I Year I Semester							
S.No	**Code**	**Course Title**	**L**	**T**	**P**	**D**	**Credits**
1	L110B	English	3	0	0	0	3
2	L110A	Differential Equations and Calculus	3	1	0	0	4
3	L110C	Applied Physics	3	0	0	0	3
4	L115A	Programming for Problem Solving	3	1	2	0	4
5	L11M2	**Audit Course-1**: Human Values and Professional Ethics	2	0	0	0	0
6	L1102	Physics Lab	0	0	2	0	1
7	L1101	English Language and Communication Skills Lab	0	0	2	0	1
8	L1151	Programming for Problem Solving Lab	0	0	4	0	2
Total			**14**	**2**	**10**	**0**	**18**

I Year II Semester							
S.No	**Code**	**Course Title**	**L**	**T**	**P**	**D**	**Credits**
1	L120D	Engineering Chemistry	3	0	0	0	3
2	L120A	Linear Algebra and Advanced Calculus	3	1	0	0	4
3	L122A	Basic Electrical and Electronics Engineering	3	1	0	0	4
4	L1232	Engineering and IT workshop	1	0	4	0	3
5	L1231	Engineering Drawing	1	0	0	4	3
6	L12M1	**Audit course-2:** Functional English	2	0	0	0	0
7	L1203	Chemistry Lab	0	0	2	0	1
8	L1221	Basic Electrical and Electronics Engineering Lab	0	0	4	0	2
Total			**13**	**2**	**10**	**4**	**20**

II Year I Semester							
S.No	**Code**	**Course Title**	**L**	**T**	**P**	**D**	**Credits**
1	L210A	Probability and Statistics	3	1	0	0	4
2	L215A	Data Structures	3	0	0	0	3
3	L215B	Python Programming	3	0	0	0	3
4	L214E	Digital Logic Design and Computer Organization	3	0	0	0	4
5	L216B	Object Oriented Programming through Java	3	0	0	0	3
6	L21M2	Environmental Science	2	0	0	0	0
7	L2151	Data Structures and Java Programming Lab	0	0	3	0	1.5
8	L2152	Python Programming Lab	0	0	3	0	1.5
9	L2153	Internship – I	0	0	2	0	1
Total			**17**	**1**	**8**	**0**	**21**

II Year II Semester							
S.No	**Code**	**Course Title**	**L**	**T**	**P**	**D**	**Credits**
1	L225A	Operating Systems	3	0	0	0	3
2	L225B	Computer Networks	3	0	0	0	3
3	L220D	Mathematical Foundations of Computer Science	3	0	0	0	3
4	L225C	Design and Analysis of Algorithms	3	0	0	0	3
5	L225D	Formal Languages and Automata Theory	3	0	0	0	3
6	L226B	Database Management Systems	3	0	0	0	3
7	L22M1	Gender Sensitization	2	0	0	0	0
8	L2251	Operating System and Computer Networks Lab	0	0	3	0	1.5
9	L2261	Database Management Systems Lab	0	0	3	0	1.5
Total			**20**	**0**	**6**	**0**	**21**

III Year I Semester							
S.No	**Code**	**Course Title**	**L**	**T**	**P**	**D**	**Credits**
1	L315A	Compiler Design	3	1	0	0	4
2	L315B	Web Technologies	3	0	0	0	3
3	L31AA	Machine Learning	3	0	0	0	3
4	BTCSEO1	Open Elective – I	3	0	0	0	3
5	BTCSEE1	Professional Elective –I	3	0	0	0	3
6	L31M2	Cyber Security	2	0	0	0	0
7	L31T2	**Audit Course-3:** Foundations of Entrepreneurship	2	0	0	0	0
8	L3151	Web Technologies Lab	0	0	3	0	1.5
9	L31A1	Machine Learning Lab	0	0	3	0	1.5
10	L3153	Internship – II	0	0	2	0	1
Total			**19**	**1**	**8**	**0**	**20**

III Year II Semester							
S.No	**Code**	**Course Title**	**L**	**T**	**P**	**D**	**Credits**
1	L325A	Software Engineering	3	0	0	0	3
2	L32EA	Business Economics and Financial Analysis	3	1	0	0	4
3	BTCSEE2	Professional Elective – II	3	0	0	0	3
4	BTCSEE3	Professional Elective - III	3	0	0	0	3
5	BTCSEO2	Open Elective – II	3	0	0	0	3
6	BTCSEO3	Open Elective – III	3	0	0	0	3
7	L32M5	E-Commerce	2	0	0	0	0
8	L32T1	**Audit Course-4:** Employability Skills	2	0	0	0	0
9	L3251	Software Engineering Lab	0	0	2	0	1
10	L3201	Life Skills and Professional Skills Lab	0	0	4	0	2
Total			**22**	**1**	**6**	**0**	**22**

IV Year I Semester							
S.No	**Code**	**Course Title**	**L**	**T**	**P**	**D**	**Credits**
1	L415A	Advanced Linux Programming	3	0	0	0	3
2	L41DA	Data Science through R	3	0	0	0	3
3	BTCSEE4	Professional Elective - IV	3	0	0	0	3
4	BTCSEE5	Professional Elective - V	3	0	0	0	3
5	BTCSEO4	Open Elective – IV	3	0	0	0	3
6	L41MD	Computer Vision	2	0	0	0	0
7	L4151	Advanced Linux Programming Lab	0	0	4	0	2
8	L41D1	Data Science through R Lab	0	0	4	0	2
9	L4152	Mini Project	0	0	4	0	2
10	L4153	Major Project Stage – I	0	0	6	0	2
Total			**17**	**0**	**18**	**0**	**23**

IV Year II Semester							
S.No	**Code**	**Course Title**	**L**	**T**	**P**	**D**	**Credits**
1	BTCSEE6	Professional Elective - VI	3	0	0	0	3
2	BTCSEO5	Open Elective – V	3	0	0	0	3
3	L4252	Major Project Stage – II	0	0	14	0	8
4	L4251	Seminar	0	0	2	0	1
Total			**6**	**0**	**16**	**0**	**15**

Professional Elective-I (III-I)							
S.No	**Code**	**Course Title**	**L**	**T**	**P**	**D**	**Credits**
1	L316E	Data Warehousing and Data Mining	3	0	0	0	3
2	L315F	Artificial Intelligence and its Applications	3	0	0	0	3
3	L316I	Object Oriented Analysis and Design	3	0	0	0	3

Professional Elective-II (III-II)							
S.No	**Code**	**Course Title**	**L**	**T**	**P**	**D**	**Credits**
1	L32DJ	Big Data Analytics	3	0	0	0	3
2	L32AJ	Deep Learning	3	0	0	0	3
3	L325G	Software Testing Methodology	3	0	0	0	3

Professional Elective-III (III-II)							
S.No	**Code**	**Course Title**	**L**	**T**	**P**	**D**	**Credits**
1	L325H	Cloud computing	3	0	0	0	3
2	L32AA	Reinforcement Learning	3	0	0	0	3
3	L326F	Software Architecture and Design Patterns	3	0	0	0	3

Professional Elective-IV (IV-I)							
S.No	**Code**	**Course Title**	**L**	**T**	**P**	**D**	**Credits**
1	L417G	Internet of things	3	0	0	0	3
2	L41AB	Generative Adversarial Networks	3	0	0	0	3
3	L415G	Rapid Application Development Tools	3	0	0	0	3

Professional Elective-V (IV-I) (Mandatory MOOC)							
S.No	**Code**	**Course Title**	**L**	**T**	**P**	**D**	**Credits**
1	L41DI	Data Science for Health Care	3	0	0	0	3
2	L415K	Quantum Computing	3	0	0	0	3
3	L415L	Software Project Management	3	0	0	0	3

Professional Elective-VI (IV-II)							
S.No	**Code**	**Course Title**	**L**	**T**	**P**	**D**	**Credits**
1	L42DE	Data Science for Finance	3	0	0	0	3
2	L425C	Design Thinking	3	0	0	0	3
3	L425D	Android Application Development	3	0	0	0	3

Open Elective-I					
S. No	**Code**	**Course Title**	**L**	**Credits**	**Approving BOS**
1	L31OA	Elements of CIVIL Engineering	**3**	**3**	CE
2	L31OB	Introduction to Computer Networks	**3**	**3**	CSE
3	L31OC	Introduction to Machine Learning	**3**	**3**	AI&ML
4	L31OD	Fundamentals Of Data Science	**3**	**3**	AI&DS
5	L31OE	Principles of Communications	**3**	**3**	ECE
6	L31OF	Fundamentals of Digital Logic Design	**3**	**3**	ECM
7	L31OG	Energy Engineering	**3**	**3**	EEE
8	L31OH	Open Source Software's	**3**	**3**	IT
9	L31OI	Automotive Technology	**3**	**3**	MECH
10	L31OJ	Introduction to Mining Technology	**3**	**3**	MINING
11	L31OK	Entrepreneurship for Micro, Small and Medium Enterprises	**3**	**3**	MBA
12	L31OL	Numerical Solution of Ordinary Differential Equations	**3**	**3**	Maths
13	L31OM	Nano materials	**3**	**3**	Physics
14	L31ON	Chemistry of Engineering materials	**3**	**3**	Chemistry
15	L31OO	Technical writing skills	**3**	**3**	English
16	L31OP	Indian Constitution	**3**	**3**	English

Open Elective-II					
S. No	**Code**	**Course Title**	**L**	**Credits**	**Approving BOS**
1	L32OA	Construction Management, Contracts and valuation	**3**	**3**	CE
2	L32OB	Principles of Operating Systems	**3**	**3**	CSE
3	L32OC	Introduction to Predictive Analytics	**3**	**3**	AI & ML
4	L32OD	Business Data Analytics	**3**	**3**	AI & DS
5	L32OE	Basics of IC Technology	**3**	**3**	ECE
6	L32OF	Introduction to Micro Processor and Micro Controllers	**3**	**3**	ECM
7	L32OG	Hybrid Electric Vehicles	**3**	**3**	EEE
8	L32OH	Distributed Systems	**3**	**3**	IT
9	L32OI	Fundamentals of Operations Research	**3**	**3**	MECH
10	L32OJ	Introduction to Surface Mining	**3**	**3**	MINING
11	L32OK	Intellectual Property Rights	**3**	**3**	MBA
12	L32OL	Numerical Solution of Partial Differential Equations	**3**	**3**	Maths
13	L32OM	Advanced physics for Engineers	**3**	**3**	Physics
14	L32ON	Nano Chemistry	**3**	**3**	Chemistry
15	L32OO	Teamwork and Team Building	**3**	**3**	English
16	L32OP	Essence of Indian Traditional Knowledge	**3**	**3**	English

Open Elective-III					
S. No	**Code**	**Course Title**	**L**	**Credits**	**Approving BOS**
1	L32OQ	Road Safety Engineering	**3**	**3**	CE
2	L32OR	Introduction to Java Programming	**3**	**3**	CSE
3	L32OS	Introduction to Neural Networks	**3**	**3**	AI&ML
4	L32OT	Health Care Data Analytics	**3**	**3**	AI&DS
5	L32OU	MATLAB Programming Language	**3**	**3**	ECE
6	L32OV	Introduction to Sensors and Its Applications	**3**	**3**	ECM
7	L32OX	Non-Conventional Energy Sources	**3**	**3**	EEE
8	L32OY	Soft Computing	**3**	**3**	IT
9	L32OZ	Basics of Robotics	**3**	**3**	MECH
10	L32O1	Basic Mining Geology	**3**	**3**	MINING
11	L32O2	Digital Marketing	**3**	**3**	MBA
12	L32O3	Number Theory and Cryptography	**3**	**3**	Maths
13	L32O4	NDT and Vaccum Technology	**3**	**3**	Physics
14	L32O5	Chemistry for Engineers	**3**	**3**	Chemistry
15	L32O6	Technical communication skills	**3**	**3**	English

Open Elective-IV					
S. No	**Code**	**Course Title**	**L**	**Credits**	**Approving BOS**
1	L41OA	Environmental Impact Assessment	3	3	CE
2	L41OB	Introduction to Python Programming	3	3	CSE
3	L41OC	Introduction to Deep Learning	3	3	AI&ML
4	L41OD	Fundamentals of Big Data	3	3	AI&DS
5	L41OE	Consumer Electronics	3	3	ECE
6	L41OF	Introduction to Embedded Systems	3	3	ECM
7	L41OG	Special Electrical Machines	3	3	EEE
8	L41OH	Object Oriented Analysis and Design	3	3	IT
9	L41OI	Basics of MINE Environment	3	3	MINING
10	L41OJ	Rural Marketing	3	3	MBA

Open Elective-V					
S. No	**Code**	**Course Title**	**L**	**Credits**	**Approving BOS**
1	L42OA	Energy Audit & Green buildings	**3**	**3**	CE
2	L42OB	Introduction to Big Data Analytics	**3**	**3**	CSE
3	L42OC	Introduction to Generative Adversarial Networks	**3**	**3**	AI&ML
4	L42OD	Cloud Computing	**3**	**3**	AI&DS
5	L42OE	Principles of Sensors and their Application	**3**	**3**	ECE
6	L42OF	Introduction to Electronic Instrumentation	**3**	**3**	ECM
7	L42OG	Instrumentation	**3**	**3**	EEE
8	L42OH	Cyber Laws & Ethics	**3**	**3**	IT
9	L42OI	Fundamentals to Rock Mechanics	**3**	**3**	MINING
10	L42OJ	Customer Relationship management	**3**	**3**	MBA

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-I Sem			
Course Code: L110B	**ENGLISH** (Common to CSE, IT, ECM&AI&DS)	L	T	P	D
Credits: 3		**3**	**0**	**0**	**0**

Pre-Requisites:

Module 1:

The Model Millionaire-Oscar Wilde from the prescribed textbook 'Forging Ahead' published by Orient Black Swan.
Listening: The Listening Process-Hearing and Listening; Types of Listening.
Speaking: Narrating Personal Experiences, Expressing Opinions.
Reading: Reading for Summarizing and Paraphrasing, Facts versus Opinions.
Writing Skills: Note-making, summarizing; Writing Formal Letters.
Vocabulary and Grammar: Subject-Verb Agreement, Noun-Pronoun Agreement; Collocations.

Module 2:

The Lotos-Eaters (extract)-**Alfred Tennyson** from the prescribed textbook 'Forging Ahead' published by Orient Black Swan.
Listening: Listening for Style-Communicative Purpose, Degree of Formality, Choice of Vocabulary Pronunciation and Syntax; Listening for Structure-Introduction, Body, and Conclusion.
Speaking: Making Presentation-Preparing a Presentation, Structuring Content, Delivering the Presentation.
Reading: Reading for Meaning; Reading for Pleasure; Making Inferences; Reading Between the Lines.
Writing Skills: Writing an Appreciation of a Poem; Paraphrasing; Note-Taking.
Vocabulary And Grammar: Word Roots and Affixes; Tenses; Correcting Errors in Punctuation.

Module 3:

Continuous Transformation-Azim Premji from the prescribed textbook 'Forging Ahead' published by Orient Black Swan.
Listening: Listening with a Purpose-Barriers to Listening.
Speaking: Agreeing and Disagreeing with, and Defending Opinions.
Reading: Reading Methods-SQ3R Reading Technique.
Writing Skills: Writing Argumentative Essays.
Vocabulary and Grammar: Active and Passive Voice, Academic Vocabulary.

Module 4:

Steve Jobs-Steven Paul Jobs from the prescribed textbook 'Forging Ahead' published by Orient Black Swan.
Listening: Effective Listening Strategies-Ten Thumb Rules for Good Listening.
Speaking: What is a Group Discussion? GD Strategies-Type of GDs-Dos and Don'ts.

Reading: Reading Strategies-Scanning and Skimming Skills.
Writing Skills: Writing Job Application Letters and CVs.
Vocabulary and Grammar: Phrasal Verbs, Phrasal Prepositions;Technical Vocabulary.

Module 5:

How I Became a Public Speaker (extract) – **George Bernard Shaw** from the prescribed textbook 'Forging Ahead' published by Orient Black Swan.
Listening: Listening for Explicit and Implicit Information.
Speaking: Making Presentations as a Team.
Reading: Reading Strategies-Extensive and Intensive Reading Skills.
Writing Skills: Report Writing-Formats of Reports, Types of Reports.
Vocabulary and Grammar: Improving Vocabulary-Avoiding Cliches, Redundancies; Correcting Common Errors.

Text Books

1. Chitra. V.B. G.M. Sundaravalli, D.S. Kesava Rao. Ed. *Forging Ahead: A Course Book for B. Tech Students:* Orient Black Swan: Hyderabad, 2022.
2. Ashraf Rizvi. M. *Effective Technical Communication*. McGraw-Hill: New Delhi, 2010.

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.

E-Resources

1. https://poemanalysis.com/alfred-tennyson/the-lotos-eaters/
2. https://degmateng.wordpress.com/2019/11/27/ls-6-the-model-millionaire-oscar-wilde-summary/
3. https://www.britannica.com/biography/Steve-Jobs
4. http://kjtenglishnotes.blogspot.com/2015/10/how-i-became-public-speaker.html
5. https://www.learngrammar.net/english-grammar

Course Outcomes

At the end of the course, the student will be able to:

CO1. Use English Language effectively in spoken and written forms.
CO2. Comprehend the given texts and respond appropriately.
CO3. Use the proper vocabulary and grammatically correct sentences.
CO4. Communicate confidently in various contexts and different cultures.
CO5. Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-I Sem			
Course Code: **L110A**	**DIFFERENTIAL EQUATIONS AND CALCULUS** **(**Common to all Branches)	L	T	P	D
Credits: **4**		**3**	**1**	**0**	**0**

Pre-Requisites:

Module 1: First Order, First Degree ODE and its Applications

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

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}.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

Definition of a Sequence, limit, Convergent, Divergent and Oscillatory sequences.

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

Determination of Fourier coefficients, Fourier series of 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

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

Definition of Improper Integrals, Beta functions, Properties of beta functions, Gamma functions, Properties of Gamma functions, Relation between the Gamma and Beta functions, evaluation of improper integrals using Beta and Gamma functions.

Module 5: Functions of Multivariable's

Limits, Continuity, Partial differentiation, partial derivatives of first and second order, homogeneous function, Euler's theorem, total derivative, Chain rule, 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
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,11thReprint, 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://onlinecourses.nptel.ac.in/noc20_ma15/preview

Course Outcomes

At the end of the course, the student will be able to:

CO1.Formulate and solve the First order linear differential equations.
CO2.Apply the concepts of higher order linear differential equations with constant Coefficients solving physical problems arising in engineering.
CO3.Obtain Fourier series expansion of a given function.
CO4.Analyse the improper integrals.
CO5.Find the maxima and minima of multivariable functions.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-I Sem			
Course Code: **L110C**	**APPLIED PHYSICS (COMMON TO EEE, ECE, CSE, IT, ECM, CSE(AI&ML), CSE(DS), AI&ML & AI&DS)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Fundamentals of Physics.

Module-1: Quantum Mechanics

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: Band Theory of Solids& Semiconductors

Band Theory of Solids: Free electron theory, Density of energy states, Quantum theory of free electron, 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.

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

Module–3: Light-Semiconductor Devices

Direct and indirect band gap semiconductors, Carrier generation and Recombination, Drift and Diffusion, 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 & Fiber Optics

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.

Fiber Optics: Principle and construction of an optical fiber, Acceptance angle, Numerical aperture, Types of optical fibers (Single mode, multimode, step index, graded index), Losses in optical fibers, Optical fiber communication system with block diagram and Applications of optical fibers.

Module-5: Electromagnetism & Dielectric Properties

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

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, Ferro-electricity and Piezo 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 Arun Murthy , 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 Guptha 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=PLzJaFd3A7DZse2tQ2qUFCh SiCj7jBidO0.
7. https://www.youtube.com/watch?v=4a0FbQdH3dY.

Course Outcomes

After completion of this course 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.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – I Sem			
Course Code: L115A	PROGRAMMING FOR PROBLEM SOLVING (Common to ECE, CSE, IT & ECM)	L	T	P	D
Credits: 4		3	1	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, (3rdEdition).

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 (16thImpression)
3. Stephen G. Kochan, Programming in C, Fourth Edition, PearsonEducation.
4. Herbert Schildt, C: The Complete Reference, McGraw Hill, 4thEdition
5. Byron Gottfried, Schaum'sOutline of Programming with C,McGraw-Hil

E - Resources:

1. https://onlinecourses.nptel.ac.in/noc23_cs53/preview
2. https://www.youtube.com/watch?v=-wA61VyjHy8
3. https://fresh2refresh.com/c-programming/
4. https://www.studytonight.com/c/
5. https://beginnersbook.com/2014/01/c-tutorial-for-beginners-with-examples/
6. https://www.programiz.com/c-programming
7. http://www.gtucampus.com/uploads/studymaterials/Degree%20EngineeringSandipFundaments_of_C.pdf
8. 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.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE I Year – I Sem			
Course Code: L11M2	Audit Course-I HUMAN VALUES AND 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.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-I Sem			
Course Code: **L1102**	**PHYSICS LAB** (COMMON TO: All branches)	L	T	P	D
Credits: **1**		**0**	**0**	**2**	**0**

Pre-Requisites: Intermediate basic concepts.

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 and Laser Diode:

Plot V-I characteristics of light emitting diode and Laser diode.

4. Optical fiber:

Determination of Numerical Aperture 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).

11.Melde's Experiment

To determine the frequency of a vibrating bar or turning fork using Melde's arrangement.

12. Torsional Pendulum

To determine the rigidity modulus of the material of the given wire using torsional pendulum.

13.Newton's Rings

To determine the radius of curvature of the lens by forming Newton's rings.

14.Diffraction Grating

To determine the number of lines per inch of the grating.

15.Sonometer

To determine the frequency of AC Supply sonometer.

Note: Any 10 experiments are to be performed.

Text Books

1.Dr. Narendra, L. Mathakari,"Experiments in Applied Physics" (Physics Lab Manual 4th edition) ,

2. " Engineering Physics Lab Resources" By Department of Physics JBIET.

Course Outcomes

At the end of the course, students will be able to

1. Learn the experimental concepts on in LED, Electric and Electronics 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 waves, oscillations and optics.
5. Lasers and fiber optics enable the students to apply to various systems like communications, solar cell, photo cells and so on.

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AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-I Sem			
Course Code: **L1101**	**ENGLISH LANGUAGE COMMUNICATION SKILLS** (Common to CSE, IT, ECM & AI&DS)	L	T	P	D
Credits: 1		**0**	**0**	**2**	**0**

Pre-Requisites:

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

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

Module 1:

CALL Lab:

Common Indian Variants in Pronunciation-Introduction to Phonetics – Speech Sounds – Vowels and Consonants;Minimal Pairs;Pronunciation Patterns.

ICS Lab:

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

Module 2:

CALL Lab:

The Phoneme: The Syllable.

ICS Lab:

Features of Good Conversation - Non-verbal Communication- Telephone Etiquette-Role Plays.

Module 3:

CALL Lab:
Stress-Word and Sentence Stress- Stress Shift- Strong and Weak Forms.

ICS Lab:

Presentations Skills-Formal Presentations.

Module 4:

CALL Lab:
Intonation-Errors in Pronunciation-The Influence of Mother Tongue (MTI)-Differences in British and American Pronunciation.
ICS Lab:
Group Discussion Skills- Mock GD.

Module 5: [9L]

CALL Lab:
Listening for Specific Details-Listening Comprehension Tests.
ICS Lab:
Interview Skills-Mock Interviews.

Text Books

1. ELCS Lab Manual: A Workbook for CALL & ICS Lab Activities; Orient Black Swan.

Reference Books

1. Balasubramanian. T (2009), A Textbook of English Phonetics for Indian Students. Macmillan.
2. Bansal. R.K, Harrison J.B. (2008). Spoken English. Orient Black Swan.
3. Ashraf Rizvi M (2010). Effective Technical Communication. McGraw-Hill.

E-Resources

1. https://bbamantra.com/listening/
2. https://en.wikipedia.org/wiki/Phonetics#:~:text=Phonetics%20is%20a%20branch%20of,the%20physical%20properties%20of%20speech.
3. https://www.innovativeteachingideas.com/blog/10-great-activities-to-break-the-ice-with-your-students
4. http://kjtenglishnotes.blogspot.com/2015/10/how-i-became-public-speaker.html
5. https://www.learngrammar.net/english-grammar

Course Outcomes

At the end of the course, the student will be able to:
CO1. Use English Language effectively in spoken and written forms.
CO2. Comprehend the given texts and respond appropriately.
CO3. Use the proper vocabulary and grammatically correct sentences.
CO4. Communicate confidently in various contexts and different cultures.
CO5. Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – I Sem			
Course Code: L1151	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. Analyse 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

Lab Experiments:

1. a) Write a program for find the max and min from the three numbers.
   c) Write a program to read marks from keyboard and your program should display equivalent grade according to following table(if else ladder)

Marks	Grade
100 – 80	Distinction
79 – 60	First Class
59 – 40	Second Class
< 40	Fail

2.Write a C program, which takes two integer operands and one operator from the user, performs the operation, and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

3. Write a program that finds if a given number is a prime number
4. Write a C program to generate the first n terms of the sequence
5. Write a C program to find the minimum, maximum and average in an array of integers.
6. Write a C program to find Addition of Two Matrices
7. 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.
8. 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.)

9. a) Write a C program to implement binary search algorithm.
b) Write a C program to implement linear search algorithm.
10. a) Write a C program that implements the Bubble sort method.
b) Write a C program that implements the Insertion sort method.
11. Write a C program that implements the Quick sort method.
12. Write a C program that implements the Merge sort method.

Case Studies:

1. Implement Hotel Management system in C with the following requirements.
Requirements:
-Provide the information on reserving rooms, book an event, check the features
- Give the login for both admin and user for proper login validation
-Add/View/Edit/Delete user records
-Calculate the bill after checkout of customers
2. Implement Library management system in C with the following requirements.
Requirements:
-To add Book Information
- Display Book Information
-List all the books of the given author
-List the title of the specified Book
-List the count of books in the library

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 with different function types
5. Create, read, and write to and from simple text and binary files.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-II Sem			
Course Code: **L120D**	**ENGINEERING CHEMISTRY** **(**COMMON TO: AIDS, CSE, IT and ECM)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Module 1: Molecular Structure and Theories of Bonding

Atomic and Molecular orbitals-Molecular orbital theory-LCAO – bonding in homo and heteronuclear diatomic molecules, molecular orbital energy level diagrams of homo nuclear di atomic molecules(N_2, O_2 and F_2), hetero nuclear di atomic molecules(CO and NO). Crystal Field Theory (CFT), Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral, Octahedral complexes. Magnetic and colour properties of complexes. Band theory of solids – band diagrams for conductors, semiconductors and insulators, effect of doping on conductance.

Module 2: Water and Its Treatment

Introduction – hardness of water – Causes of hardness - Types of hardness- temporary and permanent – units of hardness-numerical problems – Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in potable water treatment – Disinfection of water by chlorination and ozonization-Breakpoint chlorination. Boiler feed water- scale and sludge formation--internal treatment of boiler feed water– Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange process.Desalination of brackish water – Reverse osmosis.

Module 3: Electrochemistry and Corrosion

Electrochemistry

Introduction-electrode potential, standard electrode potential, Electrochemical cell-Galvanic cell – Nernst equation derivation-applications,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 (Li-MnO_2 cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery).

Corrosion

Causes and effects of corrosion – chemical and electrochemical corrosion – mechanism of electrochemical corrosion, types of corrosion-galvanic, pitting and waterline corrosion-factors influencing rate of corrosion-Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current cathodic methods-Surface coatings-Hot dipping(Galvanizing and Tinning).

Module 4: Chemical Fuels

Fuels: Definition, classification, characteristics of a good fuel, Calorific value (CV)-HCV and LCV. Calculation of CV using Dulong's formula, numerical.

Solid Fuels: Coal-proximate &ultimate analysis-significance.

Liquid Fuels: Composition and CV of gasoline, cracking: Fixed bed catalytic cracking method. Knocking and its significance, octane number, cetane number.

Module 5: Polymers and Nanomaterials

Polymers

Definition – Types of polymerizations – addition and condensation polymerization with examples. Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, compounding, and fabrication of plastics (compression and injection moulding). Preparation, Properties and engineering applications of PVC, Nylon-6, 6 and Bakelite. Conducting Polymers-conduction in polyacetylene.

Nanomaterials

Introduction, Synthesis: Top down and bottom up approaches. Sol-gel and Chemical Vapour Deposition(CVD) methods. Properties and applications of fullerenes, carbon nanotubes. Medical applications of nanomaterials.

Text Books

1. Engineering Chemistry: P. C. Jain & M. Jain, Dhanpat Rai Publications, New Delhi.
2. Engineering Chemistry: Shashi Chawla, Dhanapathrai Publications (2019), New Delhi.

