMP

Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

Module 2:

Unit 1: Introduction to IC-555 Applications

Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Saw tooth, Square Wave, IC555 Timer -Functional Diagram, Monostable, and Astable Operations, Applications.

Unit 2: Timer and Phase Locked Loops(PLL)

Applications

IC565 PLL – Block Schematic, Description of Individual Blocks, Applications.

Module 3:

Unit 1: Converters of DAC

Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC

Unit 2: Converters of ADC

Different Types of ADCs – Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

Module 4:**Unit 1: Digital Integrated Circuits**

Classification of Integrated Circuits, Comparison of Various Logic Families
Combinational Logic ICs – Specifications and Applications of TTL-74XX

Unit 2: Applications of Digital ICs

Code Converters, Decoders, Demultiplexers, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators

Module 5:**Unit 1: Combinational Circuits Using TTL 74XX ICS**

Familiarity with commonly available 74XX & CMOS 40XX Series ICs – All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.

Unit 2: Memories

Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

Text Books:

1. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.
2. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition, 2005

Reference Books:

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2ndEd., 2003.
2. Op Amps and Linear Integrated Circuits-Concepts and Applications James M. Fiore,Cengage Learning/ Jaico, 2009.
3. Operational Amplifiers with Linear Integrated Circuits by K. Lal Kishore – Pearson,2009.
4. Linear Integrated Circuits and Applications – Salivahanan, MC GRAW HILLEDCATION.
5. Modern Digital Electronics – RP Jain – 4/e – MC GRAW HILL EDUCATION, 2010.

E-Resources:

1. http://fmcet.in/ECE/EC6404_uw.pdf
2. https://www.iare.ac.in/sites/default/files/lecture_notes/LDIC%20Lecture%20Notes.pdf.
3. [http://smec.ac.in/sites/default/files/lecture_notes/Course%20File%20of%20LDIC\(Linear%20and%20Digital%20IC%20Applications\).pdf](http://smec.ac.in/sites/default/files/lecture_notes/Course%20File%20of%20LDIC(Linear%20and%20Digital%20IC%20Applications).pdf)
4. Integrated Circuits, MOSFETS, Op-Amps and their Applications:
<https://archive.swayam.gov.in/courses/4441-integrated-circuits-mosfets-op-amps-andtheir-applications>

Course Outcomes:

Students will be able to

1. **Understanding** of operational amplifiers with linear integrated circuits.
2. **Apply** the knowledge of the different families of digital integrated circuits and their characteristics.
3. **Analyse** the functioning of various design circuits using operational amplifiers for various applications.
4. **Design** various techniques to develop a/d and d/a convertors.
5. **Acquire** hands-on laboratory experience on ic based project kits in above areas according to specifications.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	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
CO1	2	2	-	-	-	-	-	-	-	-	-	-	2	-
CO2	2	2	2	-	-	-	-	-	-	-	-	-	3	3
CO3	1	2	2	-	-	-	-	-	-	-	-	-	1	2
CO4	1	2	1	-	2	-	-	-	-	-	-	1	1	2
CO5	2	2	2	-	-	-	-	-	-	-	-	-	-	3
Average	1.6	2	1.7	-	2	-	-	-	-	-	-	1	1.75	2.5

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech. IV Year – I Sem			
Course Code: J41OP	INTRODUCTION TO GEOLOGY (Open Elective-III)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

The students will

1. To introduce rock types and their physical properties
2. To acquaint with different structures occurring in rocks
3. To get idea about Ground water, and aquifers
4. To get idea about coal formation and its stages.
5. To know about minerals occurring in India.

Module 1

Unit - 1: Introduction, Definitions, Importance of geology in mining, Types of rocks, Physical properties of rocks.

Module 2

Unit - 1: Structural Geology: Definition, terminology, and Primary and secondary structures: Bedding, lineation, foliation, cleavage, Strike and dip.

Unit - 2: Definition of faults, folds and joints and their types, Unconformities and its kinds.

Module 3

Unit - 1: Ground Water: Introduction, Hydrological Cycle, origin and occurrence of groundwater, water table.

Unit - 2: Aquifers: Types of aquifers, confined and unconfined aquifers, perched aquifers.

Module 4

Unit - 1: Coal: Stages of formation, composition, theories of formation of coal.

Module 5

Unit - 1: Occurrence and distribution of important metallic mineral deposits in India: Iron, Copper, Lead, Zinc, Manganese, Aluminum, Chromium.

Unit - 2: Occurrence and distribution of important non-metallic mineral deposits in India: Asbestos, Kyanite, Sillimanite.

Textbooks:

1. Structural Geology – Billings, M.P. Prentice Hall.
2. Engineering geology –by Dr. Chennkeshavulu.

Reference Books:

1. A Textbook of Geology: Mukherjee P.K., The World Press Pvt. Limited Calcutta.

E-resources:

1. <http://www.publiclandsforthepeople.org/wp-content/uploads/2015/06/Introduction-to-Geology-and-Hard-Rock-Mining-2015.pdf>
2. <https://www.eolss.net/Sample-Chapters/C01/E6-15-08-03.pdf>
3. <https://pubs.usgs.gov/of/2001/0151/pdf/of01-151.pdf>
4. <https://digitalworks.union.edu/cgi/viewcontent.cgi?article=1008&context=ajes>

Course Outcomes:

The student will be able to:

1. **Understand** about rocks and their properties
2. **Learn** about different structures occurring in rocks
3. **Understand** about ground water, water table and aquifers
4. **Learn** about coal and its formation theories
5. **Distinguish** metallic and non-metallic minerals.

1. CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO4	2	2	1	-	-	-	-	-	-	-	-	-	-	-
CO5	3	1	2	-	-	-	-	-	-	-	-	-	-	-
Average	3	2	1.6	-	-	-	-	-	-	-	-	-	-	-

AY 2020-21 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – I Sem			
Course Code: J41OR	INTEGRAL TRANSFORMS AND INTEGRAL EQUATIONS (Common to CE,EEE, ECE, ME, CSE,IT ,ECM & MIE)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Differential Equations

Course Objectives:

The students will

1. approximation of real-valued periodic functions to suitably restricted non-periodic functions $f(x)$ defined for all real numbers
2. how to use Laplace transform methods to solve ordinary and partial differential equations
3. make them familiar with the methods of solving differential equations, partial differential equations.
4. the properties of Z-Transform and associating the knowledge of properties of ROC in response to different operations on discrete signals.
5. discretization techniques to find approximate solutions of differential equations different types of errors involved in such solutions, their measures and practical applications.

MODULE-I: Applications of Differential Equations

Basic introduction of the course using precise examples like periodic functions, signal propagation, solving mathematical models corresponding to Electrical Circuits.

MODULE-II: Laplace Transforms

UNIT-I: Laplace Transform (LT) – definition – linearity property of LT. Existence Theorem – First and Second Translation theorems. Change of scale property, LT of derivatives, multiplication by t and division by t – Initial and Final Value theorems.

UNIT-II: Inverse Laplace Transforms: definition – standard forms. First and Second shifting theorems. Change of scale property – Use of partial fractions, Inverse transforms of derivatives, Inverse Laplace Transform of integrals – definition of convolution – Convolution theorem

MODULE-III : Fourier Transforms

Fourier Transforms – Fourier integral formula, Inverse Theorem for Fourier Transform; Fourier Sine Transform, Inverse formula for Fourier Sine Transform; Fourier Cosine Transform, Inverse formula for Fourier Cosine Transform; linearity property, change of scale property, shifting property.

MODULE–IV : Z-Transforms

Definition and properties of Z-Transform, Standard functions of Z-Transform, Unit step Function. Unit Impulse function, Initial value Theorem and Final value Theorem, Inverse Z-Transform, Partial fraction method, Difference Equation using Z-Transforms.

MODULE-V: Henkel Transforms

Henkel Transforms- Henkel Transform of the derivatives of a function.- Application of Henkel Transforms in boundary value problems.

