J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY
(UGC AUTONOMOUS)

Bhaskar Nagar, Moinabad Mandal, R.R. District, Hyderabad -500075

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B. Tech - COMPUTER SCIENCE AND ENGINEERING (CSE): R-25

COURSE STRUCTURE (2025-2026)

I Year - I Semester						
S. No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N1100A	Matrices and Calculus	3	1	0	4
2	N1100C	Engineering Chemistry	3	0	0	3
3	N1100D	English for Skill Enhancement	3	0	0	3
4	N1104A	Electronic Devices and Circuits	3	0	0	3
5	N1105A	Programming for Problem Solving	3	0	0	3
6	N11002	Engineering Chemistry Lab	0	0	2	1
7	N11051	Programming for Problem Solving Lab	0	0	2	1
8	N11003	English Language and Communication Skills Lab	0	0	2	1
9	N11031	Engineering Workshop	0	0	2	1
10		Induction Program				
Total			15	1	8	20

I Year - II Semester						
S. No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N1200A	Ordinary Differential Equations and Vector Calculus	3	0	0	3
2	N1200B	Advanced Engineering Physics	3	0	0	3
3	N1203A	Engineering Drawing and Computer Aided Drafting	2	0	2	3
4	N1202A	Basic Electrical Engineering	3	0	0	3
5	N1205A	Data Structures	3	0	0	3
6	N12001	Advanced Engineering Physics Lab	0	0	2	1
7	N12051	Data Structures Lab	0	0	2	1
8	N12053	Python Programming Lab	0	0	2	1
9	N12021	Basic Electrical Engineering Lab	0	0	2	1
10	N12121	IT Workshop	0	0	2	1
11	N1200F	Lingua skills for Professionals B1	2	0	0	0
Total			14	0	10	20

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COURSE STRUCTURE (2025-2026)

II Year - I Semester						
S. No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N2105A	Discrete Mathematics	3	0	0	3
2	N2105B	Computer Organization and Architecture	3	0	0	3
3	N2112B	Object Oriented Programming through java	3	0	0	3
4	N2105C	Software Engineering	3	0	0	3
5	N2112C	Database Management Systems	3	0	0	3
6	N210EA	Innovation and Entrepreneurship	2	0	0	2
7	N21122	Object Oriented Programming through java Lab	0	0	2	1
8	N21051	Software Engineering Lab	0	0	2	1
9	N21123	Database Management Systems Lab	0	0	2	1
10	N21052	Node Js/React JS/ Django	0	0	2	1
11	N2100D	Environmental Science	1	0	0	1
Total			18	0	08	22

II Year - II Semester						
S. No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N2200A	Computer oriented Statistical Methods	3	0	0	3
2	N2205A	Operating Systems	3	0	0	3
3	N2205B	Algorithm design and Analysis	3	0	0	3
4	N2205C	Computer Networks	3	0	0	3
5	N2273A	Machine Learning	3	0	0	3
6	N22001	Computational Mathematics Lab	0	0	2	1
7	N22051	Operating Systems Lab	0	0	2	1
8	N22052	Computer Networks Lab	0	0	2	1
9	N22731	Machine Learning Lab	0	0	2	1
10	N22721	Data Visualization	0	0	2	1
11	N2200D	Lingua skills for Professionals B2	2	0	0	0
Total			15	0	10	20

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COURSE STRUCTURE (2025-2026)

III Year - I Semester						
S. No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N3105A	Automata Theory and Compiler Design	3	0	0	3
2	N3173A	Artificial Intelligence	3	0	0	3
3	N3105B	DevOps	3	0	0	3
4	PE-CSE1	Professional Elective-I	3	0	0	3
5	OE-CSE1	Open Elective-I	2	0	0	2
6	N31051	Compiler Design Lab	0	0	2	1
7	N31732	Artificial Intelligence with Python Lab	0	0	2	1
8	N31052	DevOps Lab	0	0	2	1
9	N31053	Field-Based Research Project	0	0	4	2
10	N31054	UI Design – Flutter/ Android Studio	0	0	2	1
11	N3100A	Indian Knowledge System	1	0	0	1
Total			15	0	12	21

III Year - II Semester						
S. No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N3205A	Cryptography and Networks Security	3	0	0	3
2	N3273B	Deep Learning	3	0	0	3
3	N320EA	Business Economics and Financial Analysis	3	0	0	3
4	PE-CSE2	Professional Elective-II	3	0	0	3
5	OE-CSE2	Open Elective – II	2	0	0	2
6	N32051	Cryptography and Networks Security Lab	0	0	2	1
7	N32732	Deep Learning Lab	0	0	2	1
8	N32052	Advanced Data Structures using Python Lab	0	0	2	1
9	N32001	English for Employability Skills Lab	0	0	2	1
10	N32734	Prompt Engineering	0	0	2	1
11	N3200B	Gender Sensitization*/ Human Values and Professional Ethics*	1	0	0	0.5+0.5
Total			15	0	10	20

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B. Tech - COMPUTER SCIENCE AND ENGINEERING (CSE): R-25

COURSE STRUCTURE (2025-2026)

IV Year - I Semester						
S. No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N4173C	Natural Language Processing	3	0	0	3
2	N4112B	Cyber Security	3	0	0	3
3	N410EA	Fundamentals of Management	3	0	0	3
4	PE-CSE3	Professional Elective-III	3	0	0	3
5	PE-CSE4	Professional Elective – IV	3	0	0	3
6	OE-CSE3	Open Elective – III	2	0	0	2
7	N41733	Natural Language Processing Lab	0	0	2	1
8	N41122	Cyber Security Lab	0	0	2	1
9	N41051	Industry Oriented Mini Project/ Internship	0	0	4	2
Total			17	0	8	21

IV Year – II Semester						
S. No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	PE-CSE5	Professional Elective – V	3	0	0	3
2	PE-CSE6	Professional Elective – VI	3	0	0	3
3	N42051	Project Work	0	0	42	14
Total			6	0	42	20

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COURSE STRUCTURE (2025-2026)

Professional Elective-I (III-I)						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N3105F	Computer Graphics	3	0	0	3
2	N3172C	Introduction to Data Science	3	0	0	3
3	N3105G	Software Testing Methodologies	3	0	0	3
4	N3172B	Data Mining	3	0	0	3
5	N3112A	Web Programming	3	0	0	3
6	N3105H	Distributed Systems	3	0	0	3

Professional Elective-II (III-II)						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N3205C	Image Processing	3	0	0	3
2	N3205D	Blockchain Technology	3	0	0	3
3	N3212A	Software Project Management	3	0	0	3
4	N3205E	Mining Massive Datasets	3	0	0	3
5	N3205F	Full Stack Development	3	0	0	3
6	N3273C	Generative AI	3	0	0	3

Professional Elective-III (IV-I)						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N4105B	Computer Vision	3	0	0	3
2	N4105C	Scripting Languages	3	0	0	3
3	N4112C	Vulnerability and Penetration Testing	3	0	0	3
4	N4172A	Data Stream Mining	3	0	0	3
5	N4105D	Cloud Computing	3	0	0	3
6	N4112D	Information Retrieval Systems	3	0	0	3

Professional Elective-IV (IV-I)						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N4105E	Augmented Reality & Virtual Reality	3	0	0	3
2	N4112E	Agile Methodology	3	0	0	3
3	N4172C	Big Data Analytics	3	0	0	3
4	N4105F	Quantum Computing	3	0	0	3
5	N4103J	Robotic Process Automation	3	0	0	3
6	N4112F	Cyber Forensics	3	0	0	3

Professional Elective-V (IV-II)						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N4205A	Social Media Mining	3	0	0	3
2	N4205B	Nature Inspired Computing	3	0	0	3
3	N4219A	Internet of Things	3	0	0	3
4	N4205M	Game Theory	3	0	0	3
5	N4212A	Mobile Application Development	3	0	0	3
6	N4205C	Human Computer Interaction	3	0	0	3

Professional Elective-VI (IV-II)						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N4205D	High Performance Computing	3	0	0	3
2	N4205E	Edge Computing	3	0	0	3
3	N4205F	Graph Theory	3	0	0	3
4	N4205G	Adhoc and Sensor Networks	3	0	0	3
5	N4201A	Sustainable Engineering	3	0	0	3
6	N4212B	Distributed Databases	3	0	0	3

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B. Tech - COMPUTER SCIENCE AND ENGINEERING (CSE): R-25

COURSE STRUCTURE (2025-2026)

OPEN ELECTIVES OFFERED BY CSE:

Open Elective-I (III-I)						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N3105OA	Operating Systems	3	0	0	3
2	N3105OB	Database Management Systems	3	0	0	3

Open Elective-II (III-II)						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N3205OA	Introduction to Computer Networks	3	0	0	3
2	N3205OB	Software Engineering	3	0	0	3

Open Elective-III (IV-I)						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N4105OA	Algorithms Design and Analysis	3	0	0	3
2	N4105OB	Fundamentals of Cyber Security	3	0	0	3

inAY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-I Sem			
Course Code: N1100A	MATRICES AND CALCULUS (COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(AIML), CSE(DS), AIDS & AIML)	L	T	P	C
		3	1	0	4

Pre-Requisites: Mathematical Knowledge at pre-university level

Module 1: Matrices: [08L]

Rank of a matrix by Echelon form and Normal form – Inverse of Non-singular matrices by Gauss Jordan method. System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations. Gauss Seidel Iteration Method.

Module 2: Eigen values and Eigen vectors: [10L]

Eigen values – Eigen vectors and their properties – Diagonalization of a matrix – Cayley-Hamilton Theorem (without proof) – Finding inverse and power of a matrix by Cayley-Hamilton Theorem. Quadratic forms and Nature of the Quadratic Forms – Reduction of Quadratic form to canonical form by Orthogonal Transformation.

Module 3: Single Variable Calculus: [10L]

Limits and Continuity of functions and its properties. Mean value theorems: Rolle's theorem – Lagrange's Mean value theorem with their Geometrical Interpretation and applications – Cauchy's Mean value Theorem – Taylor's and Maclaurin's series (All the theorems without proof).

Curve Tracing: Curve tracing in cartesian coordinates.

Module 4: Multivariable Calculus-I: [10L]

Definitions of Limit and continuity – Partial Differentiation: Euler's Theorem – Total derivative – Jacobian – Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

Module 5: Multivariable Calculus-II: [10L]

Evaluation of Double Integrals (Cartesian and polar coordinates) – change of order of integration (only Cartesian form) – Change of variables for double integrals (Cartesian to polar). Evaluation of Triple Integrals- Change of variables for triple integrals (Cartesian to Spherical and Cylindrical polar coordinates). Applications: Areas by double integrals and volumes by triple integrals.

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 45th Edition, 2020.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Editon, 2019.

Reference Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2020.

2. Maurice D. Weir, Joel Hass, Christopher Heil, Przemyslaw Bogacki, Thomas' Calculus, 13th Edition, Pearson, Reprint, 2024.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 8th Edition, 2016.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand and Company Limited, New Delhi, 2014.

E-Resources

- https://nptel.ac.in/courses/111/108/111108098/
- https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors
- https://nptel.ac.in/courses/111/107/111107108/
- https://www.cheric.org/files/education/cyberlecture/e200303/e200303-301.pdf
- https://www.whitman.edu/mathematics/calculus_online/chapter16.html

Course Objectives:

To learn

1. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
2. Concept of eigen values and eigen vectors and to reduce the quadratic form to canonical form.
3. Geometrical approach to the mean value theorems and their application to the mathematical problems.
4. Finding maxima and minima of functions of two and three variables.
5. Evaluation of multiple integrals and their applications.

Course Outcomes:

After learning the contents of this paper, the student must be able to

CO1: Compute the rank of a matrix and analyze the solution of the system of equations.

CO2: Determine Eigenvalues and Eigenvectors of matrices and apply orthogonal transformations to reduce quadratic forms into canonical form.

CO3: Apply the Mean Value Theorems to solve engineering problems.

CO4: Find the extreme values of functions of two variables with/ without constraints.

CO5: Evaluate the multiple integrals and apply the concept to find areas, volumes.

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	2	1	-	-	1	1	-	2	1	-	2	-	-
CO2	3	2	2	1	-	1	1	-	2	1	-	2	-	-
CO3	3	2	2	-	-	1	1	-	2	1	-	2	-	-
CO4	3	2	1	1	-	1	1	-	2	1	-	2	-	-
CO5	3	2	1	-	-	1	1	1	2	1	-	2	-	-
Average	**3**	**2**	**1.4**	**1**	**-**	**1**	**1**	**1**	**2**	**2**	**-**	**2**	**-**	**-**

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-I Sem			
Course Code: N1100C	ENGINEERING CHEMISTRY (CSE, IT, ECM)	L	T	P	C
		3	0	0	3

Pre-Requisites: Chemistry Knowledge at pre-university level

Course Objectives:

1. To develop adaptability to new advances in Engineering Chemistry and acquire the essential skills to become a competent engineering professional.

2. To understand the industrial significance of water treatment, fundamental principles of battery chemistry, and the impact of corrosion along with its control methods for structural protection.

3. To impart foundational knowledge of various energy sources and their practical applications in engineering.

4. To equip students with an understanding of smart materials, , analytical techniques applicable in engineering, industrial, environmental, and biomedical fields.

5. Understand the composition, properties, setting, and hardening processes of Portland cement and gain knowledge about lubricants, refractories.

Module 1: Water and its treatment: [11L]

Introduction- Hardness, types, degree of hardness and units. Estimation of hardness of water by complexometric method - Numerical problems. Potable water and its specifications (WHO) - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and breakpoint chlorination. Defluoridation - Nalgonda technique.