Reference Books

1. Engineering Chemistry, M. Thirumalachary and Laxminarayana, Scitech Publications.
2. Text Book of Engineering Chemistry, Cengage Learning, B.Rama Devi, Ch. VenkataRamana Reddy and PrasanthRath.
3. Engineering Chemistry (NPTEL Web-book)by B.L. Tembe, Kamaluddin and M.S.Krishnan

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.youtube.com/watch?v=W0-CvvAGtEM
5. https://sengerandu.wordpress.com/tutorials/physical-metallurgy/engineering-materials

Course Outcomes

At the end of the course, the student will be able to:

CO1. Understand and analyse microscopic chemistry in terms of atomic orbitals, molecular orbitals.
CO2. Recognize and select the domestic and industrial problems caused by hard water and also learn about the municipal water treatment using various methods.

CO3. Understand and interpret the important fundamental concepts of electrochemical procedures related to corrosion and its control.

CO4. Rate the fuels and suggest methods for enhancement of the quality of fuels for the required output.
CO5. Identify & recognize the role of polymers and Nanomaterials in everyday life.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-II Sem			
Course Code: **L120A**	**Linear Algebra and Advanced Calculus** **(**Common to all Branches)	L	T	P	D
Credits: **4**		**3**	**1**	**0**	**0**

Pre-Requisites:

Module 1: Matrices and system of equations

Types of Matrices, Symmetric, Skew-symmetric, Hermitian, Skew-Hermitian, orthogonal matrices, Unitary Matrices, rank of a matrix by Echelon form and Normal form, Gauss elimination, 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 Quadratic Forms

Eigen values, Eigen vectors and their properties, Diagonalization, Cayley - Hamilton theorem (without proof), Inverse and powers of a matrix using Cayley - Hamilton theorem.

Definitions of Linear Transformation and Orthogonal Transformation, Quadratic forms, rank and nature of the quadratic forms, index and signature, reduction of quadratic forms into canonical form using Linear Transformation and Orthogonal Transformations.

Module 3: Multiple Integrals

Evaluation of double integrals, change of order of integration, change of variables, evaluation of triple integrals, change of variables.

Applications: Finding areas and volumes, centre of gravity.

Module 4: vector differential calculus

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

Module 5: Vector integral calculus

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, LaxmiPublications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,11thReprint, 2010.

E-Resources

1. **https://nptel.ac.in/courses/111/108/111108098/**
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 the course, the student will be able to:

CO1. Solve the consistent system of linear equations.
CO2. Apply orthogonal congruent Transformations to a quadratic form.
CO3. Evaluate multiple integrals in various coordinate system.
CO4. Apply the concept of gradient, divergence and curl to formulate engineering problems.
CO5. Convert line integrals to surface integrals and surface integrals to volume integrals.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE I Year-II Sem			
Course Code: **L122A**	**Basic Electrical and Electronics Engineering (Common to AIDS, IT, CSE & ECM)**	L	T	P	D
Credits: **4**		**3**	**1**	**0**	**0**

Pre-Requisites: Physics

Module 1: DC and AC Circuits

Unit-I: DC Circuits

Electrical quantities - resistors - inductors - capacitors - Ohm's Law - Kirchhoff's Laws - series and parallel circuits - analysis of DC circuits - mesh, nodal - simple problems.

Unit-II: AC Circuits

Sinusoidal functions - phasor representation - RMS and Average values - form and peak factors - RLC series circuits - power and power factor-concept of three phase system.

Module 2: DC and AC Electrical Machines

Unit-I: DC Electrical Machines

Construction and principle of operation of DC machines – DC generator – EMF equation – Types – DC motor – Types

Unit-II: AC Electrical Machines

Single phase transformer – Construction and operation – EMF equation - Three phase induction motor – Construction and operation.

Module 3: Measuring Instruments and Electrical Installation

Unit-I: Measuring Instruments

PMMC and MI Instruments - Construction and operation – Torque Equation - advantages and disadvantages.

Unit-II: Electrical Installation

Electrical Installation: Components of LT Switchgear - Switch Fuse Unit (SFU) –MCB – MCCB – Earthing.

Module 4: DIODES AND APPLICATIONS

Unit-I: P-N junction diode Principle of operation and characteristics of a P-N junction diode static and dynamic resistance of a diode , ideal diode, Zener Diode, Avalanche and Zener Breakdown mechanisms, V-I characteristics of Zener Diode

Unit-II: Rectifiers & Filters: Diode 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 5: TRANSISTOR CHARACTERISTICS

Unit-I: Bi-Polar Junction Transistor (BJT): Principle of operation of Bi-Polar Junction Transistor (BJT), current components in a junction Transistor, V-I characteristics in CB, CE,CC configurations, determination of " α" and " β " of a transistor from the V-I characteristics,

Unit-II: Field Effect Transistors (FET): Comparison of BJT & JFET, Construction & Operation of JFET, V-I Characteristics of JFET, Determination of FET Parameters from the V-I characteristics. MOSFET Construction & Operation in Enhancement and Depletion modes, V-I Characteristics of MOSFET.

Textbooks

1. V.K. Mehta, "Principles of Electrical Engineering and Electronics", S. Chand & Company Ltd, 2012
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
3. A. K. Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation", Dhanapath Rai and Sons., 10th Edition, 2007.
4. Electronic Devices & Circuits :Millman & Halkias Mcgraw Hill
5. Integrated Electronics: Millman & Halkias Mcgraw Hill

Reference Books

1. Dr. Ramana Pilla, Dr. M. Suryakalavathi, "Basic Electrical Engineering", S. Chand, 2018.
2. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

E-Resources

1. https://onlinecourses.swayam2.ac.in/nou21_ee02/preview
2. https://nptel.ac.in/courses/108/108/108108076/
3. https://www.electrical4u.com

Course Outcomes

At the end of the course, the student will be able to:

CO 1. Apply the basic laws of electricity in DC and AC circuits.
CO 2. Describe the construction and operation of electrical machines.
CO 3. Explain the functioning of measuring instruments and components of LT Switchgear.
CO 4. Understand PN junction diode operation, characteristics, and applications.
CO 5. Gain Knowledge on characteristics of BJT & FET in various modes of operation

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE I Year – II Sem			
Course Code: L1232	ENGINEERING AND IT WORKSHOP	L	T	P	D
Credits: 3		1	0	4	0

Course Objectives:

1. To study/demonstrate the concepts of computer w.r.t. it's hardware.
2. To install the operating system and perform various tasks.
3. To conduct the experiments related to production engineering technology.
4. To demonstrate the usage of power tools, CNC lathe and machine shop for different exercises

List of Experiments for Engineering Workshop

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

List of Experiments for 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

TEXT BOOKS:

1. IT Essentials PC Hardware and Software Companion Guide Third Edition by Davis Anfinson and Ken Quamme CISC Press, Pearson Education.

2. PC Hardware and A+ Handbook – Kate J. Chase PHI (Microsoft)

Course Outcomes:

After completion of the course the student will be able to

1. Identify, assemble, and dissemble the given configuration of a computer.
2. Install the operating system in the given configuration of a computer and execute.
3. Commands for LINUX Operating System
4. Develop components using the techniques of carpentry, tin smithy, forging, etc. listed in trades for exercises.
5. Work out the given models in machine shop and CNC lathe.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE I Year – II Sem			
Course Code: L1231	ENGINEERING DRAWING (Common to ECE, CSE, IT, ECM)	L	T	P	D
Credits: 3		1	0	0	4

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

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-II Sem			
Course Code: **L12M1**	**FUNCTIONAL ENGISH** (Audit Course-II) COMMON TO: ALL	L	T	P	D
Credits: 0		**2**	**0**	**0**	**0**

Pre-Requisites:

Module 1:FUNCTIONAL ENGLISH

Introduction - Functional Spoken English;Listening – Speaking**:** Do's and Don'ts; Expressing: Ability/ Admiration/ Agreement/ Anger/ Annoyance/ Appreciation/ Pleasure/ Sarcasm/ Satisfaction/ Surprise/ Approval/ Capability/ Certainty/ Condolences/ Doubt/ Fear/ Gratitude/ Possibility/ Worry; Asking for: Advice/Clarification/Direction/Information/ Permission/ Predictions/ Recommendation.

Module 2: VOCABULARY BUILDING

Vocabulary for Day-to-day Conversations; Introduction: Vegetables/ Groceries/ Fruits/ Weather; Parts of Human body/ Dresses/ Furniture/ Relations; Birds/ Cries of Animals; Food/ Hospitality/ Houses/ Rooms/ Tools; Airport/ News Paper/ Books/ Gems; Corporate Vocabulary/ Jobs/ Occupations; Diseases; Slang Words and Technical Jargon.

Module 3: FUNCTIONAL GRAMMAR - I

Introduction: Parts of Speech;Verb Forms; Phrases and Clauses; Tenses; Speeches; Voices; Degrees of Comparison;Simple, Complex and Compound Sentences.

Module 4: FUNCTIONAL GRAMMAR - II

Sentence Making for Effective Communication; Sentence Structure – 'Wh' Questions - How to Frame Questions and Give Answers; Question Tags; Spotting Errors.

Module 5:COMMUNICATION SKILLS

Polite, Courteous and Diplomatic Terms; Useful Daily Expressions; Courtesy, Good Manners and Etiquettes; Conversation Techniques; Story Telling.

Text Books

1.L. Adinarayana and V. Prakasam, *Spoken English*, Neelkamal Publications Pvt. Ltd., New Delhi, 2008.

2.Ram Bhasker Raju, *The Complete Book on Spoken English*, Goutham Buddha Publications, Hyderabad, 2002.

Reference Books

1.Sabina Pillai, *Spoken English for My World*, Oxford University Press, New Delhi, 2016.

2.K. R. Lakshminarayanan, *Speak in English*,Scitech Publications, Chennai, 2009.

E-Resources

- https://www.britishcouncil.in/programmes/english-partnerships/state/skills-projects/AP-English-Skills.
- https://www.fluentu.com/blog/english/websites-to-learn-english/

Course Outcomes

At the end of the course, the student will be able to:

CO1. Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.

CO2. Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

CO3. Learn the transformation of sentences and use them effectively.

CO4. Understand making small sentences and use them in daily colloquial situation.

CO5. Learn the useful communication expression and use them in day-to-day life.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-II Sem			
Course Code: **L1203**	**CHEMISTRY LAB** **(**COMMON TO: AIDS, CSE, IT and ECM)	L	T	P	D
Credits: **1**		**0**	**0**	**2**	**0**

Pre-Requisites: Nil

List of Experiments (Any 10-12 experiments)

Volumetric Analysis:

1. Preparation of standard solution of oxalic acid and standardisation of NaOH.
2. Determination of total hardness of water by complexometric method using EDTA.
3. Determination of chloride content of water by Argentometry.
4. Estimation of Fe^{2+} in Mohr's salt using permanganomerty.
5. Estimation of ferrous iron by dichrometry.

Instrumental methods of Analysis:

6. Estimation of an HCl by Conductometric titrations using NaOH.
7. Estimation of Acetic acid by Conductometric titrations using NaOH.
8. Estimation of HCl by Potentiometric titrations using NaOH.
9. Estimation of Fe^{2+} by Potentiometry using $KMnO_4$.

Determination of Physico-Chemical Properties:

10. Determination of viscosity of a given liquid by using Ostwald's viscometer.
11. Determination of surface tension of a given liquid using stalagmometer.
12. Determination of partition coefficient of acetic acid between n-butanol and water.

Synthesis of Nanomaterials, Polymers, and drug molecules:

13. Synthesis of drug molecule Aspirin.
14. Synthesis of Polymer-Bakelite.
15. Synthesis of Iron nanoparticles.

Text Books

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg, (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma & D.S. Sharma, (Vikas publishing, N. Delhi)
3. "Textbook of practical organic chemistry", Vogel's ,5th edition.
4. "Textbook on Experiments and calculations in engineering chemistry", S.S. Dara

Course Outcomes

At the end of the course, the students will be able to:

1. Identify the basic chemical methods to analyse the substances quantitatively & qualitatively.
2. Calculate the concentration and amount of various substances using instrumental techniques.
3. Synthesize the engineering materials like nano materials, polymers, and drug molecules.
4. Determine the physic-chemical properties like partition co-efficient, surface tension and viscosity.
5. Determine the partition coefficient of organic compound in two immiscible liquids.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE I Year-II Sem			
Course Code: **L1221**	**Basic Electrical and Electronics Engineering Lab (Common to AIDS, IT, CSE & ECM)**	L	T	P	D
Credits: **2**		**0**	**0**	**4**	**0**

Pre-Requisites: Basic Electrical and Electronics Engineering

List of Experiments

1. Verification of Ohms Law.
2. Determination of unknown resistance.
3. Verification of KVL and KCL.
4. Resonance in series RLC circuit.
5. Calculations and verification of impedance and current of RL, RC and RLC series circuits.
6. Measurement of voltage, current and real power in primary and secondary circuits of a single phase transformer.
7. Performance Characteristics of a DC Shunt Motor.
8. Performance Characteristics of a Three-phase Induction Motor.
9. Characteristics of PN Junction Diode & Zener diode
10. Characteristics of Transistor in CB Configuration.
11. Characteristics of Transistor in CE Configuration.
12. Half Wave Rectifier & Full Wave Rectifier without & with capacitor filter
13. FET characteristics
14. Frequency Response of CE Amplifier.

Course Outcomes

At the end of the course, the student will be able to:

CO 1. Analyse DC Circuits using basic Laws.
CO 2. Determine the impedance and current of RL, RC and RLC series circuits.
CO 3. Analyse the performance characteristics of DC and AC electrical machines.
CO 4. Identify the characteristics of PN Junction, Zener diode.
CO 5. Analyse the characteristics of rectifiers and transistors.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-I Sem			
Course Code: **L210A**	**Probability And Statistics (Common to CE, CSE, IT, ECM, MIE,AI&ML & AI&DS)**	L	T	P	D
Credits: **4**		**3**	**1**	**0**	**0**

Pre-Requisites:

Module 1: Single Random variables

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

Binomial, Poisson, Normal, exponential distributions, and their properties. moment generating functions of the above distributions and hence finds the mean and variance.

Module 3: Correlation & Regression Sampling Distributions

Correlation: Types of correlation, coefficient of correlation, the rank correlation, Covariance of two random variables. Regression- Regression coefficient, the lines of regression.

Sampling: Definitions of population, sampling, statistic, and 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

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.

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

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. Fre

E-Resources

1. **https://nptel.ac.in/courses/111/108/111108098/**
2. **https://en.wikipedia.org/wiki/Probability_distribution**
3. **http://www.randomservices.org/random/sample/Covariance.html**
4. **https://www.nptel.ac.in/ content/storage2/courses/103106120/Lecture Notes/Lec3_1.pdf**
5. **https://www.smartbugmedia.com/blog/hypotheses-worth-testing-on-your-website**

Course Outcomes

At the end of the course, the student will be able to:

CO1. Understand the concept of probability and statistics

CO2. Find the mean and variance of a given probability distribution

CO3.Find the coefficient of correlation and lines of regression.

CO4. Test the hypothesis for large samples.

CO5. Test the hypothesis for small sample.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE II Year – I Sem			
Course Code: L215A	DATA STRUCTURES	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 lists, 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, Heap sort.

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: Minimum spanning trees, Prims and Kruskals method.

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, ReemaThareja, 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, SartajSahni, SanguthevarRajasekaran, Universities Press.

E - Resources:

1. http://masterraghu.com/subjects/Datastructures/ebooks/rema%20thareja.pdf.
2. https://www.slideshare.net/adisesha12/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 hashing and pattern matching Techniques.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – I Sem			
Course Code: L215B	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. Identify basic principles of Python programming language.
2. Analyse the use of lists, tuples, and dictionaries in Python programs.
3. Apply the concepts of object-oriented programming using Python.
4. Use exception handling in Python applications for error handling.
5. Evaluate different database operations using Python.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE II Year – I Sem			
Course Code: L214E	DIGITAL LOGIC DESIGN AND COMPUTER ORGANIZATION	L	T	P	D
Credits: 4		3	1	0	0

Pre-Requisites: Basic knowledge of Computers.

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, ZvonkoVranesic, SafwatZaky, 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, III 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, McGraw-Hill 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.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – I Sem			
Course Code: L216B	OBJECT ORIENTED PROGRAMMING THROUGH JAVA	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. C Programming Knowledge.

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 edition, 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

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.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – I Sem			
Course Code: L21M2	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 Reddy2007
2. Principles of Environmental Science and Engineering by P.VenugopalRao.
3. Introduction to Environmental Studies by K.Mukkanti
4. Text book of Environmental studies by Kaushik&Anubhakaushik

Reference Books:

1. Tata McgrawHill : Introduction to Environmental Studies by Benny Joseph
2. Environmental Studies by ErachBharucha 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.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE II Year – I Sem			
Course Code: L2151	DATA STRUCTURES AND JAVA PROGRAMMING LAB	L	T	P	D
Credits: 1.5		0	0	3	0

Pre-Requisites:

- Knowledge of C Programming.

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. Implement 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)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

JAVA PROGRAMMING

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.

a) 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

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.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE II Year – I Sem			
Course Code: L2152	PYTHON PROGRAMMING LAB	L	T	P	D
Credits: 1.5		0	0	3	0

Pre-Requisites:

- Knowledge of basic programming

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 program 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, istitile, 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=RSl87lqOXDE
4. https://www.youtube.com/watch?v=bSZtsYYwFS0

Course outcomes:

The Student will be able to:

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

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE II Year – II Sem			
Course Code: L225A	OPERATING SYSTEMS	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.Dhamdhere, 2nd Edition, TMH.

Reference Books:

1. **Principles of Operating Systems-NareshChauhan,** 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&sectioned=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.

AY 2022-23 onwards	**J. B. Institute of Engineering and Technology (UGC Autonomous)**	**B.Tech CSE II Year – II Sem**

Course Code: L225B	COMPUTER NETWORKS (Common to CSE & IT)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

- Knowledge on Data Structures.

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: Address Resolution Protocol(ARP), Reverse Address Resolution Protocol (RARP), Dynamic Host Configuration Protocol (DHCP), Internet Control Message Protocol(ICMP) andInternet Group Management Protocol(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: Domain Name System (DNS), World Wide Web(WWW), Hypertext Transfer Protocol(HTTP), File Transfer Protocol(FTP),Electronic Mail(E-MAIL), TELNET, Simple Network Management Protocol(SNMP), Secure Shell(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. ComputerNetworks, 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://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. Operate with Data link Layers.
3. Apply fragmentation, assigning of logical address and judge on routing and congestion.
4. Apply the working of IP Protocol, other protocols of internet layer and services of transport layer.
5. Demonstrate the services of Application Layer while using popular applications

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-II Sem			
Course Code: **L220D**	**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**	L	T	P	D
Credits:**3**		**3**	**0**	**0**	**0**

Pre-Requisites:

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: Logic

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

Recurrence relations: solving recurrence relation by substitution and Generating functions. Characteristics roots solution of Inhomogeneous 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 Dhami, Oxford University Press.
3.

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

At the end of the course, the student will be able to:

CO1.Use the notions of propositions and predicate formulae, satisfiability and formal proof.
CO2.Identify the properties of relations, functions and algebraic structures.
CO3. Apply the Permutations and combinations in problem solving
CO4. Solve recurrence relations using different methods.
CO5.Apply graph theory in solving computer science problems.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – II Sem			
Course Code: L225C	DESIGN AND ANALYSIS OF ALGORITHMS	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, SatrajSahni and Rajasekharam, Galgotia Publications Pvt. Ltd.
2. Introduction to Algorithms-T.H.Cormen, C.E.Leiserso, 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

Course outcomes:

The Student will be able to:

1. Analyze time complexity and space complexity as well as asymptotic notations for a given algorithm, union and find algorithms, connected components and bi-connected components.
2. Apply divide and conquer method for solving sorting and searching problems and greedy method to solve variety of problems.
3. Make use of dynamic programming to solve a collection of problems.
4. Utilize back tracking to solve different types of problems.
5. Choose branch and bound to unravel diverse forms of predicaments.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – II Sem			
Course Code: L225D	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 Î transitions - Significance, acceptance of languages. Equivalence between NFA with and without Î transitions, NFA to DFA conversion, minimization of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Mealy 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, Greibach 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 Chandrasekaran, 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, NKalayani, 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_FmDFBJBz0zCsOFxf
5. https://www.tutorialspoint.com/automata_theory/index.htm
6. https://books.google.co.in/booksd?i =oBqh1G17tokC&printsec =frontcover

Course outcomes:

The Student will be able to:

1. Differentiate different types of 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. Design a PDA for given CFL.
5. Distinguish between decidability and undecidability problems.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE II Year – II Sem			
Course Code: L226B	DATABASE MANAGEMENT SYSTEMS	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 ER Model, 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 McGraw-Hill 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. Apply Structured Query Language (SQL) to perform database operations.
5. Analyze functional dependencies for designing a robust database.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: **L22M1**	**GENDER SENSITIZATION** (Mandatory Course)	L	T	P	D
Credits: 0	COMMON TO: ALL	**2**	**0**	**0**	**0**

Pre-Requisites:

Module 1:UNDERSTANDING GENDER

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: GENDER AND BIOLOGY

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-I

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.

Module 5ISSUES OF VIOLENCE-II

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

Text Books

1. **"*Towards a World of Equals: A Bilingual Textbook on Gender"*** written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, GoguShyamala, DeepaSreenivas and Susie Tharu.

Reference Books

1. Raj Paul Singh, Anupama Singh. Gender Sensitization: Issues and Challenges: Raj Publications: 2019.

E-Resources

- https://www.medicalnewstoday.com/articles/232363
- https://web.stanford.edu/~eckert/PDF/Chap1.pdf
- https://open.lib.umn.edu/sociology/chapter/11-1-understanding-sex-and-gender/

Course Outcomes

At the end of the course, the student will be able to:

CO1. Develop a better understanding of important issues related to gender in contemporary India.

CO2. Sensitize 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.

CO3. Attain a finer grasp of how gender discrimination works in our society and how to counter it.

CO4. Acquire insight into the gendered division of labour and its relation to politics and economics.

CO5. Equipped to work and live together as equals.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE II Year – II Sem			
Course Code: L2251	OPERATING SYSTEMS AND COMPUTER NETWORKS LAB	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 16and 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 art 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-NareshChauhan, 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.Dhamdhere, 2nd Edition, TMH.
3. ComputerNetworks, 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&sectioned=967
6. https://www.edx.org/course/computer-hardware-and-operating-systems

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech CSE II Year – II Sem			
Course Code: L2261	DATABASE MANAGEMENT SYSTEMS LAB	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

Experiment – 1.

E-R Model: Analyze the Problem with the entities which identify data persisted in the database which contains entities, attributes**.**

Experiment – 2.

Concept design with E-R Model

Experiment – 3.

Relational Model

Experiment – 4.

Normalization

Experiment - 5.

Installation of Mysql and Practicing DDL and DML commands

Experiment – 7

Querying using Aggregate functions, GROUP BY, HAVING and creation and dropping of views

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.
4. Find the names of all **Student** who are enrolled in two classes that meet at the same time.
5. Find the names of faculty members who teach in every room in which some class is taught.

6. Find the names of faculty members for whom the combined enrolment of the courses that they teach is less than 5
7. Print the Level and the average age of **Student** for that Level, for each Level.
8. Print the Level and the average age of **Student** for that Level, for all Levels except JR. 9
9. Print the Level and the average age of **Student** for that Level, whose average age is greater than 20.
10. Find the names of **Student** who are enrolled in the maximum number of classes.
11. Find the names of **Student** who are not enrolled in any class.
12. Count the number of junior level **Student**.
13. Display all the **Student** whose names starts with the letter "p".
14. Display all the teachers whose names contain letter 'a' or 'I' in their names.

Experiment – 10. Procedures

Experiment – 11. CASE STUDY E-R MODEL: GENERAL HOSPITAL

Course outcomes:
The student will be able to:

1. Acquire the underlying concepts of database technologies.
2. Design and implement a database schema for a given problem-domain.
3. Apply Normalization to a database.
4. Populate and query a database using SQL DML/DDL commands.
5. Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS.

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- I Sem			
Course Code: **L315A**	**COMPILER DESIGN**	L	T	P	D
Credits: **4**		**3**	**1**	**0**	**0**

Pre-Requisites:

1. Formal Languages and Automata theory.

Course Objectives:

The students should be able to

1. Understand the functionalities of various phases of compilation.
2. Extend the knowledge of parser by parsing LL parser and LR parsers.
3. Implement the concepts of semantic analysis using semantic rules.
4. Gain the knowledge of symbol table organizations and code optimization techniques.
5. Apply the knowledge of data flow analysis and object code generation.

Module 1:

Overview of Compilation:

Language Processing System, Difference between Compiler and Interpreter, Phases of Compilation, Role of a Lexical Analysis, Input Buffering.

Regular Grammar and Regular expression for common programming language features, Pass and Phases of translation, Bootstrapping, LEX lexical analyser generator

Module 2:

Parsing:

Context free grammars, Top down parsing – Backtracking, LL (1), recursive descent parsing, Predictive parsing, and 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.

Attribute grammars, Syntax directed translation, Syntax directed definition, Conversion of popular Programming languages language constructs into Intermediate code forms, Type checking.

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.

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, Cariel 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

At the end of the course, the student will be able to:

CO1.Design a Lexical Analyser.

CO2.Compare different types of parsing techniques

CO3.Implement the concepts of Semantic analysis and type checking.

CO4.Apply different code optimization techniques.

C05. Drive a target code using different code generation techniques.

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- I Sem			
Course Code: **L315B**	**WEB TECHNOLOGIES**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

- Knowledge of Java Programming.

Course Objectives:

The students should be able to

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 and 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 (on Click, on submit 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.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. 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

At the end of the course, the student will be able to:

CO1. Design web pages using HTML, Cascading Style Sheets and JavaScript

CO2. Write XML documents and Schemas.

CO3. Implement server-side programming using JDBC

CO4. Create dynamic web pages

CO5. Create web application development using bdk, jsp and servlets.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- I Sem			
Course Code: **L31AA**	**MACHINE LEARNING**	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 students should be able to

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, Gibs

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 Neighbour 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 Presss,1995.

E-Resources

1. https://www.slideshare.net/darshanharry/machine-learning-46440299
2. https://news.vidyaacademy.ac.in/
3. https://nptel.ac.in/courses/106/106/106106202/

Course Outcomes

At the end of the course, the student will be able to:

CO1. Summaries on well-posed problem, concept learning and various perspectives ofmachine learning

CO2. Apply machine-learning algorithms such as Decision tree, Artificial Neural Networks to solve real world problems and formulate evaluation hypotheses.

CO3. Compare and contrast various machine-learning methodologies such as Bayesian Learning, Computational learning theory, instance based learning and Genetic algorithms.

CO4. Implement rule based learning and analytical learning strategies to solve complex problems.

CO5. Combine inductive learning with analytical learning and deploy Reinforcement learning which supports dynamic programming.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- I Sem			
Course Code: **L316E**	**DATA WAREHOUSING AND DATA MINING** (Professional Elective –I)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Basic knowledge in **DBMS**

Course Objectives:

The students should be able to

1. Introduce the basic concepts and techniques in building a Data Warehouse.
2. Apply pre-processing techniques for any given raw data.
3. Implement and apply basic algorithms for finding frequent patterns in transactionaldatabases.
4. Implement and apply basic algorithms for supervised and unsupervised learning.
5. Discuss an overview of mining complex types of data.

Module 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.

Data Preprocessing:

Need for preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Module 2:

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.

Data Cube Computation and Data Generalization:

Efficient Methods for Data Cube Computation and Data Generalization, Attribute-Oriented Induction.

Module 3:

Mining Frequent Patterns:

Basic Concepts, Efficient and Scalable Frequent Item set Mining Methods

Associations and Correlations:

Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining

Module 4:

Classification:

Issues Regarding Classification and Prediction, Classification by Decision Tree Induction,

Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Support Vector Machines.

Prediction:

Simple linear regression, Logistic Regression, Accuracy and Error measures, evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods.

Module 5:

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.

Mining Complex Types of Data:

Mining Spatial Databases, Mining Multimedia Databases, Mining Time-Series andSequence Data, Mining Text Data and Mining the World Wide Web.

Applications and Trends in Data Mining: Data Mining Applications, Data MiningSystem Products and Research Prototypes

Text Books

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, MorganKaufmann Publishers, Elsevier,2nd Edition, 2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar,Pearson education

Reference Books

1. Data Mining Techniques – Arun K Pujari,2nd edition, Universities Press.
2. Data Warehousing in the Real World – Sam Aanhory & Dennis Murray Pearson EdnAsia.
3. Insight into Data Mining, K.P.Soman, S.Diwakar, V.Ajay, PHI, 2008.

E-Resources

1. https://drive.google.com/file/d/1KwbqsxdL-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

At the end of the course, the student will be able to:

CO1. Assess raw input data and process it to provide suitable input for a range of datamining algorithms.

CO2. Identify a data warehouse for an organization.

CO3. Apply Data mining techniques such as characterization, comparison, association.

CO4. Apply an appropriate data Mining algorithms for classification and clusteringfrom large databases.

