MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

B.Tech–Computer Science and Engineering (Data Science)

Course Structure (BT25)

Applicable From 2025-26 Admitted Batch

Structure Breakup

I YEAR I SEMESTER (I Semester)

S. No.	Course Code	Course Title	Course Area	Hours Per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIA)	External (SEE)	Total
		THEORY								
1	2510001	Matrices and Calculus	BS	3	1	0	4	40	60	100
2	2510008	Advanced Engineering Physics	BS	3	0	0	3	40	60	100
3	2510501	Programming for Problem Solving	ES	3	0	0	3	40	60	100
4	2510401	Electronic Devices and Circuits	ES	3	0	0	3	40	60	100
5	2510010	English for Skill Enhancement	HSMC	3	0	0	3	40	60	100
		LABORATORY								
1	2510071	Advanced Engineering Physics Lab	BS	0	0	2	1	40	60	100
2	2510571	Programming for Problem Solving Lab	ES	0	0	2	1	40	60	100
3	2510073	English Language and Communication Skills Lab	HSMC	0	0	2	1	40	60	100
4	2510371	Engineering Workshop	ES	0	0	2	1	40	60	100
		VALUE ADDED COURSE								
1		Foreign Language*	VAC	0	0	0	0	-	-	-
		Induction Program								
			Total Credits	**15**	**1**	**8**	**20**	**360**	**540**	**900**

- Students can choose any one of the foreign language from the given list
  - **i)** 25X0FL1 French
  - **ii)** 25X0FL2 German
  - **iii)** 25X0FL3 Spanish
  - **iv)** 25X0FL4 Korean

I YEAR II SEMESTER (II Semester)

S. No.	Course Code	Course Title	Course Area	Hours Per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIA)	External (SEE)	Total
		THEORY								
1	2520002	Ordinary Differential Equations and Vector Calculus	BS	3	0	0	3	40	60	100
2	2520009	Engineering Chemistry	BS	3	0	0	3	40	60	100
3	2520507	Object Oriented Programming through JAVA	PC	3	0	0	3	40	60	100
4	2520201	Basic Electrical Engineering	ES	3	0	0	3	40	60	100
		LABORATORY								
1	2520371	Engineering Drawing and Computer Aided Drafting	ES	2	0	2	3	40	60	100
2	2520072	Engineering Chemistry Lab	BS	0	0	2	1	40	60	100
3	2520271	Basic Electrical Engineering Lab	ES	0	0	2	1	40	60	100
4	2520578	Object Oriented Programming through Java Lab	PC	0	0	2	1	40	60	100
5	2520573	IT Workshop	ES	0	0	2	1	40	60	100
		Mandatory Course								
1	2520028	Indian Knowledge System	MC	1	0	0	1	40	60	100
		Value Added Course								
1	2520026	Yoga & Inner Engineering	MC	0	0	0	0	-	-	-
Total Credits				**15**	**0**	**10**	**20**	**400**	**600**	**1000**

II YEAR I SEMESTER (III Semester)

S. No.	Course Code	Course Title	Course Area	Hours Per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal (CIA)	External (SEE)	Total
		THEORY								
1	2530702	Mathematical and Statistical Foundations	BS	3	0	0	3	40	60	100
2	2530506	Computer Organization and Architecture	PC	3	0	0	3	40	60	100
3	2530504	Data Structures	ES	3	0	0	3	40	60	100
4	2530508	Software Engineering	PC	3	0	0	3	40	60	100
5	2530509	Database Management Systems	PC	3	0	0	3	40	60	100
		LABORATORY								
1	25300075	Computational Mathematics Lab	PC	0	0	2	1	40	60	100
2	25300574	Data Structures Lab	ES	0	0	2	1	40	60	100
3	2530579	Software Engineering Lab	PC	0	0	2	1	40	60	100
4	2530580	Database Management Systems Lab	PC	0	0	2	1	40	60	100
5	2530575	Python Programming Lab	ES	0	0	2	1	40	60	100
Total Credits				**15**	**0**	**10**	**20**	**400**	**600**	**1000**