Boiler troubles: Scales, Sludges and Caustic embrittlement. Internal treatment of boiler feed water - Calgon conditioning, Phosphate conditioning, Colloidal conditioning. External treatment methods - Softening of water by ion- exchange processes. Desalination of brackish water – Reverse osmosis.

Module 2: Electrochemistry and Corrosion: [12L]

Introduction- Electrode potential, standard electrode potential, Nernst equation (no derivation),electrochemical cell - Galvanic cell, cell representation, EMF of cell - Numerical problems. Types of reference electrodes -quinhydrone and calomel electrode.. Construction, working and determination of pH of unknown solution using quinhydrone and calomel electrode.

Corrosion: Introduction- Definition, causes and effects of corrosion – Theories of corrosion, chemical and electrochemical theories of corrosion, Factors affecting rate of corrosion - Nature of the metal, Nature of the corroding environment. Corrosion control methods - Cathodic protection Methods - Sacrificial anode and impressed current methods.

Module 3: Energy sources: [9L]

Batteries: Introduction – Classification of batteries - Primary, secondary and reserve batteries with examples. Construction, working and applications of Lead acid storage battery and Lithium ion battery. Fuel Cells – Differences between a battery and a fuel cell, Construction and applications of Direct Methanol Fuel Cell (DMFC).

Fuels: Introduction and characteristics of a good fuel, Calorific value – Units - HCV, LCV- Dulongs formula - Numerical problems. Fossil fuels: Introduction, Classification, Petroleum - Refining of Crude oil. LPG and CNG composition and uses.

Synthetic Fuels: Fischer-Tropsch process, Introduction and applications of Hythane and Green Hydrogen.

Module 4: Polymers: [10L]

Definition - Classification of polymers: Based on origin and tacticity with examples – Types of polymerization - Addition (free radical addition mechanism) and condensation polymerization. Plastics, Elastomers and Fibers: Definition and applications (PVC,Teflon, Nylon-6,6). Differences between themoplastics and thermo setting plastics.

Conducting polymers: Definition and Classification with examples - Mechanism of conduction in transpoly-acetylene and applications of conducting polymers. Biodegradable polymers: Polylactic acid and its applications.

Module 5: Engineering Materials and their applications [8L]

Smart materials: Introduction, Classification with examples - Shape Memory Alloys – Nitinol, Piezoelectric materials – quartz and their engineering applications.

Cement: Portland cement, its composition, setting and hardening.

Lubricants: Definition and characteristics of a good lubricant. Properties of lubricants - viscosity, cloud and pour point, flash and fire point.

Refractories: Classification and Characteristics of a good refractory. Properties Refractoriness and RUL.

TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010.

2. Engineering Chemistry by Rama Devi, Dr. P. Aparna and Rath, Cengage learning, 2025.

REFERENCE BOOKS:

1. Engineering Chemistry: by Thirumala Chary Laxminarayana & Shashikala, Pearson Publications (2020).
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi 2011.

3. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi 2015.
4. Engineering Analysis of Smart Material Systems by Donald J. Leo, Wiley, 2007.
5. Challenges and Opportunities in Green Hydrogen by Editors: Paramvir Singh, Avinash Kumar Agarwal, Anupma Thakur, R.K Sinha.
6. Raman Spectroscopy in Human Health and Biomedicine, https://www.worldscientific.com/doi/epdf/10.1142/13094

E-Resources:

1. https://doi.org/10.1142/13094 | October 2023
2. https://archive.org/details/EngineeringChemistryByShashiChawla/page/n11/mode/2u

Course Outcomes:

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

CO1. Understand the fundamental properties of water and its applications in both domestic and industrial purposes.

CO2. Gain basic knowledge of electro chemical processes and their relevance to corrosion and its control methods.

CO3. Comprehend the significance and practical applications of batteries and various energy sources, enhancing their potential as future engineers and entrepreneurs.

CO4. Learn the basic concepts and properties of polymers and other engineering materials.

CO5. Apply the knowledge in handling smart materials and biomedical and industrial applications and Assess the suitability of materials like cement, lubricants, and refractories in engineering 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**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2	-	-	-	3	2	-	-	-	-	3	-	-
CO2	3	1	-	-	-	3	2	-	-	-	-	3	-	-
CO3	3	1	-	-	-	3	3	-	-	-	-	3	-	-
CO4	2	-	-	-	-	3	2	-	-	-	-	2	-	-
CO5	3	-	-	-	-	2	3	-	-	-	-	1	-	-
Average	**2.8**	**1.3**	**-**	**-**	**-**	**2.8**	**2.4**	**-**	**-**	**-**	**-**	**2.4**	**-**	**-**

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE I Year- I Sem			
Course Code: N1100D	ENGLISH FOR SKILL ENHANCEMENT (COMMON TO ALL)	L	T	P	C
		3	0	0	3

Pre-Requisites: NIL

Course Objectives:

This course will enable the students to:

1. Improve their vocabulary.
2. Use appropriate sentence structures in their oral and written communication.
3. Develop their reading and study skills.
4. Equip students to write paragraphs, essays, précis and draft letters.
5. Acquire skills for Technical report writing.

Unit 1 **(10L)**

Theme: Perspectives

Lesson on 'The Generation Gap' by Benjamin M. Spock from the prescribed textbook titled English for the Young in the Digital World published by Orient Black Swan Pvt. Ltd.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Words Often Misspelt - Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Parts of Speech particularly Articles and Prepositions — Degrees of Comparison

Reading: Reading and Its Importance- Sub Skills of Reading — Skimming and Scanning.

Writing: Sentence Structures and Types -Use of Phrases and Clauses in Sentences. Importance of Proper Punctuation- Techniques for Writing Precisely —Nature and Style of Formal Writing.

Unit 2 **(9L)**

Theme: Digital Transformation

Lesson on 'Emerging Technologies' from the prescribed textbook titled English for the Young in the Digital World published by Orient BlackSwan Pvt. Ltd.

Vocabulary: Homophones, Homonyms and Homographs

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

Reading: Reading Strategies-Guessing Meaning from Context — Identifying Main Ideas — Exercises for Practice

Writing: Paragraph Writing — Types, Structures and Features of a Paragraph - Creating Coherence — Linkers and Connectives - Organizing Principles in a Paragraph — Defining- Describing People, Objects, Places and Events — Classifying- Providing Examples or Evidence - Essay Writing - Writing Introduction and Conclusion.

Unit 3 **(8L)**

Theme: Attitude and Gratitude

Poems on 'Leisure' by William Henry Davies and 'Be Thankful' - Unknown Author from the prescribed textbook titled English for the Young in the Digital World published by Orient BlackSwan Pvt. Ltd.

Vocabulary: Words Often Confused - Words from Foreign Languages and their Use in English.
Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses. Reading: Sub-Skills of Reading — Identifying Topic Sentence and Providing Supporting Ideas - Exercises for Practice.
Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Job Application with CV/Resume —Difference between Writing a Letter and an Email - Email Etiquette.

Unit 4 **(8L)**

Theme: Entrepreneurship
Lesson on 'Why a Start-Up Needs to Find its Customers First by Pranav Jain from the prescribed textbook titled English for the Young in the Digital World published by Orient BlackSwan Pvt. Ltd.
Vocabulary: Standard Abbreviations in English — Inferring Meanings of Words through Context — Phrasal Verbs — Idioms.
Grammar: Redundancies and Clichés in Written Communication — Converting Passive to Active Voice and Vice-Versa.
Reading: Prompt Engineering Techniques— Comprehending and Generating Appropriate Prompts - Exercises for Practice
Writing: Writing Practices- Note Making-Précis Writing.

Unit 5 **(8L)**

Theme: Integrity and Professionalism
Lesson on 'Professional Ethics' from the prescribed textbook titled English for the Young in the Digital World published by Orient BlackSwan Pvt. Ltd.
Vocabulary: Technical Vocabulary and their Usage— One Word Substitutes — Collocations.
Grammar: Direct and Indirect Speech - Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)
Reading: Survey, Question, Read, Recite and Review (SQ3R Method) — Inferring the Meaning and Evaluating a Text- Exercises for Practice
Writing: Report Writing - Technical Reports- Introduction — Characteristics of a Report — Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Technical Report.

Text Books

1. Board of Editors. 2025. English for the Young in the Digital World. Orient Black Swan Pvt. Ltd.

Reference Books

1. Swan, Michael. (2016). Practical English Usage. Oxford University Press. New Edition.
2. Karal, Rajeevan. 2023. English Grammar Just for You. Oxford University Press. New Delhi.
3. 2024. Empowering with Language: Communicative English for Undergraduates. Cengage Learning India Pvt. Ltd. New Delhi.
4. Sanjay Kumar & Pushp Lata. 2022. Communication Skills — A Workbook. Oxford University Press. New Delhi.
5. Wood,F.T. (2007). Remedial English Grammar. Macmillan.

6. Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.

E-Resources

1. https://mdu.ac.in/UpFiles/UpPdfFiles/2021/Mar/4_03-02-2021_11-35-30_English-I%20BA1001-1).pdf
2. https://www.swansea.ac.uk/media/Leisure---W-H-Davies.pdf
3. https://www.entrepreneur.com/en-in/starting-a-business/overcome-this-grave-mistake-and-ensure-guaranteed-success/327761
4. Cambridge English
5. BBC Learning English - Learn English with BBC Learning English - Homepage

Course Outcomes

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

CO1: Choose appropriate vocabulary in their oral and written communication.

CO2: Demonstrate their understanding of the rules of functional grammar and sentence structures.

CO3: Develop comprehension skills from known and unknown passages.

CO4: Write paragraphs, essays, précis and draft letters.

CO5: Write abstracts and reports in various contexts.

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	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO2	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO3	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO4	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO5	-	-	-	-	-	-	-	-	2	2	-	3	-	-
Average	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**	**3**	**-**	**-**

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE I Year-I Sem			
Course Code: N1104A	ELECTRONIC DEVICES AND CIRCUITS	L	T	P	C
		3	0	0	3

Course Overview: This course introduces fundamental semiconductor devices and their behavior, including diodes, BJTs, and FETs. It covers their characteristics, applications, and the analysis of basic electronic circuits. The course also explores rectifiers, voltage regulation, amplifier design, and advanced semiconductor technologies like FinFETs and CNTFETs. Emphasis is placed on developing a strong foundation for analog circuit design and understanding modern device technologies in electronics.

Course Outcomes:

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

CO1: Analyze the electrical characteristics and models of semiconductor diodes and apply them in rectifier and clipping circuits.

CO2: Evaluate the operation and configurations of Bipolar Junction Transistors (BJTs) and analyze their input and output characteristics.

CO3: Design appropriate biasing networks for BJTs and determine the operating point for amplifier applications.

CO4: Analyze transistor amplifier circuits using h-parameter models and assess performance for various configurations.

CO5: Analyze the structure, working, and characteristics of JFETs, MOSFETs, and advanced devices like FinFETs and CNTFETs, and compare modern device technologies.

UNIT - I:

Diode Characteristics and Applications: PN junction diode – I-V characteristics, Diode resistance and capacitance, Diode models (Ideal, Simplified, Piecewise Linear), Rectifiers – Half-wave, Full-wave (Center-tap and bridge), Capacitor filter for rectifiers, Clippers and clampers, Zener diode – I-V characteristics and voltage regulation.

UNIT - II:

Bipolar Junction Transistor (BJT): Structure and working principle of BJT, Current components and transistor action, Configurations: Common Base (CB), Common Emitter (CE), Common Collector (CC), Input and output characteristics, Determination of h-parameters from transistor characteristics.

UNIT - III:

BJT Biasing: Need for biasing and stabilization, Load line and operating point, Biasing techniques: Fixed bias, Collector-to-base bias, Voltage divider bias, Stability factors and thermal runaway

UNIT - IV:

Transistor Amplifiers: Transistor as a small-signal amplifier, h-parameter equivalent circuit, CE, CB, CC amplifier analysis using h-parameters, Approximate CE model – with and without emitter bypass capacitor.

UNIT - V:

Special Purpose Diodes: Principle of Operation of – SCR, Tunnel Diode, Varactor Diode, Photo Diode, Solar Cell, LED and Schottky Diode

Field Effect Transistors and Advanced Devices: JFET: Structure, operation, and characteristics, MOSFET: Enhancement and Depletion modes – Structure, operation, and characteristics,
Advanced Devices: FinFETs - 3D structure, Scaling advantages, CNTFETs - Structure, ballistic transport, fabrication, Comparison: CMOS vs. FinFET vs. CNTFET.

TEXT BOOKS:

1. Millman, Jacob, and Christos C. Halkias. Electronic Devices and Circuits. Tata McGraw-Hill, 1991.
2. Boylestad, Robert L., and Louis Nashelsky. Electronic Devices and Circuit Theory. Pearson, 11th ed., 2013.
3. Sedra, Adel S., and Kenneth C. Smith. Microelectronic Circuits. Oxford University Press, 7th ed., 2014.