CO5. Demonstrate knowledge on mining complex types of data.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- I Sem			
Course Code: **L315F**	**ARTIFICIAL INTELLIGENCE AND ITS APPLICATIONS** (Professional Elective –I)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

1. A solid understanding of mathematics, including calculus, linear algebra, probability, and statistics.
2. Basic programming skills in at least one language, such as Python, Java, or C++.
3. Familiarity with Data structures and algorithms.

Course Objectives:

The students should be able to

1. To introduce students to the fundamental concepts of Artificial Intelligence (AI) and its applications in various domains, including business.
2. To provide students with a comprehensive understanding of AI problem-solving techniques, search algorithms, and knowledge representation and reasoning.
3. To help students gain knowledge and experience in developing AI systems that can solve problems efficiently and effectively.
4. To expose students to advanced topics in AI, including reasoning under uncertainty, learning, and expert systems.
5. To equip students with the knowledge and skills needed to design and implement AI-based solutions for real-world problems, including those related to fraud detection, customer relationship management, supply chain optimization, and human resource management.

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, Nonmonotonic 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.

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

Module 5:

Introduction to AI in Business and its impact: Common business applications of AI- Chatbots, including their definition, applications, and design and implementation- Personalized Recommendations, including their definition, applications, and design and implementation

Fraud Detection: Definition, Applications, and Design and Implementation of Fraud Detection Systems Other Applications of AI in Business:- Predictive Analytics- Supply Chain Optimization- Customer Relationship Management- Human Resource Management- Ethical Considerations in AI Applications in Business: Bias in AI Applications- Data Privacy Concerns- Responsibility and Accountability.

Text Books

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

Reference Books

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivashankar 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

At the end of the course, the student will be able to:

CO1. identify different AI problems and apply various search algorithms to solve them.
CO2. construct and analyse search trees, apply A* search implementation and minimax search, and perform alpha-beta pruning.
CO3. represent knowledge using propositional logic and first-order logic and apply forward and backward chaining techniques to reason with that knowledge.
CO4. represent and reason with uncertain knowledge using basic probability and Bayesian Networks.
CO5. design and implement AI systems for solving real-world problems related to fraud detection, customer relationship management, supply chain optimization, and human resource management.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- I Sem			
Course Code: **L316I**	**OBJECT ORIENTED ANALYSIS AND DESIGN** (Professional Elective-I)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Software Engineering, Object oriented Programming Course Objectives:

The students should be able to

- Understand the importance of modelling and principles, architecture, and software development cycle.
- Learn about the basics and advanced structural modelling techniques.
- understand the class and object diagrams for various applications.
- acquire Knowledge about the basics of behavioural modelling and its applicability.
- Learn the state, time and space issues and supporting applicability.

Module 1:

Introduction to UML: The importance of modelling, principles of modelling, Object oriented modelling, A Conceptual model of the UML, Architecture, Software Development Life Cycle.

Module 2:

Basic Structural Modelling: Classes, Relationships, Common Mechanisms and Diagrams.

Advanced Structural Modeling1: Advanced Classes, Advanced Relationships

Module 3:

Advanced Structural Modeling2: Interfaces, Types and Roles, Packages.

Class & Object Diagrams: Terms and Concepts, Instances Common Modeling techniques for Class & Object Diagrams.

Module 4:

Basic Behavioural Modelling: Interactions, Interaction diagrams, Use cases, Use case diagrams, Activity diagrams.

Module 5:

Advanced Behavioural Modelling: Events and signals, State machines, Process and Threads, Time and Space, Chart Diagrams.

Architectural Modeling: Components, Deployment, Component diagrams and Deployment Diagrams.

Text Books

1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education.

2. Appling UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education.

Reference Books

1. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hil Companies.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd,2012
3. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education,2000
4. Pascal Roques: Modeling Software Systems Using UML2, WILEY-Dreamtech India Pvt. Ltd.,2011

E-Resources

1. https://nptel.ac.in/courses/106105153
2. https://www.uml-diagrams.org/uml-object-oriented-concepts.html
3. https://www.youtube.com/watch?v=WnMQ8HlmeXc

Course Outcomes

At the end of the course, the student will be able to:

CO1: Know the importance of modelling and principles, architecture and software development cycle.
CO2: Learn about the basics and advanced structural modelling techniques
CO3: Draw the class and object diagrams for various applications.
CO4: Gain Knowledge about the basics of behavioural modelling and its applicability
CO5: Learn the state, time and space issues and supporting applicability.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- I Sem			
Course Code: **L31M2**	**CYBER SECURITY**	L	T	P	D
Credits: **0**		**2**	**0**	**0**	**0**

Pre-Requisites: NIL

Course Objectives:

The students should be able to

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 defence, 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

At the end of the course, the student will be able to:

CO1. Demonstrate cybercrimes and how they are planned.
CO2. Develop a framework to secure Mobile and wireless devices.
CO3. Interpret crimes and Acts related to mobile and wireless devices.
CO4. Memorize Computer Forensics and its related matters.
CO5. Identify Cyber Security-Organizational Implications

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- I Sem			
Course Code: **L31T2**	**FOUNDATIONS OF ENTREPRRENEURSHIP**	L	T	P	D
Credits: 0		**2**	**0**	**0**	**0**

Pre-Requisites:

NIL

Course Objectives:

The students should be able to

1. To implore 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 I:

UNIT - 1:

Understanding Entrepreneurial Mindset- The revolution impact of entrepreneurship- The evolution of entrepreneurship - Functions of Entrepreneurs – types of entrepreneurs –

UNIT - 2:

Approaches to entrepreneurship- Process approach- Role of entrepreneurship in economic development- Twenty first century trends in entrepreneurship.

MODULE:II

UNIT:1

The Individual Entrepreneurial Mind-Set and Personality- The entrepreneurial journey-Stress and the entrepreneur - the entrepreneurial ego - Entrepreneurial motivations-

UNIT:2

Motivational cycle – Entrepreneurial motivational behaviour – Entrepreneurial competencies.

Corporate Entrepreneurial Mindset, the nature of corporate entrepreneur- conceptualization of corporate entrepreneurship Strategy-sustaining corporate entrepreneurship.

MODULE: III

UNIT - 1:

Launching Entrepreneurial Ventures - opportunities identification- Finding gaps in the marketplace – techniques for generating ideas- entrepreneurial Imagination and Creativity- the nature of the creativity process - Innovation and entrepreneurship.

UNIT -2:

Methods to initiate Ventures- Creating new ventures-Acquiring an Established entrepreneurial venture- Franchising- advantage and disadvantages of Franchising.

MODUL IV:

UNIT - 1:

Legal Challenges of Entrepreneurship - Intellectual property protection - Patents, Copyrights - Trademarks and Trade secrets - Avoiding trademark pitfalls Feasibility Analysis - Industry and competitor analysis - Formulation of the entrepreneurial Plan.

UNIT - 2:

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: V

UNIT - 1:

Strategic Perspectives in Entrepreneurship - Strategic planning - Strategic actions-strategic positioning- Business stabilization - Building the adaptive firms.

UNIT - 2:

Understanding the growth stage – Internal growth strategies and external growth strategies, Unique managerial concern of growing ventures. Initiatives by the Government of India to promote entrepreneurship, Social and women entrepreneurship -T-hub, J-hub.

Text Books

1. S.S. Khanka, Entrepreneurship Development, S. Chand Publications, 2015. Stuart Read, Effectual Entrepreneurship, Routledge, 2013.
2. Rajeev Roy, Entrepreneurship, 2e, Oxford publications, 2012

Reference 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. Nandan .H, Fundamentals of Entrepreneurship, PHI, 2013
4. Madhurima Lal Shikha Sahai – Entrepreneurship, Excel Books.

E-Resources

1. https://nptel.ac.in/courses/127105007

Course Outcomes

At the end of the course, the student will be able to:

CO1. Understand the need and significance of Entrepreneurship in the Economy
CO2. Develop Entrepreneurial Competencies
CO3. Develop Business Plan with the required contents.
CO4. Understand contribution of family business and Social Entrepreneurship in the Economy.
CO5. Plan Strategic perspectives in entrepreneurship.

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- I Sem			
Course Code: **L3151**	**WEB TECHNOLOGIES LAB**	L	T	P	D
Credits: **1.5**		**0**	**0**	**3**	**0**

Pre-Requisites:

- Knowledge of Java Programming.

Course Objectives:

The students should be able to

1. understand HTML, CSS and JavaScript.
2. Write XML documents and Schemas.
3. Implement server-side programming.
4. create dynamic web pages.
5. create web applications using PHP and MySQL.

EXPERIMENT 1

Create HOME PAGE for an online bookstore.

EXPERIMENT 2:

Login page for an online bookstore

Experiment 3:

Create CATOLOGUE 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

At the end of the course, the student will be able to:

1. Design simple ecommerce website using HTML, CSS, and JavaScript.
2. Create XML documents and validate XML using Schemas.
3. Create Servlets for accessing database using JDBC.
4. Develop JSP pages for dynamic webpage generation.
5. Develop web applications using PHP and MySQL

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- I Sem			
Course Code: **L31A1**	**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 students should be able to

1. Familiarize with ANACONDA framework and JUPYTER IDE.
2. Learn Python Packages like numpy, pandas and Matplotlib for data pre-processing 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 Jupiter, for importing modules anddependencies 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 Outcomes

At the end of the course, the student will be able to:

CO1. Effectively use ANACONDA framework and JUPYTER IDE.
CO2. Use Python Packages like NumPy, pandas and Matplotlib for data pre-processing and visualization.
CO3. Implement inductive learning algorithms using python.
CO4. Implement the applications of neural networks and back propagation algorithm.
CO5. Use machine-learning concepts for Text mining.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)				B. Tech-CSE III Year- II Sem
Course Code: **L325A**	**SOFTWARE ENGINEERING**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Knowledge of Object-Oriented Principles

Course Objectives:

The students should be able to

1. Understand different process models of Software Engineering.
2. collect requirements from client and analyse the collected requirements.
3. Understand the concepts of designing and implementing the Software Product or Project.
4. Understand software metrics and measures.
5. Understand different testing strategies and assess the software product quality.

Module 1:

Introduction to Software Engineering: The Evolving Role of Software, Software, the Changing Nature of Software, Legacy 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: Prescriptive Models, the Waterfall Model, Incremental Process Models, Evolutionary Models, the Unified Process.

Module 2:

An Agile View of Process: What Is Agility? , What Is an Agile Process? , Agile Process Models.

Requirements Engineering: A Bridge To Design and Construction, Requirements Engineering Tasks, Initiating the Requirements Engineering Process, Eliciting Requirements, Developing Use cases, Building the Analysis Model, Negotiating Requirements, Validating Requirements.

Module 3:

Building the Analysis Model: Requirements Analysis, Analysis Modelling Approaches, Data Modelling Concepts, Flow Oriented Modelling, Class Based Modelling Creating a Behavioural Model.

Design Engineering: Design within the Context of Software Engineering, Design Process and Design Quality, Design Concepts the Design Model, Pattern Based Software Design.

Creating an Architectural Design: Software Architecture, Data Design, Architectural Styles and Patterns, Architectural Design, Assessing Alternative Architectural Designs**:**

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Module 4:

Conducting Component Level Design, Designing Conventional Components.

Performing User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

Software Process And Project Metrics: Introduction, Metrics in the Process and Project Domains, Software Measurement, Metrics for Software Quality, Integrating Metrics within the software Process.

Module 5:

Software Quality Assurance: Quality Concepts, Quality Movement, SQA, Software Reviews, Formal Technical Reviews, Formal Approaches to SQA, Software Reliability, ISO 9000 Quality Standards, SQA Plan.

Software Testing Strategies: Strategic Approach, Strategic Issues, Test strategies for Conventional Software, White box testing, Black Box testing, Test strategies for Object Oriented Software, Validation Testing.

Text Books

1. Roger S. Pressman. Software Engineering A Practitioner's Approach. Mc Graw Hill, 8 edition, 2014. ISBN 9780078022128.
2. Software Engineering, Ian Sommerville, 7th edition, Pearson education

Reference Books

1. The Unified Modeling Language, User Guide by Grady Booch, James Rambaugh, Ivar Jaccobson.
2. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
3. Software Engineering: A Primer, Waman S Jawadekar, 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

At the end of the course, the student will be able to:

CO1. Compare and analyse the different Process models.

CO2. Analyse the Requirement Engineering process and System Modelling

CO3. Apply the systematic procedure for Software design.

CO4. Integrate software metrics in the development process.

CO5. Evaluate Projects with various Quality standards.

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- II Sem			
Course Code: **L32EA**	**BUSINESS ECONOMICS AND FINANCIAL ANALYSIS**	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 Business and Economics:

Unit – 1: Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Unit – 2: Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

Module 2:
Demand and Supply Analysis:

Unit – 1: Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Unit – 2: Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

Module 3:
Production, Cost, Market Structures & Pricing:
Unit – 1: Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions. Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Unit – 2: Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition. Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

Module 4:

Unit – 1: Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

Module 5:

Unit – 1: Financial Analysis through Ratios: Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).
Unit – 2: Introduction to Fund Flow and Cash Flow Analysis (simple problems

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. Ambrish Guptha, 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=searchsite&q=Compensation+and+Reward+Management

Course Outcomes

At the end of the course, the student will be able to:
CO1. Identify the market dynamics namely business, economics, trends in market.
CO2. Estimate the demand elasticity of demand and supply in different market conditions.
CO3. Analyse the important investment and financing decisions respective to production, cost, and pricing in different markets.
CO4. Evaluate a company's financial statements and come to a reasoned conclusion about the financial situations of the company.
CO5. Interpret the financial statements through ratio analysis.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- II Sem			
Course Code: **L32DJ**	**BIG DATA ANALYTICS (Professional Elective-II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Database Management Systems, Cloud Computing.

Course Objectives:

The students should be able to

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 HDFC 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 forBig 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, HDFC Files, File system types, commands, org.apache.hadoop.io package, HDF, 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;

HDFC (Hadoop Distributed File System): HDFC 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, Wileypublications.
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-WesleyIt Service.
3. Yuli Vasiliev, " Oracle Business Intelligence : The Condensed Guide to Analysisand 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

At the end of the course, the student will be able to:

CO1. Identify the basics of Big Data and its environment.
CO2. Use Big Data analytics Tools and its Approaches.
CO3. Define Map Reduce fundamentals and HDFC Architecture
CO4. Distinguish between Hadoop and RDBMS concepts.
CO5. Illustrate analytics on Structured and Unstructured Data.

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- II Sem			
Course Code: **L32AJ**	**DEEP LEARNING (Professional Elective-II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Probability Statistics, linear algebra. Machine learning.

Course Objectives:

The students should be able to

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 learningmethods.
3. Appreciate, understand, and apply neural networks as tools for complete learningproblems.
4. Investigate and deploy/club multi-layer neural networks for learning related toimages, text and speech sequences.
5. Appreciate, understand and implement Deep learning in real world practicalproblems.

Module 1:

Introduction to Deep Learning

Introduction to Deep Learning, Brief History of Deep Learning, AI, Machine Learningand 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, GradientDescent, 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:

Applications of Deep Learning

Classical Supervised Tasks with Deep Learning, Image Denoising, SemanticSegmentation, Object Detection, Generative Modelling with Deep Learning,

Variation Auto encoder, Generative Adversarial Network, Object recognition withPython.

Text Books

1. Deep Learning- Ian Goodfelllow, 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, OReillyPress
2. Python Deep Learning: Exploring deep learning techniques and neural network architectures with PyTorch, Keras, and TensorFlow, 2nd Edition by Ivan Vasilev, PaktPublication.

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

At the end of the course, the student will be able to:

CO1. Identify tools of machine learning and deep learning, appropriate to any problems
CO2. Apply optimization techniques to improve the quality of various learning solutions.
CO3. Apply neural network for complete learning problems.
CO4. Deploy deep learning methods to multidimensional and sequential inputs.
CO5. Investigate the scope of implementation of various deep learning techniques for real world problems.

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- II Sem			
Course Code: **L325G**	**SOFTWARE TESTING METHODOLOGY (Professional Elective –II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

A course on "Software Engineering".

Course Objectives:

The students should be able to

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

Course Outcomes

At the end of the course, the student will be able to:

CO1: Design test cases using black box testing technique, which includes decision tables domain testing and transition testing.

CO2: Design test cases for a white box testing technique, which includes path testing, data flow graphs and matrix representation for a given problem.

CO3: 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.

CO4: Conduct Performance testing using testing tools.

CO5: Identify the importance of testing and its role in software development.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- II Sem			
Course Code: **L325H**	**CLOUD COMPUTING (Professional Elective-III)**	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 students should be able to

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 security and legal issues 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 Madisetti, 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-COMPUTINGPrinciples-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

At the end of the course, the student will be able to:

CO1. Identify different elements of cloud computing.

CO2. Analyze the impact of Cloud Computing on organizations and strategy.

CO3. . Analyze the different types of virtualization.

CO4. . Design cloud based application.

CO5. Identify security and legal issues in the cloud management.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- II Sem			
Course Code: **L32AA**	**REINFORCEMENT LEARNING (Professional Elective-III)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Mathematics for Machine Learning, Deep Learning.

Course objectives:

The Student will:

1. Learn about Basics of Reinforcement Learning
2. Achieve knowledge in Tabular based solutions.
3. Expand their knowledge in Function approximation solutions.
4. Familiar with Model based Reinforcement Learning.
5. Realize the Meta learning.

Module 1:

Introduction to Reinforcement Learning:

Introduction to Reinforcement Learning- Examples- Elements of Reinforcement Learning- Limitations and Scope- Case study: Tic Tac Toe- Early history of reinforcement learning.

Multi armed bandits:

A K armed bandit Problem- Action Value Methods- The 10-armed testbed- incremental implementation- tracking a non-stationary problem.

Module 2:

Finite Markov Decision Processes:

The Agent & Environment interface- goals and rewards- returns and episodes- Policies and Value functions- Optimality and Approximation.

Dynamic Programming:

Policy Evaluation- Policy Improvement- Policy Iteration- Value Iteration- Asynchronous Dynamic Programming

Module 3:

Monte Carlo Methods: Monte Carlo Prediction- Monte Carlo estimation of action values- Monte Carlo control- Monte Carlo control without exploring starts- off policy monte Carlo control.

Temporal Difference Learning:

TD Prediction- optimality of TD(0)-SARSA-Q-Learning- Expected SARSA- Maximization Bias and Double learning

Module 4:

Model-based reinforcement learning:

Model-based reinforcement learning, Imitation learning - behavioral cloning, inverse RL, generative adversarial imitation learning.

Function approximation solutions:

Function approximation solutions - Deep Q-networks**,** Policy gradient from basic –REINFORCE, towards advanced topics - proximal policy optimization, deep deterministic policy gradient, etc.

Module 5:

Meta-learning: Meta-learning, Multi-agent learning, partial observable environments

Recent advances and applications: Code standards and libraries used in

RL(python/karas/TensorFlow)- safety in RL- TD Gammon- Samuel's Checkers players- Watson's Daily double wagering

Text Books:

1. Richard S. Sutton and Andrew G. Barto, "Reinforcement learning: An introduction", Second Edition,MIT Press, 2019
2. Li, Yuxi. "Deep reinforcement learning." arXiv preprint arXiv:1810.06339 (2018).
3. Wiering, Marco, and Martijn Van Otterlo. "Reinforcement learning." Adaptation, learning, and optimization 12 (2012): 3.

Reference Books:

1. Russell, Stuart J., and Peter Norvig. "Artificial intelligence: a modern approach."Pearson Education Limited, 2016.
2. Goodfellow, Ian, YoshuaBengio, and Aaron Courville. "Deep learning." MIT press, 2016.
3. David Silver's course on Reinforcement Learning (link)

E-Resources:

1. https://www.geeksforgeeks.org/what-is-reinforcement-learning/
2. https://en.wikipedia.org/wiki/Reinforcement_learning
3. https://www.javatpoint.com/reinforcement-learning
4. https://deepsense.ai/what-is-reinforcement-learning-the-complete-guide/

Course outcomes:

The student will be able to:

1. Design Reinforcement Learning concepts for solving different types of problems.
2. Identify Tabular based solutions for cracking glitches.
3. Apply Function approximation solutions for resolving complications.
4. Implement Model based Reinforcement Learning to unravel variety of issues.
5. Apply Meta learning to work out distinctive varieties of setbacks.

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- II Sem			
Course Code: **L326F**	**SOFTWARE ARCHITECTURE AND DESIGN PATTERNS (Professional Elective-III)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

- Knowledge of Software Engineering

Course Objectives:

The students should be able to

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, Documentingsoftware 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:

Behavioral 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 & RickKazman, 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

At the end of the course, the student will be able to:

CO1. Apply a deeper knowledge of the principles of Object-Oriented Design.
CO2. Analyse the Software architectures in terms of performance, availability, security and cost benefit analysis.
CO3. Illustrate the knowledge of various patterns that are related to object-oriented design.
CO4. Analyse behavioural architectural patterns
CO5. Apply the Knowledge of Design Patterns for developing a software.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- II Sem			
Course Code: **L32M5**	**E-COMMERCE**	L	T	P	D
Credits: **0**		**2**	**0**	**0**	**0**

Pre-Requisites: NIL

Course Objectives:

The students should be able to

1. Gain knowledge of E Commerce Framework. Applications, Business Models,
2. Learn about Consumer Oriented Applications, Electronic Payment Systems
3. Learn about EDI Applications, Supply Chain Management
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, Workflow 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 catalogues 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

Reference Books

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-inbusiness/electronic-commerce/
3. https://www.researchgate.net/publication/238522299_A_Reference_Model_for_ECommerce
4. https://www.edx.org/learn/ecommerce

Course Outcomes

At the end of the course, the student will be able to:

CO1. Learn basic concepts of e-commerce and different elements.
CO2. Demonstrate an understanding of retailing in e-commerce.
CO3. Assessing the effects of disintermediation.
CO4. Analyse the impact of e-commerce on business models and strategy.
CO5. Describe internet-trading relationships including business-to-business, intra- organizational.

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- II Sem			
Course Code: **L32T1**	**EMPLOYABILITY SKILLS**	L	T	P	D
Credits: **0**		**2**	**0**	**0**	**0**

Pre-Requisites:

NIL

Course Objectives:

The students should 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.

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 correcttone.

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-Resources

1. https://www.youtube.com/watch?v=JIdPnUFr36g&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=O0qT4cKwtk&ab_channel=LearnEnglishLab
5. https://www.youtube.com/watch?v=p6qVJ1KhHek&ab_channel=LearnEnglish wi thLet%27sTalk-FreeEnglishLessons.
6. https://www.youtube.com/watch?v=I4uL5mkcAJc&ab_channel=LearnEnglish wit hLet%27sTalk-FreeEnglishLessonsLearnEnglishwithLet%27sTalk-FreeEnglishLessonsVerified

Course Outcomes

At the end of the course, the student will be able to:

CO1. Understand the importance of Listening skills.
CO2. Learn how reading skills help an individual.
CO3. Obtain knowledge and practice session on speaking effectively.
CO4. Understand why proper writing skills are important.
CO5. Implement business Etiquette in day-to-day life.

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- II Sem			
Course Code: **L3251**	**SOFTWARE ENGINEERING LAB**	L	T	P	D
Credits: **1**		**0**	**0**	**2**	**0**

Pre-Requisites:

- Basic Knowledge of Java Programming

Course objectives:

The Student will:

1. Analyse 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 anysystem.

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 andBehavioral Diagrams).

Experiment 7

Study the specification of different type of insurance policies, write the functional testcases.

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.

Course Outcomes

At the end of the course, the student will be able to:

CO1. Apply software principles and techniques for software requirement specification.
CO2. Design data flow diagram for different applications.
CO3. Apply different test plan cases.
CO4. Write programs for various testing scenarios.
CO5. Design structural and behavioural diagrams for different applications.

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- II Sem			
Course Code: **L3201**	**LIFE SKILLS AND PROFESSIONAL SKILLS LAB**	L	T	P	D
Credits: **2**		**0**	**0**	**4**	**0**

Pre-Requisites:

NIL

Course Objectives:

The students should be able 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.

Text 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.
3. Rizvi, M Ashraf. Effective Technical-Communication. New Delhi: Tata McGraw-Hill., 2005.

Course Outcomes

At the end of the course, the student will be able to:

CO1. Recognize importance of self-awareness and assessment.
CO2. Translate the needs of others and themselves.
CO3. Practice being social and possess positive energy.
CO4. Employ leadership Traits and skills in day-to-day life.
CO5. Analyse the importance of Thinking- out- of - the-Box.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IV Year- I Sem			
Course Code: **L415A**	**ADVANCED LINUX PROGRAMMING**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

1. Computer Organization, Computer Networks, C Programming, etc.

Course Objectives:

The students should be able to

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 socketprogramming.

Module 1:

Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Diskutilities, 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, and 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, WileyIndia Edition.
2. Linux System Programming, Robert Love, O'Reilly, SPD.
3. Advanced Programming in the UNIX environment, 2nd Edition, W.R.Stevens, PearsonEducation.

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

At the end of the course, the student will be able to:

CO1. Analyse all the Linux utilities, an implement shell scripting.
CO2. Implement the concept of shell scripting.
CO3. Demonstrate the basic Linux process structure and the Linux file system.
CO4. Interpret Inter-process Communication using pipes, shared memory, semaphoresand messages.
CO5. Design various client server applications using TCP or UDP protocols.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IV Year- I Sem			
Course Code: **L41DA**	**DATA SCIENCE THROUGH R**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

NIL

Course Objectives:

The students should be able to

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 DataVisualisation

Module 1:

What is Data Science? - Big Data VS Data Science, Datafication, Current landscape of perspectives and Skill sets needed.

Statistical Inference, Populations and samples, Statistical modelling, probability distributions, fitting a model.

Module 2:

Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA, The Data Science Process.

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:

An Overview of Classification, Why Not Linear Regression? Logistic Regression, Linear Discriminant Analysis, A Comparison of Classification Methods.

Cross- Validation and The Bootstrap. .

Module 4:

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.

Reading CSVs, Excel Data.

Base Graphs, ggplot2. Writing R functions, control statements – if and else, switch, compound tests, for loops, while loops.

Module 5:

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.

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 Hatie, RoberstTibhirani , "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-Resources

1. https://nptel.ac.in/courses/106/106/106106179/
2. https://towardsdatascience.com/
3. https://www.r-bloggers.com/

Course Outcomes

At the end of the course, the student will be able to:

CO1. Identify the fundamental concepts of Data Science.
CO2. Evaluate the Data analysis, Data Science Process and Linear Regression
CO3. Investigate the various methods of Data Analysis
CO4. Install and Use the R studio for data analysis.
CO5. Evaluate the Data Science analysis using R programming and Data Visualisation.

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IV Year- I Sem			
Course Code: **L417G**	**INTERNET OF THINGS (Professional Elective – IV)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

NIL

Course Objectives:

The students should be able to

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, HTTP Lib, URL Lib, SMTP Lib

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 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

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

At the end of the course, the student will be able to:

CO1. Analyse current vision of the Internet of Things and its impact on the world.
CO2. Identify basic concepts of IoT and M2M & IoT system management.
CO3. Practice the concepts of python language using different python packages.
CO4. Design IoT Physical devices using python Programming.
CO5. Categorize advanced concepts of IoT physical servers, cloud offerings and Hadoop.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IV Year- I Sem			
Course Code: **L41AB**	**GENERATIVE ADVERSARIAL NETWORKS (Professional Elective-IV)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

1. Math: Linear Algebra, Calculus, Probability and Statistics
2. Data Structures
3. Machine Learning
4. Deep Learning

Course Objectives:

The students should be able to

1. Understand the difference between generative and discriminative models.
2. Identify problems that GANs can solve.
3. Understand the roles of the generator and discriminator in a GAN system.
4. Understand the advantages and disadvantages of common GAN loss functions.
5. Identify possible solutions to common problems with GAN training.

Module 1:

GAN: Definition and Overview- Working Principles of GANs- GAN Training Techniques- Understanding Equilibrium in GANs-Various Applications of GANs. Introduction to Generative Modelling- Working of Auto Encoders at high level- Auto Encoders to GAN- Usage of Auto Encoders

Module 2:

Introduction to CNN- Convolutional Filters- Parameter sharing- ConvNets Visualized. Introduction to Deep GAN- Batch Normalization- Understanding Normalization- Computing Normalization.

Module 3:

Evaluation Framework- Inception Score- Frechet Inception Distance. Adding Network depth-Min-Max GAN-Non-Saturating GANs-Determining the stopping point for training-Wasserstein GAN

Module 4:

Semi Supervised GAN- Architecture- Training Process- Training Objectives- Implementation-Comparison to fully supervised Classifier. Motivation- CGAN Generator- CGAN Discriminator-Architecture- Implementation

Module 5:

Image to Image Translation- Cycle Consistency Loss- Adversarial Loss- Identity Loss-Architecture- Applications of Cycle GAN. GAN in Medicine- GAN in fashion- Ethics- GAN Innovations

Text Books

1. GANs in Action, Deep learning with Generative Adversarial Networks, Jakub Langr, Vladimir Bok, Manning Publication
2. Generative Deep Learning by David Foster, O'Reilly Media, Inc.