TEXT BOOKS:

1. A.R.Vashista, Dr. R.K.Gupta, Integral transforms - Krishna Prakasham Mandir urray
2. .R.Spiegel, Theory and problems of Laplace transforms - Shamus Outline Series Tata Mac Grawhill

REFERENCES:

1. Brian Davies, Integral Transforms & their applications - Springers
2. L Debnath , D Bhatta, Integral Transforms & their Applications – Chapman & Hall/CRC
3. Chorafas, Integral Transforms & their Applications

E-RESOURCES

1. <https://nptel.ac.in/content/storage2/courses/112104158/lecture8.pdf>
2. <https://tutorial.math.lamar.edu/classes/de/inversetransforms.aspx>
3. <http://www.thefouriertransform.com/>
4. <http://dsp-book.narod.ru/TAH/ch06.pdf>
5. <https://www.henkel-adhesives.com/in/en.html>

Course outcomes:

At the end of this course students will be able to

1. understand the concepts of integral transforms
2. Determine Laplace transform of a function and understand the fundamental properties and apply Laplace transform in solving ODEs.
3. Determine Fourier and inverse Fourier transform of a function and understand the fundamental properties and apply Fourier transform in solving ODEs.
4. apply the Z transform techniques to solve second-order ordinary difference equations.
5. apply the Hankel transform in the infinite 2-dimensional plane

CO-PO/PSO Mapping Chart (Draft) (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO2	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO3	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO4	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO5	3	3	2	3	-	-	-	-	-	-	-	2	-	-
Average	3	3	2	3	-	-	-	-	-	-	-	2	-	-

AY 2020-21 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – I Sem			
Course Code: J41OS	NDT and VACUUM TECHNOLOGY (Common to CE, EEE, ME, ECE, CSE, IT, ECM& MIE) (Open Elective-III)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

This course will enable students to:

1. study various Non Destructive Testing and types of defects.
2. know the basics of non-destructive techniques using ultrasonic interferometer.
3. provide a basic level of understanding on Vacuum technology.
4. understand the importance Pressure gauges.
5. introduce the fundamental concepts vacuum pumps.

Module 1: Introduction to Non-destructive testing

Introduction, Objectives of Non-destructive testing, Types of defects – Cracking, Spalling, Staining, Construction and Design defects, Honey combing, Dusting, Blistering, Rain damage..

Module 2: Methods of Non-destructive Testing

Liquid penetration method, Dye penetration method, Ultrasonic Inspection method, Pulse Echo method, Radiographic testing Magnetic particle testing, Eddy current Testing.

Module 3: Introduction to Vacuum Technology

Unit-1: Definition of vacuum, Degrees of vacuum and their ranges; Review of Kinetic theory of gases; Definitions of particle flux, mono layer formation time, pressure; Elementary gas transport phenomena; Knudsen’s and Reynolds’ numbers; Throughput, mass flow and conductance.

Unit-2: Flow meters: Molar flow, Mass flow.

Module 4: Pressure gauges

Classification, Direct and indirect gauges, Indirect gauges – Pirani gauge, Thermocouple gauge, Ionization gauge, hot cathode gauge, Penning gauge.

Module-5: Vacuum Pumps

Introduction, Pumping speed, Rotary vane pump, Turbo molecular pump, Diffusion pumps.

Text Books:

1. “Engineering Physics”, B K Pandey and S Chaturvedi, Cengage Learning India, Revised Edition, 2014.
2. “A User’s guide to Vacuum technology”, John. F. O’Hanlon, Wiley, 3rd Edition, 2003.

Reference Books:

1. “Physics for Engineers”, R Srinivasan, New Age international, 1st reprint, 2007.
2. “Engineering Physics”, R K Gaur and S L Gupta, Dhanpat rai, Reprint, 2006.
3. “Hand Book of Thin film deposition”, Krishna Seshan, Noyes, 2nd Edition, 2002

E - Resources:

1. <http://www.enfm.net/catalog/catalog/enfm-usa.pdf>
2. <http://web.itu.edu.tr/~arana/ndt.pdf>
3. http://www.issp.ac.ru/ebooks/books/open/Nondestructive_Testing_Methods_and_New_Applications.pdf
4. <https://www.journals.elsevier.com/ndt-and-e-international/https://www.journals.elsevier.com/vacuum>
5. <http://nptel.ac.in/courses/114106035/35>
6. <http://nptel.ac.in/courses/112101004/37>.

Course Outcomes:

On completion of the course, the students will be able to:

1. **Describe** the Types of defects and analyze them.
2. **Analyze** the principles of NDT methods.
3. **Analyze** Vacuum technology and concepts of flow meters.
4. **Develop** pressure gauges.
5. **Understand** the concepts of different vacuum pumps.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	1	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	1	-
CO4	2	2	-	-	2	-	-	-	-	-	-	-	1	-
CO5	2	2	-	-	2	-	-	-	-	-	-	-	1	-
Average	2.6	2	-	-	2	-	-	-	-	-	-	--	1	-

AY 2020-21 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IV Year – I Sem			
Course Code: J41OT	Nano Chemistry (Common to CE, EEE, ME, ECE, CSE, IT, ECM& MIE) (Open Elective-III)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

This course will enable students to:

1. To know about the scope of Nanoscale materials and synthesis.
2. Understand the properties of Nanomaterials.
3. Give knowledge of various instrumental techniques to the analysis the Nanomaterials.
4. learn about the different applications of Nanomaterials.
5. Analyze the Nano technology in Environmental purpose.

Module 1: Synthesis of Nano materials:

Introduction -synthesis of Nanostructure materials, Bottom-up approach and Top-down approach with examples-sol-gel method-solvothermal and hydrothermal routes, Chemical Vapor Deposition and precipitation methods.

Module 2: Properties of Nano materials:

Properties of Nanomaterials-Electronic properties, Energy bands and gaps in semiconductors, Fermi Surfaces-Optical properties- Fluorescence, Photoluminescence, Electroluminescence. Magnetic properties-mechanical properties-thermal properties.

Module 3: Instrumental Analysis:

Characterization techniques- Principle and block diagram of Scanning Electron Microscopy (SEM), Electron Dispersion Spectroscopy(EDS). Principle and block diagram of Electron Microscopy (TEM), Dynamic Light Scattering (DLS) and Atomic Force Microscopy(AFM) -Illustrative examples.

Module 4: Carbon Nano structures and Applications:

Carbon Nano structures, carbon clusters, types and preparation of carbon Nano tubes-optical and telecommunication applications, Nano structured crystals (graphite), graphene, carbon fibers, fullerenes and their applications. Nano solar cells and its applications

Module-5: Environmental Nanotechnology:

Implications of Nanotechnology & Research Needs-Nanostructured Catalysts TiO₂ Nanoparticles for Water purification- Nano membranes in drinking water treatment and desalination, Nanomembranes in Sea desalination-Nano particles for treatment of

Chlorinated Organic Contaminants.

Text Books:

1. "Nanotechnology a gentle introduction to the next big idea", Mark A. Ratner, D. Ratner. Pearson Education Inc., Asia, 2003.
2. "Nano: The essentials-understanding Nanoscience and Nanotechnology", Pradeep.T. Tata Mc.Graw Hill, New Delhi, 2007.

Reference Books:

1. "Nanomaterials: Synthesis, Characterization, and Applications", A. K. Haghi, Ajesh K. Zachariah, Nandakumar Kalariakkal. Apple Academic Press, 2013.
2. "Nanomaterials and Nanochemistry", Brechignac C., Houdy P., Lahmani M. (Eds.) (Springer,) 748p. ISBN 978-3-540-72993-8, 2007
3. "Principles of Nanotechnology", Phanikumar. SciTech Publications 2nd Edition, 2010.
4. "Environmental Nanotechnology" Preetijain, Shankar LalGarg. Lap Lambert Academic publishing, 2015.

E - Resources:

1. <https://www.acs.org/content/acs/en/careers/college-to-career/chemistry-careers/nanochemistry.html>
2. <https://www.sciencedirect.com/book/9780444519566/nanochemistry>
3. https://www.researchgate.net/publication/320068992_Introduction_to_Nano-chemistry_and_Nano-materials
4. <https://www.kemi.dtu.dk/english/research/organic-inorganic-chemistry/nanochemistry>
5. <https://www.cambridge.org/core/books/engineering-chemistry/nanochemistry/D6DB35E32E530525DD927E68CED43197>

Course Outcomes:

On completion of the course, the students will be able to:

1. **Learn** the different synthetic methods of the Nano materials.
2. **Know** the student Electronic, optical and magnetic properties of Nano materials.
3. **Acquire** the knowledge various instrumental methods of analysis (TEM, EDS, SEM, DLS &AFM).
4. **Know** the carbon nanotubes, carbon Nano fibers, Nano structured catalysts and Nano solar cells.
5. **Learn** usage of Nano materials in the purification of water.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	2	2	1	-	-	-	-	-	-	-	2	-	-
CO2	3	-	2	-	-	-	-	-	-	-	-	1	-	-
CO3	2	2	-	1	-	-	-	-	-	-	-	2	-	-
CO4	2	2	1	-	-	-	-	-	-	-	-		-	-
CO5	1	1	-	-	-	-	-	-	-	-	-	2	-	-
Average	2.2	1.6	1.6	1	-	-	-	-	-	-	-	1.4	-	-

AY 2020-21 onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B.Tech IV Year – I Sem			
Course Code: J41OU	TEAMWORK AND TEAM BUILDING (COMMON TO ALL) (Open Elective-III)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Objectives:

The students will

1. Know the working experience in the group and team
2. Understand the process and role of the team
3. Apply the knowledge of team building
4. Understand the role of team leader.
5. Plan the meetings and understanding the role of meetings

Module -I Working in Groups and Teams

Introduction-defining Types of Groups and Teams- Understanding the role of Teams in Organization; Recognizing differences between group and Teams-ensuring team success-empowering teams- working with a distributed team- technology @work: virtual worlds.