REFERENCE BOOKS:

1. Bell, David A. Electronic Devices and Circuits. Oxford University Press, 5th ed., 2008.
2. Neamen, Donald A. Electronic Circuit Analysis and Design. McGraw-Hill, 2nd ed., 2001.
3. Salivahanan, S., and N. Suresh Kumar. Electronic Devices and Circuits. McGraw-Hill Education, 4th ed., 2017.
4. Razavi, Behzad. Fundamentals of Microelectronics. Wiley, 2nd ed., 2013.
5. Taur, Yuan, and Tak H. Ning. Fundamentals of Modern VLSI Devices. Cambridge University Press, 2nd ed., 2009.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE I Year-I Sem			
Course Code: N1105A	PROGRAMMING FOR PROBLEM SOLVING	L	T	P	C
		3	0	0	3

Pre-Requisites: NIL

Course Objectives:

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of the C programming language.
4. To learn the usage of structured programming approaches in solving problems

Unit 1: Overview of C **[10L]**

C Language Elements, Variable Declarations and Data Types, Executable Statements, General Form of a C Program, Arithmetic Expressions, Formatting Numbers in Program Output. Selection Structures: Control Structures, Conditions, if Statement, if Statements with Compound Statements, Decision Steps in Algorithms. Repetition and Loop Statements: Repetition in Programs, Counting Loops and the while Statement, Computing a Sum or Product in a Loop, for Statement, Conditional Loops, Loop Design, Nested Loops, do-while Statement.

Unit 2: Top-Down Design with Functions **[10L]**

Building Programs from Existing Information, Library Functions, Top-Down Design and Structure Charts, Functions without Arguments, Functions with Input Arguments. Pointers and Modular Programming: Pointers and the Indirection Operator, Functions with Output Parameters, Multiple Calls to a Function with Input/ Output Parameters, Scope of Names, Formal Output Parameters as Actual Arguments.

Unit 3: Arrays **[10 L]**

Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Using Array Elements as Function Arguments, Array Arguments, Searching and Sorting an Array, Parallel Arrays and Enumerated Types, Multidimensional Arrays. Strings: String Basics, String Library Functions: Assignment and Substrings, Longer Strings: Concatenation and Whole-Line Input, String Comparison, Arrays of Pointers.

Unit 4: Recursion **[10L]**

The Nature of Recursion, Tracing a Recursive Function, Recursive Mathematical Functions, Recursive Functions with Array and String Parameters

Structure and Union Types: User-Defined Structure Types, Structure Type Data as Input and Output Parameters, Functions with Structured Result Values, Union Types.

Unit 5: Text and Binary File Pointers **[10L]**

Input/ Output Files - Review and Further Study, Binary Files, Searching a Database.

Searching and Sorting: Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms).

Text Books

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

Reference Books

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

Course Outcomes:

The student will able to learn

CO1: Apply fundamental C programming concepts such as variables, data types, operators, control structures, and loops to develop simple computational solutions.

CO2: Design modular programs using functions, pointers, and structured programming techniques for problem-solving.

CO3: Demonstrate the use of arrays, strings, and associated algorithms (searching and sorting) in solving real-world problems.

CO4: Implement recursive algorithms and utilize user-defined structures and unions for handling complex data.

CO5: Apply files concepts, searching and sorting techniques for data management.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE I Year-I Sem			
Course Code: N11051	PROGRAMMING FOR PROBLEM SOLVING LAB	L	T	P	C
		0	0	2	1

Pre-Requisites: Nil

Course Objectives:

1. To work with an IDE to create, edit, compile, run and debug programs
2. To analyze the various steps in program development.
3. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
5. To Write programs using the Dynamic Memory Allocation concept.
6. To create, read from and write to text and binary files

Experiment 1: Simple numeric problems

a. Write a program for finding the max and min from the three numbers.
b. Write the program for the simple, compound interest.
c. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:
   5 x 1 = 5
   5 x 2 = 10
   5 x 3 = 15
d. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Experiment 2: Expression Evaluation

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

Experiment 3: Arrays, Pointers and Functions

a. Write a C program to find the minimum, maximum and average in an array of integers.
b. Write a C program that uses functions to perform the following:
   i. Addition of Two Matrices
   ii. Multiplication of Two Matrices
c. Write a program for reading elements using a pointer into an array and display the values using the array.
d. Write a program for display values reverse order from an array using a pointer.

Experiment 4: Files

a. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
b. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

Experiment 5: Strings

a. Write a C program that uses functions to perform the following operations:
    i. To insert a sub-string into a given main string from a given position.
    ii. To delete n Characters from a given position in a given string
b. 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.)
c. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
d. Write a C program to count the lines, words and characters in a given text.

Experiment 6: Sorting and Searching

a. Write a C program that uses non-recursive function to search for a Key value in a given list of integers using linear search method.
b. Write a C program that uses non-recursive function to search for a Key value in a given sorted list of integers using binary search method.
c. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
d. Write a C program that sorts the given array of integers using selection sort in descending order
e. Write a C program that sorts the given array of integers using insertion sort in ascending order
f. Write a C program that sorts a given array of names.

Text Books

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

Reference Books

8. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
9. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill.
10. Yashavant Kanetkar, Let Us C, 18th Edition, BPB.
11. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression).
12. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
13. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition.
14. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

Course outcomes:

The student will learn

CO1: Formulate algorithms for simple problems and translate them into correct C programs.

CO2: Apply debugging techniques to identify, correct syntax errors, and resolve logical errors during program execution.

CO3: Manipulate data efficiently using arrays, strings, structures, and pointers.

CO4: Modularize solutions using functions to enhance reusability and clarity in program design.

CO5: *Apply* file handling operations on text and binary files, and basic searching and sorting algorithms

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech :CSE I Year-I Sem			
Course Code: N11003	ENGLISH LANGUAGE COMMUNICATION SKILLS COMMON TO: All Branches	L	T	P	C
		0	0	2	1

Pre-Requisites: NIL

Course Objectives

To train students:

1. To enable students develop their active listening skills.
2. To equip students with necessary training in listening, so that they can comprehend the speech of people from different linguistic backgrounds.
3. To improve their pronunciation and neutralize accent.
4. To enable students express themselves fluently and appropriately.
5. To practise speaking in social and professional contexts.

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: (9L)

CALL Lab:

Instruction: Speech Sounds-Listening Skill - Importance — Purpose - Types- Barriers- Active Listening **Practice:** Listening to Distinguish Speech Sounds (Minimal Pairs) - Testing Exercises

ICS Lab:

Diagnostic Test — Activity titled 'Express Your View'

Instruction: Spoken and Written language - Formal and Informal English - Greetings - Introducing Oneself and Others

Practice: Any Ice-Breaking Activity

Module 2: (9L)

CALL Lab:

Instruction: Listening vs. Hearing - Barriers to Listening

Practice: Listening for General Information - Multiple Choice Questions - Listening Comprehension Exercises

ICS Lab:

Instruction: Features of Good Conversation — Strategies for Effective Communication

Practice: Role Play Activity - Situational Dialogues —Expressions used in Various Situations — Making Requests and Seeking Permissions — Taking Leave - Telephone Etiquette

Module 3: (9L)

CALL Lab:

Instruction: Errors in Pronunciation — Tips for Neutralizing Mother Tongue Influence (MTI)

Practice: Differences between British and American Pronunciation —Listening Comprehension Exercises

ICS Lab:

Instruction: Describing Objects, Situations, Places, People and Events

Practice: Picture Description Activity — Looking at a Picture and Describing Objects, Situations, Places, People and Events

Module 4: **(9L)**

CALL Lab:

Instruction: Techniques for Effective Listening

Practice: Listening for Specific Details - Listening - Gap Fill Exercises - Listening Comprehension Exercises (It is essential to identify a suitable passage with exercises for practice.)

ICS Lab:

Instruction: How to Tell a Good Story - Story Star- Sequencing-Creativity

Practice: Activity on Telling and Retelling Stories - Collage

Module 5: **(9L)**

CALL Lab:

Instruction: Identifying the literal and implied meaning

Practice: Listening for Evaluation - Write the Summary — Listening Comprehension Exercises

ICS Lab:

Instruction: Understanding Non-Verbal Communication

Practice: Silent Speech - Dumb Charades Activity

Post-Assessment Test on 'Express Your View'

Text Books

1. Board of Editors. (2016). ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient BlackSwan Pvt. Ltd.

Reference Books

2. Shobha, KN & Rayen, J. Lourdes. (2019). Communicative English — A workbook. Cambridge University Press
3. Mishra, Veerendra et al. (2020). English Language Skills: A Practical Approach. Cambridge University Press
4. (2022). English Language Communication Skills — Lab Manual cum Workbook. Cengage Learning India Pvt. Ltd.
5. Ur, Penny and Wright, Andrew. 2022. Five Minute Activities — A Resource Book for Language Teachers. Cambridge University Press.

E-Resources

1. https://dictionary.cambridge.org/dictionary/english/
2. https://www.oxfordlearnersdictionaries.com/definition/english/
3. https://www.scribd.com/doc/310229959/English-in-Mind-1-Workbook-110-pdf
4. https://ia801409.us.archive.org/27/items/cambridge-english-pronunciation-in-use-elementary/Cambridge%20-%20English%20Pronunciation%20in%20Use%20-%20Elementary_text.pdf
5. https://dn720003.ca.archive.org/0/items/4.-cambridge-english-vocabulary-in-use-advanced-3rd-edition/4.%20Cambridge%20English%20Vocabulary%20in%20Use%20(Advanced)%203rd%20Edition.pdf

Course Outcomes

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

CO1: Listen actively and identify important information in spoken texts

CO2: Interpret the speech and infer the intention of the speaker

CO3: Improve their accent for intelligibility

CO4: Speak fluently with clarity and confidence

CO5: Use the language in real life situations

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE I Year – I Sem			
Course Code: N11031	ENGINEERING WORKSHOP	L	T	P	C
		0	0	2	1

Pre-Requisites: Practical skill

Course Objectives:

1. To introduce students to basic manufacturing processes and workshop practices.
2. To provide hands-on training in carpentry, fitting, welding, sheet metal, and machining
3. To develop skills in using hand tools and measuring instruments.
4. To enhance safety awareness and proper handling of workshop equipment.
5. To build a foundational understanding of industrial production and fabrication.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

i. **Carpentry:** T- Lap Joint, Dovetail Joint, Mortise and Tenon Joint

ii. **Fitting:** V- Fit, Square Fit and Straight Fit

iii. **Tin Smithy**: Square Tin, Rectangular Tray and Conical Funnel

iv. **Foundry**: Preparation of Green Sand Mould using Single Piece and Split Pattern

v. **Welding Practice:** Arc Welding

vi. **House wiring**: Parallel and Series, Two-way Switch and Tube Light

vii. **Black Smithy**: Round to Square, Fan Hook and S- Hook

2. TRADES FOR DEMONSTRATION AND EXPOSURE:

3D Printing and Machine Shop

TEXT BOOKS:

1. Workshop Practice, B. L. Juneja, Cengage Learning India, 1st edition, 2015.
2. Workshop Practice Manual, K. Venkata Reddy, BS Publication,6th Edition, Rpt.2025.

REFERENCE BOOKS:

1. Workshop Manual, K. Venugopal, Anuradha Publications, 2012th edition, 2012.

Course Outcomes:

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

CO1. Understand the basic manufacturing processes and operations.
CO2. Use hand tools and equipment safely and efficiently.
CO3. Perform basic operations in carpentry, fitting, welding, sheet metal work, and machining
CO4. Read and interpret workshop drawings
CO5. Develop teamwork, time management, and quality awareness in a workshop environment.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE I Year-II Sem			
		L	T	P	C
Course Code: N1200A	ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(AIML), CSE(DS), AIDS & AIML)	3	0	0	3

Pre-Requisites: Mathematical Knowledge at pre-university level

Course Objectives:

To learn

1. Methods of solving the differential equations of first order and learn about its applications to basic engineering problems.
2. Methods of solving higher order differential equations and learn about its applications to basic engineering problems.
3. The Concepts, properties of Laplace transforms and demonstrate their application in solving ordinary differential equations.
4. The physical quantities involved in engineering field related to vector valued functions.
5. The basic properties of vector valued functions and their applications to line, surface and volume integrals.

Module 1: First Order Ordinary Differential Equations:
[08L]

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

Module 2: Ordinary Differential Equations of Higher Order:
[10L]

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

Module 3: Laplace Transforms:
[10L]

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

Module 4: Vector Differentiation:
[10L]

Vector point functions and scalar point functions – Gradient – Divergence and Curl – Directional derivatives– Scalar potential functions – Solenoidal and Irrotational vectors- Vector Identities (without proofs).

Module 5: Vector Integration:
[10L]

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

Text Books

3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 45th Edition, 2020.
4. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Editon, 2019.

Reference Books

5. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2020.
6. Maurice D. Weir, Joel Hass, Christopher Heil, Przemyslaw Bogacki, Thomas' Calculus, 13th Edition, Pearson, Reprint, 2024.
7. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 8th Edition, 2016.
8. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand and Company Limited, New Delhi, 2014.

E-Resources

- https://nptel.ac.in/courses/111108098
- https://www.math.hkust.edu.hk/~machas/differential-equations.pdf
- https://engineeringmath.online
- https://www.cheric.org
- https://www.whitman.edu/mathematics/calculus_online

Course Outcomes:

After learning the contents of this paper, the student must be able to

CO1: Identify whether the given differential equation of first order is exact or not.

CO2: Solve higher differential equation and apply the concept of differential equation to real world problems.

CO3: Use the Laplace Transforms techniques for solving Ordinary Differential Equations.

CO4: Find the gradient, divergence, curl and its physical interpretations.

CO5: Evaluate the Line, Surface and Volume integrals and converting them from one to another.