Reference Books

1. Learning Generative Adversarial Networks, Kuntal Ganguly, Packt Publishing
2. Generative Adversarial Networks Cookbook, Josh Kalin, Packt Publishing

E-Resources

1. https://www.youtube.com/watch?v=1ju4qmdtRdY
2. https://www.youtube.com/watch?v=MKedB9qOHi4
3. https://www.youtube.com/watch?v=LMpyYPzxQ9w
4. https://freevideolectures.com/course/4194/nptel-deep-learning-part/33

Course Outcomes

At the end of the course, the student will be able to:

CO1. Design generative and discriminative models.
CO2. Implement problems that GANs can solve.
CO3. Compare and contrast the roles of the generator and discriminator in a GAN system.
CO4. Inspect the challenges posed by common GAN loss functions.
CO5. Implement possible solutions to common problems with GAN training.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IV Year- I Sem			
Course Code: **L415G**	**RAPID APPLICATION DEVELOPMENT TOOLS (Professional Elective-IV)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Software Engineering

Course Objectives:

The students should be able to

1. Describe the fundamental principles and practices associated with each of the agile development methods.
2. Compare agile software development model with traditional development models and identify the benefits and pitfalls.
3. Use techniques and skills to establish and mentor Agile Teams for effective software development.
4. Apply core values and principles of Agile Methods in software development.

Module 1:

Introduction: Need of Agile software development, agile context– Manifesto, Principles, Methods, Values, Roles, Artefact's, Stakeholders, and challenges. Business benefits of software agility.

Project Planning: Recognizing the structure of an agile team– Programmers, Managers, Customers. User stories– Definition, Characteristics, and content. Estimation– Planning poker, Prioritizing, and selecting user stories with the customer, projecting team velocity for releases and iterations.

Module 2:

Project Design: Fundamentals, Design principles–Single responsibility, Open-closed, Liskov substitution, Dependency-inversion, Interface-segregation

Agile Projects:

Planning for Agile Teams: Scrum Teams, XP Teams, General Agile Teams,

Team Distribution; Agile Project Lifecycles: Typical Agile Project Lifecycles, Phase Activities, Product Vision, Release Planning: Creating the Product Backlog, User Stories, Prioritizing and Estimating, Creating the Release Plan; Monitoring and Adapting: Managing Risks and Issues, Retrospectives

Module 3:

Introduction to Scrum: Agile Scrum Framework, Scrum Artifacts, Meetings, Activities and Roles, Scrum Team Simulation, Scrum Planning Principles, Product and Release Planning, **Sprinting**: Planning, Execution, Review and Retrospective; User story definition and Characteristics, Acceptance tests and Verifying stories, Burn down chart, Daily scrum.

Module 4:

Introduction to Extreme Programming (XP): XP Lifecycle, the XP Team, XP Concepts: Refactoring, Technical Debt, Time boxing, Stories, Velocity; Adopting XP: Pre-requisites, Challenges;

Applying XP: Thinking- Pair Programming, Collaborating, Release, Planning, Development; XP Case Study.

Module 5:

Agile Software Design and Development: Agile design practices, Role of design Principles, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control;

Agility and Quality Assurance: Agile Interaction Design, Agile approach to Quality Assurance, Test Driven Development, Pair programming: Issues and Challenges.

Text Books

1. Robert C. Martin, Agile Software Development- Principles, Patterns and Practices, Prentice Hall, 2013.
2. Kenneth S. Rubin, Essential Scrum: A Practical Guide to the Most Popular Agile Process, Addison Wesley, 2012.

Reference Books

1. James Shore and Shane Warden, The Art of Agile Development, O'Reilly Media, 2007.
2. Craig Larman, ―Agile and Iterative Development: A manager's Guide, Addison-Wesley, 2004
3. Ken Schawber, Mike Beedle, Agile Software Development with Scrum, Pearson, 2001.

E-Resources

1. https://clearbridgemobile.com/complete-guideagile-software-development/
2. https://agileken.com/agilefundamentals-ebook/
3. https://www.edx.org/course/agile-software-development
4. https://www.coursera.org/learn/agile-software-development

Course Outcomes

At the end of the course, the student will be able to:

CO1. Interpret the concept of agile software engineering and its advantages in software development.

CO2. Analyse the core practices behind several specific agile methodologies.

CO3. Identify the roles and responsibilities in agile projects and their difference from projects following traditional methodologies.

CO4. Access implications of functional testing, unit testing, and continuous integration.

CO5. Determine the role of design principles in agile software design.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IV Year- I Sem			
Course Code: **L41DI**	**DATA SCIENCE FOR HEALTH CARE (Professional Elective-V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Probability Statistics, linear algebra. Machine learning.

Course Objectives:

The students should be able to

1. Understand Healthcare Data Analytics and its Benefits.
2. Gain knowledge of Biomedical Image analysis, Genomic Data Analysis.
3. Apply NLP, mining techniques on healthcare data.
4. Use data analytics in Fraud Detection in healthcare and pharmaceutical discoveries.
5. Understand the security aspects of healthcare data and use of emerging technologies in healthcare.

Module 1:

Introduction to Healthcare Data Analytics, Electronic Health Records, Components of Health care, Benefits of health care data analytics, how to use Health care analysis.

Benefits of Electronic Health Recorder, Barrier to Adopting, Challenges, Phenotyping Algorithms, the role of health care analyst.

Module 2:

Image Analysis Biomedical Image Analysis, Mining of Sensor Data in Healthcare, Biomedical Signal Analysis

Genomic Data Analysis for Personalized Medicine, steps involved in Genomic data analysis, different type of genomic analysis, different tools.

Module 3:

Data Analytics Natural Language Processing and Data Mining for Clinical Text, Mining the Biomedical Social Media Analytics for Healthcare

Advanced Data Analytics for Healthcare, Review of Clinical Prediction Models, Temporal Data Mining for Healthcare Data, Visual Analytics for Healthcare, Predictive Models for Integrating Clinical and Genomic Data.

Module 4:

Information Retrieval for Healthcare - Data Publishing Methods in Healthcare Applications and Practical Systems for Healthcare.

Data Analytics for Pervasive Health Fraud Detection in Healthcare, Applications and Practical Systems for Healthcare Data Analytics for Pharmaceutical Discoveries, Clinical.

Module 5:

Data Confidentially, Data Integrity, Data Protection, Security awareness, Emergent threats: Autonomous, IoT heterogeneity and ubiquity, Physical environment

Decision Support Systems- Computer-Assisted Medical Image Analysis Systems- Mobile Imaging and Analytics for Biomedical Data. Emerging Technologies for Health and Medicine Virtual Reality, Augmented Reality, Artificial Intelligence, Robotics, Industry 4.0.

Text Books

1. Chandan K. Reddy and Charu C Aggarwal, "Healthcare data analytics", Taylor & Francis,2018 Edition
2. Dac-Nhuong Le, Emerging Technologies for Health and Medicine: Virtual Reality, Augmented Reality, Artificial Intelligence, Internet of Things, Robotics, Industry 4.0

Reference Books

1. Hui Yang and Eva K. Lee, "Healthcare Analytics: From Data to Knowledge to Healthcare Improvement, Wiley, 2016

E-Resources

1. https://www.youtube.com/watch?v=k63cXMTQFPA
2. https://www.youtube.com/watch?v=9iHhXX3GMWA

Course Outcomes

At the end of the course, the student will be able to:

1. Identify the benefits of Data Analytics in Healthcare.
2. Analyse the Biomedical Images and Genomic Data.
3. Apply NLP, mining techniques on healthcare data.
4. Apply data analytics for pharmaceutical discoveries and Fraud Detection in healthcare.
5. Use emerging technologies in healthcare and medicine.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IV Year- I Sem			
Course Code: **L415K**	**QUANTUM COMPUTING (Professional Elective-V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Knowledge on "Machine Learning".

Knowledge on "Probability and Statistics"

Course Objectives:

The students should be able to

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 Simulation**s.**

Textbooks

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-intercedence, 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

At the end of the course, the student will be able to:

1. Identify the Basics of complex vector spaces.
2. Analyse Quantum mechanics as applied in Quantum computing.
3. Analyse the quantum information with Architecture and algorithms.
4. Apply the quantum programming languages.
5. Interpret the current status of quantum computing.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IV Year- I Sem			
Course Code: **L415L**	**SOFTWARE PROJECT MANAGEMENT (Professional Elective-V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Software Engineering

Course Objectives:

The students should be able to

1. Identify the different project contexts and suggest an appropriate management strategy.
2. Practice the role of professional ethics unsuccessful software development.
3. Identify and describe the key phases of project management.
4. Determine an appropriate project management approach through an evaluation of the business context and scope of the project.
5. Determine the modern project transition.

Module 1:

Conventional Software Management: The waterfall model, conventional software Management performance.

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

Module 2:

The old way and the new way: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

Life cycle phases: Engineering and production stages, Inception, Elaboration, Construction, Transition phases. Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

Module 3:

Work Flows of the process: Software process workflows, Iteration workflows. Checkpoints of the process: Major mile stones, Minor Milestones, Periodic status assessments.

Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

Module 4:

Process Automation: Automation Building blocks.

Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation. **Tailoring the Process**: Process discriminants.

Module 5:

Project Organizations and Responsibilities: Line-of-Business Organizations Future Software Project Management: Modern Project Profiles, Next generation Software economics, modern process transitions.

Case Study: The command Center Processing and Display system- Replacement (CCPDS-R) 151.

Text Books

1. Software Project Management, Walker Royce: Pearson Education, 2005.
2. Software Project Management, Joel Henry, Pearson Education.

Reference Books

1. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw- Hill Edition.
2. Software Project Management in practice, Pankaj Jalote, Pearson Education.2005.

E-Resources

1. https://www.javatpoint.com/software-project-management
2. https://www.geeksforgeeks.org/software-engineering-software-project-management-spm/

Course Outcomes

At the end of the course, the student will be able to:

CO1. Identify the different project contexts and suggest an appropriate management strategy.
CO2. Practice the role of professional ethics unsuccessful software development.
CO3. Identify and describe the key phases of project management.
CO4. Determine an appropriate project management approach through an evaluation of the business context and scope of the project.
CO5. Determine the modern project transition.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IVYear- I Sem			
Course Code: **L41MD**	**COMPUTER VISION**	L	T	P	D
Credits: **0**		**2**	**0**	**0**	**0**

Pre-Requisites:

1. Linear Algebra, Calculus, Probability and Statistics
2. Data Structures

Course Objectives:

The students should be able to

1. Review image processing techniques for computer vision.
2. Understand multicamera views.
3. Understand Hough Transform and its applications to detect lines, circles, ellipses.
4. Understand three-dimensional image analysis techniques.
5. Understand motion analysis and study some applications of computer vision algorithms.

Module 1:

Introduction to Computer Vision:

Computer Imaging Systems, Digital Image Formation and Low-Level Processing, Overview and State-of-the-art, Fundamentals of Image Formation.

Transformation: Orthogonal, Euclidean, Affine, Projective, etc. Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing.

Module 2:

Depth Estimation and Multi-Camera Views:

Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D Reconstruction Framework; Auto-Calibration

Module 3:

Feature Extraction:

Edges - Canny, LOG, DOG; Line Detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian Derivative Filters, Gabor Filters and DWT.

Module 4:

Image Segmentation:

Region Growing, Edge Based Approaches to Segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation; Object Detection

Module 5:

Motion Analysis:

Background Subtraction and Modelling, Optical Flow, KLT, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation.

Shape from X:

Light at Surfaces; Phuong Model; Reflectance Map; Albedo Estimation; Photometric Stereo; Use of Surface Smoothness Constraint; Shape from Texture, Colour, Motion and Edges.

Text Books

1. Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer
2. D. A. Forsyth, J. Ponce, "Computer Vision: A Modern Approach", Pearson Education.

Reference Books

1. Richard Hartley and Andrew Zisserman, "Multiple View Geometry in Computer Vision", Second Edition, Cambridge University Press
2. K. Fukunaga, "Introduction to Statistical Pattern Recognition", Second Edition, Academic Press, Morgan Kaufmann
3. R.C. Gonzalez and R.E. Woods, "Digital Image Processing", Addison- Wesley

E-Resources

1. https://www.mygreatlearning.com/blog/what-is-computer-vision-the-basics/
2. https://www.geeksforgeeks.org/computer-vision/

Course Outcomes

At the end of the course, the student will be able to:

CO1. Identify Computer Vision and Image Processing Basics
CO2. Differentiate the functionalities of different types of Cameras and Lenses
CO3. Extract the Features from the image using Feature Extraction Algorithms
CO4. Apply the Image Segmentation Techniques
CO5. Analyse the Motion and shape of the object.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IV Year- I Sem			
Course Code: **L4151**	**ADVANCED LINUX PROGRAMMING LAB**	L	T	P	D
Credits: **2**		**0**	**0**	**4**	**0**

Pre-Requisites:

Computer Organization, Computer Networks, C Programming, etc

Course Objectives:

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

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

Experiment 8:

Write an awk script to count the number of lines in a file that donot contain vowels.

Experiment 9:

Write an awk script to find the number of characters, words andlines in a file.

Experiment 10:

Write a c program that makes a copy of a file using standard I/Oand system calls.

Experiment 11:

Implement in C the following UNIX commands usingSystem calls

A.cat B.ls C.mv

Experiment 12:

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

A. File type. 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 inodenumber and file name.

Experiment 15:

Write a C program that demonstrates redirection of standardoutput to a file.
Ex: ls > f1.

Experiment 16:

Write a C program to create a child process and allow the parentto 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 commandsconcurrently with a command pipe. Ex: - ls –l | sort

Experiment 20:

Write C programs that illustrate communication between twounrelated processes using named pipe.

Experiment 21:

Write a C program to create a message queue with read andwrite permissions to write three messages to it with different priority numbers.

Experiment 22:

Write a C program that receives the messages (from the abovemessage queue as specified in (21)) and displays them.

Experiment 23:

Write a C program that illustrates suspending and resumingprocesses using signals

Experiment 24:

Write a C program that implements a producer-consumer systemwith two processes. (Using Semaphores).

Experiment 25:

Write client and server programs (using c) for interactionbetween server and client processes using Unix Domain sockets.

Experiment 26:

Write client and server programs (using c) for interactionbetween server and client processes using Internet Domain sockets.

Experiment 27:

Write a C program that illustrates two processes communicatingusing shared memory.

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, WileyIndia Edition.
2. Linux System Programming, Robert Love, O'Reilly, SPD.
3. Advanced Programming in the UNIX environment, 2nd Edition, W.R.Stevens, PearsonEducation.

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

At the end of the course, the student will be able to:

CO1. Know about the Linux environment.
CO2. Understand the fundamentals of shell scripting/programming
CO3. Describe various system calls and their usage.
CO4. Discuss about the Zombie process.
CO5. Discuss about the Inter Process Communication

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IVYear- I Sem			
Course Code: **L41D1**	**DATA SCIENCE THROUGH R LAB**	L	T	P	D
Credits: **2**		**0**	**0**	**4**	**0**

Pre-Requisites:

NIL

Course Objectives:

The students should be able to

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.

Write an R script to find basic descriptive statistics using summary, str, quartilefunction on mtcars & cars datasets.

Write an R script to find subset of dataset by using subset (), aggregate () functionson 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 filein specific disk location.
b. Reading Excel data sheet in R.

Experiment 4:

VISUALIZATIONS.

Find the data distributions using box and scatter plot.

Find the outliers using plot.

Plot the histogram, bar chart and pie chart on sample data.

Experiment 5:

CORRELATION AND COVARIANCE

Find the correlation matrix.

Plot the correlation plot on dataset and visualize giving an overview of relationships among data on iris data.

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 tofind 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. Alsocheck 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 onabove dataset.

Experiment 8:

REGRESSION MODEL FOR PREDICTION

Apply regression Model techniques to predict the data on above dataset

Experiment 9:

CLASSIFICATION MODEL

Install relevant package for classification.

Choose classifier for classification problem.

Evaluate the performance of classifier

Experiment 10:

CLUSTERING MODEL.

Clustering algorithms for unsupervised classification.

Plot the cluster data using R visualizations

Course Outcomes

At the end of the course, the student will be able to:

CO1. Analyze the fundamental concepts of Data Science

CO2. Evaluate the Data analysis and Data Science Process and Linear Regression

CO3. Analyze the various methods of Data Analysis.

CO4. Apply the Basics of R in its Environment.

CO5. Evaluate the Data Science analysis using R programming and Data Visualisation.

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IV Year- II Sem			
Course Code: **L42DE**	**DATA SCIENCE FOR FINANCE (PROFESSIONAL ELECTIVE-VI)**	L	T	P	D
Credits: **3**		**0**	**0**	**4**	**0**

Pre-Requisites:

Course Objectives:

The students should be able to

Module 1:

Machine Learning in Finance: Current and Future Machine Learning Applications in Finance, Types of Machine Learning, Supervised Learning Models: An overview, Time series Models, Traditional Time Series Models, Modifying Time Series data for Supervised Learning Models.

Module 2:

Supervised Learning Models to Predict Stock Price, Derivative Pricing, Investor Risk Tolerance, enabling a Machine Learning Based Robo-Advisor. Yield Curve Prediction.

Fraud Detection, Loan Default probability, Bitcoin Trading Strategy. Predicting whether to buy or sell in the Bitcoin Market.

Module 3:

Unsupervised Learning: Clustering for Pairs Trading, Clustering for grouping investors. Clustering to Implement Hierarchical Risk Parity.

Reinforcement Learning-based Trading Strategy, Reinforcement Learning-based Hedging Strategy. Portfolio Allocation.

Module 4:

Natural Language Processing Python Packages, NTLK, TextBlob, Spacy, Natural Language Processing, theory and concepts, preprocessing, Feature Representation, Interface.

Module 5:

NLP and Sentiment Analysis-Based Trading Strategies, Chatbot Digital Assistant, Creating Chatbot Using NLP. Using NLP for Document Summarization

Textbooks

1. Machine Learning & Data Science Blueprints for Finance , Hariom Tatsat, Sahil Puri, and Brad Lookabaugh , First Edition , O'Reilly

Reference Books

1. Data Science for Economics and Finance Methodologies and Applications

Course Outcomes

At the end of the course, the student will be able to:

CO1. Apply Machine learning in Finance
CO2. Analyze the importance of data science and machine learning in price prediction.
CO3. Apply different types of trading strategies using reinforcement learning techniques.
CO4. Familiar with different Natural Language Processing Python Packages.
CO5. Apply NLP and Sentiment Analysis-Based Trading Strategies.

AY: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IVYear- II Sem			
Course Code: **L425C**	**DESIGN THINKING (PROFESSIONAL ELECTIVE-VI)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:
NIL

Course Objectives:
The students should be able to

1. Expose students to the design process as a tool for innovation.
2. Develop students' professional skills in client management and communication.
3. Demonstrate the value of developing a local network and assist students in making lasting connections with the business community.
4. Develop a portfolio of work to set them apart in the job market.
5. Provide an authentic opportunity for students to develop teamwork and leadership skills.

Module 1:

Introduction to Design Thinking and Design Process

Intro to Design Thinking and Product Design, Creativity and Creative Confidence, Creative Techniques for Design Thinking, Design Thinking and Systems Thinking, Iterative properties of Design Thinking.

Design Process, Tools of persona, Journey Map and Empathy Map and Other Design Mapping tools, Design Thinking process planning, Divergent and Convergent Phases. Introduction to Synthesis phase of Design.

Module 2:

Empathy: Identification of Real Requirement

Identifying insights and opportunities of Product, how might we help and its iterations, Challenge findings, Identifying Target audience and its real needs.

Role of Leadership in Design Thinking, Feedback, visualizing ideas, Storytelling: Techniques and importance. Seen, perceived, thought, acted equilibrium.

Module 3:

Ideation

Divergent phase of Ideation, Brainstorming, Various Brainstorming Techniques, Tools for idea generation, TRIZ, SCAMPER, Case Study on Ideation.

Convergent phase of selection of few ideas for Prototype. Analysis for selection, Business Model Canvas for project.

Module 4:

Prototype

Low Fidelity Prototype, Low fidelity techniques, Feedback collection process and iterative improvement, advantages, and disadvantages of low fidelity prototyping. Low Fidelity prototype in UI/UX design, Wireframe modelling.

High Fidelity Prototype, Cost vs benefit analysis for High Fidelity Prototype, Why High-Fidelity porotype is not preferred Use areas of high-Fidelity prototype, Product Launch process.

Module 5:

Test and Implementation

Final Test Process, Test tools, Prelaunch, Limited Launch and Actual Launch Process. Feedback generation at Pre-launch and Limited Launch. Post implementation iterations.

Textbooks

1. Design Thinking: Understanding How Designers Think and Work by Nigel Cross, Berg Publication 2011
2. Creative Confidence: Unleashing the Creative Potential Within Us, By David Kelly and Tom Kelly, William Collins, 2013

Reference Books

1. Thinking Design by S. Balram, Sage Publication, 2011
2. Solving Problems with Design Thinking: Ten Stories of What Works by Jeanne Liedtka, Columbia Business School Publishing, 2013

E-Resources

1. **https://www.researchgate.net/publication/329310644_Handbook_of_Design_Thinking**
2. **https://www.rcsc.gov.bt/wp-content/uploads/2017/07/dt-guide-book-master-copy.pdf**
3. **http://www.designthinkingbook.co.uk/DT_MJV_book.pdf**
4. **https://www.tutorialspoint.com/hi/design_thinking/design_thinking_tutorial.pdf**
5. **https://www.unidue.de/imperia/md/content/innovationhub/designthingkingforlibraries.pdf**

Course Outcomes

At the end of the course, the student will be able to:

CO1. Identify the design thinking process and tools.
CO2 Identify the real requirements of Design Thinking.
CO3. Investigate the design process as a tool for innovation.
CO4. Analyse cost vs benefit for high fidelity prototyping.
CO5. Test the Final implemented product.

AY: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IV Year- II Sem			
Course Code: **L425D**	**ANDROID APPLICATION DEVELOPMENT (Professional Elective-VI)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

1. Knowledge of JAVA programming.
2. Knowledge of Structured Query Language (SQL).
3. Knowledge of Extensible Markup Language (XML)

Course Objectives:

The students should be able to

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 n0075mber 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

Course Outcomes

At the end of the course, the student will be able to:

CO1. Identify android application types and its components.

CO2. Design Android User interface and handle the events.

CO3. Interpret the Intent, Broadcast receivers and Internet services.

CO4. Use SQLite Database and content providers.

CO5. Integrate multimedia, camera and Location based services in Android Application

OPEN ELECTIVE-I

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE III Year-I Sem			
Course Code: **L31OA**	**ELEMENTS OF CIVIL ENGINEERING (Open Elective -I)**	L	T	P	D
Credits: 3		**3**	**0**	**0**	**0**

Module 1:

Unit-1: Introduction:

History of the civil engineering, sub – disciplines of civil engineering.

Module2

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 androads, traffic control mechanism.

Text Books :

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 Jain16th Edition Publisher: Laxmi Publication Delhi.

Reference Books

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, the students will be able to:

1. Explain the ba sic 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: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- I Sem			
Course Code: **L31OB**	**Introduction to Computer Networks (Open Elective -I)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Knowledge on Programming for Problem Solving

Course Objectives:

The students should be able to

1. Understand importance of Internet, Computer networks, and their elements
2. Identify the data link layer design Issues and protocols.
3. Examine design issues of network layer and corresponding protocols.
4. Identify the transport layer services and demonstrate the working of its protocols.
5. Identify the 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, Block Coding, 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, Tunnelling 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.

Textbooks

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

At the end of the course, the student will be able to:

CO1. Demonstrate the networking concepts, various Layering approaches, functionalities and internetworking devices used and some protocols of Link layer.

CO2. Identify how error control, flow control can be achieved, and a medium can be shared among multiple devices,

CO3. Identify how to do fragmentation, assigning of logical address and judge on routing, congestion.

CO4. Illustrate the working of IP Protocol, other protocols of internet layer and services of transport layer.

CO5. Demonstrate the transport layer and application layer protocols, their working.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE III Year / I Sem			
Course Code: L310C	INTRODUCTION TO MACHINE LEARNING (Open Elective I)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Data Structures, Design and Analysis of Algorithms, Python Programming & Mathematics for Machine Learning

Course objectives:

The student will:

1. To introduce the fundamental concepts of machine learning and its applications.
2. To learn the classification, clustering, regression-based machine learning algorithms
3. To understand the deep learning architectures.
4. To understand the methods of solving real life problems using the machine learning techniques.
5. Understand the limitations of machine learning algorithms.

Module 1:

Introduction: Programming Vs Learning-Types of Learning- Statistical Decision Theory – Regression-Classification- Bias Variance-Linear Regression- Multivariate Regression- Subset Selection- Shrinkage Methods

Principal Component Regression- Partial Least squares- Linear Classification- Logistic Regression- Linear Discriminant Analysis-Perceptron- Support Vector Machines

Module 2:

Neural Networks-Introduction- Early Models- Perceptron Learning- Backpropagation- Initialization- Training & Validation- Parameter Estimation – MLE- MAP-Bayesian Estimation

Decision Trees- Regression Trees- Stopping Criterion & Pruning loss functions- Categorical Attributes- Multiway Splits- Missing Values- Decision Trees – Instability Evaluation Measures

Module 3:

Ensemble Learning-Bootstrapping & Cross Validation-Class Evaluation Measures- ROC curve- MDL- Ensemble Methods – Bagging- Committee Machines and Stacking- Boosting

Gradient Boosting- Random Forests- Multi-class Classification- Naive Bayes- Bayesian Networks

Module 4:

Undirected Graphical Models- HMM- Variable Elimination-Belief Propagation-Partitional Clustering, Hierarchical Clustering

Birch Algorithm, CURE Algorithm, Density-based Clustering- Gaussian Mixture Models Expectation Maximization

Module 5:

Deep Learning Architectures and Applications: Convolution neural networks (CNN) - Layers in CNN - CNN architectures.

Recurrent Neural Network. Applications: Speech-to-text conversion- image classification-time series prediction. Recent trends in various learning techniques of machine learning and classification methods for solving real world problems.

Text Books:

1. The Elements of Statistical Learning, by Trevor Hastie, Robert Tibshirani, Jerome H. Friedman (2009). Springer-Verlag.

2. Pattern Recognition and Machine Learning, by Christopher Bishop, Springer 2006
3. Richard S. Sutton and Andrew G. Barto, "Reinforcement learning: An introduction", Second Edition, MIT Press, 2019
4. Ethem Alpaydin, “Introduction to Machine Learning”, MIT Press, Third Edition, 2014.

Reference Books:

1. Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012.
2. Francois Chollet, "Deep Learning with Python, Manning Publications, Shelter Island, New York, 2018.
3. Navin Kumar Manaswi, Deep Learning with Applications using Python, Apress, New York, 2018.

Course outcomes:

The student will be able to:

1. Identify the basic concepts of machine learning.
2. Predict the various classification, clustering, and regression algorithms.
3. Apply the deep learning architectures for real world problems.
4. Implement a method for solving real life problem using a suitable machine learning technique.
5. Prioritize the various Machine Learning algorithms.

AY 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE III Year –I Sem			
Course Code: L310D	FUNDAMENTALS OF DATA SCIENCE OPEN ELECTIVE – I	L	T	P	D
Credits: 3		3	0	0	0

Module I: Introduction to Data Science & Big Data

Unit 1:

Evolution of Data Science, Data Science Roles, Stages in a Data Science Project, Applications of Data Science in various fields, Data Security Issues.

Unit 2:

Introduction to Big Data, Elements of Big Data, Big Data Classification, Structured, Un Structured and Semi Structured Data

Module II: Data Collection and Data Pre processing

Unit 1: Data Collection Strategies, Data Pre-Processing Overview

Unit 2: Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization

Module III: Exploratory Data Analytics

Unit 1:

Introduction to Exploratory Data Analytics, Visualization the data (Histogram, bar plot, box plot, pie chart, scatter plots)

Unit 2:

Descriptive Statistics, Mean, Standard Deviation, Skewness and Kurtosis, Box Plots, Pivot Table, Correlation Statistics, ANOVA

Module IV: Model Development

Unit 1:

Introduction to Regression, Simple and Multiple Regression, Model Evaluation using Visualization

Unit 2:

Residual Plot, Distribution Plot, Polynomial Regression and Pipelines, Measures for In-sample Evaluation, Prediction and Decision Making.

Module V: Model Evaluation

Unit I:

Generalization Error, Out-of-Sample Evaluation Metrics, Cross Validation, Overfitting, Under Fitting and Model Selection.

Unit II:

Prediction by using Ridge Regression, Testing Multiple Parameters by using Grid Search.

REFERENCES:

1. Jojo Moolayil, “Smarter Decisions: The Intersection of IoT and Data Science”, PACKT, 2016.
2. Cathy O’Neil and Rachel Schutt , “Doing Data Science”, O'Reilly, 2015.
3. David Dietrich, Barry Heller, Beibei Yang, “Data Science and Big Data Analytics”, EMC 2013
4. Raj, Pethuru, “Handbook of Research on Cloud Infrastructures for Big Data Analytics”, IGI Global.