Module -II Exploring Team Roles and Processes

Defining common team roles-selecting team members-choosing the optimal team size-establishing team rules-clarifying team objectives-making collective decisions etc.

Module -III Building and Developing Team

Understanding the benefits of working in teams-fostering Resistance-using team-building activities-creating a team identity-coping with conflict and ego-dealing with difficult team members and celebrating successes.

Module -IV Leading a Team

Pursuing team leadership-preparing to be a team leader-getting start with your team-taking a project management approach- managing a team diplomatically-being sensitive to intangibles and concluding team activities.

Module -V Managing Meetings

Scheduling meeting-developing meeting agenda- planning meetings-understanding the role of meetings-conducting meetings effectively-taking notes and publishing minutes-concluding meetings and creating action plans and solving common meeting problems.

Reference/text book:

1. Butterfield, Jeff. Soft Skills for Everyone. Delhi: Cenege., 2010.

E-Resources:

1. <https://smallbusiness.chron.com/difference-between-team-building-teamwork-10981.html>

Course outcomes:

1. **Recognize** differences between group and team, ensuring team success, and empowering teams.
2. **Define** common team roles, establishing team rules, selecting team members, and making collective decisions
3. **Understand** the benefits of working in teams, fostering Resistance, using team-building activities
4. **Manage** a team diplomatically, and preparing to be a good team leader.
5. **Create** action plans and solving common meeting problems

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	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
CO1	-	-	-	-	-	-	-	-	3	2	-	3	-	-
CO2	-	-	-	-	-	-	-	-	3	2	-	3	-	-
CO3	-	-	-	-	-	-	-	-	3	2	-	3	-	-
CO4	-	-	-	-	-	-	-	-	3	2	-	3	-	-
CO5	-	-	-	-	-	-	-	-	3	2	-	3	-	-
Total	-	-	-	-	-	-	-	-	3	2	-	3	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – I Sem			
Course Code: J410V	INTELLECTUAL PROPERTY RIGHTS (Open Elective - III)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Course Objectives:

1. The main objective of the IPR is to make the students aware of their rights for the protection of their invention done in their project work.
2. To get registration in our country and foreign countries of their invention, designs and thesis or theory written by the students during their project work and for this they must have knowledge of patents, copy right, trademarks, designs and information Technology Act.
3. Further teacher will have to demonstrate with products and ask the student to identify the different types of IPR's.

Module 1:

UNIT - I:

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

Module 2:

UNIT - I:

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

UNIT – II: Selecting and evaluating trade mark, trade mark registration processes.

Module 3:

UNIT - I:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

UNIT - II

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module 4:

UNIT - I:

Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriations of trade secrets, and protection for submission, trade secret litigation.

UNIT - II:

Unfair competition: Misappropriation right of publicity, false advertising.

Module 5:**UNIT - I:**

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

UNIT – II:

International overview on intellectual property, international - trade mark law, copy right law, international patent law, and international development in trade secrets law.

Text Books:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddhaganguli, Tata McGraw Hill Publishing Company Ltd.
3. Managing Intellectual Property-The Strategic Imperative, Second Edition by Vinod V Sople, PHI.

Reference Books:

1. Intellectual Property –Copyrights, Trademarks and patents by Richard Stim, Cengage Learning.
2. Niraj Pandey & Khushdeep Dharani –Intellectual Property rights
3. V.K. AHUJA – Law relating to Intellectual Property

E-Resources:

1. www.Ipindia.nic.in
2. www.Iprlwawindia.org
3. www.mondaq.com

Course outcomes:

The students once they complete their academic projects, they get:

1. **Awareness** of the legal environment.
2. **Understanding** of different acts under the national and international laws.
3. **Acquiring** the patent and copyright for their innovative works.
4. **Awareness** of trade secrets and method of advertising.
5. **Knowledge** of plagiarism in their innovations which can be questioned legally.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	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
CO1	-	-	-	-	-	-	-	-	3	2	-	3	-	-
CO2	-	-	-	-	-	-	-	-	3	2	-	3	-	-
CO3	-	-	-	-	-	-	-	-	3	2	-	3	-	-
CO4	-	-	-	-	-	-	-	-	3	2	-	3	-	-
CO5	-	-	-	-	-	-	-	-	3	2	-	3	-	-
Total	-	-	-	-	-	-	-	-	3	2	-	3	-	-

AY 2020-21 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – II Sem			
Course Code: J42OA	AIR POLLUTION & CONTROL (Open Elective-IV)	L	T	P	D
Credits:3		3	0	0	0

Pre-requisite: Environmental Science

Course Objectives:

This course will enable students to:

1. Introduce students to basic concepts of pollution.
2. understand the causes of air pollution.
3. Study about the health related to air pollution.
4. Develop skills relevant to control of air pollution.
5. understand the quality of air.

Module 1:

Unit-1:

Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution- stationary and mobile sources

Module 2:

Unit-1: Effects of Air pollutants on man, material and vegetation; Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

Module 3:

Unit-1:

Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like SO_x; NO_x; CO; HC etc., air-fuel ratio. Computation and Control of products of combustion. Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity; Influence of Meteorological phenomena on Air Quality-wind rose diagrams.

Module 4:

Unit-1: Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

Module 5:

Unit-1: General Methods of Control of NO_x and SO_x emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

Air Quality Management – Monitoring of SPM, SO_x; NO_x and CO Emission Standards.

Text Books:

1. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
2. Air pollution by Wark and Warner.- Harper & Row, New York

Reference Books:

1. Air pollution and control By K.V.S.G. Murali Krishna, Kaushal Publishers. Kakinada

E-Resources:

1. <http://mjcetenvsci.blogspot.in/2013/11/air-pollution-causes-effects-and.html>
2. <https://www.britannica.com/technology/air-pollution-control>
3. <http://www.yourarticlelibrary.com/air-pollution/5-effective-methods-to-control-air-pollution-explained-with-diagram/28360/>
4. http://www.transportlinks.org/rtkb/english/Module%205%5C5_4a%20Environmental%20Impact%20Assessment.pdf

Course Outcomes:

On completion of the course, the students will be able to:

1. **Acquired** knowledge on the basic elements of causes and occurrence of the air pollution.
2. **Have awareness** on the different causes of the air pollution.
3. **Have awareness** about different health related problems caused due to air pollution.
4. **develop** concepts in controlling and prevention of air pollution.
5. **analyse** air quality.

CO-PO/PSO Mapping Chart (Draft) (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 – Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	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
CO1	1	-	-	-	-	1	2	-	-	-	-	1	-	-
CO2	-	-	-	-	-	1	2	-	-	-	-	1	-	-
CO3	-	-	-	-	-	1	2	-	-	-	-	1	-	-
CO4	-	-	-	-	-	1	2	-	-	-	-	1	-	-
CO5	-	-	-	-	-	1	2	-	-	-	-	1	-	-
Average	0.2	-	-	-	-	1	2	-	-	-	-	1	-	-

AY 2020-21 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – II Sem			
Course Code: J42OB	DISASTER MANAGEMENT (Open Elective-IV)	L	T	P	D
Credits:3		3	0	0	0

Pre-requisite: Environmental Science

Course Objectives:

This course will enable students to:

1. Provide basic conceptual understanding the difference between the hazard and a disaster.
2. Knowledge about the various disasters and their impacts.
3. Provide basic understanding about the hazard and vulnerability profile of India.
4. Have conceptual understanding about the disaster management phases.
5. Approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, Disasters, disaster prevention and risk reduction.

Module 1:

Unit-1: Understanding Disaster:

Concept of Disaster - Different approaches- Concept of Risk - Levels of Disasters - Disaster Phenomena and Events (Global, national and regional)

Unit-2: Hazards and Vulnerabilities:

Natural and man-made hazards; response time, frequency and forewarning levels of different hazards - Characteristics and damage potential or natural hazards; hazard assessment - Dimensions of vulnerability factors; vulnerability assessment - Vulnerability and disaster risk - Vulnerabilities to flood and earthquake hazards

Module 2:

Unit-1: Disaster Management Mechanism:

Concepts of risk management and crisis managements - Disaster Management Cycle - Response and Recovery - Development, Prevention, Mitigation and Preparedness - Planning for Relief

Module 3:

Unit-1: Capacity Building:

Capacity Building: Concept - Structural and Non-structural Measures Capacity Assessment; Strengthening Capacity for Reducing Risk - Counter-Disaster Resources and their utility in Disaster Management - Legislative Support at the state and national levels

Module 4:

Unit-1: Coping with Disaster: Coping Strategies; alternative adjustment processes - Changing Concepts of disaster management - Industrial Safety Plan; Safety norms and survival kits - Mass media and disaster management.