II YEAR II SEMESTER (IV Semester)

S. No.	Course Code	Course Title	Course Area	Hours Per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P		Internal(CIA)	External (SEE)	Total
		THEORY								
1	2530505	Discrete Mathematics	PC	3	0	0	3	40	60	100
2	2540510	Operating Systems	PC	3	0	0	3	40	60	100
3	2540511	Algorithms Design and Analysis	PC	3	0	0	3	40	60	100
4	2540512	Computer Networks	PC	3	0	0	3	40	60	100
5	2540513	Machine Learning	PC	3	0	0	3	40	60	100
6	2530EXL3	Innovation and Entrepreneurship	PS	2	0	0	2	40	60	100
		LABORATORY								
1	2540582	Operating Systems Lab	PC	0	0	2	1	40	60	100
2	2540583	Computer Networks lab	PC	0	0	2	1	40	60	100
3	2540584	Machine Learning Lab	PC	0	0	2	1	40	60	100
4	2540585	Data Visualization- R Programming/ Power BI	SD	0	0	2	1	40	60	100
5	2540581	Node JS/React JS/ Django	SD	0	0	2	1	40	60	100
Total Credits				**17**	**0**	**10**	**22**	**440**	**660**	**1100**

I-I

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2510001: MATRICES AND CALCULUS

I Year B.Tech. I Sem	L	T	P	C
(CSE, CSD, CSM, ECE, EEE, MECH, CIVIL)	3	1	0	4

Pre-requisites: Mathematics courses of 10+2 year of study.

Course Objectives: The student will try to learn

- Types of matrices and their properties, concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of eigen values, eigen vectors and reduction of quadratic form to canonical form by orthogonal transformation.
- Geometrical approach to the mean value theorems and their application to the mathematical problems. Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative and finding maxima and minima of function of two and three variables.
- Evaluation of multiple integrals and their applications.

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

CO1: Recall the concepts of rank, Echelon form, Normal form, and the properties of non singular matrices.

CO2: Explain the process of finding eigenvalues and eigenvectors of a matrix and their role in diagonalization.

CO3: Relate Beta and Gamma functions to standard integrals and solve related problems.

CO4: Apply Euler's theorem and compute total derivatives for multivariable functions.

CO5: Understand the methods for changing variables in double and triple integrals, including transformations to polar, spherical, and cylindrical coordinates.

UNIT-I: Matrices **8L**

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, L-U decomposition method.

UNIT-II: Eigen values and Eigen vectors **10L**

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

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UNIT-III: Calculus **10L**

Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series (without proofs).

Beta and Gamma functions and their applications (properties without proof).

UNIT-IV: Multivariable Calculus (Partial Differentiation and applications) **10L**

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.

UNIT-V: Multivariable Calculus (Integration) **10L**

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

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5thEditon, 2016.

REFERENCE BOOKS:

1. Erwin kreyszig, Advanced Engineering Mathematics, 9thEdition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dassand Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.

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25X0008: ADVANCED ENGINEERING PHYSICS

(CIVIL, EEE, MECH, ECE, CSE, CSM & CSD**)**

I Year B.Tech. I/II SEM

L	T	P	C
3	0	0	3

Pre-requisites:10+2 Physics.

Course Objectives: The student will try to

1. Understand fundamental concepts of quantum mechanics and their applications in solids.
2. Study the basics of quantum computing, quantum gates and quantum algorithms.
3. Classify the crystal structures, defects and material characterization techniques like XRD and SEM.
4. Learn the properties and applications of magnetic as well dielectric materials.
5. Explore the working likewise applications of lasers and fibre optics in modern technology.

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

CO1: Illustrate the concepts of quantum mechanics for explaining particle behavior and energy band formation in solids.

CO2: Understand quantum computing concepts, quantum gates and basic quantum algorithms.

CO3: Identify crystal structures, defects and XRD and SEM techniques for material characterization.