Course outcomes:

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 Visualization

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE III Year-I Sem			
Course Code: **L31OE**	**PRINCIPLES OF COMMUNICATIONS** (OE-01)	L	T	P	D
Credits: **3**		**3**	**1**	**0**	**0**

Pre-Requisites: Basic electronics and Electricals

Course Objectives: Distinguish analog and digital Modulation techniques used in various Communication systems.

Module 1: Introduction [10L]

Unit-I: [6L]

Block diagram of Electrical communication system, Radio communication: Types of communications, analog, pulse and digital types of signals, Introduction to Modulation, Need for Modulation,

Unit-II: [4L]

Amplitude Modulation: Ordinary Amplitude Modulation – Modulation index, Side bands, AM Power, Double Side Band Suppressed Carrier Modulation, Single Side Band Modulation, Vestigial Side Band Modulation, AM demodulation, Applications of AM.

Module 2: Angle Modulation [9L]

Unit-I: [5L]

Angle Modulation: Phase Modulation fundamentals, Frequency Modulation – Modulation index and sidebands, Narrowband FM, Wideband FM, Comparison of Phase Modulation and Frequency Modulation verses Amplitude Modulation, FM demodulation, Applications of FM.

Unit-II: [4L]

Types of noise, sources of noise, calculation of noise in Linear systems and noise figure.

Module 3: Pulse Modulations [8L]

Unit-I: [4L]

Signal Sampling and Analog Pulse Communication:

Sampling, Nyquist rate of sampling, sampling theorem for Band limited signals, PAM, regeneration of base band signal, PWM and PPM.

Unit-II: [4L]

Time Division Multiplexing, Frequency Division Multiplexing, Asynchronous Multiplexing.

Module 4: Digital Communication [10L]

Unit-I: [5L]

Advantages, Block diagram of PCM, Quantization, and effect of quantization, quantization error, Base band digital signal, DM, ADM, DPCM and comparison.

Unit-II: [5L]

Transmission of Binary Data in Communication Systems: ASK, FSK, PSK, DPSK, QPSK demodulation, coherent and incoherent reception,

Module 5: Information Theory [9L]

Unit-I: [5L]

Concept of information, rate of information and entropy, Source coding for optimum rate of information, coding efficiency,

Unit-II: [4L]

Shanon-Fano and Huffman coding and its problems

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.

Reference Books

1. Electronic Communication Systems – Kennedy and Davis, TMH , 4th edition, 2004.

2. Communication Systems Engineering -John. G. Proakis and MasoudSalehi, PHS, 2nd ed.2004.

E-Resources

1. https://nptel.ac.in/courses/Nanoelectronics/ IIT Madras/ab1011/102/111102111/

Course Outcomes

At the end of the course, the student will be able to:

CO1. **Illustrate** the main concepts of analog and digital communication systems.

CO2. **Analyze** the AM and FM modulator/demodulator

CO3. **Explain**, discuss, and compare different binary digital modulation techniques.

CO4. **Distinguish** different types of noise and explain the effects of noise on communication system.

CO5. **Use** the basic concepts of information theory.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO1	3	1	-	-	-	-	-	-	-	-	-	1	1	-
CO2	2	2	1	-	-	-	-	-	-	-	-	-	2	-
CO3	1	1	-	-	-	-	-	-	-	-	-	-	1	-
CO4	1	1	-	-	-	-	-	-	-	-	-	-	2	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	1	-
Average	**2.0**	**2.0**	**1.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.0**	**1.2**	**-**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE III Year-I Sem			
Course Code: **L31OF**	**FUNDAMENTALS OF DIGITAL LOGIC DESIGN (Open Elective -I)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: 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 1:

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 2:

Unit-I: 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 gages, integrated circuits.

Module 3:

Unit-I: 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 implementnations, exclusive – or function, hardward description language (hdl).

Module 4:

Unit-I: 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 5:

Unit-I:

Registers, shift registers, ripple counters synchronous counters, other counters, hdl for registers and counters.

Text Books

1. Digital design – third edition ,m.morrismano, pearson education/phi.
2. Fundamentals of logic design, roth, 5th edition,thomson.

Reference Books

1. Switching and finite automata theory by zvi. Kohavi, tatamcgraw hill.
2. Switching and logic design, c.v.s. rao, pearson education
3. Digital principles and design – donaldd.givone, tatamcgraw 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

At the end of the course, the student will be able to:

CO1. Manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, gray, and BCD.

CO2. Build Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.

CO3. Design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.

CO4. Analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.

CO5. Construct digital systems by Algorithmic State Machine Charts

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
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

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE III Year-I Sem			
Course Code: **L31OG**	**Energy Engineering (OPEN ELECTIVE-I)**	L	T	P	D
Credits: 3		**3**	**0**	**0**	**0**

MODULE-I: Fundamentals of Energy: [10L]

Energy consumption and standard of living, Classification of energy resources, Consumption trend of primary energy resources, importance and salient features of conventional energy sources and non- conventional energy sources, Energy scenario in India.

MODULE-II: Energy Sources-I: :(Elementary Aspects) [10L]

Coal fired steam thermal power plant – layout, working, Gas turbine power plant, Nuclear power plants, Hydro Electric plants.

MODULE-III: Energy Sources-II :(Elementary Aspects): [10L]

Solar energy, OTEC, Wind power plants, Tidal power plants and geothermal resources, Biomass, Fuel cell.

MODULE-IV: Environmental Pollution and Control: [10L]

Overview of Environmental Concepts: Global Warming - Ozone Layer & UV Radiations - Deforestation Pollution Control: Air Pollution, Solid Waste, Water Pollution, Influence of pollution regionally and globally.

MODULE-V: Energy Conservation And Management: [10L]

Principle of energy conservation, electrical energy conservation opportunities, Definition and Objectives of Energy Management, Energy Management System, Top management support, Energy policy purpose, Roles and responsibilities of energy manager.

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”, Wiley Eastern Limited,1990.

Reference Books

1. Management of Energy Environment Systems, W.K.Foell, John Wiley and Sons.
2. Environmental Impact Analysis Handbook, J.G.Rau, D.C.Wood, Mc Graw Hill.
3. Energy & Environment, J.M. Fowler, Mc Graw Hill.
4. Power Plant Engineering, P.K.Nag / Tata McGraw Hill.
5. G.D.Rai, “Non-conventional energy sources”, Khanna pub. Fourth Edition, 2002.
6. Energy Management Handbook, John Wiley & Sons, Wayne C.Turner.

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=3dJAtHaSQ98
4. https://www.youtube.com/watch?v=xokHLFE96h8

5. http://www.tatapower.com/businesses/renewable-energy.aspx
6. http://www.cleanlineenergy.com/technology/wind-and-solar

Course Outcomes

The students will be able to:

CO 1. Collect and organize information on renewable energy technologies as a basis for further analysis
CO 2. Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the impact on the environment.
CO 3. List and describe the primary renewable energy resources and technologies.
CO 4. Understand effect of using these sources on the environment and climate.
CO 5. To quantify energy demands and make comparisons among energy uses, resources, and technologies

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
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

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE III Year - I Sem			
Course Code: **L31OH**	**Open-Source Software** (Open Elective-I)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Unit I introduction to Open-Source:

Open Source, Need and Principles of OSS, Open-Source Standards, Requirements for Software, OSS success, Free Software, Examples, Licensing, Free Vs. Proprietary Software, Free Software Vs. Open-Source Software, Public Domain. History of free software, Proprietary Vs Open-Source Licensing Model, use of Open- Source Software, FOSS does not mean no cost. History: BSD, The Free Software Foundation and the GNU Project.

Unit II Open-Source Principles and Methodology:

Open-Source History, Open- Source Initiatives, Open Standards Principles, Methodologies, Philosophy, Software freedom, Open-Source Software Development, Licenses, Copyright vs. Copy left, Patents, Zero marginal cost, Income-generation Opportunities, Internationalization.

Unit III Understanding Open-Source Ecosystem:

Open-Source Operating Systems: GNU/Linux, Android, Free BSD, Open Solaris. Open-Source Hardware, Virtualization Technologies, Containerization Technologies: Docker, Development tools, IDEs, Debuggers, Programming languages, LAMP, Open-Source Database technologies.

Unit IV Open-Source Ethics and Social Impact:

Open source vs. closed source, Open-source Government, Ethics of Open-source, Social and Financial impacts of open-source technology, shared software, Shared source, Open Source as a Business Strategy

Unit V Case Studies:

Example Projects-Mozilla (Firefox), Wikipedia, GitHub, Open Office, LibreOffice.

Course Outcomes:

CO 1: Differentiate between Open Source and Proprietary software and Licensing.
CO 2: Recognize the applications, benefits and features of Open-Source Technologies
CO 3: Gain knowledge to start, manage open-source projects

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE III Year - I Sem			
Course Code: **L31OI**	**AUTOMOTIVE TECHNOLOGY** (Open Elective-I)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Engineering Physics.

Module 1:

Unit-1: Structural Systems of Automobile– C hassis and B ody, Power unit, Transmission System, Rear wheel drive, Front wheel drive, 4-wheel drive.

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, Hydrogen as a fuel for IC Engines, advantages and limitations.

Unit-2: Steering, Suspension and Braking Systems: Terminology in Steering geometry, Ackerman steering mechanism, Davis steering mechanism, steering linkages. Objects of suspension systems – Rigid axle suspension system. Mechanical brake system, Hydraulic brake system –Requirement of brake fluid. Pneumatic and Vacuum brakes.

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, active suspension system, power steering and power windows.

Module 5:

Unit-1: Safety Systems: Active and passive safety, airbags, seat belt tightening system, collision warning systems, anti-lock braking systems, traction control system.

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, Butter worth 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. Ljubo Vlacic, 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

At the end of the course, the student will be able to:

CO1: Outline the overview of automobile engineering

CO2: Identify the different fuels and control systems

CO3: Develop the concepts and drive train configurations of electric and hybrid-electric vehicles

CO4: Apply the use of intelligent vehicle technologies like navigation in automobiles

CO5: Aware of safety, security and regulations

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	-	3	3	3	-	-	-	-	-	-	2	3	3
CO2	3	-	3	3	3	-	-	-	-	-	-	2	3	3
CO3	3	-	3	3	3	-	-	-	-	-	-	2	3	3
CO4	3	-	3	3	3	-	-	-	-	-	-	2	3	3
CO5	3	-	3	3	3	-	-	-	-	-	-	2	3	3
Average	3	-	3	3	3	-	-	-	-	-	-	2	3	3

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech -CSE III Year-I Sem			
Course Code: **L31OJ**	**INTRODUCTION TO MINING TECHNOLOGY (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 introduce about 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

Introduction: Distribution of mineral deposits in India and other countries, mining contributions to civilization, mining terminology.

Module 2

Stages in the life of the mine - prospecting, exploration, development, exploitation, and reclamation. Access to mineral deposit- selection, location, size, and shape (incline, shaft and Adit), brief overview of underground and surface mining methods.

Module 3

Drilling: Types of drills, drilling methods, electric, pneumatic, and hydraulic drills, drill steels and bits, drilling rigs, and jumbos.

Module 4

Explosives: Classification, composition, properties and tests, fuses, detonators, blasting devices and accessories, substitutes for explosives, handling and storage, transportation of explosives.; Rock blasting: Mechanism of rock blasting, blasting procedure, and pattern of shot holes.

Module 5

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.

Course Outcomes

At the end of the course, the student will be able to:

CO1: Learn about distribution of mineral deposits in India

CO2: Learn about stages on mining process

CO3: Learn about drilling and its machinery

CO4: Understand about explosives, blasting and blasting mechanism

CO5: Understand about shaft sinking methods, precautions, and lining of shafts

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech -CSE III Year-I Sem			
Course Code: **L31OK**	**Entrepreneurship for Micro, Small and Medium Enterprises** (Open Elective-I)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Course Objective:

To understand the setting up and management of MSMEs and initiatives of Government and other institutions support for growth and development of MSMEs.

UNIT-I:

Introduction for Small and Medium Entrepreneurship (SME): Concept & Definition, Role of Business in the modern Indian Economy SMEs in India, Employment and export opportunities in MSMEs. Issues and challenges of MSMEs

UNIT-II:

Setting of SMEs': Identifying the Business opportunity, Business opportunities in various sectors, formalities for setting up an enterprise - Location of Enterprise – steps in setting up an enterprise – Environmental aspects in setting up, Incentives and subsidies, Rural entrepreneurship – Women entrepreneurship.

UNIT-III:

Institutions supporting MSMEs: –Forms of Financial support, Long term and Short term financial support, Sources of Financial support, Development Financial Institutions, Investment Institutions, Central level institutions, State level institutions, Other agencies, Commercial Bank – Appraisal of Bank for loans. Institutional aids for entrepreneurship development – Role of DST, SIDCO, NSIC, IRCI, NIDC, SIDBI, SISI, SIPCOT, Entrepreneurial guidance bureaus

UNIT-IV:

Management of MSME: Management of Product Line; Communication with clients - Credit Monitoring System - Management of NPAs - Restructuring, Revival and Rehabilitation of MSME, Problems of entrepreneurs – sickness in SMI – Reasons and remedies — Evaluating entrepreneurial performance.

UNIT-V:

Role of Government in promoting Entrepreneurship: MSME policy in India, Agencies for Policy Formulation and Implementation: District Industries Centers (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB).

Course Outcomes: Students will be able to understand

a) Issues and Challenges in MSMEs

b) Setting up of MSMEs

c) Management of MSMEs

d) Institution and Government support.

Suggested Readings:

1. Vasant Desai, Small Scale Industries and Entrepreneurship, Himalaya Publishing House, 2003.
2. Poornima M Charanthimath, Entrepreneurship Development Small Business Enterprises, Pearson, 2006.

3. Paul Burns & Jim Dew Hunt, Small Business Entrepreneurship, Palgrave Macmillan publishers, 2010.
4. Suman Kalyan Chaudhury, Micro Small and Medium Enterprises in India Hardcover, Raj Publications, 2013.
5. Aneet Monika Agarwal, Small and medium enterprises in transitional economies", challenges and opportunities, DEEP and DEEP Publications.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE III Year-I Sem			
Course Code: **L31OL**	**Numerical Solution of Ordinary Differential Equations (Open Elective-I)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Module –I Solution of Equations and Eigen value Problems [10L]

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 [9L]

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 [10L]

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 1/3 rules.

Module 4: Initial Value Problems for Ordinary Differential Equations[10L]

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**.**

Module5: Boundary Value Problems in Ordinary Differential Equations[9L]

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

4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2015
5. Chapra. S.C., and Canale.R.P., "Numerical Methods for Engineers, Tata McGraw Hill, 5 th Edition, New Delhi, 2007.

Reference Books

1. R.K.Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2015.
2. Ramana B.V., Higher Engineering Mathematics, 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. https://www.youtube.com/watch?v=ZaaeInBsRfo

Course Outcomes

At the end of the course, the student will be able to:

CO1. Understand the basic knowledge on solution of Eigen values

CO2. Use interpolation and approximation to solve engineering problems.

CO3. Discuss the numerical differentiation and integration.

CO4. Apply initial value problems for solving first order differential equation.

CO5. Apply the boundary value problems in ordinary and partial differential equations

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
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	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech -CSE III Year- I Sem			
Course Code: **L31OM**	**NANOMATERIALS (Open Elective-I)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Fundamentals of Physics.

Module -1: Introduction to Nanomaterials [9L]

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: Physical and Chemical methods [9L]

Physical Methods:

Bottom-up approach and Top-down approach, Inert gas condensation, Arc Discharge, lasers ablation, laser pyrolysis, ball milling, and electro deposition.

Chemical Methods: Nanocrystals by chemical reduction, photochemical synthesis, electrochemical synthesis, Nano crystals of semiconductors.

Module–3: Synthesis of Nanomaterials [9L]

Thermolysis route – spray pyrolysis and solved metal atom dispersion, sol-gel method solvothermal and hydrothermal routes, solution combustion synthesis, CVD method, PVD method.

Module–4: Properties of Nanomaterials [9L]

Quantum Structure: 3D-Pontential Wells (Spherical & Rectangular Parallelepiped), 2D (Circular & Square, Quantum Corrals), 1D (Quantum Wires), 0D (Quantum Dots).

Module–5: X-RAY Characterization techniques [9L]

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.C N R Rao, A Muller and A K Cheetham "The chemistry of Nano materials: Synthesis, Properties and Applications" John Wiley, First Edition, 2004

2. Hari Singh Nalwa, "Nano structured Materials and Nanotechnology", Academic Press, First Edition, 2002.

Reference Books

1.Charles P Poole Jr "Introduction to Nanotechnology", John Willey & Sons, 1st Edition, 2003
2.C Dupas, P Houdy, M Lahmani, Nanoscience: "Nanotechnologies and Nano physics", Springer-Verlag Berlin Heidelberg, 1st Edition, 2007.

E-Resources

1. http://nptel.ac.in/courses/103103033/module9/lecture1.pdf
2.http://courses.washington.edu/overney/NME498_Material/NME498_Periods/Lect ure4-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

Course Outcomes

After completion of this course the student is 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. Apply 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.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech -CSE III Year-I Sem			
Course Code: **L31ON**	**Chemistry of Engineering Materials (Open Elective-I)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Module 1: Phase Rule and alloys [8L]

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 [10L]

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: [10L]

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:[9L]

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[9L]

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

3. "A text Book of Engineering Chemistry", P.C.Jain and Monica Jain, Dhanpat Rai Publications, New Delhi, 12th Edition 2006.
4. "Text Book of Engineering chemistry", B.Rama Devi, Ch.VenkataRamana Reddy and PrasanthaRath, Cengage Learning India Pvt. Ltd, 2016.
5. **"**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

At the end 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.

AY 2022-23 onwards	J. B. Institute Of Engineering And Technology (UGC Autonomous)	B. Tech -CSE III Year – I Sem			
Course Code: L31OO	TECHNICAL WRITING SKILLS (Open Elective-I)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Course Objectives: To learn

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

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***	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
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: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech -CSE III Year-I Sem			
Course Code: **L31OP**	**Indian Constitution (Open Elective-I)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Module 1: Evolution of the Indian Constitution

1909 Act, 1919 Act end 1935 Act. Constituent Assemtily Composition and Functions Fundamentals features of the Indian Constitution.

Module 2: Union Government

Executive: President. Prime Minister, Council of Minister

Executive: Governor, Chief Minister, Council of Minister

Local Government: Panchayat Raj Institutions, Urban Government.

Module 3: Rights and Duties

Fundamental Rights. Directive principles. Fundamental Duties.

Module 4: Relation between Federal and provincial units

Union State relations. Administrative, legislative and Financial. Inter State council. NITI Ayog Finance Commission of India

Module 5: Statutory Institutions.

Elections-Election Commission of India, National Human Rights Commission National Commission for Women.

Text Books:

1 D.D. Basu, Introduction to the constitution of India. Lexis Nexis. Now Delhi

2. Subhash Kashyap, Our Parliament, National Book Trust. New Delhi.

Reference Books:

1. Peu Ghosh Indian Government & Polities. Prentice Hell of India, New Delhi

2 B.Z. Fadia & Kuldeep Fadia, Indian Government & Polices, LexisNexis. New Delhi

Course Outcomes:

At the end of the course, the student will be able to:

COI: Know the background of the present constitution of India.

CO2: Understand the working of the union, state and local levels.

CO3. Gain consciousness on the fundamental rights and duties

CO4. Be able to understand the functioning and distribution of financial resources between center and states.

Be exposed to the realty of hierarchical Indian social structure and the way the grievances the deprived sections can be addressed to raise human dignity in a democratic way

OPEN ELECTIVE-II

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE III Year-II Sem			
Course Code: **L32OA**	**CONSTRUCTION MANAGEMENT, CONTRACTSAND VALUATION**	L	T	P	D
Credits: 3	**(Open Elective-II)**	**3**	**1**	**0**	**0**

Pre-Requisites: Construction Technology and Project Management, Estimation and Costing.

Module 1: Unit-I: Concept of a Project

Characteristic features – Project Life cycle – Phases – Project Management – tools and techniquesfor project management – role of project managers.

Module 2: Unit-I: Project management plan and objectives

Programming – scheduling – project organization – organization and project team – role ofcommunication in project management – controlling systems.

Module 3: Unit-I: 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-I: 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-I: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 UniversityPress, 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 editionJan 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

At the end of the course, the student 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: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- II Sem			
Course Code: **L32OB**	**Principles of Operating Systems (Open Elective -II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Knowledge on Programming for Problem Solving

Course Objectives:

The students should be able to

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 computer system.

Module 1:

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 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:

Security Threats: Computer security concepts, Threats, Attacks and Assets, Intruders, Malicious software, Viruses, Worms, Bots, Rootkits.

Security Techniques: Authentication, Access Control, Intrusion Detection, Malware Defense, Dealing with Buffer Overflow attacks.

Textbooks

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://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

At the end of the course, the student will be able to:

CO1: Identify the different structures and functions of operating systems and it's components.

CO2: Apply different algorithms and methods to achieve concurrency among the operating system programs.

CO3: Analyse the memory management techniques used in the execution of operating system programs.

CO4: Implement the suitable methods to improve the efficiency of storage management devices.

CO5: Apply suitable algorithms to ensure the security of computer system.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE III Year -II Sem			
Course Code: L320C	INTRODUCTION TO PREDICTIVE ANALYTICS (Open Elective II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

Data mining, Machine Learning

Course objectives:

The student will:

1. Know the basics of predictive analytics and summarize Data, Categorize Models, and techniques
2. Know about the Decision tree, Support Vector Machine for Data Classification
3. Describe Methods such as Naïve Bayes Markov Model, Linear Regression, Neural Networks to Boost Prediction Accuracy for Data Classification.
4. Study the predictive models for various Real-Time Applications.
5. Study the Analysis and Visualized predictive Model's results using Data Visualization tools.

Module 1:

INTRODUCTION TO PREDICTIVE ANLAYTICS

Introduction – Predictive Analytics in the Wild – Exploring Data types and associated Techniques - Complexities of data - Applying Models: Models and simulation, Categorizing Models, Describing, summarizing data, and decisions – Identify similarities in Data: Data Clustering, converting Raw Data into a Matrix, Identify K-groups in Data.

Module 2:

DATA CLASSIFICATION – PART I

Background – Exploring Data classification process - Using Data Classification to predict the future: Decision tree, Algorithm for generating Decision Trees, Support Vector Machine.

Module 3:

DATA CLASSIFICATION – PART II

Ensemble Methods to Boost Prediction Accuracy: Naïve Bayes Classification Algorithm, The Markov Model, Linear Regression, Neural Networks – Deep learning.

Module 4:

DATA PREPARATION AND MODELLING

Adopt predictive analytics - Processing data: identifying, cleaning, generating, reducing dimensionality of data – Structuring Data – Build predictive model: develop and test the model.

Module 5:

FORECASTING AND TIME SERIES ANALYSIS

Forecasting- Time Series Analysis-Additive & Multiplicative models- Exponential smoothing techniques - Forecasting Accuracy - Auto-regressive and moving average models.

Text Books:

1. Anasse Bari, Mohamed Chaouchi, Tommy Jung, "Predictive Analytics For Dummies", Wiley Publisher, 2nd Edition, 2016.

Reference Books:

1. Bertt Lantz, Machine Learning with R: Expert techniques for predictive modeling to solve all your data analysis problems, Pack Publisher, 2nd Edition, 2015.

2. Aurelien,"Hands-On Machine Learning with Scikit-Learn & TensorFlow", O'Reilly Publisher, 5th Edition, 2017.
3. Max Kuhn, Kjell Johnson, " Applied Predictive Modeling" Springer, 2013.

E - Resources:

1. https://vuquangnguyen2016.files.wordpress.com/2018/03/applied-predictive-modeling-max-kuhn-kjell-johnson_1518.pdf
2. https://www.researchgate.net/publication/329873035_Prediction_Modeling_Methodology
3. https://www.coursera.org/learn/predictive-modeling-analytics
4. https://www.edx.org/course/predictive-analytics

Course Outcomes:

The student will be able to:

1. Identify the basics of predictive analytics and summarize Data, Categorize Models, and techniques
2. Apply Decision tree, Support Vector Machine for Data Classification
3. Apply Methods such as Naïve Bayes Markov Model, Linear Regression, Neural Networks to Boost Prediction Accuracy for Data Classification.
4. Construct predictive models for various Real-Time Applications.
5. Analyze and Visualize predictive Model's results using Data Visualization tools

AY 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE III Year – II Sem			
Course Code: L320D	BUSINESS DATA ANALYTICS (Open Elective II)	L	T	P	D
Credits: 3		3	0	0	0

Course Objective:

This course enables the students to have a formal introduction to Business Analytics and Fundamentals of R Programming

MODULE 1: **Introduction Business Analytics**

Unit 1:

Introduction to Business Analytics -Competing on Analytics - The New Science of Winning Business Analytics.

Unit 2:

Introduction to Market, Trends and People- The Paradigm Shift from Data to Insight and from Business.

MODULE 2: **Intelligence to Business Analytics**

Unit 1:

Intelligence to Business Analytics- Descriptive, Predictive and Prescriptive Analytics - Introduction to R programs-Running R programs.

Unit 2:

Mastering Fundamental R concepts -How to diagnose and correct syntax errors-

MODULE 3: **Data Sets &Variables**

Unit 1:

Getting familiar with R data sets- Creating R data sets- Reading data files into R - Excel, .txt, SPSS, SAS.

Unit 2:

Html-Assigning variable attributes Changing variable attributes,

MODULE 4: **Data Visualization**

Unit 1: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques. Icon-Based Visualization Techniques, Hierarchical Visualization Techniques.

Unit 2: Visualizing Complex Data and Relations, Charts, Plots, Maps, Diagrams and Matrices

MODULE 5: **Visualization Patterns Unit 1:**

Visualize Patterns over Time- Visualizing Relationship- Spotting Differences- Visualizing Spatial Relationships.

Unit 2:

Data Visualization Using R, Tools, Ggplot2, Bar chart, Pie Chart, Tableau, Plotly, Histogram, Box Plot, Scatter Plot, Heat Map.

Text Books

1. Essentials of Business Analytics: Camm, Cochran, others, Cengage Learning,2016
2. R for Dummies: Andrie De Varies and Joris Mays: Wiley,2016
3. Introductory Statistics with R: Peter Dalgaard, Spr

Course Outcomes:

1. Identify the source of a quantifiable problem, recognize the issues involved and produce an appropriate action plan.
2. Translate a problem into a statistical model
3. Gather Data and Employ R Programming software to fit model to data and solve problem
4. Calculate and interpret numerous statistical values and appreciate their value to the business Manager

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE III Year-II Sem			
Course Code: **L32OE**	**Basics of IC Technology** (Open Elective-II)	L	T	P	D
Credits: 3		**3**	**0**	**0**	**0**

Pre-Requisites: NIL

Module 1: INTRODUCTION TO IC TECHNOLOGIES [10L]

Unit-I: [6L]

Fabrication steps for BJT Transistor, Fabrication steps for MOSFET Transistor, Comparison between BJT and MOSFET fabrication.

Unit-II: [4L]

Semiconductor Substrate-Crystal defects, Electronic Grade Silicon, Czochralski Growth, Float Zone Growth

Module 2: Wafer Preparation & Epitaxy [9L]

Unit-I: [5L]

Wafer Preparation-Silicon Shaping, Etching and Polishing, Chemical cleaning.

Unit-II: [4L]

Epitaxy. Defects in Epitaxial growth, Liquid phase Epitaxy, Vapor Phase Epitaxy and Molecular Beam Epitaxy.

Module 3: Oxidation and Diffusion [8L]

Unit-I: [4L]

Oxidation and Kinetics of oxide growth, Deal-Grove Model of oxidation, Linear, and Parabolic Rate coefficient.

Unit-II: [4L]

Diffusuion- Ficks First law and Second law of Diffusion.

Module 4: Ion Implantation and Chemical Vapour Deposition [10L]

Unit-I: [5L]

Diffusion Vs Ion Implantation, Ion Implantation system

Unit-II: [5L]

CVD for deposition of dielectric and polysilicon- a simple CVD system, Chemical equilibrium and the law of mass action

Module 5: Pattern Transfer and Etching[9L]

Unit-I: [5L]

Lithography and types. Step by step process of Photo Lithography, photo resist, Figures of Merit.

Unit-II: [5L]

Wet etching, Plasma etching, Reaction ion etching.

Text Books

1. S.M. SZE “VLSI Technology” 2nd edition
2. Plummer Deal griffin, “Silicon VLSI Technology” Pearson Publication

Reference Books

1. VLSI Design by Sujata Pandey.
2. J. Bhasker “VHDL for Beginner” Pearson

E-Resources

NPTEL-VLSI Design by Dr. Nandita Das Gupta, IIT Madras

Course Outcomes

At the end of the course, the student will be able to:

CO1. Familiarize with IC fabrication steps.

CO2. Examine Wafer Preparation and Epitaxies.

CO3. Analyse oxidation and Diffusion Techniques.