Module 5:**Unit-1: Planning for disaster management:**

Strategies for disaster management planning - Steps for formulating a disaster risk reduction plan - Disaster management Act and Policy in India - Organizational structure for disaster management in India - Preparation of state and district disaster management plans

Text Books:

1. Manual on Disaster Management, National Disaster Management, Agency Govt of India.
2. Disaster Management by Mrinalini Pandey Wiley 2014.
3. Disaster Science and Management by T. Bhattacharya, McGraw Hill Education (India) Pvt Ltd Wiley 2015

Reference Books:

1. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BS Publications 2009.
2. National Disaster Management Plan, Ministry of Home affairs, Government of India (<http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf>)

E-Resources:

1. <https://nptel.ac.in/courses/105/104/105104183/>
2. <https://nptel.ac.in/courses/124/107/124107010/>

Course Outcomes:

On completion of the course, the students will be able to:

1. **Acquire** knowledge on various types of disasters and hazards
2. **Distinguish** between the hazard and a disaster can be analyzed
3. **Acquire** knowledge on the various approaches of Disaster Risk Reduction (DRR)
4. **Ability** to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
5. **Develop** ability to respond to different disasters

CO-PO/PSO Mapping Chart (Draft) (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 – Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	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
CO1	3	2	-	-	-	2	2	3	-	-	-	-	-	-
CO2	3	2	-	-	-	2	2	3	-	-	-	-	-	-
CO3	3	2	-	-	-	2	2	3	-	-	-	-	-	-
CO4	3	2	-	-	-	2	2	3	-	-	-	-	-	-
CO5	3	2	-	-	-	2	2	3	-	-	-	-	-	-
Average	3	2	-	-	-	2	2	3	-	-	-	-	-	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – II Sem			
Course Code: J42OC	SPECIAL ELECTRICAL MACHINES (Open Elective-IV)	L	T	P	D
Credits: 3		3	0	0	0

Prerequisite: Basic Electrical and Electronics Engineering

Course Objectives:

This course will enable students to:

1. Introduce the concepts of permanent magnets and to study the construction, operation, characteristics & control of PMSM.
2. Study construction, operation characteristics and control of PMSM.
3. Understand the construction, operation, characteristics, power controllers and control of SRM.
4. Study the operation of stepper motor, its types, control and its applications.
5. Understand the operation & characteristics of other special machines.

MODULE 1: PERMANENT MAGNET BRUSHLESS DC MOTORS

Fundamentals of permanent magnets – types - principle of operation- magnetic circuit analysis - EMF and torque equations, Characteristics and control.

MODULE 2: PERMANENT MAGNET SYNCHRONOUS MOTORS

Principle of operation – EMF and torque equations - Phasor diagram - Power controllers – performance characteristics – Digital controllers – Constructional features, operating principle and characteristics of synchronous reluctance motor.

MODULE 3: SWITCHED RELUCTANCE MOTORS

Constructional features – Principle of operation - Torque prediction – performance Characteristics-Power controllers – Control of SRM drive - Sensor less operation of SRM – Applications.

MODULE 4: STEPPER MOTORS

Constructional features –Principle of operation –Types – Torque equation – Linear and Nonlinear analysis – Characteristics – Drive circuits – Closed loop control – Applications.

MODULE 5: OTHER SPECIAL ELECTRICAL MACHINES

Principle of operation and characteristics of Hysteresis motor – AC series motors – Linear induction motor – Applications.

TEXT BOOKS:

1. T.J.E. Miller, Brushless magnet and Reluctance motor drives, Clarendon press, London, 1989.
2. R.Krishnan, Switched Reluctance motor drives, CRC press, 2001.
3. T.Kenjo, Stepping motors and their microprocessor controls, Oxford University press, New Delhi, 2000.
4. K. Venkataratnam, Special Electrical Machines, Universities Press, 2014.

REFERENCES:

1. T.Kenjo and S.Nagamori, Permanent magnet and Brushless DC motors, Clarendon press, London, 1988.
2. R.Krishnan, Electric motor drives, Prentice hall of India, 2002.
3. D.P.Kothari and I.J.Nagrath, Electric machines, Tata Mc Graw hill publishing company, New Delhi, Third Edition, 2004.
4. Irving L.Kosow, Electric Machinery and Transformers, Pearson Education, Second Edition, 2007.

E-RESOURCES:

1. <https://nptel.ac.in/courses/108/102/108102156/>
2. https://www.academia.edu/9885014/SPECIAL_ELECTRICAL_MACHINES_NPTTEL_NOTES
3. <https://easyengineering.net/ee6703-special-electrical-machines/>

Course Outcomes:

The students will be able to:

1. **Analyze** given magnetic circuit and understand operation, characteristics and control of PMBLDC motor.
2. **Understand** the construction, operation performance characteristics of PMSM and its power controllers.
3. **Understand** the construction, operation and control of SRM drive and its power controllers.
4. **Understand** the construction, operation, characteristics and control of stepper motor.
5. **Understand** the operation & characteristics of other special electrical machines.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	1	3	3	3	-	-	-	-	-	-	-	-	3	3
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	-	-
Average	1.8	2.2	3	3	-	-	-	-	-	-	-	-	3	3

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – II Sem			
Course Code: J42OD	ELECTRICAL SAFETY ENGINEERING (Open Elective-IV)	L	T	P	D
Credits: 3		3	0	0	0

Prerequisite: Basic Electrical and Electronics Engineering

Course Objectives

The students will

1. To expose the students to electrical hazards.
2. To impart knowledge on prevention of electrical shocks.
3. To create awareness about various first aid methods.
4. To study about Hazardous zones-causes of sparks and flash overs in electrical plants
5. To study about safety management.

MODULE –I: INTRODUCTION

Unit-I: General Background-Objectives of safety and security measures-Hazards associated with electric current and voltage-principles of electrical safety- Approaches to Prevent Accidents.

Unit-II: Fire Prevention and Fire Fighting-Objectives and scope of IE act and IE rules-General requirements for electrical safety as per IE rules.

MODULE –II: ELECTRICAL SHOCKS AND THEIR PREVENTION

Unit-I: Primary and Secondary Electric Shocks- Occurrence of Electric Shock -Shocks Due to Flashovers/Spark-overs- Lightning Strokes on Overhead Transmission Lines and Outdoor Substations.

Unit-II: Safety Precautions in Small LV Installations, Residential Buildings, Shops - Safety Procedures in Electrical Plant Installation and description of Earthing System-Equipment Earthing - Substation Earthing.

MODULE –III: FIRST AID

Unit-I: Introduction- Removal of Contact with Live Conductor- First Principles of Actions after Electric Shock - Artificial Respiration - Schafer's Prone Pressure Method- Silvester's Method- Nielson's Arm-lift Back-pressure Method- Mouth to Mouth Method.

Unit-II: Use of Artificial Resuscitator- External Cardiac Massage- Cardiac Pulmonary Resuscitation-First aid treatment of Heat Exhaustion and heat stroke.

MODULE –IV: ELECTRICAL SAFETY IN HAZARDOUS AREAS

Introduction-Classification of Hazardous zones-causes of sparks and flashovers in electrical plants and machines-functional requirements of electrical equipment and installations for hazardous area/zones-classification of equipment/enclosure for hazardous locations.

MODULE –V: ELECTRICAL SAFETY MANAGEMENT

Introduction-Principles of safety management-management's safety policy-safety organization-organization charts for construction phase of a project, maintenance mode of a plant and for safety department – safety auditing-training and supervision-annual reports - motivation to managers, supervisors and employees.

TEXT BOOKS:

1. S. Rao and H.L. Saluja, “Electrical Safety, Fire Safety and Safety Management”, Khanna Publishers, 2012.
2. W.F. Cooper, “
3. Electrical Safety Engineering”, Butterworth and Company, London, 1998.

REFERENCE BOOKS:

1. J. Cadick, D. Neitzel and A. Winfield, “Electrical Safety Hand Book”, McGraw Hill Education, 2012.
2. J. Maxwell Adams, “Electrical Safety- A Guide to the Causes and Prevention of Electric Hazards”, The Institution of Electric Engineers, 3rd Reprint, 2009.
3. Martha J. Boss and Gayle Nicoll, “Electrical Safety - Systems, Sustainability and Stewardship”, CRC Press, 2015.

E-Resources:

1. https://onlinecourses.swayam2.ac.in/nou20_cs08/preview
2. <https://npti.gov.in/electrical-safety-industries-and-accidents-prevention>
3. <https://www.kopykitab.com/Electrical-Safety-Fire-Safety-Engineering-And-Safety-Management-Second-Edition-by-S-Rao-Saluja>

Course Outcomes:

The students will be able to:

1. **Learn** about Electrical safety, IE act and IE rules.
2. **Understand** Electrical shocks and their prevention
3. **Acquire** knowledge about various first aid measures.
4. **Familiarize** with electrical safety in hazardous areas.
5. **Get** introduced to safety management.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	3	-	3	-	3	3	-	-	2	-	-	-	2	-
CO2	3	-	2	-	3	2	-	-	3	-	-	-	2	-
CO3	3	-	2	-	3	3	-	-	2	-	-	-	3	-
CO4	3	-	2	-	3	2	-	-	2	-	-	-	2	-
CO5	3	-	2	-	3	2	-	-	2	-	-	-	2	-
Average	3	-	2.2	-	3	2.4	-	-	2.2	-	-	-	2.2	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – II Sem			
Course Code: J42OE	DIGITAL MANUFACTURING (Open Elective-IV)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Engineering Drawing, Basics of CAD modelling.