CO4: Classify magnetic and dielectric materials and their applicability in engineering contexts.

CO5: Explain the principles of lasers and fibre optics and their applications across various fields in scientific practices.

UNIT-I: Quantum Mechanics

Introduction to quantum physics, Blackbody radiation (Qqualitative), Photoelectric effect, de-Broglie Hypothesis, Matter waves, Heisenberg uncertainty principle, Eigen values and Eigen functions, Schrödinger's time independent wave equation, Physical significance of wave function, Particle in a 1D box, Bloch's theorem (qualitative), Kronig-Penney model (qualitative), Effective mass of electron.

UNIT-II: Quantum Computing

Introduction, Concept of quantum computer, Linear algebra for quantum computation, Dirac's Bra and Ket notation and their properties, Hilbert space, Classical bits, Qubits: single and multiple Qubit system, Bloch's sphere, Entanglement, Quantum gates, Evolution of quantum systems, Quantum measurements, Challenges and advantages of quantum computing over classical computation, Quantum computing system for information processing, Quantum algorithms: Deutsch-Jozsa, Grover.

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UNIT-III: Crystallography & Materials Characterization

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.

Bock diagram and working principle of X-ray diffraction (XRD), Scanning electron microscopy (SEM).

UNIT-IV: Magnetic and Dielectric Materials

Introduction to magnetic materials, Origin of magnetic moment, Classification of magnetic materials, Hysteresis, Weiss domain theory of ferromagnetism, soft and hard magnetic materials, Magneto Resistance, Synthesis of magnetic 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, Pyro electric materials and their applications: Ferroelectric Random-Access Memory (Fe-RAM) and fire sensor.

UNIT-V: Laser and Fibre Optics

Introduction to Laser, three quantum processes - Stimulated Absorption, Spontaneous emission, Stimulated Emission Characteristics of laser, Einstein coefficients and their relations, Meta stable state, Population inversion, Pumping, Lasing action, Ruby laser, He-Ne laser, Semiconductor diode laser, Applications: Bar code scanner.

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:

1. TVS Arun Murthy & MN Avadhanulu," Advanced Engineering Physics", S. Chand Publications.
2. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2nd Edition, 2022.
3. Shatendra Sharma and Jyotsna Sharma, "Engineering Physics", Pearson Publication, 2019.
4. A.P. Siva Kumar, Y Subba Reddy, "Introduction to Quantum Technologies and applications".
5. M. N. Avadhanulu, P. G. Kshirsagar& TVS Arun Murthy "A Text book of Engineering Physics", S. Chand Publications, 11th Edition 2019.
6. S O Pillai "Solid State Physics", New Age International Private Limited, 8th Edition, 2018.

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REFERENCE BOOKS:

1. Quantum Physics, H.C.Verma, TBS Publication, 2nd Edition 2012.
2. Elementary Solid-State Physics, S.L.Gupta and V.Kumar, PragathiPrakashan, 2019.
3. A.K. Bhandhopadhya -Nano Materials, NewAgeInternational,1st Edition,2007.
4. Engineering Physics, S P Basavaraj, 2005 Edition.
5. Engineering Physics by Gupta and Gour, DhanpatRai Publications, 2016 (Reprint).
6. Vishal Sahani, Quantum Computing, McGraw Hill Education, 2007 Edition.

E-sources

- 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://dpbck.ac.in/wp-content/uploads/2022/10/Introduction-to-Solid-State-PhysicsCharles-Kittel.pdf
- https://www.thomaswong.net/introduction-to-classical-and-quantum-computing-1e4p.pdf
- https://www.fi.muni.cz/usr/gruska/qbook1.pdf
- https://profmcruz.wordpress.com/wp-content/uploads/2017/08/quantum-computation-and- quantum-information-nielsen-chuang.pdf

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25X0501 : PROGRAMMING FOR PROBLEM SOLVING

L	T	P	C
3	0	0	3

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.