CO4. Explain Ion Implantation and Chemical Vapour Deposition

CO5. Assess Photolithography and Etching process.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO1	3	3		-	-	-	-	-	-	-	-	-	3	-
CO2	3	2		-	-	-	-	-	-	-	-	-	3	-
CO3	3	1		-	-	-	-	-	-	-	-	-	3	-
CO4	3	3		-	-	-	-	-	-	-	-	-	3	-
CO5	3	2		-	-	-	-	-	-	-	-	-	3	-
Average	**3**	**2.2**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE III Year-II Sem			
Course Code: **L32OF**	**INTRODUCTION TO MICROPROCESSORS AND MICRO CONTROLLERS**	L	T	P	D
Credits: **3**	**(Open Elective -II)**	**3**	**0**	**0**	**0**

Pre-Requisites: Basic of ICs

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-I: 8086 Introduction

8086 Architecture Functional diagrams, Register organization, memory segmentation, programming model, memory addresses, physical memory organization

Unit-II: 8086 Architecture

Architecture of 8086, signal descriptions of 8086-common function signals, Timing diagrams, interrupts of 8086.

Module 2

Unit-I: Instruction set of 8086

Instruction formats, addressing modes, instruction set, assembler directives, macros.

Unit-II: Assembly language programming of 8086

Simple programs involving logical, branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

Module 3

Unit-I: I/O Interface

8255 PPI, Various modes of operation and interfacing to 8086, interfacing keyboard, Display, D/A and A/D converter.

Unit-II: Interfacing with advanced devices

Memory Interfacing to 8086, Interrupt Structure of 8086, Vector Interrupt Table, Interrupt Service Routine.

Module 4

Unit-I: Introduction to Microcontrollers

Overview of 8051 microcontrollers, architecture, I/O ports, memory organization.

Unit-II: Addressing Modes

Addressing modes and instruction set of 8051, simple programs.

Module 5:

Unit-I: 8051 Real Time control 1

Programming Time Interrupts, Programming External Hardware Interrupts.

Unit-II: 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,2nd Edition 2006.
2. Kenneth.J.Ayala, The8051Microcontroler,3rdEd., C engage Learning

Reference Books

1. Advanced Microprocessors and peripherals-A.K.Ray and K.M Bhurchandani, TMH,2 nd Edition 2006.
2. The 8051 Microcontrollers. Architecture and programming and applications- K.Uma Rao, Andhe Pallavi, Pearson, 2009.
3. Micro computer 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

At the end of the course, the student will be able to:

CO1. Design programs on 8085 microprocessors
CO2. Implement programs on 8086 microprocessors.
CO3. Design interfacing circuits with 8086.
CO4. Design and implement 8051 microcontroller-based systems.
CO5. Understand the concepts related to I/O and memory interfacing.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
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**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE III Year-II Sem			
Course Code: **L32OG**	**HYBRID ELECTRIC VEHICLES (Open Elective-II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Module 1: History of hybrid and electric vehicles [12L]

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 2: Hybrid traction [8L]

Basic concept of hybrid traction – Introduction to various hybrid drive train topologies – power flow control in hybrid drive – train Topologies-Fuel efficiency analysis.

Module 3: DC & AC Electrical Machines [14L]

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 4: Batteries [12L]

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 5: Energy management and their strategies [6L]

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,
3. Sira – Raminez ,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/
2. https://nptel.ac.in/courses/108/102/108102121/
3. https://nptel.ac.in/content/storage2/courses/108103009/download/M12.pdf
4. https://nptel.ac.in/content/storage2/courses/108103009/download/M1.pdf
5. https://nptel.ac.in/content/storage2/courses/108103009/download/M3.pdf

Course Outcomes

At the end of the course, the student will be able to:

CO 1. Understand the working of different configurations of electric vehicles, hybrid vehicles and its components.
CO 2. ApplythebasicconceptsofbatteriesandMotorsinthedesignofElectricandHybrid Vehicles.
CO 3. Differentiate the modes of operation of Hybrid Vehicles.
CO 4. Analyze the performance of hybrid vehicles.
CO 5. Design the basic parameters of Electric and Hybrid Electric Vehicles.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	**3**	**-**	**2**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**3**	**2**
CO2	**3**	**2**	**3**	**2**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**2**	**2**	**2**
CO3	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**
CO4	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**
CO5	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**2**	**2**
Average	**2.6**	**2.5**	**2.6**	**2**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**2**	**2.4**	**2.2**

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE III Year-II Sem			
Course Code: **L32OH**	**Distributed Systems (Open Elective-II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Unit I: Characterization of Distributed Systems:

Introduction, Examples of distributed systems, Trends in distributed systems, Focus on resource sharing, Challenges

Unit II: System Models:

Introduction, Physical models, Architectural models, Fundamental models.

Unit III: Inter process Communication:

Introduction, The API for the Internet protocols, External data representation and marshalling, Multicast communication, Network virtualization: Overlay networks.

Unit IV: Remote Invocation:

Introduction, Request-reply protocols, Remote procedure call, Remote method invocation. Indirect Communication: Introduction, Group communication, Publish- subscribe systems, Message queues, Shared memory approaches.

Unit V: Distributed Objects and Components:

Introduction, Distributed objects, Case study: CORBA, From objects to components.

Text Book

1. Distributed System: Concepts and Design, Coulouris, Dollimore, Kindberg, 2006, Pearson Education.

Course Outcomes:

CO 1: Understand of the principles and foundations on which the Internet and other distributed systems are based.

CO 2: Apply different approaches for supporting distributed applications.

CO3: Analyze the role of middleware technologies in designing Distributed systems

CO 4: Analyze the sharing of data in distributed environment using various distributed algorithms.

CO5: Attain the knowledge of Remote Invocation and group communication.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE III Year - II Sem			
Course Code: **L32OI**	**FUNDAMENTALS OF OPERATIONS RESEARCH** (Open Elective - II)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Engineering Mathematics.

Module 1:

Unit 1: Introduction: Development – Definition– Characteristics and Phases – Types of models – 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 problem: 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 items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail 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– Multichannel – Poisson arrivals and exponential service times with infinite population.

Module 5:

Unit 1: Theory of Games: Introduction – Terminology – Solution of games with saddle points and without saddle points- 2 x 2 games – m x 2 & 2 x n games - graphical method – m x n games - dominance principle.

Unit 2: Dynamic programming: Introduction – Terminology- Bellman's Principle of Optimality – Applications of dynamic programming- shortest path problem – linear programming problem

Text Books

1. P. Sankara Iyer, "Operations Research", Mc Graw Hill, 2017.
2. J. K. Sharma, "Operation Research", MacMillan Publishers India Ltd, 4th Edition, 2009.
3. A.C.S Kumar, "Operations Research (Quantitative Analysis for Business decision)", Yesdee, 2015.

Reference Books

1. Maurice Saseini, Arhur Yaspanand and Lawrence Friedman, "*Operations Research: Methods and Problems",* Literary Licensing Publisher, 2013
2. A. M. Natarajan, P. Bala Subramani and A. Tamilarasi "*Operations Research*" Pearson Education, 4th *Edition*, 2009.
3. Wagner H. M, "*Principles of Operations Research",* PHI Publications, 2nd Edition, 2006.

E-Resources

1. https://rb.gy/1ckbxh
2. https://nptel.ac.in/courses/112/106/112106134/
3. https://nptel.ac.in/courses/111/107/111107128/

Course Outcomes

At the end of the course, the student will be able to:

CO1: Allocate optimally the resources in any industry, to maximize the overall gain and determine the number of each item to be produced / procured, and the optimal product mix, within the framework of constraints in any organization

CO2: 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

CO3: Schedule and sequence production runs by proper allocation of machines and men to get maximum gain or profit and Compute the economic order quantity

CO4: 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

CO5: Find how to strike a balance between the waiting time cost and service facility cost and apply the Dynamic Programming model to practical problems like finding the shortest path for a salesman, optimal solution to a linear programming problem.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	3	2	-	-	3	-	-	-	-	-	2	2	2
CO2	3	3	3	-	-	3	-	-	-	-	-	2	3	3
CO3	2	3	2	-	-	3	-	-	-	-	-	2	2	2
CO4	3	3	2	-	-	3	-	-	-	-	-	2	3	3
CO5	2	3	1	-	-	3	-	-	-	-	-	2	2	2
Average	2.4	3	2	-	-	3	-	-	-	-	-	2	2.4	2.4

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE III Year - II Sem			
Course Code: **L32OJ**	**INTRODUCTION TO SURFACE MINING (OPEN ELECTIVE – II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Course Objectives:

This course will enable students to:

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

Definition, Terminology, Applicability and limitations of surface mining, Classification, Advantages, and dis-advantages of surface mining.

Module 2

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

Drilling & blasting**:** Drilling mechanism, drilling patters, Drill bits Explosives, Blasting accessories, Bulk explosives, problems in blasting.

Module 4

Basics of Mine lighting, Sources of dust in surface mining, dust control, and slope stabilization

Module 5

Methods of excavation & transportation – shovel-dumper combination, draglines, surface miner, bucket wheel excavator. Impacts on environment due to surface mining

Text Books

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

Course Outcomes

At the end of the course, the student will be able to:

CO1: Understand about surface mining terms and conditions of applicability

CO2: Learn about different machinery used in surface mining

CO3: Learn drilling and blasting in surface mining

CO4: Understand mine lighting, dust, and slopes in surface mining

CO5: Understand the transportation of ore and waste in surface mining.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE III Year - II Sem			
Course Code: **L32OK**	**INTELLECTUAL PROPERTY RIGHTS (Open Elective - II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

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.

UNIT - I:

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

UNIT - II:

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

UNIT - III:

Law of 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.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT - IV:

Trade Secrets: Trade secretes law, determination of trade secretes status, liability for misappropriations of trade secrets, and protection for submission, trade secretes litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT - V:

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

International overview on intellectual property, international - trade mark law, copy right law, international patent law, and international development in trade secrets law.

Course outcomes:

The students once they complete their academic projects, they get awareness of acquiring the patent and copyright for their innovative works. They also get the knowledge of plagiarism in their innovations which can be questioned legally.

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.
4. Intellectual Property –Copyrights, Trademarks and patents by Richard Stim, Cengage Learning.
5. Niraj Pandey & Khushdeep Dharani –Intellectual Property rights
6. V.K. AHUJA – Law relating to Intellectual Property

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE III Year-II Sem			
Course Code: **L32OL**	**Numerical Solution of Partial Differential Equations (Open Elective-II)**	L	T	P	D
Credits: 3		**3**	**0**	**0**	**0**

Pre-Requisites:

Module 1: Linear Systems of Equations [10L]

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 [9L]

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 [10L]

Vector and matrix norms - Eigen values of a common tridiagonal matrix - Gerischgorin's theorems - Stability by matrix and Fourier-series methods - A.D.I. methods.

Module 4: Hyperbolic Equations [10L]

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 [10L]

Solution of Laplace and Poisson equations in a rectangular region - Finite difference in Polar coordinate Formulas for derivatives near a curved boundary when using square mesh - Discretisation error - Mixed Boundary value problems

Text Books

1. Chapra. S.C., and Canale.R.P., "Numerical Methods for Engineers, Tata McGraw Hill, 5 th Edition, New Delhi, 2007.
2. Equations", John Wiley and sons, New York, 1980.
3. Smith G.D., "Numerical Solution of P.D.E.", Oxford University Press, New 2. York, 1995

Reference Books

1. Morton K.W., Mayers, D.F., "Numerical Solutions of Partial Differential Equations", Cambridge University Press, Cambridge, 2002.
2. Iserles A., "A first course in the Numerical Analysis of Differential Equations", Cambridge University press, New Delhi, 2010. xx t u u
3. Mitchel A.R. and Griffiths S.D.F., "The Finite Difference Methods in Partial Differential

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_twodimensional_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

At the end of the course, the student will be able to:

CO1. Know the knowledge of solving large number of algebraic linear equation.

CO2. Understand the knowledge of solving one dimensional parabolic equations by numerical methods

CO3. Recognize the knowledge of solving two dimensional parabolic equations by numerical methods.

CO4. Apply and understand the knowledge of solving hyperbolic equation by numerical methods

CO5. Know the knowledge of solving elliptic equations by numerical methods.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
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	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE III Year-II Sem			
Course Code: **L32OM**	**ADVANCED PHYSICS FOR ENGINEERS (Open Elective-II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Foundations of Mechanics & Physics

Module- 1: Special Theory of Relativity [9L]

Introduction, Concept of theory of relativity, Frames of reference-Inertial, noinertial; 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 [9L]

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 [9L]

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 [9L]

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[9L]

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. R K Gaur and SL Gupta, “Engineering Physics” Dhanpat Rai Publications, 8th revised Edition, 2006.
2. B K Pandey and S Chaturvedi, “Engineering Physics” Cengage Learning India, Revised Edition, 2014.

Reference Books

1.R F Bun shah, “Hand Book of Technologies for Films and coating”, Noyes publishers,1st Edition, 1996.
2.B E A Saleh and A C Tech, “Fundamentals of Photonics”, John Wiley and Sons, New York, 1st Edition, 1993.

E-Resources

1.http://physics.mq.edu.au/~jcresser/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/

Course Outcomes

After completion of this course the student is able to

1.Explain special theory of relativity and apply its concepts in various fields of physicsand engineering.

2. Analyze the basic concepts of Holography and applications.

3. Identify different concepts of film deposition.

4. Apply basic knowledge on the photonic crystals.

5. Apply the basic concepts of solar cell physics.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE III Year-II Sem			
Course Code: **L32ON**	**Nano Chemistry (Open Elective-II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Module 1: Synthesis of Nano materials [8L]

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 [10L]

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 4: Instrumental Analysis [10L]

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 5: Carbon Nano structures and Applications [10L]

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 [9L]

Implications of Nanotechnology & Research needs-Nanostructured Catalysts TiO_2 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. "Green Chemistry: Theory and Practice", Anastas, P.; Warner, J. Oxford University Press: London, 1998.
2. "Nanomaterials: Synthesis, Characterization, and Applications", A. K. Haghi, Ajesh K. Zachariah, Nandakumar Kalariakkal. Apple Academic Press, 2013.
3. "Nanomaterials and Nanochemistry", Brechignac C., Houdy P., Lahmani M. (Eds.) (Springer,) 748p. ISBN 978-3-540-72993-8, 2007
4. "Principles of Nanotechnology", Phanikumar. SciTech Publications 2nd Edition, 2010.

5. “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

At the end 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.

AY 2022-23 onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech:CSE III Year – II Sem			
Course Code: L32OO	TEAMWORK AND TEAM BUILDING (Open Elective-II)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Objectives:

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.

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: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE III Year-II Sem			
Course Code: **L320P**	**Essence of Indian Traditional Knowledge (Open Elective-II)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Module 1: Introduction to Culture

Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India

Module 2: Indian Languages, Culture and Literature

Indian Languages and Literature-l the role of Sanskrit, significance of scriptures to scriptures to current society, Indian philosophies, other Sanskrit literature, literature of south India

Indian Languages and Literature-II. Northern Indian languages & literature

Module 3: Religion and Philosophy

Religion and Philosophy in ancient India Religion and Philosophy in Medieval India Religious Reform Movements in Modern India (selected movements only)

Module 4: Fine Arts in India (Art, Technology & Engineering)

Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient medieval, and modern) Science and Technology in India, development of science in ancient medieval and modern India.

Module 5: Education System in India

Education in ancient, medieval and modern India, aims of education, subjects' languages Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India.

Text Books

1. Kapil Kapoor. "Text and Interpretation: The India Tradition" ISBN: 81246013375 2005.

1. "Science in Sanskrit". Samskrita Bharti Publisher, ISBN 978-8187276731.2007

Reference Books

1.NCERT, "Position paper on Arts, Music, Dance and Theatre". ISBN 81-7450 494- 200.

Course Outcomes

At the end of the course, the student will be able to:

COI: Understand philosophy of Indian culture.

CO2: Distinguish the Indian languages and literature

CO3: Learn the philosophy of ancient, medieval and modern India.

CO4: Acquire the information about the fine arts in India.

COS: Know the contribution of scientists of different eras.

OPEN ELECTIVE-III

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE III Year-II Sem			
Course Code: **L32OQ**	**ROAD SAFETY EINGINEERING (Open Elective-III)**	L	T	P	D
Credits: 3		**3**	**0**	**0**	**0**

Pre-Requisites: NIL

Module 1: Fundamentals of Traffic Engineering

Unit-I:

Road User Characteristics, Vehicular Characteristics, Applications of Traffic Control Devices,Traffic signs, Road Marking.

Module 2: Introduction to Road Safety

Unit-I:

Accident Situation in India, International Comparison of Accident Data, Standard Definitions byIRC, Collection of Accident Data, Collision and Condition Diagrams.

Module 3: Statistical Methods and Analysis of Accident Data

Unit-I:

Methods in Analysis of accident Data, Regression Method, Poisson Distribution, Chi- SquaredDistribution, Statistical Comparisons, Black Spot Identification & Investigations.

Module 4: Road & its Effect on Accidents Unit-I:

Factors Causing Accidents, Skidding, Factors Determining Skid Resistance, Pedestrian Safety,Measures to Increase Pedestrian Safety, Safety Improvement Strategies.

Module 5: Accident Mitigation Measures

Unit-I

Accident prevention by better planning, Accident prevention by better design of roads, Highway operation and accident control measures, Highway Safety Measures during construction, Highwaygeometry 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 Road Safety by NCHRP.

E- Resources

1. https://nptel.ac.in/courses/105/101/105101087/

Course Outcomes

At the end of the course, the student will be able to:

1. Understand the Traffic characteristics
2. Analyze Collision and Condition Diagrams.
3. Describe Road & its Effect on Accidents
4. Understand the various Accident prevention measures.
5. Understand the statistical analysis of traffic flow variables.

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: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE III Year- II Sem			
Course Code: **L32OR**	**Introduction to Java Programming (Open Elective -III)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Knowledge on Programming for Problem Solving

Course Objectives:

The students should be able to

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 lifetime 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

Textbooks

1. Java The complete reference, 8th edition, Herbert Schildt, TMH.
2. Understanding OOP with Java, updated 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. http://www.javasoft.com
2. http://www.w3schools.com

Course Outcomes

At the end of the course, the student will be able to:

CO1: Use OOP concepts in problem solving.

CO2: Demonstrate Inheritance and Polymorphism

CO3: Create user defined Packages and Interfaces

CO4: Illustrate the concept of Exception handling and Multithreading.

CO5: Design GUI based applications using Applet Programming and Event Handling

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE III Year II Sem			
Course Code: L320S	INTRODUCTION TO NEURAL NETWORKS (Open Elective III)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites:

1. Data Structures
2. Design and Analysis of Algorithms
3. Python Programming
4. Mathematics for Machine Learning

Course objectives:

The student will:

1. Become familiar with the fundamental concepts of Neural Networks and its applications.
2. Learn various learning strategies for solving real world problems.
3. Demonstrate various architectures of Artificial neural networks.
4. Summarise the limitations of the perceptron model
5. Understand the paradigms of associative memories.

Module 1:

INTRODUCTION TO NEURAL NETWORKS

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron,

Biological and Artificial Neuron Models, Characteristics of ANN

McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

Module 2:

ESSENTIALS OF ARTIFICIAL NEURAL NETWORKS

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN Connectivity, Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules.

Module 3:

SINGLE LAYER FEED FORWARD NETWORKS

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category

Training Algorithms: Discrete and Continuous Perceptron Networks, Limitations of the Perceptron Model.

Module 4:

MULTI- LAYER FEED FORWARD NETWORKS

Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm

Kolmogorov Theorem, Learning Difficulties, and Improvements.

Module 5:

ASSOCIATIVE MEMORIES: Linear Association, Basic Concepts of recurrent Auto associative memory: rentrieval algorithm, storage algorithm; By directional associative memory, Architecture, Association encoding & decoding, Stability.

SELF ORGANIZING NETWORKS: Unsupervised learning of clusters, winner-take-all learning, recall mode, Initialisation of weights, seperability limitations

Text Books:

1. Laurene Fausett, "Fundamentals of Neural Networks" , Pearson Education,2004..
2. Simon Haykin, "Neural Networks- A comprehensive foundation", Pearson Education, 2003.
3. S.N.Sivanandam, S.Sumathi,S. N. Deepa "Introduction to Neural Networks using MATLAB 6.0", TATA Mc Graw Hill, 2006.

Reference Books:

1. S. Rajasekharan and G. A. Vijayalakshmi pai, "Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications", PHI Publication, 2004.
2. Timothy J. Ross, " Fuzzy Logic with Engineering Applications", Tata McGraw-Hill Inc. 2000

Course outcomes:

The student will be able to:

1. Analyze Neural Networks and its applications.
2. Apply learning strategies for solving real world problems.
3. Implement various architectures of Artificial neural networks.
4. Categorize the merits of various perceptron models.
5. Construct the paradigms of associative memories.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech : CSE III Year-II Sem			
Course Code: **L320T**	**HEALTH CARE DATA ANALYTICS (Open Elective-III)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Module I: Introduction to Health Care Data Analytics & Electronic Health Record
Unit I: Introduction to Health care data sources and basic analytics, advanced data analytics, Applications and practical systems for health care, resources for health care data analytics,
Unit II: Electronics Health Records, Components of EHR, Coding System of EHR, Benefits of EHR- Barrier to Adopting EHR Challenges-Phenotyping Algorithms, Conclusion.

Module II: Biomedical image modalities and Mining of Sensor Data in Health Care
Unit 1: Biomedical image modalities, Object Detection**,** Image Segmentation, Image Registration, Feature Extraction, Conclusion and Feature work.
Unit II: Introduction Mining sensor data in medical informatics, scope and challenges, Challenges in the Health care data analysis, Sensor Data Mining Applications, Non clinical Health Care Application, Summary and concluding remarks.

Module III: Biomedical Signal Analysis and Genomic data analysis
Unit I: -introduction types of biomedical signal analysis, ECG signal analysis, denoising of signals, multivariate bio medical signal analysis, cross correlation analysis.
Unit II: introduction genomic data generation, methods and standards for genomic data analysis, types of computational genomics studies towards personalized medicine, genetic and genomic study to the bed side of personalized medicine, concluding remarks.
Module IV: Natural language processing and data mining for clinical text & Biomedical literature Unit I: Introduction to Natural language processing, Mining information for clinical text, Challenges of processing clinical reports, clinical applications, conclusions.
Unit II: Introduction terminology acquisition and management information extraction, text mining environments, applications integration with clinical text mining, conclusions.
Module V: Social media and analytics for health care and Advanced data analytics for health care Unit I: Introduction to social media analysis for detection and trapping of infectious disease outbreaks, social media analysis for public health research and analysis of social media used in health care, conclusions.
Unit II: introduction basics statistical predication model, alternative, clinical predication model, survival models, evaluation and validation and conclusion.

TEXT BOOKS

1. Chandan K. Reddy and Charu C Aggarwal, “Healthcare data analytics”, Taylor & Francis,2020 Edition

REFERENCE BOOKS

1. Hui Yang and Eva K. Lee, “Healthcare Analytics: From Data to Knowledge to Healthcare Improvement, Wiley, 2016.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE III Year-II Sem			
Course Code: **L320U**	**MATLAB PROGRAMING LANGUAGE (Open Elective-III)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

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: Introduction to MATLAB [10L]

Unit-I: [6L]

Historical Background, Applications, Scope of MATLAB, Importance of MATLAB for Engineers, Features, MATLAB Windows (Editor, Work Space, Command History, Command Window).

Unit-II: [4L]

Operations with Variables, Naming and Checking Existence, Clearing Operations, Commands, Data types, Operators.

Module 2: Data Flow in MATLAB [10L]

Unit-I: [10L]

Vectors, Matrix Operations & Operators, Reshaping Matrices, Arrays, Colon Notations, Numbers, Strings, Functions, File Input-Output, Importing and Exporting of data.

Module 3: MATLAB Programming [10L]

Unit-I:

Conditional Statements, Loops, Writing Script Files, Error Correction, saving Files, Worked out Examples.

Module 4: MATLAB Advanced [10L]

Unit-I: [10L]

Plotting, Graphics, Creating Plot & Editing Plot, GUI (Graphical User Interface). Matlab-Algebra, Calculus, Differential, Integration, Polynomials, solving a system of linear equations.

Module 5: SIMULINK [9L]

Unit-I: [9L]

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 WithMatlab: 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

CO1. Translate mathematical methods to MATLAB code.
CO2. Generalize results and represent data visually.
CO3. Apply computer methods for solving a wide range of engineering problems.
CO4. Utilize computer skills to enhance learning and performance in other engineering and science courses.
CO5. Acquire knowledge of Advanced Matlab programming methods and Simulink.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE III Year-II Sem			
Course Code: **L32OV**	**INTRODUCTION TO SENSORS AND ITS APPLICATIONS (Open Elective -III)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Course Objectives:

Students will learn 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-I: Introduction

Basics of Measurement – Classification of errors – Error analysis – Static and dynamic characteristics of transducers.

Unit-II: Performance measures of sensors

Classification of sensors – Sensor calibration techniques – Sensor Output Signal Types.

Module 2:

Unit-I: Motion, Proximity And Ranging Sensors

Motion Sensors – Potentiometers, Resolver, Encoders – Optical, Magnetic, Inductive, Capacitive

Unit-II:

LVDT – RVDT – Synchro – Microsyn, Accelerometer.,– GPS, Bluetooth, Range Sensors – RF beacons, Ultrasonic Ranging, Reflective beacons, Laser Range Sensor (LIDAR).

Module 3:

Unit-I: 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, Inclinometers.

Module 4:

Unit-I: Optical, Pressure And Temperature Sensors

Photo conductive cell, photo voltaic, Photo resistive, LDR – Fiber optic sensors – Pressure – Diaphragm, Bellows, Piezoelectric – Tactile sensors, Temperature – IC, Thermistor, RTD.

Unit-II:

Thermocouple. Acoustic Sensors – flow and level measurement, Radiation Sensors - Smart Sensors, Film sensor, MEMS & Nano Sensors, LASER sensors.

Module 5:

Unit-I: Signal Conditioning And Daq Systems

Amplification – Filtering – Sample and Hold circuits – Data Acquisition: Single channel and multi-channel data acquisition

Unit-II:

Data logging - applications - Automobile, Aerospace, Home appliances, Manufacturing, Environmental monitoring

Text Books

1. S 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.

Reference Books

1. Patranabis D, "Sensors and Transducers", 2nd Edition, PHI, New Delhi,2010.
2. 1. John Turner and Martyn Hill, "Instrumentation for Engineers and Scientists", Oxford Science Publications,1999.
3. 2. 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/

Course Outcomes

At the end of the course, the student will be able to:

CO1. Expertise in various calibration techniques and signal types for sensors.

CO2. Apply the various sensors in the Automotive and Mechatronics applications.

CO3. Study the basic principles of various smart sensors..

CO4. Apply Optical and Acoustic sensors in Home Appliances..

CO5. Implement the DAQ systems with different sensors for real time applications.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	3	-	-	-	-	-	-	-	-	-	-
CO4	3	1	-		-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	3	-	-	-	-	-	-	-	-	-	-
Average	2.4	2	2.5	2.67	-	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE III Year-II Sem			
Course Code: **L32OX**	**Non-Conventional Energy Sources (OPEN ELECTIVE - III)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Course Objectives:

This course will enable students:

1. To elucidate the fundamentals of various energy sources and future energy requirement.
2. To impart a thorough knowledge about the application of solar energy.
3. To inculcate the students on feasibility and limitations of wind Energy Systems.
4. To analyse the principle and operation of Biomass energy.
5. To analyse the principle and operation of ocean energy and it's potential in india.

Module 1: Introduction [9L]

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.

Module 2: Solar Energy [12L]

Fundamentals of Solar Energy, Solar Radiation on Earth's surface, Solar radiation geometry, Solar radiation measurements, Solar radiation data, Solar radiation on horizontal and tilted surfaces. Solar Thermal conversion: Flat plate collectors and concentrated collectors, collector efficiency. Solar applications: Heating, distillation, pumping, drying, cooking and solar electric power generation

Module 3: Wind Energy [10L]

Basic principle of wind energy conversion, site selection consideration, Betz Limit, Aerodynamics of wind turbine, basic components of wind energy conversion systems (WECS), types of WECS, applications of wind energy, safety system.

Module 4: Bio-Mass [9L]

Energy from Bio Mass: Various fuels, Conversion technologies, Aerobic digestion and anaerobic digestion, types of Bio-gas digesters, applications of bio-gas plants Factors affecting generation of bio gas, Community biogas plant, compare biomass and biogas.

Module 5: Geo-Thermal and Ocean Energy [10L]

Geothermal energy: Resources, methods of harnessing the energy, potential in India **Ocean energy:** Principle of ocean thermal energy conversion (OTEC), types: open cycle OTEC system, closed cycle and hybrid cycle, applications. Tidal and wave energy: Potential and conversion techniques.

Text Books

1. "G. D. Rai", "Non-Conventional Energy sources", Khanna publishers, 2004
2. "John Twidell & Wier", "Renewable Energy Resources", CRC Press, 2009.