Course Objectives:

This course will enable students to:

1. Understand the need of digital fabrication
2. Understand about Two dimensional layer by layer techniques
3. Know about extrusion based systems, post processing and the software issues involved in digital fabrication
4. Know the applications of digital fabrication

Module - I:

Unit-1: Introduction to additive manufacturing: Introduction to AM, AM evolution, Classification of Additive Manufacturing, Distinction between AM & CNC Machining, Advantages of AM

Module - II:

Unit-1: Two- dimensional layer- by layer techniques: Stereo-lithography (SL), Solid Foil Polymerization (SFP), Selective Laser Sintering (SLS), Selective Powder Building (SPB), Ballistic Particle Manufacturing (PM)

Module - III:

Unit-1: Extrusion based systems: Introduction, basic principles, Fused Deposition Modeling, Materials, and Limitations of FDM

Unit-2: Post processing: Introduction, Support Material Removal, Surface Texture Improvements, Accuracy Improvements, Aesthetic Improvements

Module - IV:

Unit-1: Software issues for additive manufacturing: Introduction, Preparation of CAD Models: The STL file, Problems with STL files, STL file manipulation, Beyond the STL file, Additional software to assist AM

Module - V:

Unit-1: AM applications: Applications in design, Applications in Engineering Analysis and Planning

Unit-2: Medical Applications: Customized Implants and Prosthesis, Aerospace applications and Automotive Applications

Unit-3: Other Applications: Jewelry Industry, Coin Industry, Tableware Industry.

TEXT BOOKS:

1. Ian Gibson, David W Rosen, Brent Stucker, “Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing”, Springer 2010.
2. Chuaa Chee Kai, Leong Kah Fai, “Rapid Prototyping: Principles & Applications”, World Scientific, 2010.

REFERENCES:

1. Ali K.Karmani, EmandAbouel Nasr, “Rapid Prototyping: Theory and Practice”, Springer 2006.
2. Andreas Gebhardt, Understanding Additive Manufacture: Rapid Prototyping, Rapid Tooling and Rapid Manufacture, Hanser Publishers, 2013.
3. Hopkinson, N.Haque, and Dickens Rapid Manufacturing: Advanced Research in Virtual and Rapid Prototyping, Taylor and Francis, 2007.

E- Resources:

1. shorturl.at/qQT07
2. shorturl.at/etyzN
3. shorturl.at/hBOV6

Course Outcomes:

On completion of the course, the students will be able to:

1. **Understand** the importance of digital fabrication
2. **Identify** different techniques involved in two dimensional layering
3. **Analyze** the software issues involved in digital fabrication and know about extrusion based systems and post processing
4. **Apply** the knowledge gained in the digital fabrication

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	1	3	3	3	3							3		
CO2	2	2	3	3	3							3		
CO3	2	2	3	3	3							3		
CO4	1	3	3	3	3							3		
CO5	1	2	2	2	2							3		
Average	1.4	2.4	2.8	2.8	2.8							3		

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – II Sem			
Course Code: J42OG	CONSUMER ELECTRONICS (Open Elective-IV)	L	T	P	D
Credits: 3		3	1	0	0

Prerequisites: Nil

Course Objectives:

The students will

1. Learn how a Consumer Product is developed
2. Learn how to simulate and test that designs.
3. Learn in-depth study of systems and the use of those.
4. To understand concept of Audio Systems.
5. To implement Television Receivers & Video Systems.

Module 1

UNIT-I

Audio Fundamentals and Devices: Basic characteristics of sound signal: level and loudness, pitch, frequency response, fidelity and linearity, Reverberation. Audio level metering, decibel level in acoustic measurement. Microphone: working principle, sensitivity, nature of response, directional characteristics.

UNIT-II

Types: carbon, condenser, crystal, electrets, tie- clip, wireless. Loud speaker: working principle, characteristic impedance, watt capacity. Types: electrostatic, dynamic, permanent magnet, woofers and tweeters. Sound recording: Optical recording, stereophony and multichannel sound, MP3 standard.

Module 2

UNIT-I

Audio systems: CD player, home theatre sound system, surround sound. Digital console: block diagram, working principle, applications.

UNIT-II

FM tuner: concepts of digital tuning, ICs used in FM tuner TDA 7021T . PA address system: planning, speaker impedance matching, Characteristics, power amplifier, Specification.

Module 3

UNIT-I

Television Systems: Monochrome TV standards, scanning process, aspect ratio, persistence of vision and flicker, interlace scanning, picture resolution. Composite video signal: horizontal and vertical sync details, scanning sequence.

UNIT-II

Colour TV standards, colour theory, hue, brightness, saturation, luminance and chrominance. Different types of TV camera. Transmission standards: PAL system, channel bandwidth

Module 4

UNIT-I

Television Receivers and Video Systems: PAL-D colour TV receiver, block diagram, Precision IN Line colour picture tube. Digital TVs:- LCD, LED , PLASMA, HDTV, 3-D TV, projection TV, DTH receiver.

UNIT-II

Video interface: Composite, Component, Separate Video, Digital Video, SDI, HDMI (Multimedia Interface) , Digital Video Interface . CD and DVD player: working principles, Interfaces.

Module 5

UNIT-I

Home / Office Appliances: FAX and Photocopier. Microwave Oven: types, single chip controllers, wiring and safety instructions, technical specifications. Washing Machine: wiring diagram, electronic controller for washing machine, technical specifications, types of washing machine, fuzzy logic.

UNIT-II

Air conditioner and Refrigerators: Components features, applications, and technical specification. Digital camera and cam coder: - pick up devices - picture processing - picture storage.

Text Books:

1. Consumer Electronics, Bali S.P., Pearson Education India,2010.
2. Audio video systems : principle practices & troubleshooting, Bali R and Bali S.P., Khanna Book Publishing Co. (P) Ltd., 2010Delhi , India.

REFERENCES:

1. Intellectual Property in Consumer Electronics, Software and Technology Startups, Springer Nature; 2014th edition (24 September 2013),ISBN-10:9781461479116.
2. Consumer Electronics, B.R. Gupta , V. Singhal, S.K. Kataria & Sons; 2013th edition

E- Resources:

1. <https://www.allaboutcircuits.com/videos/category/consumer-electronics/>
2. <https://www.youtube.com/watch?v=IttXKAGl6zE>

Course Outcomes:

1. **Learn** how a Consumer Product is developed
2. **Analyze** how to simulate and test that designs.
3. **Apply** in-depth study of systems and the use of those.
4. **understand** concept of Audio Systems.
5. **Develope** Television Receivers & Video Systems.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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 1	PS 2
CO1	2	3	2											
CO2	2	2		2										
CO3	3	2		3										
CO4	3	1												
CO5	2	2	3	3										
Average	2.4	2.0	2.5	2.67										

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – II Sem			
Course Code:J42OH	NANO ELECTRONICS (Open Elective-IV)	L	T	P	D
Credits: 3		3	1	0	0

Prerequisites: Basic Electronics

Course Objectives:

The student will

1. understand the basic concepts of Nanotechnology and Nano machines.
2. understand the fundamental logic devices and the need of Quantum computing.
3. mathematically represent the ‘Quantum tunneling’.
4. understand the mathematical treatment for the modeling and design of the carbon nanotubes.
5. study the applications such as MEMS, RAM, Mass Storage devices etc.

Module 1

UNIT-I

Background to nanotechnology: Types of nanotechnology and nanomachines – periodic table – atomic structure – molecules and phases – energy – molecular and atomic size – surface and dimensional space – top down and bottom up; Molecular Nanotechnology: Electron microscope

UNIT-II

scanning electron microscope – atomic force microscope – scanning tunnelling microscope – nanomanipulator – nanotweezers – atom manipulation – nanodots – self assembly – dip pen nanolithography. Nanomaterials: preparation – plasma arcing – chemical vapor deposition – sol-gels – electrodeposition – ball milling – applications of nanomaterials;

Module 2

UNIT-I

Fundamentals of logic devices:- Requirements – dynamic properties – threshold gates; physical limits to computations; concepts of logic devices:- classifications – two terminal devices – field effect devices – coulomb blockade devices – spintronics – quantum cellular automata – quantum computing –

UNIT-II

DNA computer; performance of information processing systems;- basic binary operations, measure of performance processing capability of biological neurons – performance estimation for the human brain. Ultimate computation:- power dissipation limit – dissipation in reversible computation – the ultimate computer.