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	1	-	-	1	1	-	2	1	-	2	-	-
CO2	3	2	2	1	-	1	1	-	2	1	-	2	-	-
CO3	3	2	2	-	-	1	1	-	2	1	-	2	-	-
CO4	3	2	1	1	-	1	1	-	2	1	-	2	-	-
CO5	3	2	1	-	-	1	1	1	2	1	-	2	-	-
Average	**3**	**2**	**1.4**	**1**	**-**	**1**	**1**	**1**	**2**	**1**	**-**	**2**	**-**	**-**

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE I Year II Sem			
Course Code: N1200B	ADVANCED ENGINEERING PHYSICS (COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(AIML), CSE(DS), AIDS, AIML)	L	T	P	C
		3	0	0	3

Pre-Requisites: 10+2 Physics

Course Objectives:

The students should be able to

1. To study crystal structures, defects, and material characterization techniques like XRD and SEM.
2. To understand fundamental concepts of quantum mechanics and their applications in solids and nanomaterials.
3. To introduce quantum computing principles, quantum gates, and basic quantum algorithms.
4. To learn the properties and applications of magnetic and dielectric materials.
5. To explore the working and applications of lasers and fibre optics in modern technology.

UNIT - I: Crystallography & Materials Characterization [10L]

Introduction: Unit cell, space lattice, basis, lattice parameters; crystal structures, Bravais lattices, packing factor: SC, BCC, FCC; Miller indices, inter-planar distance; defects in crystals (Qualitative): point defects, line defects, surface defects and volume defects. concept of nanomaterials: surface to volume ratio, X -ray diffraction: Bragg's law, powder method, calculation of average crystallite size using Debye Scherrer's formula, scanning electron microscopy (SEM): block diagram, working principle.

UNIT - II: Quantum Mechanics
[10L]

Introduction, de-Broglie hypothesis, Heisenberg uncertainty principle, physical significance of wave function, postulates of quantum mechanics: operators in quantum mechanics, eigen values and eigen functions, expectation value; Schrödinger's time independent wave equation, particle in a 1D box, Bloch's theorem (qualitative), Kronig-Penney model (qualitative): E-k diagram, concepts of group velocity and phase velocity, formation of energy bands, origin of bandgap, classification of solids, concept of discrete energy levels and quantum confinement in nanomaterials.

UNIT - III: Quantum Computing [9L]

Introduction, linear algebra for quantum computation, Dirac's Bra and Ket notation and their properties, Hilbert space, Bloch's sphere, concept of quantum computer, classical bits, Qubits, multiple Qubit system, quantum computing system for information processing, evolution of quantum systems, quantum measurements, entanglement, quantum gates, challenges and advantages of quantum computing over classical computation, quantum algorithms: Deutsch-Jozsa, Grover.

UNIT - IV: Magnetic and Dielectric Materials
[10L]

Introduction to magnetic materials, origin of magnetic moment-classification of magnetic materials, hysteresis, Weiss domain theory of ferromagnetism, soft and hard magnetic materials, synthesis of ferrimagnetic materials using sol-gel method, applications: magnetic hyperthermia for cancer treatment, magnets for EV, Giant Magneto Resistance (GMR) device.

Introduction to dielectric materials, types of polarization (qualitative): electronics, ionic & orientation; ferroelectric, piezoelectric, pyroelectric materials and their applications: Ferroelectric Random-Access Memory (Fe-RAM), load cell and fire sensor.

UNIT - V: Laser and Fibre Optics [9L]

Introduction to laser, characteristics of laser, Einstein coefficients and their relations, metastable state, population inversion, pumping, lasing action, Ruby laser, He-Ne laser, Nd:YAG laser, semiconductor diode laser, applications: Bar code scanner, LiDAR for autonomous vehicle.

Introduction to fibre optics, total internal reflection, construction of optical fibre, acceptance angle, numerical aperture, classification of optical fibres, losses in optical fibre, applications: optical fibre for communication system, sensor for structural health monitoring.

Text Books

2. Walter Borchardt-Ott, Crystallography: An Introduction, Springer.
3. Charles Kittel, Introduction to Solid State Physics, John Wiley & Sons, Inc.
4. Thomas G. Wong, Introduction to Classical and Quantum Computing, Rooted Grove

Reference Books

1. Jozef Gruska, Quantum Computing, McGraw Hill
2. Michael A. Nielsen & Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press.
3. John M. Senior, Optical Fiber Communications Principles and Practice, Pearson Education Limited. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.

E-Resources

- https://shijuinpallotti.wordpress.com/wp-content/uploads/2019/07/optical-fiber communications-principles-and-pr.pdf
- https://www.geokniga.org/bookfiles/geokniga-crystallography_0.pdf
- https://www.thomaswong.net/introduction-to-classical-and-quantum-computing-1e4p.pdf
- https://www.fi.muni.cz/usr/gruska/qbook1.pdf

Course Outcomes

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

CO1: Analyze crystal structures, identify defects, and apply XRD and SEM techniques for material characterization.

CO2: Apply quantum mechanical principles to explain particle behaviour and energy band formation in solids.

CO3: Understand quantum computing concepts, use quantum gates, and explain basic quantum algorithms.

CO4: Classify magnetic and dielectric materials and explain their properties, synthesis, and applications.

CO5: Explain the principles of lasers and fibre optics and their applications in communication and sensing.

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**	**PSO1**	**PSO2**
CO1	2	2	1	-	-	-	-	-	-	-	-	-	1	-
CO2	3	1	2	-	-	-	-	-	-	-	-	-	1	-
CO3	2	1	2	-	-	-	-	-	-	-	-	-	1	-
CO4	2	2	1	-	-	-	-	-	-	-	-	-	1	-
CO5	2	2	1	-	-	-	-	-	-	-	-	-	2	-
Average	-	-	-	-	-	-	-	-	-	-	-	-		-

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE I Year-II Sem			
Course Code: N1203A	ENGINEERING DRAWING AND COMPUTER AIDED DRAFTING	L	T	P	C
		2	0	2	3

Course Objectives:

1. To introduce the fundamentals of engineering drawing and projection systems.
2. To develop skills in constructing orthographic, isometric, and sectional views.
3. To train students in interpreting and creating technical drawings using CAD tools.
4. To familiarize students with dimensioning standards and drafting conventions.
5. To bridge manual drafting techniques with computer-aided drafting practices.

Module 1: Introduction to Engineering Graphics (Conventional)

Conventional: Principles of Engineering Graphics and their Significance, Geometrical Constructions, Scales, Plain and Diagonal, Conic Sections including the Rectangular Hyperbola, General method only. Cycloid, Epicycloid and Hypocycloid.

Module 2: Orthographic Projections (Conventional and Computer Aided)

Conventional: Principles of Orthographic Projections, Conventions, Projections of Points and Lines, Projections of Plane regular geometric figures. Computer aided orthographic projections, points, lines and planes.

Computer Aided: Introduction to Computer aided drafting, views, commands and conics.

Module 3: Projections of Regular Solids (Conventional and Computer Aided)

Conventional: Projection of regular solids - Prism, Cylinder, Pyramid, Cone. Sections or Sectional views of Right Regular Solids, Prism, Cylinder, Pyramid, Cone.

Computer Aided: Computer aided projections of solids, sectional views.

Module 4: Development of Surfaces (Conventional)

Conventional: Prism, Cylinder, Pyramid and Cone.

Module 5: Isometric Projections (Conventional and Computer Aided)

Conventional and Computer Aided: Principles of Isometric Projection, Isometric Scale, Isometric Views, Conventions, Isometric Views of Lines, Plane Figures, Simple Solids. Conversion of Isometric Views to Orthographic Views and Vice- versa i.e. Conversion of orthographic projection into isometric view.

Note:

1. The End Semester Examination will be in conventional mode.
2. CIE – I will be in conventional mode.
3. CIE – II will be using Computer

Text Books

1. Engineering Drawing, N. D. Bhatt, Charotar, 54th Edition, 2023.
2. Engineering Drawing and graphics Using AutoCAD, T. Jeyapoovan and Vikas, S. Chand and company Ltd., 3rdEdition,2010.

REFERENCE BOOKS:

1. Engineering Drawing, Basant Agrawal and C.M. Agrawal, McGraw Hill, 3rd Edition, 2019.
2. Engineering Graphics and Design, WILEY, John Wiley and Sons Inc, 3rdEdition, 2020.
3. Engineering Drawing, M. B. Shah and B.C. Rane, Pearson, 2nd Edition, 2009.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford, 1st Edition, 2015.
5. Computer Aided Engineering Drawing, K. Balaveera Reddy, CBS Publishers, 2nd Edtn, 2015.

Course Outcomes

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

CO1. Understand and apply the principles of orthographic and isometric projections.
CO2. Create sectional views and dimensioned drawings using BIS standards.
CO3. Use CAD software to generate 2D engineering drawings.
CO4. Visualize and construct solid models from 2D views.
CO5. Interpret and produce engineering drawings of mechanical components and assemblies.
CO6. Demonstrate drafting skills for practical and industrial 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**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	2	2	2	-	-	-	-	-	-	-	3	2	-
CO2	3	2	2	2	-	-	-	-	-	-	-	3	2	-
CO3	3	2	2	2	-	-	-	-	-	-	-	3	2	-
CO4	3	2	1	3	-	-	-	-	-	-	-	3	3	-
CO5	3	2	1	3	-	-	-	-	-	-	-	3	3	-
Average	3	2	1.6	2.4	-	-	-	-	-	-	-	3	2.4	-

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE I Year-II Sem			
Course Code: N1202A	**BASIC ELECTRICAL ENGINEERING**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Mathematics

COURSE OBJECTIVES

COB1: To understand the basic circuit elements, sources, and laws, and learn network theorems for DC circuit analysis.

COB2: To study sinusoidal waveforms, phasors, power relations, resonance, and three-phase circuit analysis.

COB3: To gain knowledge of construction, principle, types, equivalent circuit, and performance evaluation of transformers.

COB4: To learn the construction, principle, and characteristics of DC machines and induction motors.

COB5: To acquire knowledge of LT switchgear components, earthing methods, and basic electrical installation calculations.

UNIT 1: D.C. CIRCUITS

Electrical circuit elements (R, L and C), voltage and current sources, KVL & KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.

UNIT 2: A.C. Circuits:

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

UNIT 3: Transformers:

Construction and working Principle, types, ideal and practical transformer, equivalent circuit, e.m.f. equation, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT 4: Electrical Machines:

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

UNIT 5: Electrical Installations:

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

TEXT BOOKS

T1: D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.

T2: MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS

R1: P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, "Basic Electrical Engineering", S. Chand, 2nd Edition, 2019.

R2: D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

R3: M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.

R4: Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.

R5: L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.

R6: E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

R7: V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

E-RESOURCES

E1: https://onlinecourses.nptel.ac.in/noc24_ee125/preview

E2: https://nptel.ac.in/courses/108105155

E3: https://onlinecourses.nptel.ac.in/noc25_ee160/preview

COURSE OUTCOMES

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

CO1: Apply KVL, KCL, and theorems (Superposition, Thevenin, Norton) to analyze simple DC circuits.

CO2: Analyze single-phase RLC circuits, determine resonance, and explain voltage/current relations in balanced three-phase star and delta systems.

CO3: Explain the construction, principle, EMF equation, and types of transformers, and evaluate their losses, regulation, and efficiency.

CO4: Describe the construction and operation of DC and induction machines, and interpret their characteristics and torque–slip relations.

CO5: Identify LT switchgear components and earthing methods, and compute energy consumption and power factor improvement.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE I Year-II Sem			
Course Code: N1205A	DATA STRUCTURES	L	T	P	C
		3	0	0	3

Pre-Requisites: Programming for Problem Solving

Unit 1: Introduction to Data Structures **[10L]**

Basic Terminology, Classification of Data Structures, Operation on Data Structures, abstract data types, selecting a Data Structure, Linear list – Introduction, singly linked list, Circular Linked Lists, Doubly Linked List, Stacks- Operations, Stack algorithm, Stack ADT, Stack applications, Queues- operations, Queue Algorithm, Queue ADT, Queue Applications

Unit 2: Trees **[10L]**

Introduction, Types of Trees, creating a Binary Tree from a General Tree, traversing a Binary Tree, Binary Search Trees (BST), BST Operations- Searching, Insertion and Deletion, BST ADT, BST Applications, Threaded Binary Trees, AVL Trees, Red –Black Trees, Splay Trees

Unit 3: Multi way Search Trees **[10 L]**

Introduction, B Trees, B Trees ADT, 2-3 Trees, 2-3- Tree, B* Tree, B+ Trees Heaps: Binary Heaps, Binomial heaps, Fibonacci heaps, Comparison of Various Heaps, Applications Searching: Introduction, Interpolation Search, Jump search

Unit 4: Graphs **[10L]**

Introduction, Directed Graphs, Bi connected Components, Representation of Graphs, Graph Traversal Algorithms, Graph ADT, and Applications of Graphs

Sorting: Radix Sort, Heap sort, Shell Sort, Tree Sort,

Unit 5: Hashing and Collision: **[10L]**

Introduction, Hash Tables, Hash Functions, Different Hash Functions: Division Method, Multiplication Method, Mid-square Method, Folding Method; collisions: Collision Resolution by Open Addressing, Collision Resolution by Chaining

Files and their Organization: Introduction, Data hierarchy, File Attributes, Text and Binary Files, Basic File Operations, File Organization, Indexing

Text Books

5. Data Structures: A Pseudocode Approach with C, 2 nd Edition, R. F. Gilberg and B.A.Forouzan, Cengage Learning
6. Data Structure using C– Reema Thareja, 3rd Edition, Oxford University Press

Reference Books

15. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

Course Objectives:

1. Exploring basic data structures such as stacks and queues.
2. Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
3. Introduces sorting and pattern matching algorithms.