Reference Books

1. "D. P .Kothari, Singal, Rakesh and Ranjan", "Renewable Energy sources and Emerging Technologies", PHI, 2009.
2. "F. C. Treble", Generating Electricity from Sun, Pergamon Press, 1st Edition 1991
3. "C. S. Solanki", "Solar Photovoltaics - Fundamentals- Principles and Applications", PHI, 2009
4. "S. P. Sukhatme", "Solar Energy Principles and Application", TMH, 2009.
5. Agarwal, M.P., 'Future Sources of Electrical Power', S.Chand & Co. Ltd, New Delhi, 1999.

E-Resources

1. https://nptel.ac.in/courses/121106014
2. https://www.energy.gov/eere/geothermal/electricity-generation
3. https://beeindia.gov.in/sites/default/files/4Ch12.pdf
4. https://www.ireda.in/home
5. https://mnre.gov.in/wind/current-status/

Course Outcomes

At the end of the course, the student will be able to:

CO 1. Understand the need of utilization of alternate energy resources & fundamentals of various non-conventional energy Systems.

CO 2. Analyze solar thermal and photovoltaic systems and related technologies for energy conversion.

CO 3. Understand Wind energy conversion and devices available for it.

CO 4. Understand Biomass conversion technologies, Geo thermal resources and energy conversion principles and technologies.

CO 5. Realize Power from oceans (thermal, wave, tidal) and conversion devices

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
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	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech : CSE III Year-II Sem			
Course Code: **L32OY**	**Soft Computing (OPEN ELECTIVE - III)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Unit I Soft Computing:
Introduction to soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing.

Unit II Artificial Intelligence:
Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques.

Unit III Neural Network:
Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, characteristic and applications of ANN.

Unit IV: Perceptron
Perceptron training algorithm, Linear separability.

Unit V Genetic algorithm:
Fundamental, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modelling.

Text Books:
1. S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications, 2nd Edition, 2011.
2. S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications, PHI Publication, 1st Edition, 2009.
Course Outcomes: At the end of the course the student should be able to
CO 1. Learn about soft computing techniques and their applications
CO 2. Analyze various neural network architectures
CO 3. Understand perceptrons.
CO 4. Define the fuzzy systems
CO 5. Analyze the genetic algorithms and their applications

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE III Year – II Sem			
Course Code: **L32OZ**	**BASICS OF ROBOTICS** (Open Elective-III)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Engineering Physics, Engineering Mathematics

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

Module 2

Unit 1: Grippers - End effectors: Mechanical gripper – Magnetic – Vacuum cup and other types of grippers.

Unit2: Industrial robots specifications. Selection based on the Application.

Module 3:

Unit 1: Rotation Matrix, Homogenous TransformationMatrix, transformation matrix problems.

Unit 2: Kinematics-Manipulators Kinematics, 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, blending scheme.

Unit 2: Types of motion: Slew motion – joint interpolated motion – straight line motion – problems.

Module 5:

Unit 1: Sensors-Internal sensors: Position sensors & Velocity sensors, External sensors: Proximity sensors, Tactile Sensors, & Force or Torque sensors.

Unit 2: Programming of Robots and Vision System-Lead through programming methods-Teach pendent- overview of various textual programming languages like VAL etc.

Text books

1. Industrial Robotics / Groover M P /McGraw Hill
2. Introdu`ction 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.

E- Resources

1. https://rb.gy/dw0rkv https://rb.gy/iayh9d
2. https://nptel.ac.in/courses/112/105/112105249/
3. https://nptel.ac.in/courses/112/101/112101098/

Course outcomes

At the end of the course, the student will be able to:

CO1: Apply the basic components of robots

CO2: Differentiate types of robots and robot grippers.

CO3: Model forward and inverse kinematics of robot manipulators.

CO4: Analyze the path planning of the robot.

CO5: Program a robot to perform tasks in differential applications.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	2	3	3	-	-	-	-	-	-	3	3	3
CO2	3	3	2	3	3	-	-	-	-	-	-	3	3	3
CO3	3	2	2	3	3	-	-	-	-	-	-	3	3	3
CO4	3	2	2	3	3	-	-	-	-	-	-	3	3	3
CO5	1	2	2	3	3	-	-	-	-	-	-	1	3	3
Average	2.6	2	2	3	3	-	-	-	-	-	-	2.6	3	3

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE III Year-II Sem			
Course Code: **L32O1**	**BASIC MINING GEOLOGY (OPEN ELECTIVE – III)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Course Objectives

This course will enable students to:

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

Introduction, Definitions, Importance of geology in mining, Types of rocks, Physical properties of rocks.

Module 2

Structural Geology: Definition, terminology, and Primary and secondary structures: Bedding, lineation, foliation, cleavage, Strike and dip. Definition of faults, folds and joints and their types, Unconformities, and its kinds.

Module 3

Ground Water: Introduction, Hydrological Cycle, origin and occurrence of groundwater, water table. Aquifers: Types of aquifers, confined and unconfined aquifers, perched aquifers.

Module 4

Coal: Stages of formation, composition, theories of formation of coal.

Module 5

Occurrence and distribution of important metallic mineral deposits in India: Iron, Copper-Lead and Zinc–Manganese– Aluminum–Chromium. 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.

Course Outcomes

At the end of the course, the student will be able to:

CO1 : Understand about rocks and their properties
CO2 : Learn about different structures occurring in rocks
CO3 : Understand about ground water, water table and aquifers
CO4 : Learn about coal and its formation theories
CO5: Distinguish metallic and non-metallic minerals.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE III Year-II Sem			
Course Code: **L32O2**	**DIGITAL MARKETING (Open Elective-III)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Course Objective:

To understand the importance of digital marketing and its applications

1. To understand the basics of Digital Marketing
2. To understand the Channels of Digital Marketing
3. To develop the capability to form Digital Marketing strategy
4. To enable the students to use new media such as Search Engine and Social Networking

UNIT - I: Understanding Digital Marketing: Concept, Components of Digital Marketing, Need and Scope of Digital Marketing, Benefits of Digital Marketing, Digital Marketing Platforms and Strategies, Comparison of Marketing and Digital Marketing, Digital Marketing Trends, Practical Exposure towards Social Media Marketing.

UNIT - II: Channels of Digital Marketing: Digital Marketing, Website Marketing, Search Engine Marketing, Online Advertising, Email Marketing, Blog Marketing, Social Media Marketing, Audio, Video and Interactive Marketing, Online Public Relations, Mobile Marketing, Migrating from Traditional Channels to Digital Channels, Affiliate Marketing.

UNIT - II: Marketing in the Digital Era: Segmentation – Importance of Audience Segmentation, How different segments use Digital Media – Organizational Characteristics, Purchasing Characteristics, Using Digital Media to Reach, Acquisition and Retention of new customers, Digital Media for Customer Loyalty.

UNIT - III: Digital Marketing Plan: Need of a Digital Marketing Plan, Elements of a Digital Marketing Plan– Marketing Plan, Executive Summary, Mission, Situational Analysis, Opportunities and Issues, Goals and Objectives, Marketing Strategy, Action Plan, Budget, Writing the Marketing Plan and Implementing the Plan.

UNIT - IV: Search Engine Marketing and Online Advertising: Importance of SEM, understanding Web Search – keywords, HTML tags, Inbound Links, Online Advertising vs. Traditional Advertising, Payment Methods of Online Advertising – CPM (Cost-per-Thousand) and CPC (Cost-per-click), Display Ads - choosing a Display Ad Format, Landing Page and its importance.

UNIT - V: Social Media Marketing: Understanding Social Media, Social Networking with Face book, LinkedIn, Blogging as a social medium, Micro blogging with Twitter, Social Sharing with YouTube, Social Media for Customer Reach, Acquisition and Retention.

Measurement of Digital Media: Analyzing Digital Media Performance, Analyzing Website Performance, Analyzing Advertising Performance.

Course outcomes:

Upon successfully completing the course, students should be able to:

1. Apply digital marketing in the globalized market
2. Define Channels of Digital Marketing
3. Design and develop Digital marketing plan
4. Understand Search engine marketing
5. Acquainted with Online Advertising

Suggested Readings:

1. Michael Miller, B2B Digital Marketing, 1e, Pearson, 2014.
2. Vandana Ahuja, Digital marketing, Oxford University Press 2015
3. Michael R Solomon, Tracy Tuten, Social Media Marketing, Pearson, 1e, 2015. Judy Strauss &Raymond Frost, E-Marketing, Pearson, 2016
4. Richard Gay, Alan Charles worth and Rita Esen, Online marketing – A customer led approach Oxford University Press 2007.
5. Arup Varma, Pawan S. Budhwar, Angelo S. De Nisi, Digital Marketing, Wiley, 2016.
6. David Bain – Digital Marketing in 2017

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE III Year-II Sem			
Course Code: **L32O3**	**Number Theory & Cryptography (Open Elective-III)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Module –I Divisibility Theory And Canonical Decompositions[9L]

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 [10L]

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 [9L]

Wilson‘s theorem – Fermat‘s little theorem – Euler‘s theorem – Euler‘s Phi functions

Module 4: Classical Encryption Techniques [10L]

Classical encryption techniques: Symmetric chipper model – Substitution techniques – Transposition techniques – Steganography.

Module 5: Block chippers public key Encryption [10L]

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. Koblitz, N. "Course on Number Theory and Cryptography", Springer Verlag, 1986
2. Menezes, A, et.al. "Handbook of Applied Cryptography", CRC Press, 1996

Reference Books

1. Ivan Niven, Herbert S. Zukerman, Hugh L. Montgomery, "An Introduction to the Theory of Numbers".

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

At the end of the course, the student will be able to:

CO1. Ability to think and reason about abstract mathematics
CO2. Analyze the vulnerabilities in any computing system and hence be able to design a security solutions
CO3. Evaluate security mechanisms using rigorous approaches, including theoretical
CO4. Solve problems in elementary number theory
CO5. Apply elementary number theory to cryptography

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
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	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE III Year-II Sem			
Course Code: **L32O4**	**NDT and VACUUM TECHNOLOGY (Open Elective)**	L	T	P	D
Credits: **3**	**(**COMMON TO: All branches)	**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Module- 1: Introduction to Non-destructive testing [8L]

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 [9L]

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: Vacuum Technology and Flow Meters [9L]

Vacuum Technology: 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.

Flow meters: Molar flow, Mass flow.

Module- 4: Pressure gauges [8L]

Pressure gauges: Classification, Direct and indirect gauges, Indirect gauges – Pirani gauge, Thermocouple gauge, Ionization gauge, hot cathode gauge, Penning gauge.

Module-5 : Vacuum Pumps [9L]

Introduction, Pumping speed, Rotary vane pump, Turbo molecular pump, Diffusion pumps.

Text Books

1.B K Pandey, S Chaturvedi, "Engineering Physics", Cengage learning, 1st Edition, 2014.

2. John. F. O'Hanlon, "A User's guide to Vacuum technology", Wiley, 3rd Edition, 2003.

Reference Books

1. R Srinivasan, "Physics for Engineers", New Age international, 1st reprint, 2007.

2. R K Gaur and S L Gupta, "Engineering Physics", Dhanpat rai, Reprint, 2006.

3. Krishna Seshan, "Hand Book of Thin film deposition", 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.http://nptel.ac.in/courses/114106035/35

5. http://nptel.ac.in/courses/112101004/37

Course Outcomes

After completion of this course the student is able to

1. Describe the Types of defects and analyze them.
2. The principles of NDT methods.
3. Analyze Vacuum technology and concepts of flow meters.
4. Apply the basic knowledge on pressure gauges.
5. Understand the concepts of different vacuum pumps.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech;CSE III Year-II Sem			
Course Code: **L3205**	**Chemistry for Engineers (Open Elective-III)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Module 1: Fibres and Rubbers [9]

Fibres-classification-Characteristics of fibres-Preparation and applications of Nylon-6, 6 and Dacron-Fibre reinforced plastics(FRP)-Applications.

Rubbers-Natural rubber and its vulcanization. Elastomers-Buna-S, Butyl rubber and Thiokol rubber.

Module 2: Polymers for Electronics[10]

Polymer resists for integrated circuit fabrication, lithography and photolithography, Electron beam, X-ray and ion sensitive resists, Conducting polymers, types, properties and applications, electroluminescence, molecular basis of electrical conductivity, Photonic applications and non-linear optics, optical information
Storage.

Module 3: Analysis and Testing of Polymers [8]

Chemical analysis of Polymers: Spectroscopic methods – IR spectroscopy, Raman spectroscopy, NMR spectroscopy, Mass spectroscopy – X-Ray Diffraction analysis. Thermal analysis: Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC), Thermo Gravemetric Analysis (TGA).

Module 4: Surfactants and Lubricants[10]

Methods of preparation, cleaning mechanism. Critical micelle concentration and its determination. Hydrophobic and hydrophilic interactions. Micelles and reverse micelles. Detergents. Fricohesity of surfactants. Lubricants-physical and chemical properties, types and mechanism of lubrication. Additives of lubricants and freezing points of lubricants.

Module 5: Metals and Alloys [9]

Phase rule and applications to one, two and multi-component systems. Iron-carbon phase diagram. Types of alloys, carbon steel, alloy steel, alloys of Cu, Al, Pb.

Text Books

1. A Textbook of Engineering Chemistry, by Shashi Chawla
2. Engineering Chemistry, by S. S. Dara

Reference Books

1. Engineering Chemistry, by P. C Jain and M. Jain
2. Advanced Polymer Chemistry, by M. Chanda

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

At the end of the course, the students will be able to:

1. Learn the different synthetic methods of the fibres and rubbers.
2. Know the electronic applications of polymers.
3. Acquire the knowledge on various instrumental methods of analysis.
4. Know the use of surfactants and lubricants.
5. Learn the use and applications of alloys.

AY 2022-23 onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech III Year – II Sem			
Course Code: L32O6	TECHNICAL COMMUNICATION SKILLS (Open Elective-III)	L	T	P	D
Credits: 3		3	0	0	0

Pre-Requisites: Nil

Objectives:

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.

Course outcomes:

1. Use the language skills in order to better communication
2. Learn the presentation skills and use them in conferences and seminars
3. Identify the role of presentation skills in expressing our feelings and emotions
4. Understand the role of group discussion for getting jobs
5. Know the importance of interview skills for getting jobs

CO-PO/PSO Mapping

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	..	..

OPEN ELECTIVE-IV

AY: 2022-23 Onwards	**J. B. Institute of Engineering and Technology** (UGC Autonomous)				**B. Tech CSE IV Year-I Sem**
Course Code: **L41OA**	**ENVIRONMENTAL IMPACT ASSESSMENT (Open Elective-IV)**	L	T	P	D
Credits: 3		**3**	**0**	**0**	**0**

Pre-Requisites: Environmental Science.

Module 1:

Unit-1: Initial Environmental examination –Factors affecting EIA – Need for EnvironmentalImpact 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, 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, Wild life Protection Act-1972, The water (Prevention and control) Act-1974

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 InternationalPublications. 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: 2022-23 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)				B. Tech-CSE IV Year- I Sem
Course Code: **L41OB**	**INTRODUCTION TO PYTHON PROGRAMMING (Open Elective -IV)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: NIL

Course Objectives:

The students should be able to

1. Acquire programming skills in core Python.
2. Apply the Python programming language operations, control structures
3. Develop the ability to use built-in data types
4. Develop the skill of creating functions, writing data to files
5. Acquire Object Oriented Skills in Python

Module 1: Introduction

Unit-I: History

Python Introduction, History of Python, Introduction to Python Interpreter and program execution, Python Installation Process in Windows and Linux, Introduction to anaconda.

Unit-II: Variables

Python IDE, python variable declaration, Keywords, Indents in Python, Python input/output operations.

Module 2: Operators, Conditional Statements, Loops

Unit-I: Operators

Arithmetic Operators, Comparison Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Ternary Operator, Operator precedence.

Unit-II: Conditional Statements, Loops

Conditional Statements (If, If-else, If-elif-else, Nested-if etc.) and loop control statements (for, while, Nested loops, Break, Continue, Pass statements)

Module 3: Built-in Data types

Unit-I: Strings, Lists

Strings Creating, initializing and accessing the elements; String operators, String functions and methods. Lists: Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements

Unit-II: Tuple, Set, Dictionary

Tuples creating, initializing and accessing the elements in a tuple. Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, dictionary operations, Dictionary functions and methods.

Module 4: Functions and Files

Unit-I: Functions

Introduction to functions, Function definition and calling, Function parameters, Default argument function, Variable argument function, in built functions in python, Scope of variable in python.

Unit-II: Files

Concept of Files, File opening in various modes, closing of a file. Reading from a file, writing onto a file, some important File handling functions.

Module 5: Object oriented Programming

Unit-I: Programming types

Programming types, Procedure-oriented programming, Object Oriented Programming.

Unit-II:

Accessing Databases using Python.

Text Books

1. Python for Everybody: Exploring Data in Python 3 by Charles Severance

Reference Books

1. Programming in Python 3 - A complete Introduction to the Python Language Second Edition, Mark Summerfield, Addison-Wesley 2010
2. Object-Oriented Programming in Python, Michael H, Goldwasser, David Letscher, Pearson Prentice Hall, 2008.
3. Programming Python- 4 th Edition, Mark Lutz, O'Reilly, 2011.

E-Resources

1. https://www.youtube.com/watch?v=YYXdXT2l-Gg&list=PL-osiE80TeTskrapNbzXhwoFUiLCjGgY7
2. https://docs.python.org/3/tutorial/
3. https://www.programiz.com/python-programming
4. https://www.w3schools.com/python/

Course Outcomes

At the end of the course, the student will be able to:

CO1. Choose the right data representation formats based on the requirements of the problem.
CO2. Identify tasks and write programs in python, to solve the task.
CO3. Use the comparisons and limitations of the various built-in data types and choose the right one.
CO4. Identify and write the functions, programs required for accessing files.
CO5. Demonstrates how to achieve reusability using inheritance, interfaces.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE IV Year-I Sem			
Course Code: L410C	INTRODUCTION TO DEEP LEARNING (Open Elective IV)	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.

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

Module 5:

Applications

Detection & Segmentation problem definition, challenges, Evaluation, Datasets and Localization by regression, Detection as classification

Region proposals, RCNN and YOLO architectures, fully convolutional segmentations, Mask-RCNNs.

Text Books:

1. Deep Learning- Ian Goodfelllow, 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. Implement 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

AY 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE IV Year – I Sem			
Course Code: L410D	FUNDAMENTALS OF BIG DATA (Open Elective -IV)	L	T	P	D
Credits: 3		3	0	0	0

Course Objectives:

1. The purpose of this course is to provide the students with the knowledge of Big data Analytics principles and techniques.
2. This course is also designed to give an exposure of the frontiers of Big data Analytics

MODULE-I: Introduction to Big Data and Big Data Analytics

Unit 1:
Introduction to Big Data: Big Data and its Importance, Four V's of Big Data,Structring Big Data

Unit 2:
Drivers for Big Data, Introduction to Big Data Analytics, Classification of Analytics, Big Data Analytics applications

MODULE- II: Big Data Technologies Unit 1:
Big Data Technologies: Hadoop's Parallel World, Data discovery, Open source technology for Big Data Analytics, cloud and Big Data.

Unit 2:
Predictive Analytics, Mobile Business Intelligence and Big Data

MODULE- III: Introduction to Hadoop and Map Reduce
Unit 1:
Introduction Hadoop: Big Data, Apache Hadoop & Hadoop Eco System, Moving Data in and out of Hadoop.

Unit 2:
Map Reduce, understanding inputs and outputs of Map Reduce - Data Serialization.

MODULE- IV: Hadoop Architecture & HDFS Architecture

Unit 1:
Hadoop Architecture: Hadoop: RDBMS Vs Hadoop, Hadoop Overview, Hadoop distributors, HDFS,HDFS Daemons, Anatomy of File Write and Read., Name Node, Secondary Name Node, and Data Node.

Unit 2:
HDFS Architecture, Hadoop Configuration, Map Reduce Framework, Role of HBase in Big Data processing, HIVE, PIG.

MODULE- V: Data Analytics & Social Media Analytics
Unit 1:
Data Analytics with R Machine Learning: Introduction, Supervised Learning, Unsupervised Learning.

Unit 2:
Collaborative Filtering, Social Media Analytics, Mobile Analytics, Big Data Analytics with Big R

TEXT BOOKS:

1. Big Data Analytics, Seema Acharya, Subhasini Chellappan, Wiley 2015.
2. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business, Michael Minelli, Michehe Chambers, 1st Edition, Ambiga Dhiraj, Wiely CIO Series, 2013.
3. Hadoop: The Definitive Guide, Tom White, 3rd Edition, O"Reilly Media, 2012.
4. Big Data Analytics: Disruptive Technologies for Changing the Game, Arvind Sathi, 1st Edition, IBM Corporation, 2012.

REFERENCE BOOKS:

1. Big Data and Business Analytics, Jay Liebowitz, Auerbach Publications, CRC press (2013)
2. Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop, Tom Plunkett, Mark Hornick, McGraw-Hill/Osborne Media (2013), Oracle press.
3. Professional Hadoop Solutions, Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, Wiley, ISBN: 9788126551071, 2015.
4. Understanding Big data, Chris Eaton, Dirk deroos et al. McGraw Hill, 2012.
5. Intelligent Data Analysis, Michael Berthold, David J. Hand, Springer, 2007.
6. Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, Bill Franks, 1st Edition, Wiley and SAS Business Series, 2012.

Courses Outcomes:

1. Ability to explain the foundations, definitions, and challenges of Big Data and various Analytical tools.
2. Ability to program using HADOOP and Map reduce, NOSQL
3. Ability to understand the importance of Big Data in social media and Mining.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE IV Year-I Sem			
Course Code: **L41OE**	**CONSUMER ELECTRONICS (OPEN ELECTIVE)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: NIL

Module 1: [10L]

Unit-I: [6L]

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: [4L]

Types: carbon, condenser, crystal, electrets, tie- clip, wireless. Loudspeaker: 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: [8L]

Unit-I: [4L]Audio systems: CD player, home theatre sound system, surround sound. Digital console: block diagram, working principle, applications.

Unit-II: [4L]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: [8L]

Unit-I: [4L]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: [4L]Colour TV standards, colour theory, hue, brightness, saturation, luminance and chrominance. Different types of TV camera. Transmission standards: PAL system, channel bandwidth

Module 4: [10L]

Unit-I: [5L]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: [5L]Video interface: Composite, Component, Separate Video, Digital Video, SDI, HDMI Multimedia Interface), Digital Video Interface. CD and DVD player: working principles, Interfaces.

Module 5: [9L]

Unit-I: [5L]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:[4L]Air conditioner and Refrigerators: Components features, applications, and technical specification. Digital camera and cam coder: - pick up devices - picture processing - picture storage.

Textbooks

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.

Reference Books

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

At the end of the course, the student will be able to:

CO1. Learn how a Consumer Product is developed.
CO2. **Analyze** how to simulate and test that designs.
CO3. **Apply** in-depth study of systems and the use of those.
CO4. **Understand** concept of Audio Systems.
CO5. **Develop**Television Receivers & Video Systems.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	-	-	2	2	3	-	-	-	-	-	-	-	2	-
CO2	2	2	-	-	-	-	-	-	-	-	-	-	2	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO5	2	-	3	3	-	-	-	-	-	-	-	-	2	-
Average	2.3	2	2.5	2.5	3	-	-	-	-	-	-	-	2	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE IV Year-I Sem			
Course Code: **L41OF**	**INTRODUCTION TO EMBEDDED SYSTEMS (Open Elective-IV)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

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-I: Embedded Computing

Introduction, complex systems and microprocessor, the embedded system design process, formalisms for system design, design examples

Unit-II: 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-I: Basic Assembly Language Programming Concepts

The assembly language programming process, programming tools and techniques, programming the 8051.

Unit-II:

Data transfer and logical instructions, arithmetic operations, decimal arithmetic, jump and call instructions.

Module 3:

Unit-I: 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-II: 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-I: Embedded Software Development Tools

Host and target machines, linker/locators for embedded software, getting embedded software into the target system

Unit-II: Debugging Techniques

Testing on host machine, using laboratory tools, an example system.

Module 5:

Unit-I: Introduction to advanced Architectures

ARM and SHARC, processor and memory organization and instruction level parallelism.

Unit-II: 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, Elseveir, 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

At the end of the course, the student will be able to:

CO1. Program an embedded system.

CO2. Analyze Interfacing with keyboard, A/D & D/A conversions, serial data Communication, LCD and LED display.

CO3. Illustrate Tasks, Semaphores, Message queues, pipes, Timer functions.

CO4. Design embedded systems and real-time systems.

CO5. Compare and contrast ARM, SHARC, internet enabled systems.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
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

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE IV Year-I Sem			
Course Code: **L41OG**	**SPECIAL ELECTRICAL MACHINES (OPEN ELECTIVE-IV)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Basic Electrical and Electronics Engineering

Module 1: PERMANENT MAGNET BRUSHLESS DC MOTORS [8L]

Fundamentals of permanent magnets – types - principle of operation- magnetic circuit analysis - EMF and torque equations, Characteristics and control.

Module 2: PERMANENT MAGNET SYNCHRONOUS MOTORS [12L]

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 [10L]

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 [10L]

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 [8L]

Principle of operation and characteristics of Hysteresis motor – AC series motors – Linear inductionmotor – Applications.

Text Books

1. T.J.E. Miller, Brushless magnet and Reluctance motor drives, Claredon 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.

Reference Books

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_NPTEL_NOTES
3. https://easyengineering.net/ee6703-special-electrical-machines/

Course Outcomes

At the end of the course, the student will be able to:

CO 1. Analyze given magnetic circuit and understand operation, characteristics and control of PMBLDC motor.
CO 2. Understand the construction, operation performance characteristics of PMSM and its power controllers.
CO 3. Understand the construction, operation and control of SRM drive and its power controllers.
CO 4. Understand the construction, operation, characteristics and control of stepper motor.
CO 5. Understand the operation & characteristics of other special electrical machines.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
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

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE IV Year-I Sem			
Course Code: **L41OH**	**Object Oriented Analysis and Design (OPEN ELECTIVE-IV)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

UNIT - I Introduction to UML:

Importance of modeling, principles of modelling, object-oriented modeling, conceptual model of the UML, Architecture, and Software Development Life Cycle.

UNIT - II Basic Structural Modeling:

Classes, Relationships, common Mechanisms, and diagrams. Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

UNIT - III Class & Object Diagrams:

Terms, concepts, modeling techniques for Class & Object Diagrams.

UNIT - IV Basic Behavioral Modeling-I:

Interactions, Interaction diagrams Use cases, Use case Diagrams, Activity Diagrams

UNIT - V Advanced Behavioral Modeling:

Events and signals, state machines, processes and Threads, time and space, state chart diagrams. Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

TEXT BOOK

1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education**.**

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

CO 1: Select the basic elements of modeling such as Things, Relationships and Diagrams depending on the views of UML Architecture and SDLC.
CO 2. Apply basic and Advanced Structural Modeling Concepts for designing real time applications.
CO 3. Design Class and Object Diagrams that represent Static Aspects of a Software System.
CO 4. Analyze Dynamic Aspects of a Software System using Use Case, Interaction and Activity Diagrams.
CO 5. Apply techniques of State Chart Diagrams and Implementation Diagrams to model behavioral aspects and Runtime environment of Software Systems.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE IV Year-I Sem			
Course Code: **L41OI**	**BASICS OF MINE ENVIRONMENT (OPEN ELECTIVE – IV)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre- Requisites: Nil

Course Objectives

This course will enable students to:

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

Atmosphere and mine air composition. Origin of gases, properties, limitations of gases in underground mines

Module 2

Spontaneous Combustion: Factors, control measures.

Explosions: Causes of firedamp explosion, preventive measures against firedamp explosion.

Module 3

Dust: Sources in underground and opencast mines, standards, and control measures.

Module 4

Miner's diseases, Lighting standards in underground and opencast mines**.**

Module 5

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.

Course Outcomes

At the end of the course, the student will be able to:

CO1 Learn about atmospheric and mine air

CO2 Learn about spontaneous combustion and explosion in coal mines

CO3 Understand about dust sources and its control in mines

CO4 Learn about miners' diseases, mine lighting, and its standards

CO5 Learn about reclamation of mines, impacts of mining on environment and sustainable mining

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE IV Year-I Sem			
Course Code: **L41OJ**	**RURAL MARKETING (OPEN ELECTIVE-IV)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Course Objective: To understand the importance of Rural Marketing, Rural Environment, Problems in Rural Marketing in India and Strategies to be adopted by the corporate.

UNIT-I:

Introduction: Meaning - Evolution – Nature and Characteristics of Rural Market – Understanding the Indian Rural Economy –Rural Marketing Models – Rural Marketing Vs Urban Marketing – Parameters differentiating Urban & Rural Market - Differences in consumer behavior in Rural and Urban market.