Module 3

Silicon MOSFETS - Novel materials and alternate concepts:- fundamentals of MOSFET Devices- scaling rules – silicon-dioxide based gate dielectrics – metal gates – junctions & contacts – advanced MOSFET concepts. Quantum transport devices based on resonant tunneling:- Electron tunneling – resonant tunneling diodes – resonant tunneling devices; Single electron devices for logic applications:- Single electron devices – applications of single electron devices to logic circuits.

Module 4

Carbon Nanotube: Fullerenes - types of nanotubes – formation of nanotubes – assemblies – purification of carbon nanotubes – electronic properties – synthesis of carbon nanotubes – carbon nanotube interconnects – carbon nanotube FETs – Nanotube for memory applications – prospects of an all carbon nanotube nanoelectronics.

Module 5

Electrodes & contacts – functions – molecular electronic devices – first test systems – simulation and circuit design – fabrication; Future applications: MEMS – robots – random access memory – mass storage devices for washing machine, technical specifications, types of washing machine, fuzzy logic.

Text Books:

1. 'Introduction to Nanoelectronics' by V. V. Mitin, V. Kochelap, Michel A Stroscio. Cambridge, 2007.
2. 'Fundamental of Nanoelectronics' by George W Hanson, Prentice Hall, 2008.

References Books:

1. Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons and Burkhard
2. Raguse, Nanotechnology: Basic Science and Emerging Technologies, Chapman & Hall / CRC, 2002.

E - Resources:

1. <https://nptel.ac.in/courses/bjy/ab1011/102/111102111/>

Course Outcomes:

1. **develop** the basic concepts of Nanotechnology and Nano machines.
2. **apply** fundamentals of logic devices and the need of Quantum computing.
3. **illustrate** the operation of Silicon MOSFETS.
4. **describe** the mathematical treatment for the modeling and design of the carbon nanotubes.
5. **understand** the applications such as MEMS, RAM, Mass Storage devices and gain knowledge on Electrodes and Contacts.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	PS O 1	PS O 2
CO1	3	1	-	-	-	-	-	-	-	-	-	1	1	-
CO2	2	2	2	-	-	-	-	-	-	-	-	-	2	-
CO3	1	1	-	-	-	-	-	-	-	-	-	-	1	-
CO4	2	1	-	-	-	-	-	-	-	-	-	-	2	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	1	-
Average	2.2	2	2	-	-	-	-	-	-	-	-	1	1.2	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – II Sem			
Course Code: J42OI	FUNDAMENTALS OF CLOUD COMPUTING (Open Elective-IV)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. A course on “Computer Networks”.
2. A course on “operating systems”.

Course objectives:

The Student will:

1. Understand the fundamentals of the Cloud Computing and strategies in the New Economy.
2. Provide a fundamental understanding of different types of cloud computing applications.
3. Provide insights to implement virtualization techniques.
4. Understand the design of cloud and its architecture.
5. Outlines the categories and multimedia in Cloud Computing.

Module 1:

Cloud Computing **Overview-** Origins of Cloud computing cloud components - Essential characteristics - On-demand self-service Broad network access Location independent resource pooling Rapid elasticity, Measured service.

Module 2:

Cloud scenarios - Benefits: scalability. Simplicity, vendor’s security. Limitations - Sensitive information application development - Security concerns - privacy concern with a third party - security level of third party - security benefits Regularity issues: Government policies.

Module 3:

Cloud architecture: Cloud delivery model - SPI framework SPI evolution, SPI vs. traditional IT Model and Software as a Service (SaaS): SaaS service providers - Google App Engine, Salesforce. Cloud, google platform - Benefits - operational benefits Economic benefits - Evaluating SaaS Platform as a service (PaaS): PaaS service providers - Right Scale - Salesforce. Cloud, Rackspace- Force .com, Services and Benefits.

Module 4:

Infrastructure as a Service (IaaS): IaaS service providers - Amazon EC2, GoGrid
Microsoft soft implementation and support - Amazon EC service level agreement -
Recent developments - Benefits

Cloud deployment model: Public clouds - Private clouds - Community clouds - Hybrid
clouds - Advantages of cloud computing.

Module 5:

Virtualization: Virtualization and cloud computing - Need of virtualization – cost,
administration. last deployment, reduce infrastructure cost - limitations

Types of hardware virtualization: Full virtualization - partial virtualization - para
virtualization

Desktop virtualization: Software virtualization - Memory virtualization - Storage
virtualization - Data virtualization - Network virtualization Micro soft Implementation:
Microsoft Hyper V - Vmware features and infrastructure - Virtual Box.

Text Books:

1. Cloud computing a practical approach - Anthony T.Velte, Toby J. Velte Robert
Elsenperer TATA McGraw- Hill, New Delhi – 2010.
2. Cloud Computing: Web-Based Application s That Change the Way You Work
and Collaborate Online - Michael Miller - Que 2008.

Reference Books:

1. Cloud Computing: Arshdeep Bahga, Vijay Madiseti, 2014, University Press.
2. Mastering Cloud Computing: Raj Kumar buyya, Christian Vecchiola,selvi-2013.

E - Resources:

1. <https://nptel.ac.in/courses/106/105/106105167/>
2. <https://sjceodisha.in/wp-content/uploads/2019/09/CLOUD-COMPUTING-Principles-and-Paradigms.pdf>
3. <https://www.alljntuworld.in/download/cloud-computing-cc-materials-notes/>
4. <https://www.slideshare.net/jeetraj17/cloud-computing-it703-unit-1-5>

Course outcomes:

The Student will be able to:

1. **Identify** different elements of cloud computing.
2. **Examine** the essential processes of a Cloud Computing system.
3. **Analyze** the impact of Cloud Computing on organizations and strategy.
4. **Learns** the various marketing strategies for an online business.
5. **Explain** the infrastructure and multimedia concepts.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	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
CO1	2	2	-	-	-	-	-	-	-	-	-	-	2	2
CO2	2	2	-	2	2	-	-	-	-	-	-	-	2	2
CO3	2	2	2	-	2	-	-	-	-	-	-	-	-	2
CO4	2	2	2	-	1	-	-	-	-	-	-	-	-	-
CO5	2	-	-	-	-	-	-	-	-	-	-	-	2	2
Average	2.0	2.0	2.0	2.0	1.7	-	-	-	-	-	-	-	2.0	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – II Sem			
Course Code: J42OJ	INTRODUCTION TO BIG DATA ANALYTICS (Open Elective-IV)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Database Management Systems, Cloud Computing.

Course objectives:

The Student will:

1. Understand the basics of Big Data and Big Data Platform
2. Attain the knowledge of Big Data analytics, Approaches and Tools
3. Describe Map Reduce fundamentals and HDFS File system
4. Differentiate between Hadoop and RDBMS concepts
5. Apply analytics on Structured and Unstructured Data.

Module 1:

UNIT-1:

Introduction to Big Data: Types of Digital Data, what is big data, History of Data Management; Characteristics of Data, Evolution of Big Data, Structuring Big Data; Elements of Big Data; Challenges with Big Data; Why Big Data; Traditional Business Intelligence (BI) versus Big Data.

UNIT-2:

Introduction to Data Analytics: What Big Data Analytics Isn't? Why this sudden Hype Around Big Data Analytics, Classification of Analytics, Greatest Challenges that Prevent Business from Capitalizing Big Data; Top Challenges Facing Big Data; Why is Big Data Analytics Important; Data Science; Data Scientist; Terminologies used in Big Data Environments; BASE; Few Top Analytics Tools.

Module 2:

UNIT-1:

Understanding Analytics and Big Data: Comparing Reporting and Analysis, Types of Analytics; Points to Consider during Analysis; Developing an Analytic Team; Understanding Text Analytics;

UNIT-2:

Analytical Approach and Tools to Analyze Data: Analytical Approaches; History of Analytical Tools; Introducing Popular Analytical Tools; Comparing Various Analytical Tools.

Module 3:

UNIT-1:

Understanding MapReduce Fundamentals and HBase: The MapReduce Framework; Techniques to Optimize MapReduce Jobs; Uses of MapReduce; Role of HBase in Big Data Processing; Storing Data in Hadoop

UNIT-2:

Introduction of HDFS: Architecture, HDFS Files, File system types, commands, org.apache.hadoop.io package, HDFS - High Availability; Introducing HBase, Architecture, Storing Big Data with HBase, interacting with the Hadoop Ecosystem; HBase in Operations-Programming with HBase; Installation, Combining HBase and HDFS

Module 4:

UNIT-1:

Big Data Technology Landscape and Hadoop: NoSQL, Hadoop; RDBMS versus Hadoop; Distributed Computing Challenges; History of Hadoop; Hadoop Overview; Use Case of Hadoop; Hadoop Distributors;

UNIT-2:

HDFS (Hadoop Distributed File System): HDFS Daemons, read, write, Replica Processing of Data with Hadoop; Managing Resources and Applications with Hadoop YARN.