Course outcomes:

The student will able to learn

CO1: Select suitable data structures to represent and organize data efficiently for solving computational problems.

CO2: Analyze the performance and trade-offs of different data structure implementations.

CO3: Implement fundamental algorithms for searching, sorting, and pattern matching.

CO4: Design solutions using advanced data structures such as trees, heaps and graphs.

CO5: Apply hashing techniques and file organization methods to store, retrieve, and manage data efficiently.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE I Year- II Sem			
Course Code: N12001	ADVANCED ENGINEERING PHYSICS LAB	L	T	P	C
	COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(AIML), CSE(DS), AIDS, AIML	0	0	2	1

Pre-Requisites: 10+2 Physics basic concepts.

Course Objectives:

1. To provide practical exposure to advanced concepts in solid-state and modern physics.
2. To synthesize and study the physical properties of materials like semiconductors, ferromagnetic, and ferroelectric substances.
3. To perform semiconductor characterization using Hall effect and band gap experiments.
4. To explore the working principles of lasers and optical fibers through hands-on experiments.
5. To develop skills in data analysis, interpretation, and scientific reporting.

List of Experiments:

1. Synthesis of magnetite (Fe_3O_4) powder using sol-gel method.

2. Determination of energy gap of a semiconductor.

3. Determination of Hall coefficient and carrier concertation of a given semiconductor.

4. Determination of magnetic moment of a bar magnet and horizontal earth magnetic field.

5. Study of B-H curve of a ferro magnetic material.

6. Study of P-E loop of a given ferroelectric crystal.

7. Determination of dielectric constant of a given material.

8. Determination of Curie's temperature of a given ferroelectric material.

9. A) Determination of wavelength of a laser using diffraction grating.

   B) Study of V-I & L-I characteristics of a given laser diode.

10. A) Determination of numerical aperture of a given optical fibre.

    B) Determination of bending losses of a given optical fibre.

Note: Any 8 experiments are to be performed.

Text Books

1. Dr. Narendra, L. Mathakari,"Experiments in Applied Physics" (Physics Lab Manual 4th edition),
2. "Advanced Engineering Physics Lab Resources" By Department of Physics JBIET.

Course Outcomes

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

1. Synthesize and analyze nanomaterials such as magnetite (Fe_3O_4) using chemical methods.
2. Determine key electrical, magnetic, and optical properties of semiconductors and other functional materials.
3. Characterize semiconductors using Hall effect and energy gap measurement techniques.
4. Demonstrate working knowledge of laser systems and optical fiber parameters through experimental study.
5. Apply scientific methods for accurate data collection, analysis, and technical report writing.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE I Year-II Sem			
Course Code: N12051	DATA STRUCTURES LAB	L	T	P	C
		0	0	2	1

Pre-Requisites: Programming for Problem solving

Course Objectives:

1. To work with an IDE to create, edit, compile, run and debug programs
2. To analyze the various steps in program development.
3. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
5. To Write programs using the Dynamic Memory Allocation concept.
6. To create, read from and write to text and binary files

List of Experiments

1. Write a program that uses functions to perform the following operations on singly linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
4. Write a program that implement stack (its operations) using
   i) Arrays ii) ADT
5. Write a program that implement Queue (its operations) using
   i) Arrays ii) ADT
6. Write a program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Radix Sort, ii) Heap sort, iii) Shell Sort, iv) Tree Sort
7. Write a program to implement the tree traversal methods (Recursive and Non-Recursive).
8. Write a program to implement
   i) Binary Search tree ii) B Trees iii) B+ Trees iv) AVL trees v) Red - Black trees
9. Write a program to implement the graph traversal methods.
10. Write a program to implement the following Hash Functions:
    i) Division Method, ii) Multiplication Method, iii) Mid-square Method, iv) Folding Method

Text Books

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

Reference Books

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

Course outcomes:

The student will able to

CO1: Implement linear data structures such as linked lists, stacks, and queues using functions and abstract data types.

CO2: Apply advanced sorting algorithms (Radix, Heap, and Shell, Tree sort) to arrange data efficiently.

CO3: Demonstrate tree-based data structures including binary search trees, AVL trees, B-trees, B+ trees, and Red-Black trees with traversal techniques.

CO4: Develop graph representations and apply traversal algorithms for problem solving.

CO5: Apply hashing techniques with various hash functions and collision resolution strategies for efficient data retrieval.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE I Year-II Sem			
Course Code: N12053	PYTHON PROGRAMMING LAB	L	T	P	C
		0	0	2	1

Course Objectives:

- To install and run the Python interpreter
- To learn control structures.
- To Understand Lists, Dictionaries in python
- To Handle Strings and Files in Python

Note: The lab experiments will be like the following experiment examples.

List of Experiments:

1.
   I. Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.
   II. Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.
3. Write a program to calculate compound interest when principal, rate and number of periods are given.
4. Read the name, address, email and phone number of a person through the keyboard and print the details.
5. Print the below triangle using
   for loop. 5
   4 4
   3 3 3
   2 2 2 2
   1 1 1 1 1
6. Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character(use 'if-else-if' ladder)
7. Python program to print all prime numbers in a given interval (use break)
8. Write a program to convert a list and tuple into arrays.
9. Write a program to find common values between two arrays.
10. Write a function called palindrome that takes a string argument and returnsTrue if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.
11. Write a function called is_sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
12. Write a function called has_duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.
13. Write a function called remove_duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same

order.

14. The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.
15. Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.
16. Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'
17. Remove the given word in all the places in a string?
18. Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?
19. Writes a recursive function that generates all binary strings of n-bit length
20. Write a python program that defines a matrix and prints
21. Write a python program to perform multiplication of two square matrices
22. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
23. Use the structure of exception handling all general-purpose exceptions.
24. Write a function called draw_rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.
25. Add an attribute named color to your Rectangle objects and modify draw_rectangle so that it uses the color attribute as the fill color.
26. Write a function called draw_point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.
27. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw_circle that draws circles on the canvas.
28. Write a python code to read a phone number and email-id from the user and validate it for correctness.
29. Write a Python code to merge two given file contents into a third file.
30. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.
31. Write a Python code to Read text from a text file, find the word with most number of occurrences
32. Write a function that reads a file *file1*and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.
33. Import numpy, Plotpy and Scipy and explore their functionalities.
34. Install NumPypackage with pip and explore it.
35. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR
36. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.

TEXT BOOKS:

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

REFERENCE BOOKS:

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson

2. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
3. Introduction to Python Programming, Gowrishakar S, Veena A, CRC Press
4. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
5. Python for Data Science, Dr. Mohd Abdul Hameed, Wiley publications
6. Core Python Programming, Dr. R. Nageswara Rao, Dreamtech press
7. Introduction to Python, Gowrishankar S, Veena A., CRC Press

COURSE OUTCOMES:

After completion of the course, the student should be able to

- Develop the application specific codes using python.
- Understand Strings, Lists, Tuples and Dictionaries in Python
- Verify programs using modular approach, file I/O, Python standard library
- Implement Digital Systems using Python

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: CSE I Year-II Sem			
Course Code: N12021	BASIC ELECTRICAL ENGINEERING LAB	L	T	P	C
		0	0	2	1

Pre-Requisites: Basic Electrical Engineering

COURSE OBJECTIVES

COB1: To experimentally verify fundamental electrical laws and theorems.

COB2: To enable students to understand and experimentally verify the concepts of impedance, current, and resonance in RL, RC, and RLC series circuits.

COB3: To familiarize students with the measurement of electrical quantities in single-phase and three-phase transformers.

COB4: To enable students to analyse the performance of transformers and three-phase systems through efficiency, regulation, and power measurement.

COB5: To study the performance characteristics of DC and AC motors through experimental methods.

List of Experiments

PART- A (compulsory)

1. Verification of Ohm's Law.
2. Verification of KVL and KCL.
3. Verification of Thevenin's and Norton's theorem.
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. Torque-Speed Characteristics of a Three-phase Induction Motor.

PART-B (any two experiments from the given list)

1. Verification of Superposition theorem.
2. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
3. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
4. Measurement of Active and Reactive Power in a balanced Three-phase circuit

COURSE OUTCOMES

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

CO1: Apply and validate Ohm's Law, KVL, and KCL in practical electrical circuits.

CO2: Analyse the behaviour of RL, RC, and RLC series circuits by calculating and verifying impedance and current experimentally.

CO3: Measure voltage, current, and power in transformer circuits and verify the phase and magnitude relationships of voltages and currents for various three-phase transformer connections.

CO4: Determine the efficiency and regulation of a single-phase transformer and measure active and reactive power in a balanced three-phase circuit.

CO5: Analyse the performance of a DC shunt motor and evaluate the torque–speed characteristics of a three-phase induction motor.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE I Year- II Sem			
Course Code: N12121	**IT WORKSHOP**	L	T	P	C
		0	**0**	**2**	**1**

Course Objectives: The IT Workshop for engineers is a training lab course spread over 60 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, PowerPoint and Publisher.

Course Outcomes:

- Perform Hardware troubleshooting
- Understand Hardware components and inter dependencies
- Safeguard computer systems from viruses/worms
- Document/ Presentation preparation
- Perform calculations using spreadsheets

PC Hardware

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

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

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

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

Internet & World Wide Web

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

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

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

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

LaTeX and WORD

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

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

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

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

Excel

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

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

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

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

PowerPoint

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

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

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

REFERENCE BOOKS:

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE I Year- II Sem			
Course Code: N1200F	LINGUASKILL FOR PROFESSIONALS (Audit Course) (COMMON TO ALL)	L	T	P	C
		2	0	0	0

Pre-Requisites: NIL

COURSE OBJECTIVES:

To enable students

1. Acquire an extensive range of vocabulary related to diverse topics.
2. Enhance pronunciation skills, focusing on specific sounds and intonation patterns
3. Improve the use of various grammar concepts
4. Strengthen listening, speaking, reading, and writing skills across different proficiency levels
5. Develop practical language skills for everyday communication scenarios

Module 1 **(6L)**

UNIT-1

Grammar: Subject-Object, Present Tense

Vocabulary: Words about friendship, communication, work and technology

Pronunciation: Word stress, sentence stress

UNIT-2

Everyday English: Opinions and suggestions

- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

Writing: Guide, Email giving news

Module 2 **(6L)**

UNIT-1

Grammar: Modals, Phrases of ability, Articles, *used to* and *usually*

Vocabulary: Words about relationship and ability

Pronunciation: Linking sounds, Intonation in question tags

UNIT -2

Everyday English: Telling a story; Offering and asking for help

- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

Writing: About someone's life, online advertisement

Module 3 **(6L)**

UNIT-1

Grammar: Future forms, zero and first conditionals, comparatives and superlatives

Vocabulary: Words about the natural world, environmental issues and food

Pronunciation: Sound and spelling 'a', /ʃ/, /tʃ/

UNIT-2

Everyday English: Giving reasons, results and examples; Asking and giving recommendations

- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

Writing: Discussion essay, Review of a restaurant or café

Module 4 **(6L)**

UNIT-1

Grammar: Quantifiers, Reported speech

Vocabulary: Words about buildings and sharing information

Pronunciation: Sounds */t//d//k//g//h//w/*

UNIT-2

Everyday English: Offers, request, permission; generalising and being vague

- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

Writing: A note with useful information, an email summary of a news story

Module 5 **(6L)**

UNIT-1

Grammar: Passive, Relative clause, Second and third conditionals

Vocabulary: Words about music and sport; expressions with *do*, *make* and *take*

Pronunciation: -ed ending words, mostly confused words

UNIT-2

Everyday English: Recommending, Discussing problems and reassuring

- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

Writing: Article, Email with advice

Text Books

5. Doff, Adrian, et al. *Empower Second Edition Student's Book with Digital Pack: B1+ Intermediate*. Cambridge University Press, 2022.

Reference Books

7. Cullen, Pauline, et al. The Official Cambridge Guide to IELTS for Academic and General Training: Student's Book with Answers. with DVD-ROM. Cambridge Univ. Press, 2014.

E-Resources

1. Cambridge English
2. English with Cambridge - YouTube
3. BBC Learning English - Learn English with BBC Learning English - Homepage
4. https://englishonline.britishcouncil.org/

Course Outcomes

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

CO1. Demonstrate a diverse vocabulary repertoire, facilitating better expression and comprehension.

CO2. Exhibit inteligible pronunciation skills, ensuring clearer oral communication.

CO3. Utilise various grammar concepts accurately and coherently.

CO4. Strengthened language skills across listening, speaking, reading, and writing.

CO5. Apply practical language skills effectively in everyday communication scenarios.

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	-	-
CO2	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO3	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO4	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO5	-	-	-	-	-	-	-	-	2	2	-	3	-	-
Average	-	-	-	-	-	-	-	-	**2**	**2**	-	**3**	-	-

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-I Sem			
Course Code: N2105A	DISCRETE MATHEMATICS	L	T	P	C
		3	0	0	3

Pre-Requisites: Mathematics Fundamentals

Course Objectives:

1. Introduces elementary discrete mathematics for computer science and engineering.
2. Topics include formal logic notation, methods of proof, induction, sets, relations, algebraic structures, elementary graph theory, permutations and combinations, counting principles; recurrence relations and generating functions.