UNIT-II:

Rural Market Research: Sources of Information- Factors influencing rural consumers during purchase of products – Rural consumer Life style –Approaches and Tools of Marketing Research - Rural Business Research- Evolution of Rural Marketing Research – Sources and methods of data collection , data collection approaches in rural areas, data collection tools for rural market. Limitation and challenges in rural marketing research, role of rural marketing consulting agencies

UNIT-III:

Rural Marketing Mix: Rural Marketing Mix – Additional Ps in Rural Marketing – 4As of Rural Marketing Mix – New Product Development for Rural Market – Rural Market Product Life Cycle – Objectives behind new product launch – New Product development process

UNIT-IV:

Rural Market Brand & Channel Management: Brand Loyalty in Rural Market – Regional Brands Vs National Brands – Channel Management – Indian Rural Retail Market – Rural Retail Channel Management – Strategies of Rural Retail Channel Management.

UNIT-V:

Applications and Innovations: Marketing of Consumer products, services, social marketing, agricultural marketing, rural industry products- Innovation for Rural Market – Marketing Strategies – e- Rural Marketing – Agricultural Co – operative Marketing – Rural Market Mapping – Corporate Social Responsibility – Organized Rural Marketing – IT for Rural Development – e-Governance for Rural India.

TEXT BOOKS:

1. C.S.G. Krishnamacharyulu, Lalitha Ramakrishnan, Rural Marketing: Text and Cases, Pearson Education, 2009.
2. Pradeep Kashyap, Rural Marketing, 3e Perason Education, 2016.
3. Balram Dogra & Karminder Ghuman, Rural Marketing, TMH, 2009.
4. Sanal Kumar Velayudhan, Rural Marketing, 2e Sage publications, 2012.
5. T P Gopalaswamy, Rural Marketing, Environment, problems, and strategies, 3e Vikas Publications, 2016.

OPEN ELECTIVE-V

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE IV Year – II Sem			
Course Code: **L42OA**	**ENERGY AUDIT & GREEN BUILDINGS (Open Elective – V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-requisite: Green buildings

Module 1:

Unit 1: Energy Scenarios:

Energy Conservation-Energy Audit-Energy Consumption-Energy Security-Energy Strategy-CleanDevelopment 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 andEnergy 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).

REFERENCES:

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:

At the end of the course student 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
(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: 2022-23 Onwards	J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-CSE IV Year- II Sem			
Course Code: **L42OB**	**INTRODUCTION TO DESIGN THINKING (Open Elective -V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: NIL

Course Objectives:

The students should be able to

1. Understand design thinking skills and customer needs.
2. Use Applied creativity, design thinking approach for idea generation.
3. Understand Design Research strategies, teamwork, and Service design.
4. Understand the Economics of Innovation
5. Understand Design thinking and innovations in various companies.

Module 1:

Unit-I:

Understand the critical design thinking skills needed to either improve an existing product or design a new product.

Identifying & Understanding Customer Needs, Innovation and Business Success

Learn to identify customer needs and draft customer needs statements as a first step towards user innovations.

Unit-II:

Design Thinking Approach for New Product Development, Product Specifications. Learn how to translate user needs into product specifications quantitatively, and how establishing product metrics can help to define those specifications. Learn the concepts that drive design thinking.

Module 2:

Unit-I:

Introduction to Synthesis, Applied Creativity, Design Thinking Approach for Idea Generation,

Learn to apply creativity, brainstorming, and concept generation process in designing needs solutions. Translate needs into product specifications, Choose the right development process. Present the final ideas, get real-time feedback.

Unit-II:

Introduction to Ideation and Prototyping Strategies, Prototyping Explore prototyping methods, strategies, and real-life examples where these have been applied to create a design that represents customer needs and product specifications. Submit the project ideas around user innovations.

Module 3:

Unit-I:

Design Thinking Approach for Deciphering Needs, Introduction to Design Research Strategies, Design for Services, Team Work and Service Design

Understand design of services, identify the potential for innovations within them, and learn how to apply product development frameworks to the service context.

Unit-II:

Design Thinking Approach for Concept Development, Product Architecture, Design Thinking Approach for Concept Evaluation, Analyse the economics of the innovation.

Learn to use the modular and integral product architectures in determining the building blocks of a product. Identify customer needs and user groups.

Module 4:

Unit-I:

Analyse the economics of the innovation Learn to perform financial analysis of your project idea and decide if it is backed by a strong business rationale (Worth-It). Design for Environment, User Testing.

Unit-II:

Learn how to apply design for environment principles to a product life cycle.

Product Development Processes, Design Thinking Approach for Obtaining User Feedback (What Works), Marketing of Innovation and Designing Business Models, learn to select and implement a product development process (staged, spiral, and agile) that's aligned to this project needs.

Module 5: Case Studies

Unit-I:

Design Thinking and Innovation at Apple, IDEO Human Centred Service Design,

Unit-II:

Asia Miles Road to Stakeholder Centric Insight Driven Innovation.

Present the final ideas, get real-time feedback.

Text Books

1. Design Thinking: A Guide to Creative Problem Solving for Everyone, Andrew Pressman, Routledge Taylor & Francis eBooks, 2018.

Reference Books

1. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, Tim Brown, HarperCollins Publishers, 2009.
2. The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems, Michael Lewrick, Wiley Publishers, 2017.

E-Resources

1. https://www.researchgate.net/publication/329310644_Handbook_of_Design_Thinking
2. https://www.rcsc.gov.bt/wp-content/uploads/2017/07/dt-guide-book-master-copy.pdf
3. http://www.designthinkingbook.co.uk/DT_MJV_book.pdf
4. https://www.tutorialspoint.com/hi/design_thinking/design_thinking_tutorial.pdf
5. https://www.uni-due.de/imperia/md/content/innovationhub/designthingkingforlibraries.pdf
6. https://www.ibm.com/cloud/architecture/files/design-thinking-field-guide.pdf
7. https://thisisdesignthinking.net/on-design-thinking/design-thinking-resources/

Course Outcomes

At the end of the course, the student will be able to:

CO1: Identify the Design Thinking skills and customer needs.
CO2: Apply creativity, design thinking approach for idea generation.
CO3: Identify Design Research strategies, teamwork, and Service design.
CO4: Analyse the economics of innovation.
CO5: Identify the Design thinking and innovations in various companies.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE IV Year – II Sem			
Course Code: **L420C**	**INTRODUCTION TO GENERATIVE ADVERSARIAL NETWORKS (Open Elective V)**	**L**	**T**	**P**	**D**
Credits: 3		**3**	**0**	**0**	**0**

Pre-Requisites:

1. Math: Linear Algebra, Calculus, Probability and Statistics
2. Data Structures
3. Machine Learning
4. Deep Learning

Course objectives:

The student will:

1. Understand the difference between generative and discriminative models.
2. Identify problems that GANs can solve.
3. Understand the roles of the generator and discriminator in a GAN system.
4. Understand the advantages and disadvantages of common GAN loss functions.
5. Identify possible solutions to common problems with GAN training.

Module 1:

Introduction to GANs:-

What are GANs? - How do GANs work? - GAN Training- Reaching Equilibrium- Applications of GANs

Generative Modelling with encoders:-

Introduction to Generative Modelling- Working of Auto Encoders at high level- Auto Encoders to GAN- Usage of Auto Encoders

Module 2:

Convolutional Neural Networks:

Introduction to CNN- Convolutional Filters- Parameter sharing- ConvNets Visualized.

Deep GAN:

Introduction to Deep GAN- Batch Normalization- Understanding Normalization- Computing Normalization.

Module 3:

Evaluation:

Evaluation Framework- Inception Score- Frechet Inception Distance

Challenges in Training:

Adding Network depth- Min-Max GAN- Non-Saturating GANs- When to Stop training?- Wasserstein GAN

Module 4:

Semi Supervised GAN:

What is Semi Supervised GAN?- Architecture- Training Process- Training Objectives- Implementation- Comparison to fully supervised Classifier

Conditional GAN:

Motivation- CGAN Generator- CGAN Discriminator- Architecture- Implementation

Module 5:

Cycle GAN:

Image to Image Translation- Cycle Consistency Loss- Adversarial Loss- Identity Loss- Architecture- Applications of Cycle GAN

Applications of GAN:

Image Generation- Training GANs for specific image generation tasks- Style Transfer- photo-to-painting and day-to-night style transfer- Data Augmentation- generating realistic synthetic data to enhance the performance and generalization of machine learning models.

Text Books:

1. GANs in Action, Deep learning with Generative Adversarial Networks, Jakub Langr, Vladimir Bok, Manning Publication
2. Generative Deep Learning by David Foster, O'Reilly Media, Inc.

Reference Book:

1. Learning Generative Adversarial Networks,Kuntal Ganguly, Packt Publishing
2. Generative Adversarial Networks Cookbook, Josh Kalin,Packt Publishing

Course outcomes:

The student will be able to:

1. Design generative and discriminative models.
2. Implement problems that GANs can solve.
3. Compare and contrast the roles of the generator and discriminator in a GAN system.
4. Inspect the challenges posed by common GAN loss functions.
5. Implement possible solutions to common problems with GAN training.

AY 2022-23 onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B.Tech: CSE IV Year – II Sem			
Course Code: L420D	CLOUD COMPUTING (Open Elective V)	L	T	P	D
Credits: 3		3	0	0	0

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:**
3. Cloud Computing: Arshdeep Bahga, Vijay Madisetti, 2014, University Press.
4. Mastering Cloud Computing: Raj Kumar buyya, Christian Vecchiola,selvi-2013.

E - Resources:

1. https://nptel.ac.in/courses/106/105/106105167/1
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

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: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE IV Year-II Sem			
Course Code: **L420E**	**Principles of Sensors and their Application (Open Elective V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites:

Course Objectives:

1. Understand the fundamental principles of various sensors and their classifications.
2. Gain knowledge of signal conditioning and interfacing techniques for sensor integration.
3. Explore the applications of physical, chemical, and biological sensors in different domains.
4. Learn about smart sensors, IoT, and their integration in sensor networks.
5. Develop skills in sensor data processing, fusion, and application-specific algorithms.

Module 1: Introduction to Sensors [8L]

Unit-I: Overview of Sensors [4L]

Introduction to sensors: Definition, types, and classifications; Sensing principles: Mechanical, electrical, thermal, and optical; Sensor characteristics: Range, sensitivity, accuracy, resolution, and response time

Unit-II: [4L]

Sensor signal conditioning: Amplification, filtering, and linearization; Sensor interfacing: Analog and digital interfaces; Sensor calibration and compensation techniques

Module 2: Physical Sensors [9L]

Unit-I: [5L]

Temperature sensors: Thermocouples, RTDs, thermistors, and semiconductor temperature sensors; Pressure sensors: Piezoresistive, capacitive, and optical pressure sensors; Strain sensors: Resistive, capacitive, and piezoelectric strain gauges

Unit-II: [4L]

Accelerometers: Piezoresistive, piezoelectric, and capacitive accelerometers; Gyroscopes: Vibrating structure, fiber optic, and MEMS-based gyroscopes; Force and torque sensors: Load cells, strain gauge-based force sensors, and optical torque sensors.

Module 3: Chemical and Biological Sensors [8L]

Unit-I: [4L]

pH sensors: Glass electrode and ion-sensitive field-effect transistor (ISFET) sensors; Gas sensors: Electrochemical, semiconductor, and optical gas sensors; Biosensors: Enzyme-based, DNA-based, and immune sensors.

Unit-II: [4L]

Biosensors (continued): Lab-on-a-chip technology and bio-electrochemical sensors; Environmental sensors: CO2 sensors, humidity sensors, and particulate matter sensors; Biomedical sensors: ECG, EEG, and pulse oximetry sensors.

Module 4: Smart Sensors and Internet of Things (IoT)[10L]

Unit-I: [5L]

Introduction to smart sensors: Features, architecture, and applications; Sensor networks: Wireless sensor networks, ad-hoc networks, and protocols; IoT and sensor integration: Data acquisition, processing, and communication.

Unit-II: [5L]

Energy harvesting for sensors: Solar, thermal, and vibration energy harvesting; Wearable sensors: Applications in healthcare, sports, and activity monitoring; Industrial IoT: Sensor applications in manufacturing, automation, and predictive maintenance

Module 5: Name of the Module [9L]

Unit-I: [5L]

Signal processing techniques for sensor data: Filtering, noise reduction, and feature extraction; Data fusion: Sensor fusion techniques and algorithms Sensor arrays: Beamforming and spatial processing.

Unit-II: [4L]

Sensor-based localization and tracking: GPS, RFID, and computer vision-based methods; Sensor applications in robotics and automation Emerging trends in sensor technology and applications.

Text Books

1. Ernest O Doebelin, "Measurement Systems – Applications and Design", Tata McGraw-Hill,2009.
2. Sawney A K and PuneetSawney, "A Course in Mechanical Measurements and Instrumentation and Control", 12th edition, DhanpatRai & Co, New Delhi,2013.

Reference Books

1. Sensors and Signal Conditioning by Ramon Pallas-Areny and John G. Webster
2. Principles of Measurement Systems by John P. Bentley
3. Sensors and Sensing Technology by V. Venkatesh and R. Srinivasan
4. Biosensors: Essentials by Min Wang

E-Resources

1. NPTEL: Introduction to Sensors (https://nptel.ac.in/courses/117/101/117101073/)
2. Lecture Notes on Sensors and Transducers (http://people.scs.carleton.ca/~soma/tech-notes/Sensors.pdf)
3. Tutorialspoint: Sensors (https://www.tutorialspoint.com/sensors/index.htm)
4. NPTEL: Physical Sensors (https://nptel.ac.in/courses/117/105/117105057/)
5. Lecture Notes on Physical Sensors (http://www-personal.umich.edu/~johannb/Pubs/Sensors-Chapter-Outline.pdf)
6. Tutorialspoint: Physical Sensors (https://www.tutorialspoint.com/physical_sensors/index.htm)
7. NPTEL: Chemical Sensors (https://nptel.ac.in/courses/117/106/117106071/)
8. Lecture Notes on Chemical Sensors (http://www-personal.umich.edu/~johannb/Pubs/Sensors-Chapter-Outline.pdf)
9. Tutorialspoint: Chemical Sensors (https://www.tutorialspoint.com/chemical_sensors/index.htm)
10. NPTEL: Smart Sensors (https://nptel.ac.in/courses/117/107/117107044/)
11. Lecture Notes on IoT and Smart Sensors (https://www.iotforall.com/iot-resources/lecture-notes-internet-of-things/)
12. Tutorialspoint: IoT (https://www.tutorialspoint.com/internet_of_things/index.htm)
13. NPTEL: Sensor Data Processing (https://nptel.ac.in/courses/117/103/117103042/)

14. Lecture Notes on Sensor Data Processing
(http://www.dca.fee.unicamp.br/~miyagi/lectures/dsp-lecture-notes.pdf)
15. Tutorialspoint: Signal Processing
(https://www.tutorialspoint.com/digital_signal_processing/index.htm)

Course Outcomes

At the end of the course, the student will be able to:

CO1. Identify and select appropriate sensors for specific applications based on their sensing principles and characteristics.
CO2. Design sensor interfaces and signal conditioning circuits to enhance the accuracy and reliability of sensor measurements.
CO3. Analyze and evaluate the performance of physical, chemical, and biological sensors in real-world scenarios.
CO4. Develop solutions using smart sensors, IoT, and sensor networks for monitoring and control applications.
CO5. Apply signal processing techniques to sensor data for feature extraction, localization, and tracking in diverse applications.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE IV Year-II Sem			
Course Code: **L42OF**	**INTRODUCTION TO ELECTRONICS INSTRUMENTATION (Open Elective-V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Nil

Course Objectives:

Students will learn to

1. Get an understanding of various measurement systems functioning and metrices for performance analysis.
2. Understand the principle of operation, working of different electronic instruments viz. Signal generators, signal analyzers, recorders and measuring equipments.
3. Use various measurement techniques for measurement of different physical parameters using different classes of transducers.
4. Gain knowledge on parameters and functions of CRO.
5. Obtain knowledge on various transducers.

Module 1:

Unit-I:

Block Schematics of Measuring Systems, Performance characteristics, Static characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag; Measuring Instruments: DC Voltmeters, D' Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters.

Unit-II:

Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments. Electronic Voltmeters, Multimeters, AC,DC Meters, Digital Voltmeters: Ramp Type, Staircase Ramp, Dual Slope Integrating type, Successive Approximation Type,Autoranging,31/2,33/4 Digit Display, Pico ammeter, High Resistance Measurements, Low current Ammeter, Applications.

Module 2:

Unit-I:

Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary waveform Generator, Video Signal Generators, and Specifications.

Unit-II:

Signal Analyzers, AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Power Analyzers, Capacitance-Voltage Meters, Oscillaors.

Module 3:

Unit-I:

DC and AC Bridges: Wheat Stone Bridge, Kelvin Bridge, AC Bridges, Maxwell, Hay, Schering, Wien, Anderson Bridges.

Unit-II:

Resonance Bridge, Similar Angle Bridge ,Wagner’s ground connection, Twin T, Bridged T Networks, Detectors.

Module 4:

Unit-I:

Oscilloscopes: CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay lines, Applications, Specifications.

Unit-II:

Special Purpose Oscilloscopes: Dual Trace, Dual Beam CROs, Sampling Oscilloscopes, Storage Oscilloscopes, Digital Storage CROs, Frequency Measurement, Period Measurement, Errors in time/Frequency Measurements, universal counters, Extension of range; Recorders: Strip chart, X-Y, oscillographic recorders.

Module 5:

Unit-I:

Transducers: Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers, Digital Temperature sensing system, Piezoelectric Transducers, Variable Capacitance Transducers, Magneto Strictive Transducers.

Unit-II:

Measurement of Physical Parameters: Flow Measurement, Displacement Meters, Liquid level Measurement, Measurement of Humidity and Moisture, Velocity, Force, Pressure - High Pressure, Vacuum level, Temperature - Measurements, Data Acquisition Systems.

Text Books

1. Electronic Measurements and Instrumentations by K. Lal Kishore, Pearson Education - 2010.
2. Electronic instrumentation: H.S.Kalsi - TMH, 2nd Edition 2004.

Reference Books

1. Electronic Instrumentation and Measurements - David A. Bell, Oxford Uiv. Press, 1997.
2. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbincs, W.D. Cooper: PHI, 5th Edition, 2003.
3. Electronic Measurements and Instrumentation: B. M. Oliver, J. M. Cage TMH Reprint.
4. Industrial Instrumentation: T. R. Padmanabham Spiriger 2009.

Course Outcomes

At the end of the course, the student will be able to:

CO1. List the various measurement techniques available and analyze the basic working of instruments used for measurement..

CO2. Compute the errors in measurements and their rectification

CO3. Analyze the working of AC and DC bridges.

CO4. Illustrate the basic principle and working of Oscilloscopes

CO5. Distinguish different types of transducers.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
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

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE IV Year-II Sem			
Course Code: **L42OG**	**Instrumentation (Open Elective-V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Electrical Measurements

Module 1: Characteristics of Measuring Instruments and Signal Representations

Unit 1 [6L]

Measuring Systems, Performance Characteristics, – Static characteristics, Dynamic Characteristics; Errors in Measurement – Gross Errors, Systematic Errors, Statistical Analysis of Random Errors.

Unit 2 [6L]

Signal and their representation: Standard Test, periodic, aperiodic, modulated signal, sampled data, pulse modulation and pulse code modulation.

Module 2: Oscilloscope and Digital Voltmeters

Unit 1 [6L]

Cathode ray oscilloscope-Cathode ray tube-time base generator-horizantal and vertical amplifiers-CRO probes-applications of CRO-Measurement of phase and frequency-lissajous patterns-Sampling oscilloscope-analog and digital type.

Unit 2 [6L]

Digital voltmeters- Successive approximation, ramp, dual-Slope integration continuos balance type-Microprocessor based ramp type DVM digital frequency meter-digital phase angle meter.

Module 3: Wave Analyzers and Spectrum Analyzers

Unit 1 [5L]

Wave Analyses - Frequency selective analyzers, Heterodyne, Application of Wave analyzers-Harmonic Analyzers, Total Harmonic distortion.

Unit 2 [5L]

Spectrum analyzers, Basic spectrum analyzers, spectral displays, vector impedance meter, Q meter. Peak reading and RMS voltmeters.

Module 4: Transducers

Unit 1 [6L]

Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of resistor, inductor, LVDT and capacitor transducers; LVDT Applications.

Unit 2 [6L]

Strain gauge and its principle of operation, gauge factor, Thermostats, Thermocouples, Synchros, Piezo electric transducers, photovoltaic, photo conductive cells, photo diodes.

Module 5: Measurement of Non-Electrical Quantities

Unit 1 [5L]

Measurement of strain, Gauge Sensitivity, Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque.

Unit 2 [5L]

Measurement of Temperature, Pressure, Vacuum, Flow, Liquid level.

Text Books

1. A. K. Sawhney, “A course in Electrical and Electronics Measurements and Instrumentation”, Dhanapath Rai and Sons., 10th Edition, 2007.

2. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India.

Reference Books

1. J.B. Gupta," A course in Electronics and Electrical Measurements and Instrumentation", S. K. Kataria & Sons, 2009.
2. H.S. Kalsi," Electronic Instrumentation", Tata McGraw Hill, 2004.
3. U. A. Bakshi, A. V. Bakshi "Electrical Measurements and Instrumentation", Technical Publications, 2009

E-Resources

1. https://nptel.ac.in/courses/108/105/108105153/
2. https://nptel.ac.in/courses/112/106/112106138/
3. https://nptel.ac.in/courses/112/107/112107242/

Course Outcomes

At the end of the course, the student will be able to:

CO1. Compare the performance characteristics of Measuring Instruments.

CO2. Understand operating principles of CRO and Digital Voltmeters.

C03. Understand operating principles of Wave Anlayzer and Spectrum Analyzer.

C04. Summarize the operation of various Transducers.

C05. Measure Non-Electrical Quantities using Transducers.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes(POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	2	-	2	2	-	-	3	-	-	-	-	-	2	-
CO2	3	-	1	3	-	-	2	-	-	-	-	-	3	-
CO3	3	-	3	2	-	-	2	-	-	-	-	-	3	-
CO4	2	-	3	2	-	-	1	-	-	-	-	-	3	-
CO5	1	-	2	3	-	-	2	-	-	-	-	-	2	-
Average	2.2	-	2.2	2.4	-	-	2	-	-	-	-	-	2.6	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE IV Year-II Sem			
Course Code: **L42OH**	**Cyber Laws and Ethics (Open Elective-V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Unit I: Information Technology & Cyber Crimes:

Introduction, Glimpses, Definition and Scope, Nature and Extent, Know no Boundaries, Rapid Transmission and Accuracy, Diversity and Span of Victimization, Cyber World, Inadequacy of Law, Influence of Teenagers

Unit II: Technology & Forms of Cyber Crimes:

Influence of Technology on Criminality, Forms of Cyber Crimes.

Unit III: Cyber Crimes 'and Global Response:

Global Perspective, Country wise Legal Response, Country wise Analysis.

Unit IV: Investigation in Cyber Crimes: Implications and Challenges:

Introduction, Procedural Aspects, Issues, Complications and Challenges Concerning Cyber Crimes, Problems and Precautionary measures for Investigation.

Unit V: Cyber Crimes: Discovery and Appreciation of Evidences:

Introduction, Law of Evidence, Evidences in Cyber Crimes: Challenges and Implications, Computer Generated Evidence and their Admissibility, Judicial Interpretation of Computer related Evidence.

Text Book:

1. Dr Pramod Kr.Singh, “Laws on Cyber Crimes [Along with IT Act and Relevant Rules]” Book Enclave Jaipur India..

Course Outcomes: on completion of this course, the students should be able to:

CO 1. Understand Cyber Space, Cyber Crime, Information Technology, Internet & Services.

CO 2. List and discuss various forms of Cyber Crimes

CO 3. Explain Computer and Cyber Crimes

CO 4. Understand Cyber Crime at Global and Indian Perspective.

CO 5. Describe the ways of precaution and prevention of Cyber Crime as well as Human Rights.

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE IV Year-II Sem			
Course Code: **L42OI**	**FUNDAMENTALS TO ROCK MECHANICS (OPEN ELECTIVE – V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre Requisites: Nil

Course Objectives

This course will enable students to:

1. To introduce about concepts of stress and strain and failure criteria for rock and rock mass.
2. To acquaint with pre-mining stresses in rock and various methods of rock stress determination, its importance in mining applications.
3. To get idea about various engineering properties of rocks and soil; rock mass classification and soil classification methods
4. To get idea about instrumentation and monitoring systems used in surface and underground mine excavation stability.
5. To know about various ground improvement techniques and methods for safe mining operations

Module 1

Basic concept of stress, strain and failure of rock, Analysis of stress, Analysis of strain, Constitutive relations, Parameters influencing strength/stress-strain behavior, Failure Criteria for Rock and Rock Mass Classical theories of rock failure: Coulomb's criterion, Mohr's criterion, Pre-mining state of Stress Stresses in rock mass, Factors influencing the in-situ state of stress, Estimating in situ stresses

Module 2

Rock mass Classification and soil characterization, Overview of shear strength and compressibility of soil, Physico-mechanical properties of intact rock, Rock mass classification methods and their applications, Soil classification methods and their applications

Module 3

Response of rock mass and soil to excavation, Response of rock mass to Excavations Underground, Induced stresses and displacements around single opening in rock mass, Ground support interaction analysis and reinforcement of ground (rock mass and soil), selection and design of support systems.

Module 4

Slope Engineering: Slope failure and causes; Basic approaches to slope stability analysis and stabilization, Monitoring of Excavation Stability: Purpose and nature of monitoring,

Instrumentation and monitoring systems - Load; Stress and Deformation measuring, devices; Interpretation of monitoring data; Practical aspects of monitoring

Module 5

Ground improvement; grouting, fore polling, pre-reinforcement, shotcreteing and other methods

Textbooks

1. Introduction to Rock Mechanics, Goodman, RE.
2. Fundamental of Rock Mechanics by Jaeger, J.C. and Cook, NGW

Reference Books

1. Underground Excavation in Rock, Hoek, E and Brown, ET
2. Rock Mechanics for Underground Mining, Brady, BHG and Brown, ET

Course Outcomes

At the end of the course, the student will be able to:
1. Learn about concepts of stress and strain and failure criteria for rock and rock mass.
2. Learn about pre-mining stresses in rock and various methods of rock stress determination, its importance in mining applications.
3. Understand various engineering properties of rocks and soil; rock mass classification and soil classification methods.
4. Learn about instrumentation and monitoring systems used in surface and underground mine excavation stability.
5. Learn about various ground improvement techniques and methods for safe mining operations

AY: 2022-23 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE IV Year-II Sem			
Course Code: **L42OJ**	**CUSTOMER RELATIONSHIP MANAGEMENT (Open Elective-V)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Course Objective: To understand the importance of Customer Relationship Management in Business.

UNIT-I:

Introduction to CRM: Concepts, Evolution, Need, understanding goals and objectives of CRM, Components of CRM, Benefits, CRM as a strategic marketing tool, CRM significance to the stakeholders, CRM Applications in Consumer and Business Markets, CRM Issues & Problems.

UNIT-II:

Building Customer Relations: Customer information Database – Customer Profile Analysis - Customer perception, Expectations analysis – Customer behaviour in relationship perspectives; individual and group customer's -Customer life time value – Selection of Profitable customer segments - Customer Life Cycle, Business Networks and CRM.

UNIT-III:

CRM Process: Introduction and Objectives of a CRM Process; an Insight into CRM and e-CRTA/online CRM, The CRM cycle i.e. Assessment Phase; Planning Phase; The Executive Phase; Modules in CRM, 4C's (Elements) of CRM Process, CRM Process for Marketing Organization, CRM Value Chain, CRM Affiliation in Retailing Sector.

UNIT-IV:

CRM Structures: Elements of CRM – CRM Process – Strategies for Customer acquisition – Customer Retention and Development – Strategies for Customer Retention, Models of CRM – G-SPOT Model, KOEL's Model, WebQual Audit Model, ONYX Model - CRM road map for business applications.

UNIT-V:

CRM Planning and Implementation: Strategic CRM planning process – Implementation issues – CRM Tools- Analytical CRM –Operational CRM – Call centre management – Role of CRM Managers, Trends in CRM- e-CRM Solutions –Features and advantages of e CRM, Functional Components of e CRM- Data Warehousing – Data mining for CRM – an introduction to CRM software packages.

Course Outcome: Students will be able to understand

1. need of CRM
2. building customer relations
3. CRM process
4. CRM structures
5. Planning and Implementation of CRM.

Suggested Readings:

1. G. Shainesh, Jagdish, N.Sheth, Atul Parvatiyar, Customer Relationship Management:Emerging Concepts, Tools and Applications, Macmillan 2005.
2. Francis Buttle, Customer Relation Management: Concepts and Technologies, 2e, Routledge,2013.
3. Ekta Rastogi, Customer Relation Management: Text and Cases, Excel Books, 2011.

4. Zikmund, Customer Relationship Management, Wiley 2012.
5. Paul Greenberg, CRM at the speed of light, 4e, TMH, 2009.
6. Lakshman Jha, Customer Relationship Management: A Strategic Approach, Global India PvtLtd, 2008.