Module 5:

UNIT-1:

Social Media Analytics and Text Mining: Introducing Social Media; Key elements of Social Media; Text mining; Understanding Text Mining Process; Sentiment Analysis, Performing Social Media Analytics and Opinion Mining on Tweets;

UNIT-2:

Mobile Analytics: Introducing Mobile Analytics; Define Mobile Analytics; Mobile Analytics and Web Analytics; Types of Results from Mobile Analytics; Types of Applications for Mobile Analytics; Introducing Mobile Analytics Tools.

Text Books:

1. BIG DATA, Black Book™, Dreamtech Press, 2015 Edition.
2. BUSINESS ANALYTICS 5e, BY Albright |Winston

Reference Books:

1. Rajiv Sabherwal, Irma Becerra- Fernandez, "Business Intelligence –Practice, Technologies and Management", John Wiley 2011.
2. Lariss T. Moss, ShakuAtre, "Business Intelligence Roadmap", Addison-Wesley It Service.
3. Yuli Vasiliev, "Oracle Business Intelligence: The Condensed Guide to Analysis

E - Resources:

1. <https://www.coursera.org/learn/big-data-introduction>
2. https://www.tutorialspoint.com/big_data_analytics/index.htm
3. www.upgrad.com/Big-Data
4. <https://www.javatpoint.com/what-is-big-data>
5. <https://www.edx.org/course/big-data-analytics-using-spark>

Course outcomes:

The Student will be able to:

1. **Identify** the basics of Big Data and its environment
2. **Use** Big Data Analytics Tools and its Approaches
3. **Define** Map Reduce fundamentals and HDFS Architecture
4. **Distinguish** between Hadoop and RDBMS concepts
5. **Illustrate** analytics on Structured and Unstructured Data.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	PS O 1	PS O 2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	1	-	-	3	-	-	-	-	-	-	-	-	-
CO3	1	2	2	1	2	-	-	-	-	-	1	-	2	2
CO4	1	-	1	1	-	-	-	-	-	-	-	-	-	-
CO5	1	-	1	1	-	-	-	-	-	-	-	-	-	-
Average	1.0	1.5	1.3	1.0	2.5	-	-	-	-	-	1.0	-	2.0	2.0

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IV Year–II Sem.			
Course Code: J42OK	FUNDAMENTALS OF E-COMMERCE (Open Elective-IV)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: NIL

Course Objectives:

The students will

1. Introduction to information systems for business and management.
2. to familiarize students with organizational and managerial foundations of systems,
3. to understand the technical foundation for understanding information systems.
4. To get Electronic payment systems.
5. To familiarize with cyber laws and cyber money.

Module 1: Introduction to E Commerce

Unit 1:

E-Commerce Definitions, Business models related to E Commerce, Technical and Economical Challenges.

Unit 2:

Actors and stake holders, Fundamental Sales Process and Technological Elements.

Module 2: B2C Business

Unit 1:

The Process Model and its variants, Pricing Challenge, Fulfilment challenge, Payment Challenge.

Unit 2:

B2C Business and CRM, B2C Software Systems.

Module 3: B2B Business

The Process Model and its variants, B2B Software Systems.

Module 4: Impact of E-commerce and Security

Unit 1:

Ethics Morale and Technology, Ethical aspects of ICT, Overall impacts of E-Commerce, Foundations of Risk Management.

Unit 2:

Information Security Management(ISM) and Legal aspects of E-Commerce.

Module 5: Electronic Payment

Business and money, the payment challenges, payment procedures and cyber money.

Text Books:

1. Introduction to E-Commerce by Martin Kutz.

Reference Books:

1. Ravi Kalakota, Andrew B. Whinston, "Electronic Commerce-A Manager's guide", Addison-Wesley.

E-Resources:

1. <https://nptel.ac.in/courses/110/105/110105083/>

Course Outcomes:

The students will be able to

1. **Understand** the basic concepts and technologies used in the field of E-Commerce
2. **Have** the knowledge of the different types of Business Systems.
3. **Understand** the processes involved in E Business Systems.
4. **Be aware** of the ethical, social, and security issues.
5. **Have** knowledge with Cyber laws and EPS.

CO-Articulation Matrix														
CO-PO/PSO Mapping Chart														
3/2/1 indicates the strength of the calculation														
3-Strong, 2-Medium, 1-Low														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	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
CO1	2	2	1	2	2	-	1	-	-	-	-	-	1	-
CO2	1	1	2	2	2	-	1	-	-	-	-	-	2	-
CO3	1	3	3	3	3	-	2	-	-	-	-	-	2	-
CO4	-	2	2	2	1	-	1	-	-	-	-	-	-	-
CO5	1	2	1	1	1	-	1	-	-	-	-	-	2	-
Average	1	2	1.8	2	1.8	-	1.2	-	-	-	-	-	1.4	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech IV Year – II Sem			
Course Code: J42OL	E-WASTE MANAGEMENT (Open Elective-IV)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: NIL

Course Objectives:

The students will

1. Know regarding E-Waste Management in India Global E-Waste Growth
2. Analyze the overview of WEEE.
3. Understanding scenarios for E-Waste management.
4. Visualize the basic concepts of E-Waste Regulation
5. Understand the basic concepts of Recycling technologies.

Module 1:

Unit 1:

Introduction to e-Waste Management in India Global e-waste growth, Dark shadows of digitization on Indian horizon, e-waste generation, migration, Present practice and systems, disposal methods, Present processing practices.

Unit 2:

Initiatives to manage e-waste, Strengths and weaknesses of the current system.

Module 2:

Unit 1:

WEEE (waste electrical and electronic equipment) - toxicity and health Hazardous substances in waste electrical and electronic equipment-toxicity and release.

Unit 2:

Occupational and environmental health perspectives of e-waste recycling.

Module 3:

Unit 1:

Options and Scenarios for e-Waste Management Actions to be considered to achieve goals of ewaste management, Collection/ take back system,

Unit 2:

Closing the Plastic loop: Turning the supply chain into a supply cycle by mining plastics from end-of-life electronics and other durable goods.

Module 4:**Unit 1:**

E-waste legislation in the European Union and the Basel Convention. Regulating e-waste: a review of the international and national legal framework on e-waste Extended producer responsibility: a key tool for international rules and regulations on e-waste.

Module 5:**Unit 1:**

Recycling technologies for e-waste Recycling of e-scrap in a global environment opportunities and challenges.

Unit 2:

Technologies for recovery of resources from e-waste. Reuse:A Bridge from Unsustainable e-waste to sustainable e-resources.

Text Books:

1. Rakesh Johri, E-waste: Implications, regulations, and management in India and current global best practices.
2. Klaus Hieronymi, Ramzy Kahhat, Eric Williams, E-Waste Management: from Waste to Resource

Reference Books:

1. Satish Sinha, Priti Mahesh, Waste Electrical and Electronic Equipment The EU and India.
2. By Ronald E. Hester, Roy M. Harrison , Electronic Waste Management.

E-Resources:

1. <https://nptel.ac.in/courses/105/105/105105169/>

Course Outcomes:

At the end of the course, students will be able to:

1. **Demonstrate** knowledge of E-Waste management.
2. **Implementing** environmental health perspectives of E-Waste recycling.
3. **Achieve** goals of E-Waste management.
4. **Develop** the skills in E-Waste extended producer responsibility.
5. **Describe** the technologies for recovery of resources from E-Waste.

CO-Articulation Matrix														
CO-PO/PSO Mapping Chart														
3/2/1 indicates the strength of the calculation														
3-Strong, 2-Medium, 1-Low														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	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
CO1	2	2	1	2	2	-	1	-	-	-	-	-	1	-
CO2	1	1	2	2	2	-	1	-	-	-	-	-	2	-
CO3	1	3	3	3	3	-	2	-	-	-	-	-	2	-
CO4	-	2	2	2	1	-	1	-	-	-	-	-	-	-
CO5	1	2	1	1	1	-	1	-	-	-	-	-	2	-
Average	1	2	1.8	2	1.8	-	1.2	-	-	-	-	-	1.4	-

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IV Year –II Sem.			
Course Code: J42OM	INTRODUCTION TO EMBEDDED SYSTEMS (Open Elective-IV)	L	T	P	D
AY 2020-21 onwards		3	0	0	0

Pre-requisite: Basics Computer Knowledge

Course Objectives:

Students will learn to

1. Understand the basic concepts of embedded systems and 8051 microcontrollers.
2. Compare and contrast the basics of assembly programming language.
3. Identify the unique characteristics of real-time systems
4. Analyze the general structure of a real-time system and define the unique design problems and challenges of real-time systems.
5. Acquaint the embedded software development tools and various advanced architectures.

Module 1:

Unit 1: Embedded Computing: Introduction, complex systems and microprocessor, the embedded system design process, formalisms for system design, design examples

Unit 2 : The 8051 Architecture: Introduction, 8051 micro controller hardware, input/output ports and circuits, external memory, counter and timers, serial data input/output, interrupts.

Module 2:

Unit 1: Basic Assembly Language Programming Concepts: The assembly language programming process, programming tools and techniques, programming the 8051.