UNIT 1: [10L]

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

UNIT 2: [8 L]

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

UNIT 3: [8 L]

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

UNIT 4: [12 L]

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

UNIT 5: [12L]

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

Text Book

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

Reference Books

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

Course outcomes:

CO1: Develop logically sound and rigorously justified proofs for propositions, theorems, and statements in discrete mathematics.
CO2: Use principles of propositional and predicate logic, as well as set operations, to model, reason, and express precise mathematical and computational statements.
CO3: Solve counting problems on finite and discrete structures
CO4: Analyze sequences and series, including arithmetic, geometric, and recurrence relations, for problem-solving in discrete mathematics.
CO5: Apply graph theory to solve computing problems.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-I Sem			
Course Code: N2105B	COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
		3	0	0	3

Pre-Requisites: No

Course Objectives:

1. The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.
2. It begins with basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.
3. Topics include computer arithmetic, instruction set design, microprogrammed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors

UNIT 1: [10L]

Boolean Algebra and Logic Gates: Binary codes, Binary Storage and Registers, Binary logic. **Digital logic gates. Data Representation**: Data types, Complements, Fixed Point Representation, Floating Point Representation

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

UNIT 2: [8 L]

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

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

UNIT 3: [8 L]

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

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

UNIT 4: [12 L]

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

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

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT 5: [12L]

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

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

Text Book

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

Reference Books

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

Course outcomes:

CO1: Explain the fundamentals of Boolean algebra, logic gates, and data representation in digital computers.
CO2: Design combinational and sequential logic circuits using standard procedures and HDL.
CO3: Demonstrate register transfer operations, micro-operations, and basic computer instruction execution.
CO4: Apply micro programmed control techniques, CPU organization concepts, and computer arithmetic algorithms.
CO5: Illustrate input-output organization, memory hierarchy, and data transfer methods in computer systems.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-I Sem			
Course Code: N2112B	OBJECT ORIENTED PROGRAMMING THROUGH JAVA	L	T	P	C
		3	0	0	3

Pre-Requisites:

Course Objectives:

1. To Understand the basic object-oriented programming concepts and apply them in problem solving.
2. To Illustrate inheritance concepts for reusing the program.
3. To Demonstrate multitasking by using multiple threads and event handling
4. To Develop data-centric applications using JDBC.
5. To Understand the basics of java console and GUI based programming

UNIT 1: [10L]

Object oriented thinking and Java Basics- Need for oop paradigm, summary of oop concepts, coping with complexity, abstraction mechanisms. History of Java, Java buzzwords, data types, variables, scope and lifetime of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, nested and inner classes, exploring String class.

UNIT 2: [8 L]

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

UNIT 3: [8 L]

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

UNIT 4: [12 L]

Exploring String class, Object class, Exploring java.util package, Exploring java.io package
Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.

UNIT 5: **[12L]**

Swing — Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JFrame and JComponent, JLabel, ImageIcon, JTextField, JButton, JCheckBox, JRadioButton, JList, JComboBox, Tabbed Panes, Scroll Panes, Trees, and Tables. Menu Basics, Menu related classes - JMenuBar, JMenu, JMenuItem, JCheckBoxMenuItem, JRadioButtonMenuItem, JSeperator. creating a popup menu

Text Book

1. Java the complete reference, 13th edition, Herbert schildt, Dr. Denny Coward, Mc Graw Hill.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson education.

Reference Books

1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John Wiley & sons.
2. An Introduction to OOP, third edition, T. Budd, Pearson education.

Course outcomes:

Student will able to

CO1: Demonstrate programs using control structures, constructors, string handling, and garbage collection.
CO2: Implement inheritance (multilevel, hierarchical, and multiple) using extends and implements keywords.
CO3: Apply multithreading concepts to develop inter-process communication.
CO4: Design graphical user interfaces using AWT or Swing.
CO5: Develop applets that interact with the client environment and deploy on a server.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech :CSE II Year-I Sem			
Course Code: N2105C	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

Pre-Requisites:

Course Objectives:

1. The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
2. Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

UNIT 1: [10L]

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths. A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI). Process models: The waterfall model, Spiral model, Incremental Process Models, Concurrent Models, Component based development and Agile Development.

UNIT 2: [8 L]

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

UNIT 3: [8 L]

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

UNIT 4: [12 L]

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

UNIT 5: [12L]

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

Text Book

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

Reference Books

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.
4. Fundamentals of Software Engineering-Rajib Mall, PHI.

Course outcomes:

CO1: Explain the fundamentals of software engineering, software processes, and various process models.
CO2: Elicit, analyze, and document functional and non-functional software requirements.
CO3: Design software architectures and develop UML-based models for system representation.
CO4: Apply testing strategies and software metrics to ensure quality and reliability.
CO5: Manage software risks and implement quality assurance practices to achieve high-quality software products.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-I Sem			
Course Code: N2112C	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

Pre-Requisites:

Course Objectives:

1. To understand the basic concepts and the applications of database systems.
2. To master the basics of SQL and construct queries using SQL.
3. Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

UNIT 1: [10L]

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

UNIT 2: [8 L]

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

Relational Algebra, Tuple relational Calculus, Domain relational calculus.

.

UNIT 3: [8 L]

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active databases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multivalued dependencies, FOURTH normal form, FIFTH normal form.

UNIT 4: [12 L]

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

UNIT 5: [12L]

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree based Indexing, Comparison of File Organizations, Indexes- Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM),

B+ Trees: A Dynamic Index Structure.

Text Book

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

Reference Books

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

Course outcomes:

Student will able to

CO1: Describe the concepts of database systems, data models, and ER-based conceptual design.
CO2: Apply relational algebra and relational calculus to formulate queries and enforce integrity constraints.
CO3: Construct SQL queries, triggers, and normalized schemas to maintain data consistency.
CO4: Analyze transactions, concurrency control, and recovery mechanisms to ensure database integrity.
CO5: Implement file organization and indexing techniques for efficient data storage and retrieval.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-I Sem			
Course Code: N210EA	INNOVATION AND ENTREPRENEURSHIP	L	T	P	C
		2	0	0	2

Course Objectives

1. To highlight the relevance of creative thinking in the context of Innovation and Entrepreneurship.
2. To provide an overview of the models of creative problem solving.
3. To impart knowledge of the models and methods of developing creative intelligence.
4. To provide an overview of innovation management and theories of outsourcing new product development.
5. To provide a micro and macro perspective of innovation.

Course Outcomes: Students will be able to

1. Gain an understanding of the concepts and processes of creativity and appreciate the need for improving the quality of creativity.
2. Learn the methods of creative problem solving.
3. Orient themselves on developing creative intelligence and unblock their creative energies.
4. Learn the concepts and methods of innovation and ideation and the theories of outsourcing new product development.
5. Develop a perspective of micro and macro level innovation.

Unit – I: The Creativity Phenomenon: Creative Cerebration, Creative Personality and Motivation, Creative Environment, Creative Technology, Creativity Training Puzzles of Creativity, Spiritual and Social Roots of Creativity, Essence, Elaborative and Expressive Creativities, Quality of Creativity, Existential, Entrepreneurial and Empowerment Creativities, Criteria for Evaluating Creativity, Credible Evaluation, Improving the Quality of our Creativity.

Unit–II: Mastering Creative Problem Solving: Structuring of ill-defined problems, Creative Problem Solving, Models of Creative Problem Solving, Mechanisms of Divergent Thinking, Useful Mechanisms of Convergent Thinking, Techniques of Creative Problem solving

Unit – III: Creative Intelligence: Creative Intelligence Abilities, A Model of Creative Intelligence, Convergent Thinking Ability, Traits Congenial to Creativity, Creative Personality and Forms of Creativity, Motivation and Creativity, Blocks to Creativity: Fears and Disabilities, Strategies for Unblocking Energy of your Creativity, Designing Creativogenic Environment.

Unit – IV: Innovation Management: Concept of Innovation, Levels of Innovation: Incremental Vs Radical Innovation, Inbound and Outbound Ideation, Open and Other Innovative Ideation Methods. Theories of Outsourcing New Product Development: Transaction Cost, Resource Based, Resource Dependence, Knowledge Based Theories.

Unit – V: Micro and Macro Perspectives of Innovation: Systems Approach to Innovation-Innovation in the context of Emerging Economies, Organizational Factors affecting Innovation at the Firm Level, Leadership and Innovations, Open Innovation, Innovation Framework,

Innovations Developed by Open Technology Communities.

Suggested Readings

- Mike Kennard, *Innovation and Entrepreneurship*, Routledge, 2021.
- Paul Trott, *Innovation Management and New Product Development*, 4e, Pearson, 2018.
- Vinnie Jauhari, Sudanshu Bhushan, *Innovation Management*, Oxford Higher Education, 2014.
- C.S.G. Krishnamacharyulu, R. Lalitha, *Innovation Management*, Himalaya Publishing House, 2010.
- Pradip N. Khandwalla, *Lifelong Creativity, An Unending Quest*, Tata McGraw Hill, 2004.
- Brian Clegg, Paul Birch, *Creativity*, Kogan Page, 2009.
- A. Dale Timpe, *Creativity*, Jaico Publishing House, 2003.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-I Sem			
Course Code: N21122	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB	L	T	P	C
		0	0	2	1

Course Objectives:

1. To write programs using abstract classes.
2. To write programs for solving real world problems using the java collection framework.
3. To write multithreaded programs.
4. To write GUI programs using swing controls in Java.
5. To introduce java compiler and eclipse platform.
6. To impart hands-on experience with java programming.

Note:

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

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

List of Experiments:

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

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

3.
   A) Develop an applet in Java that displays a simple message.
   B) Develop an applet in Java that receives an integer in one text field, and computes its factorial

4. Value and returns it in another text field, when the button named “Compute” is clicked.

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

6. Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread

   computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.

7. Write a Java program for the ollowing:
   Create a doubly linked list of elements.
   Delete a given element from the above list.
   Display the contents of the list after deletion.
8. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “Stop” or “Ready” or “Go” should appear above the buttons in the selected color. Initially, there is no message shown.

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

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

12. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).
13. Write a Java program that loads names and phone numbers from a text file where the data is
    organized as one line per record and each field in a record are separated by a tab (\t). It takes aname or phone number as input and prints the corresponding other value from the hash table (hint:use hash tables).
14. Write a Java program that correctly implements the producer – consumer problem using the
    concept of inter thread communication.
15. Write a Java program to list all the files in a directory including the files present in all its subdirectories.

TEXT BOOKS:

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition Pearson education.
2. Thinking in Java, Bruce Eckel, Pearson Education.

REFERENCE BOOKS

1. Java Programming, D. S. Malik and P. S. Nair, Cengage Learning.
2. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, Pearson.

COURSE OUTCOMES:

Student will able to

CO1: Use IDE tools to develop, debug, and manage Java programs efficiently.

CO2: Implement GUI applications and applets with event handling and exception management.

CO3: Develop multithreaded programs to solve concurrency and synchronization problems.

CO4: Manipulate data structures and perform file I/O operations to handle real-world data.

CO5: Integrate object-oriented concepts to design modular and reusable Java applications.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-I Sem			
Course Code: N21051	SOFTWARE ENGINEERING LAB	L	T	P	C
		0	0	2	1

Course Objectives:

To have hands-on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development. multithreaded programs.

List of Experiments:

Do the following seven exercises for any two projects given in the list of sample projects or any other Projects:

1. Development of problem statements.
2. Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
3. Preparation of Software Configuration Management and Risk Management related documents.
4. Study and usage of any Design phase CASE tool
5. Performing the Design by using any Design phase CASE tools.
6. Develop test cases for unit testing and integration testing
7. Develop test cases for various white box and black box testing techniques.

Sample Projects:

1. Passport automation System
2. Book Bank
3. Online Exam Registration
4. Stock Maintenance System
5. Online course reservation system
6. E-ticketing
7. Software Personnel Management System
8. Credit Card Processing
9. E-book management System.
10. Recruitment system

Text Book

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

Reference Books

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill.

Course outcomes:

CO1: Develop problem statements and structured software documents.
CO2: Prepare software requirement, design, and testing documents.
CO3: Create software configuration and risk management documents.
CO4: Utilize CASE tools to perform software design.
CO5: Design test cases for unit, integration, white-box, and black-box testing.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-I Sem			
Course Code: N21123	DATABASE MANAGEMENT SYSTEMS LAB	L	T	P	C
		0	0	2	1

Course Objectives:

1. Introduce ER data model, database design and normalization
2. Learn SQL basics for data definition and data manipulation

List of Experiments:

Experiment 1:

Concept design with E-R Model

Experiment 2:

Relational Model

Experiment 3:

Normalization

Experiment 4:

Practicing DDL commands

Experiment 5:

Practicing DML commands

Experiment 6:

A) Querying (using ANY, ALL, UNION, INTERSECT, JOIN, Constraints etc.)

B) Nested, Correlated subqueries

Experiment 7:

Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.

Experiment 8:

Triggers (Creation of insert trigger, delete trigger, update trigger)

Experiment 9:

Procedures

Experiment 10:

Usage of Cursors

Text Book

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

Reference Books

1. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
2. Introduction to Database Systems, C.J. Date, Pearson Education

Course outcomes:

Student will able to

CO1: Design conceptual database schemas using the Entity-Relationship (E-R) model and relational model.
CO2: Apply normalization techniques to eliminate redundancy and improve database efficiency.
CO3: Implement database structures using DDL and DML commands.
CO4: Develop complex SQL queries using joins, subqueries, aggregate functions, and views.
CO5: Use advanced database features such as triggers, stored procedures, and cursors for effective data management**.**

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-I Sem			
Course Code: N21052	NODE JS/ REACT JS/ DJANGO	L	T	P	C
		0	0	2	1

Course Objectives:

1. To implement the static web pages using HTML and do client-side validation using JavaScript.
2. To design and work with databases using Java
3. To develop an end to end application using java full stack.
4. To introduce Node JS implementation for server-side programming.
5. To experiment with single page application development using React.

Experiments/Exercises:

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

Reference Books

1. Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Wrox Publications, 2010.
2. Bryan Basham, Kathy Sierra and Bert Bates, Head First Servlets and JSP, O'Reilly Media, 2nd Edition, 2008.

3. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node ,2nd Edition, APress.

Course outcomes:

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

CO1: Build a custom website using HTML, CSS, Bootstrap, and basic JavaScript.
CO2: Demonstrate advanced JavaScript features and implement database connectivity using JDBC.
CO3: Develop server-side applications using Java technologies.
CO4: Implement server-side functionality using Node.js.
CO5: Design a Single Page Application (SPA) using React.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-I Sem			
Course Code: N2100D	ENVIRONMENTAL SCIENCE	L	T	P	C
		1	0	0	1

Course Objectives:

1. Understand the components, structure, and functions of ecosystems and their relevance to human society.
2. Comprehend classification, sustainable management, and challenges of natural resources including water, minerals, land, forests, and energy.
3. Grasp the significance, value, and conservation approaches for biodiversity, including threats and legislative frameworks.
4. Analyze types, sources, and impacts of environmental pollution, and learn technological and policy measures for pollution prevention and control.
5. Develop awareness about global environmental challenges, international agreements, and the role of policy, law, and Environmental Impact Assessment (EIA) in sustainable development.

UNIT 1: [8L]

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification, ecosystem value, services and carrying capacity, Field visits.

UNIT 2: [8 L]

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies

UNIT 3: [8 L]

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act

UNIT 4: [10 L]

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards.

Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT 5: [10 L]

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan(EMP). Contemporary Environmental Issues Climate change; Sustainable development goals (SDGs); Global environmental challenges; Environmental policies and international agreements

Text Book

1. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.
2. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
3. Environmental Studies by R. Rajagopalan, Oxford University Press.

Reference Books

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

Course outcomes:

1. Understand the structure, function, and significance of ecosystems, including energy flow, biogeochemical cycles, and biodiversity conservation through field experiences.
2. Analyze the classification, utilization, and sustainable management of natural resources, along with alternative energy options.
3. Evaluate biodiversity at genetic, species, and ecosystem levels, its values, threats, and conservation methods under national and international frameworks.
4. Identify types, sources, and impacts of environmental pollution, and apply suitable control technologies while assessing global environmental challenges and protocols.
5. Interpret environmental policies, legislation, and the EIA process to propose management plans addressing contemporary environmental and sustainability issues

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-II Sem			
Course Code: N2200A	COMPUTER ORIENTED STATISTICAL METHODS	L	T	P	C
		3	0	0	3

Course Objectives:

1. The theory of Random variable Probability distributions of single random variables
2. The sampling theory, testing of hypothesis and making statistical inferences Stochastic process and Markov chains

UNIT 1: [8L]

Random Variables and Probability Distributions: Concept of a Random Variable — Discrete Probability Distributions — Continuous Probability Distributions – Mean of a Random Variable – Variance of a Random Variable.
Discrete Probability Distributions: Binomial Distribution – Poisson distribution.

UNIT 2: [10 L]

Continuous Distributions and sampling : Uniform Distribution – Normal Distribution – Areas under the Normal Curve – Applications of the Normal Distribution — Normal Approximation to the Binomial Distributions. **Fundamental Sampling Distributions:** Random Sampling – Some Important Statistics – Sampling Distributions – Sampling Distribution of Means – Central Limit Theorem.

UNIT 3: [10 L]

Estimation: Introduction – Statistical Inference – Classical Methods of Estimation – Single Sample: Estimating the mean – Standard error of a point estimate. Two samples: Estimating the difference between two means– Single sample: Estimating a proportion — Two samples: Estimating the difference between two proportions– Two samples: Estimating the ratio of two variances.

UNIT 4: [10 L]

Tests of Hypotheses (Large and Small Samples): Statistical Hypotheses: General Concepts — Testing a Statistical Hypothesis. Single sample: Tests concerning a single mean. Two samples: Tests on two means (Unknown for equal variance). One sample: Test on a single proportion. Two samples: Tests on two proportions. Two- sample tests concerning variances: F-distribution

UNIT 5: [10L]

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

Text Books

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.
2. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.
3. S.D.Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi.

Reference Books

8. T.T. Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons, 2004.
9. Sheldon M Ross, Probability and statistics for Engineers and scientists, academic press
10. Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, Pearson Educations.

Course outcomes:

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

1. Apply the concepts of Random variable and distributions to case studies.
2. Formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.
3. Apply concept of estimation and testing of hypothesis to case studies.
4. Correlate the concepts of one unit to the concepts in other units.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-II Sem			
Course Code: N2205A	OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

Prerequisites:

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

Course Objectives:

1. Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
2. Introduce the issues to be considered in the design and development of operating system
3. Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

UNIT 1: [8L]

Operating System - Introduction, Structures - Simple Batch, Multiprogrammed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

Process - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads

UNIT 2: [10 L]

CPU Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, exec

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock

UNIT 3: [10 L]

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

UNIT 4: [10 L]

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

UNIT 5: **[10L]**

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

Text Books

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

Reference Books

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

Course outcomes:

Student will able to

CO1: Describe the structure, components, and services of operating systems.
CO2: Analyze process concepts, scheduling algorithms, and thread management.
CO3: Apply synchronization techniques and interprocess communication mechanisms.
CO4: Implement memory management and virtual memory strategies including paging and segmentation.
CO5: Utilize file system structures, access methods, and related system calls for effective file management.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-II Sem			
Course Code: N2205B	ALGORITHMS DESIGN AND ANALYSIS	L	T	P	C
		3	0	0	3

Prerequisites: Programming for problem solving and Data Structures

Course Objectives:

1. Develop proficiency in evaluating algorithms using asymptotic notations, including best-, average-, and worst-case time/space complexities, and solving related recurrence relations.
2. Master various algorithmic strategies—divide-and-conquer, greedy, dynamic programming, backtracking, and branch-and-bound—identifying suitable use cases and demonstrating their application.
3. Critically assess and contrast different algorithms in terms of efficiency, scalability, and correctness through rigorous analytical reasoning and empirical evaluation.
4. Differentiate between tractable (polynomial-time) and intractable (super-polynomial or exponential-time) problems.
5. **Identify and classify** problems as P, NP, NP-hard, or NP-complete, and **assess** their relationships through polynomial-time reductions and Cook's theorem.

UNIT 1: [8L]

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation, and Little oh notation.

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT 2: [10 L]

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

UNIT 3: [10 L]

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

UNIT 4: [10 L]

Greedy method: General method, applications- Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

Basic Traversal and Search Techniques: Techniques for Binary Trees, Techniques for Graphs, Connected components, Biconnected components

UNIT 5: **[10L]**

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

Text Books

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni, and Rajasekaran, University Press.

Reference Books

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

Course outcomes:

At the end of course, student will able to

1. Apply space and time complexity analysis using asymptotic notations.
2. Design divide-and-conquer algorithms and critically assess their runtime and space trade-offs.
3. Device backtracking and dynamic programming solutions.
4. Apply greedy methods and graph traversal algorithms
5. Analyse branch-and-bound algorithms for NP-hard problems

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-II Sem			
Course Code: N2205C	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

Prerequisites:

1. A course on "Programming for problem solving".
2. A course on "Data Structures".

Course Objectives:

1. Equip the students with a general overview of the concepts and fundamentals of computer networks.
2. Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.
3. Elucidate the students about working and implementation of protocols at various layers in protocols stack.
4. Appreciating the protocol working by observing and analysing outputs of the packet sniffer,

UNIT 1: [8L]

Introduction: The Internet, Protocol, Network Edge, Access Networks, Network Core, Packet Switching, Circuit Switching, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol reference models: ISO-OSI, TCP/IP, Types of Network attacks, History of Computer Networking and the Internet.

UNIT 2: [10 L]

Application Layer: Principles of Network Applications, Network Application Architectures, Processes Communicating, Transport Services Available to Applications, Transport Services Provided by the Internet, Application-Layer Protocols, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, SMTP, DNS, Peer-to-Peer Applications, Socket Programming: Creating Network Applications.

UNIT 3: [10 L]

Transport Layer: Transport-Layer Services, Multiplexing and Demultiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transfer, Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go-Back-N (GBN), Selective Repeat (SR), Connection-Oriented Transport: TCP, The TCP Connection, Segment Structure, Round-Trip Time Estimation and Timeout, Reliable Data Transfer, Flow Control, TCP Connection Management, Principles of Congestion Control, TCP Congestion Control, Fairness.

UNIT 4: [10 L]

Network Layer: Data and Control plane, Forwarding and Routing 308, Network Service Models, Virtual Circuit and Datagram Networks, Router working, The Internet Protocol (IP): Forwarding and Addressing in the Internet, Datagram Format, IPv4 Addressing,

Internet Control Message Protocol (ICMP), IPv6, IP Security, Routing Algorithms- The Link-State (LS) Routing Algorithm, The Distance- Vector (DV) Routing Algorithm, Hierarchical Routing, Routing in the Internet-Intra-AS Routing in the Internet: RIP, Intra-AS Routing in the Internet: OSPF, Inter-AS Routing: BGP, Broadcast and Multicast Routing, Broadcast Routing Algorithms, Multicasting.

UNIT 5: [10L]

The Link Layer: The Services Provided by the Link Layer, Error-Detection and -Correction Techniques- Parity Checks, Checksum Methods, Cyclic Redundancy Check (CRC), Hamming code, Multiple Access Links and Protocols, Channel Partitioning Protocols, Random Access Protocols, Taking-Turns Protocols, DOCSIS: The Link-Layer Protocol for Cable Internet Access, Switched Local Area Networks, Link-Layer Addressing and ARP, Ethernet, Link-Layer Switches, Virtual Local Area Networks (VLANs), Link Virtualization-Multiprotocol Label Switching (MPLS), Data Center Networking, A Day in the Life of a Web Page Request. Wireless network characteristics, Wireless LAN.

Text Books

1. Computer Networking: A Top-Down Approach – James F.Kurose, Keith W. Ross, Pearson
2. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson/PHI

Reference Books

1. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

Course outcomes:

At the end of the course, student will able to

CO1: Identify the fundamentals of computer network technologies.
CO2: Explain the functions of each layer in ISO-OSI and TCP/IP reference models.
CO3: Apply subnetting and routing mechanisms in network design.
CO4: Analyze essential network protocols and their application in network implementation.
CO5: Interpret protocol behavior through packet traces captured by a sniffer.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-II Sem			
Course Code: N2273A	MACHINE LEARNING	L	T	P	C

Course Objectives:

1. To introduce students to the basic concepts and techniques of Machine Learning.
2. To have a thorough understanding of the Supervised and Unsupervised learning techniques
3. To study the various probability-based learning techniques

UNIT 1: [8L]

Introduction to Machine Learning: Types of Human learning, machine learning process, Well-posed learning problem, Types of machine learning and comparison, applications of machine learning.

Model Preparation, Evaluation and feature engineering: Machine learning activities, Types of data in machine learning, dataset understanding, plotting and exploration, checking data quality, remediation, data pre-processing, selecting a model, predictive and descriptive models, supervised learning model training, cross-validation and boot strapping, lazy vs eager learner, interpreting the model- underfitting,overfitting, bias-variance trade-off. Parameter for evaluating performance of classification, regression, and clustering model. Improving performance of a model.

UNIT 2: [10 L]

Feature Engineering: Feature transformation - feature construction, feature extraction by PCA, SVD, LDA. Feature subset selection — feature relevancy and redundancy measures. Feature selection process and approaches.

Review of Probability concepts: joint probability, conditional probability, bayes rule, Common discrete and continuous distributions, dealing with multiple random variables, central limit theorem. Bayes classifier, Multi-class Classification, Naïve Bayes classifier, Bayesian belief network.

UNIT 3: [10 L]

Supervised Learning - Introduction to supervised learning,

Regression: Introduction of regression, Regression algorithms: Simple linear regression, Multiple linear regression, Polynomial regression model, Logistic regression, Maximum likelihood estimation.

Classification: Classification model and learning steps, Classification algorithms: Naïve Bayes classifier, Distance measures, k-Nearest Neighbor (kNN), Decision tree, Support vector machines, Kernel trick, Random Forest.

UNIT 4: [10 L]

Unsupervised Learning: Introduction to unsupervised learning, Unsupervised vs supervised learning, Application of unsupervised learning, Clustering and its types, Partitioning method: k-Means and K- Medoids, Hierarchical clustering, Density-based methods – DBSCAN.

UNIT 5: **[10L]**

Artificial Neural Network: Biological neuron, Artificial neuron, Activation functions, neural network architecture, perceptron, learning process in ANN, Back propagation. Introduction to deep learning, overview of reinforcement learning, Representation learning, Evolutionary learning. Case-study of ML applications: Image recognition, Email spam filtering, Online fraud detection.