Unit 2 : Data transfer and logical instructions, arithmetic operations, decimal arithmetic, jump and call instructions.

Module 3:

Unit 1: Introduction to Real-Time Operating Systems: Tasks and task states, tasks and data, semaphores, and shared data; message queues, mailboxes and pipes, timer functions, events, memory management, interrupt routines in an RTOS environment.

Unit 2 : Basic Design Using a Real-Time Operating System: Principles, semaphores and queues, hard real-time scheduling considerations, saving memory and power, an example RTOS like uC-OS (open source).

Module 4:

Unit 1 : Embedded Software Development Tools: Host and target machines, linker/locators for embedded software, getting embedded software into the target system.

Unit 2 : Debugging Techniques: Testing on host machine, using laboratory tools, an example system.

Module 5:

Unit 1: Introduction to advanced Architectures: ARM and SHARC, processor and memory organization and instruction level parallelism.

Unit 2: Networked embedded systems: bus protocols, I2C bus and CAN bus; internet-enabled systems, design example-elevator controller.

Text Books:

1. Wayne Wolf (2008), Computers as Components-principles of embedded computer system design, Elsevier, New Delhi, India.
2. Kenneth J. Ayala (2008), The 8051 Microcontroller, 3rd edition, Cengage Learning, India.

Reference Books:

1. David E. Simon (1999), An Embedded Software Primer, Pearson Education, India.
2. Jean J. Labrosse (2000), Embedding System Building Blocks, 2nd edition, CMP publishers, USA.
3. Raj Kamal (2004), Embedded Systems, Tata McGraw hill, India.

E-Resources:

1. <https://nptel.ac.in/courses/108/102/108102045/>
2. <https://www.edx.org/course/utaustinx/utaustinx-ut-6-02x-embedded-systems-4806>

Course Outcomes:

Students will be able to

1. **Program** an embedded system
2. **Analyze** Interfacing with keyboard, A/D & D/A conversions, serial data Communication, LCD and LED display.
3. **Illustrate** Tasks, Semaphores, Message queues, pipes, Timer functions.
4. **Design** embedded systems and real-time systems
5. **Compare** and contrast ARM, SHARC, internet enabled systems.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)											Program Specific Outcomes*		
	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
CO1	2	1	2	-	-	-	-	-	1	-	2	2	2	-
CO2	2	2	2	-	-	-	-	-	2	-	2	2	3	1
CO3	2	2	-	-	-	-	-	-	2	-	-	2	3	1
CO4	1	3	-	-	-	-	-	-	2	-	-	2	3	1
CO5	2	1	-	-	-	-	-	-	2	-	2	2	2	1
Average	1.8	1.8	2	-	-	-	-	-	1.8	-	2	2	2.6	1

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech IV Year –II Sem.			
Course Code: J42ON	INTRODUCTION TO NETWORK SECURITY (Open Elective-IV	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

The students will

1. Learn about Information security, security attacks, threats, services, and mechanisms and Application of each of confidentiality, integrity, and availability.
2. Know the principles of public key encryption and private key encryption and the algorithms used for both.
3. Master in E-mail security understand the algorithms PGP, MIME and S/MIME
4. Analyse IP Security architecture and understand concepts of SSL (Secure socket layer), TLS (transport layer security) and SET (secure electronic transactions)
5. Become familiar with the basic categories of threats to computers and networks.

Module 1:

Unit 1: Attacks on Computers and Computer Security:

Introduction, The need for security, Security approaches, Principles of security.

Unit 2 Security Cryptography:

Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques encryption and decryption, symmetric and asymmetric key cryptography, stenography, key range and key size, possible types of attacks.

Module 2:

Unit 1: Symmetric key Ciphers:

Block Cipher principles & Algorithms (DES, AES, Blowfish), Differential and Linear Crypt Analysis Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption, function, Key distribution.

Unit 2: Asymmetric key Ciphers:

Principles of public key crypto systems, Algorithms (RSA, Diffie-Hellman, ECC), Key Distribution.

Module 3:

Unit 1: Message Authentication Algorithms and Hash Functions:

Authentication requirements, Functions, Message authentication codes, Hash Functions,

Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm.

Module 4:

Unit 1: Data visualisation:

Introduction, Types of data visualisation, Data for visualisation:

Unit 2: Data Types and Methods :

Data types, Data encodings, Retinal variables, mapping variables to encodings, Visual encodings.

Module 5:

Unit 1: Applications:

Applications of Data Science, Technologies for visualisation, Bokeh (Python), recent trends in various data collection and analysis techniques

Unit 2: Technologies:

Various visualization techniques, application development methods of used in data science.

Text Books:

1. Cathy O’Neil, Rachel Schutt, Doing Data Science, Straight Talk from The Frontline. O’Reilly, 2013.

Reference Books:

1. Jure Leskovek, AnandRajaraman, Jeffrey Ullman, Mining of Massive Datasets. V2.1, Cambridge University Press, 2014.

Web Resources:

1. https://www.tutorialspoint.com/information_security_cyber_law/network_security.htm
2. https://www.tutorialspoint.com/information_security_cyber_law/cyber_security_strategies.htm
3. https://www.tutorialspoint.com/information_security_cyber_law/index.htm
4. https://www.tutorialspoint.com/information_security_cyber_law/cyber_law_objectives.htm
5. https://www.tutorialspoint.com/information_security_cyber_law/introduction.htm
6. https://www.tutorialspoint.com/information_security_cyber_law/intellectual_property_right.htm
7. https://www.tutorialspoint.com/information_security_cyber_law/policies_to_mitigate_cyber_risk.htm
8. https://www.tutorialspoint.com/information_security_cyber_law/information_technology_act.htm

Course Outcomes:

Students will be able to

1. **Understand** cyber-attacks and types of cybercrimes.
2. **Summarize** Cyber Laws and Cyber Forensics.
3. **Understand** frauds in Wireless era.
4. **Analyze** and evaluate the cyber security needs of an organization.
5. **Outline** Data Privacy and privacy policies.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 – Weak														
Course Outcomes (Cos)	Program Outcomes (Pos)												Program Specific Outcomes*	
	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
CO1	2	2	2	-	2	2	1	-	-	-	-	1		
CO2	-	-	2	-	1	2	-	-	-	-	-	1		
CO3	2	3	1	-	2	1	1	-	-	-	-	-		
CO4	2	2	2	-	-	-	1	-	-	-	-	1		
CO5	-	-	-	-	-	1	2	-	-	-	-	2		
Average	1.2	1.4	1.4	-	1	1.2	1	-	-	-	-	1		

AY 2020-21 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech. IV Year – II Sem			
Course Code: J42OP	INTRODUCTION TO MINE ENVIRONMENT (Open Elective-IV)	L	T	P	D
Credits: 3		3	0	0	0

Pre-requisite: Nil

Course Objectives:

The students will

1. To introduce about atmospheric, mine air & their limitations
2. To acquaint with spontaneous heating and explosions in coal mines
3. To get idea about sources of dust, and its control in mines
4. To get idea about miners' diseases & lighting in mines
5. To know about reclamation of mines, impact of mining on environment & sustainable mining

Module 1

Unit - 1: Atmosphere and mine air composition. Origin of gases, properties, limitations of gases in underground mines

Module 2

Unit - 1: Spontaneous Combustion: Factors, control measures.

Unit - 2: Explosions: Causes of firedamp explosion, preventive measures against firedamp explosion.

Module 3

Unit - 1: Dust: Sources in underground and opencast mines, standards and control measures.

Module 4

Unit - 1: Miners diseases, Lighting standards in underground and opencast mines.

Module 5

Unit - 1: Reclamation, plantation of surface mines, Impact of mining on environment & sustainable mining.

Textbooks:

1. Elements of Mining Technology (VOL-2) – by D.J. Deshmukh.
2. Surface Mining – by S.K. Das.

Reference Books:

1. Mine Ventilation – by G.B. Mishra.

E-Resources:

1. https://www.ltu.se/cms_fs/1.124549!/file/rapport%20Environmental%20Aspects%20of%20mining_low.pdf
2. <https://pubs.usgs.gov/pp/1802/b/pp1802b.pdf>
3. <https://www.elaw.org/files/mining-eia-guidebook/Chapter1.pdf>

Course Outcomes:

The student will be able to:

1. **Learn** about atmospheric and mine air
2. **Learn** about spontaneous combustion and explosion in coal mines
3. **Understand** about dust sources and its control in mines
4. **Learn** about miners' diseases, mine lighting and its standards
5. **Learn** about reclamation of mines, impacts of mining on environment and sustainable mining

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – Strong; 2 – Medium; 1 - Weak														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes	
	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	PS O 1	PS O 2
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO4	2	2	1	-	-	-	-	-	-	-	-	-	-	-
CO5	3	1	2	-	-	-	-	-	-	-	-	-	-	-
Average	3	2	1.6	-	-	-	-	-	-	-	-	-	-	-