Text Books

1. Saikat Dutt, S. Chjandramouli, Das – Machine Learning, Frist Edition, Pearson
2. M N Murty, Anathanarayana V S – Machine Learning, First Edition, University Press
3. Tom M Mitchell, ―Machine Learning, First Edition, McGraw Hill Education, 2013

Reference Books

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

Course outcomes:

Student will able to:

CO1: Understand the fundamentals of machine learning, its types, processes, and applications.
CO2: Apply data preprocessing, feature engineering, and model evaluation techniques to improve learning outcomes.
CO3: Implement supervised learning algorithms including regression and classification models.
CO4: Analyze unsupervised learning techniques, clustering methods, and their applications.
CO5: Develop artificial neural network models and explore advanced ML topics such as deep learning and reinforcement learning.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-II Sem			
Course Code: N22001	COMPUTATIONAL MATHEMATICS LAB (Using Python/MATLAB software)	L	T	P	C
		0	0	2	1

Pre-requisites: Matrices, Iterative methods and ordinary differential equations

* **Visualize all solutions Graphically through programmes**

Course Objectives:

1. Solve problems of Eigen values and Eigen Vectors using Python/MATLAB.
2. Solution of Algebraic and Transcendental Equations using Python/MATLAB
3. Solve problems of Linear system of equations
4. Solve problems of First-Order ODEs Higher order linear differential equations with constant coefficients

UNIT 1: **[6P]**

Eigen values and Eigenvectors:

Programs:

- Finding real and complex Eigen values.
- Finding Eigen vectors.

UNIT 2: **[6P]**

Solution of Algebraic and Transcendental Equations

Bisection method, Newton Raphson Method

Programs:

- Root of a given equation using Bisection method.
- Root of a given equation Newton Raphson Method

UNIT 3: **[6P]**

Linear system of equations:

Jacobi's iteration method and Gauss-Seidal iteration method

Programs:

- Solution of given system of linear equations using Jacobi's method
- Solution of given system of linear equations using Gauss-Seidal method

UNIT 4: **[8P]**

First-Order ODEs

Exact and non-exact equations, Applications: exponential growth/decay, Newton's law of cooling.

Programs:

- Solving exact and non-exact equations
- Solving exponential growth/decay and Newton's law of cooling problems

UNIT 5: **[6P]**

Higher order linear differential equations with constant coefficients

Programs:

- Solving homogeneous ODEs
- Solving non-homogeneous ODEs

Text Books

1. MATLAB and its Applications in Engineering, Rajkumar Basal, Ashok Kumar Geo, Manoj Kumar Sharma, Pearson publication.
2. Kenneth A. Lambert, The fundamentals of Python: First Programs, 2011, Cengage Learnings.
3. Think Python First Edition, by Allen B. Downey, Orielly publishing.
4. Introduction to Python Programming, William Mitchell, Povel Solin, Martin Novak et al., NC Lab Public Computing, 2012.
5. Introduction to Python Programming, ©Jacob Fredslund, 2007.

Reference Books

1. An Introduction to Python, John C. Lusth, The University of Alabama, 2011.
2. Introduction to Python, ©Dave Kuhlman, 2008.

Course outcomes:

1. Develop the code to find the Eigen values and Eigen Vectors using Python/MATLAB.
2. Develop the code find solution of Algebraic and Transcendental Equations and Linear system of equations using Python/MATLAB
3. Write the code to solve problems of First-Order ODEs Higher order linear differential equations with constant coefficients

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-II Sem			
Course Code: N22051	OPERATING SYSTEMS LAB	L	T	P	C
		0	0	2	1

Prerequisites:

- A course on "Programming for Problem Solving".
- A course on "Computer Organization and Architecture".

Co-requisite: A course on "Operating Systems"

Course Objectives:

1. To provide an understanding of the design aspects of operating system concepts through simulation.
2. Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix.

List of Experiments:

Experiment 1:

Write C programs to simulate the following CPU Scheduling algorithms

a) FCFS b) SJF c) Round Robin d) priority

Experiment 2:

Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, lseek, stat, fork, exit)

Experiment 3:

Write a C program to simulate Bankers Algorithm for Deadlock Avoidance.

Experiment 4:

Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.

Experiment 5:

Write C programs to illustrate the following IPC mechanisms

a) Pipes b) FIFOs c) Message Queues d) Shared Memory

Experiment 6:

Write C programs to simulate the following memory management techniques

a) Paging b) Segmentation

Experiment 7:

Write C programs to simulate Page replacement policies

a) FCFS b) LRU c) Optimal

Text Book

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

Reference Books

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

Course outcomes:

At the end of the course, Student will able to

CO1: Implement CPU scheduling algorithms including FCFS, SJF, Round Robin, and Priority scheduling.
CO2: Utilize UNIX/Linux system calls for file operations and process management.
CO3: Apply deadlock avoidance and synchronization techniques using Bankers Algorithm and semaphores.
CO4: Demonstrate interprocess communication mechanisms such as Pipes, FIFOs, Message Queues, and Shared Memory.
CO5: Simulate memory management techniques and page replacement policies including Paging, Segmentation, FCFS, LRU, and Optimal.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-II Sem			
Course Code: N22052	COMPUTER NETWORKS LAB	L	T	P	C
		0	0	2	1

Course Objectives:

- To understand the working principle of various communication protocols.
- To understand the network simulator environment and visualize a network topology and observe its performance
- To analyze the traffic flow and the contents of protocol frames

List of Experiments

1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijsktra's algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption
8. Write a program for congestion control using Leaky bucket algorithm.
9. Write a program for frame sorting techniques used in buffers.
10. **Wireshark**
    i. Packet Capture Using Wire shark
    ii. Starting Wire shark
    iii. Viewing Captured Traffic
    iv. Analysis and Statistics & Filters.
11. How to run Nmap scan
12. Operating System Detection using Nmap
13. Do the following using NS2 Simulator
    I. NS2 Simulator-Introduction
    II. Simulate to Find the Number of Packets Dropped
    III. Simulate to Find the Number of Packets Dropped by TCP/UDP
    IV. Simulate to Find the Number of Packets Dropped due to Congestion
    V. Simulate to Compare Data Rate & Throughput.
    VI. Simulate to Plot Congestion for Different Source/Destination
    VII. Simulate to Determine the Performance with respect to Transmission of Packets

TEXT BOOK:

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

REFERENCES:

1. An Engineering Approach to Computer Networks, S.Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. 3rd Edition, TMH.

Course Outcomes:

At the end of course, student will able to

CO1: Implement data link layer framing methods.
CO2: Analyze error detection and correction codes.
CO3: Implement and evaluate routing and congestion control techniques.
CO4: Apply encoding and decoding techniques used in the presentation layer.
CO5: Utilize various network tools for simulation and analysis.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-II Sem			
Course Code: N22731	MACHINE LEARNING LAB	L	T	P	C
		0	0	2	1

Course Objective:

- The objective of this lab is to get an overview of the various machine learning techniques and can demonstrate them using python.

List of Experiments:

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

TEXT BOOK:

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

REFERENCE BOOK:

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

Course Outcomes:

Student will able to

CO1: Compute statistical measures and analyze data using Python libraries such as Statistics, Math, NumPy, and SciPy.
CO2: Explore and manipulate datasets using Python libraries like Pandas and Matplotlib for data visualization.
CO3: Implement supervised learning algorithms including Linear Regression, Logistic Regression, Decision Trees, and K-Nearest Neighbors using scikit-learn.
CO4: Apply unsupervised learning techniques such as K-Means clustering for pattern discovery in data.
CO5: Evaluate and analyze the performance of machine learning models on real datasets.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE II Year-II Sem			
Course Code: N22721	DATA VISUALIZATION	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES

Students will be able to

1. Understand the importance of data visualization for business intelligence and decision making.
2. Know approaches to understand visual perception
3. Learn about categories of visualization and application areas
4. Familiarize with the data visualization tools
5. Gain knowledge of effective data visuals to solve workplace problems

Experiments:

1. a) Using R program to add, sub, mul, divn. (calculator)
   b) To check given no is even or odd
   c) While and for loops
2. a) Using R program execute a) switch b) find a factorial using Recursion
3. Execute R demo Programs a) array B) matrix and C) list
4. Execute R demo program on a) Data frames b) Common functions used with factor
5. Execute R demo program to read and write csv, excel data, basic plots.
6. Execute R programs Pie chart, histogram, line plot
7. Introduction to various Data Visualization tools
8. Basic Visualization in R
9. Connecting to Data and preparing data for visualization in R
10. Data Aggregation and Statistical functions in R
11. Data Visualizations in R
12. Creating custom charts, cyclical data and circular area charts, Dual Axis charts.

REFERENCE BOOKS:

1. Microsoft Power BI cookbook, Brett Powell, 2nd edition.
2. R Programming for Data Science by Roger D. Peng (References)
3. The Art of R Programming by Norman Matloff Cengage Learning India
4. Data Visualization with R: 111 Examples by Thomas Rahlf, Springer, 2020

COURSE OUTCOMES:

Student will able to

CO1: Describe the fundamentals of R programming.
CO2: Use R to create basic and advanced data visualizations.
CO3: Apply visualizations to interpret trends and patterns in data.
CO4: Construct effective visualizations to address real-world problems.
CO5: Explore and implement various plotting libraries for enhanced data representation.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech:CSE II Year- II Sem			
Course Code: N2200D	LINGUASKILL FOR PROFESSIONALS-B2 (Audit Course) (COMMON TO ALL)	L	T	P	C
		2	0	0	0

Pre-Requisites: A1-B1 levels (CEFR)

COURSE OBJECTIVES:

To enable students

6. Acquire an extensive range of vocabulary related to diverse topics.
7. Enhance pronunciation skills, focusing on specific sounds and intonation patterns
8. Improve the use of various grammar concepts
9. Strengthen listening, speaking, reading, and writing skills across different proficiency levels
10. Develop practical language skills for everyday communication scenarios

Module 1 **(6L)**

UNIT-1

Grammar: Tenses, Clauses and Conditionals, Questions

Vocabulary: Character adjectives, Words connected with 'get', trying and succeeding

Pronunciation: Letter 'e' and 'g'; Rapid speech, Intonation in Question tags

UNIT-2

Everyday English: Breaking off a conversation; Explaining and checking understanding; Agreeing; giving compliments and responding

- **Listening:** Listening Activity 1, Listening Activity 2 (A1 Level)
- **Reading:** Reading Activity 1, Reading Activity 2 (A1 Level)
- **Speaking:** Speaking Activity 1, Speaking Activity 2 (A1 Level)

Writing: Articles, Guidelines

Module 2 **(6L)**

UNIT-1

Grammar: Multi-word verbs; *used to* and *would*

Vocabulary: Words related to ability, achievements and sports; cause and result

Pronunciation: Constant sounds; sound 'u'; word stress

UNIT -2

Everyday English: Making suggestions; describing photos; expressing disagreement

- **Listening:** Listening Activity 1, Listening Activity 2 (A2 Level)
- **Reading:** Reading Activity 1, Reading Activity 2 (A2 Level)
- **Speaking:** Speaking Activity 1, Speaking Activity 2 (A2 Level)

Writing: Job Application, For and against essay

Module 3 **(6L)**

UNIT-1

Grammar: Infinitives and -ing forms; passives

Vocabulary: Attitude adjectives; words related to natural world and travel

Pronunciation: Sound 'th'; consonant clusters; intonation

UNIT-2

Everyday English: Responding to an idea; Discussing advantages and disadvantages

- **Listening:** Listening Activity 1, Listening Activity 2 (B1 Level)
- **Reading:** Reading Activity 1, Reading Activity 2 (B1 Level)
- **Speaking:** Speaking Activity 1, Speaking Activity 2 (B1 Level)

Writing: Travel blog, Complaint email

Module 4 **(6L)**

UNIT-1

Grammar: *too, enough, so/such*

Vocabulary: Words related to life in cities, money and finance, crime and film

Pronunciation: Sound 'o', 'l'

UNIT-2

Everyday English: Imagining, vague language, encouraging

- **Listening:** Listening Activity 1, Listening Activity 2 (B1+ Level)
- **Reading:** Reading Activity 1, Reading Activity 2 (B1+ Level)
- **Speaking:** Speaking Activity 1, Speaking Activity 2 (B1+ Level)
  Writing: Review, Opinion essay

Module 5 **(6L)**

UNIT-1

Grammar: Relative clause, reported speech

Vocabulary: Words related to health, thought and knowledge

Pronunciation: Sound 'ui'; linking

UNIT-2

Everyday English: Expressing uncertainty, clarifying a misunderstanding, interrupting and announcing a news

- **Listening:** Listening Activity 1, Listening Activity 2 (B2 Level)
- **Reading:** Reading Activity 1, Reading Activity 2 (B2 Level)
- **Speaking:** Speaking Activity 1, Speaking Activity 2 (B2 Level)
  Writing: Story

Text Books

6. Doff, Adrian, et al. *Empower Second Edition Student's Book with Digital Pack: B2 Upper Intermediate*. Cambridge University Press, 2022.

Reference Books

11. Cullen, Pauline, et al. The Official Cambridge Guide to IELTS for Academic and General Training: Student's Book with Answers. with DVD-ROM. Cambridge Univ. Press, 2014.

E-Resources

5. Cambridge English
6. English with Cambridge - YouTube
7. BBC Learning English - Learn English with BBC Learning English - Homepage
8. https://englishonline.britishcouncil.org/

Course Outcomes

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

CO1. Demonstrate a diverse vocabulary repertoire, facilitating better expression and comprehension.

CO2. Exhibit intelligible pronunciation skills, ensuring clearer oral communication.

CO3. Utilise various grammar concepts accurately and coherently.

CO4. Strengthened language skills across listening, speaking, reading, and writing.

CO5. Apply practical language skills effectively in everyday communication scenarios.

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	2	-	3	-	-
CO2	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO3	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO4	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO5	-	-	-	-	-	-	-	-	2	2	-	3	-	-
Average	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**	**3**	**-**	**-**

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