Course Outcomes: After Completion of the Course, Students should be able to:

1. Apply selection and repetition control structures for algorithmic problem solving.
2. Design modular C programs using top-down approach, library functions, user-defined functions, pointers, scope rules, and parameter passing mechanisms.
3. Develop programs using one-dimensional and multidimensional arrays, strings, string library functions, and array-based function arguments.
4. Analyze and implement recursive solutions and user-defined data types such as structures and unions, including structured input, output, and function return values.
5. Construct programs involving text and binary file handling, database search operations, and implement fundamental searching and sorting algorithms on data collections.

UNIT - I: Overview of C: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 - II: Top-Down Design with Functions: 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 - III: Arrays: 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 - IV: Recursion: 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 - V: Text and Binary File Pointers: 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.

2510401: ELECTRONIC DEVICES AND CIRCUITS

I Year B.Tech. CSM I – Sem. **L T P C**

3 0 0 3

Couse 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.

Pre-requisites: Knowledge on Basic Electrical Engineering and Semiconductor Device Physics.

Course Objectives:

The students will try to learn

- Characteristics of semiconductor diodes, their models, and applications
- Structure, operation, and characteristics of Bipolar Junction Transistors (BJT) in various configurations, along with the determination of h-parameters
- Need for transistor biasing, load line analysis, operating point selection, and various biasing techniques with emphasis on stabilization and prevention of thermal runaway
- The design and analysis of transistor-based small-signal amplifiers using h-parameters in CE, CB, and CC configurations with approximate models
- Principles, operation, and characteristics of special-purpose diodes, FET devices, and advanced transistors like FinFETs and CNTFETs

Course Outcomes:

After successful completion of the course, students shall be able to

- Analyze the electrical characteristics and models of semiconductor diodes and apply them in rectifier and clipping circuits
- Evaluate the operation and configurations of Bipolar Junction Transistors (BJTs) and analyze their input and output characteristics
- Design appropriate biasing networks for BJTs and determine the operating point for amplifier applications
- Analyze transistor amplifier circuits using h-parameter models and assess performance for various configurations
- Analyze the structure, working, and characteristics of JFETs, MOSFETs, and advanced devices like FinFETs and CNTFETs, and compare modern device technologies.

Module – I: Diode Characteristics and Applications **7L**

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

Module – II: Bipolar Junction Transistor (BJT) **6L**

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.

Module – III: BJT Biasing **6L**

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.

Module – IV: Transistor Amplifiers **6L**

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.

Module – V: Special Purpose Diodes, Field Effect Transistors and Advanced Devices **10L**

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. 3rd edition, Tata McGraw-Hill, 2010.
2. Boylestad, Robert L., and Louis Nashelsky. Electronic Devices and Circuit Theory, 11th edition, Pearson, 2013.

REFERENCES:

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.

		L	T	P	C
25X0010	**English for Skill Enhancement** **Civil, EEE, Mech, ECE, CSE,CSM & CSD**	**3**	**0**	**0**	**3**

Introduction

The course, aligned with the National Education Policy 2020, aims to develop students' proficiency in English by focusing on Listening, Speaking, Reading, and Writing (LSRW) skills. It emphasizes clear and effective communication for academic, personal, and professional needs while promoting cultural and value-based learning. Through a structured syllabus, interactive teaching methods, and authentic learning materials, students will enhance vocabulary, grammar, comprehension, and writing skills for lifelong learning.

Prerequisites: Language Comprehension

Course Objectives: This course will enable the students to:

a. Improve their vocabulary.

b. Use appropriate sentence structures in their oral and written communication.

c. Develop their reading and study skills.

d. Equip students to write paragraphs, essays, précis and draft letters.

e. Acquire skills for technical report writing.

Course Outcomes: After successful completion of the course, students should be able to:

1. Identify appropriate vocabulary in their oral and written communication.
2. Demonstrate their understanding of the rules of functional grammar and sentence structures.
3. Develop comprehension skills from known and unknown passages.
4. Construct paragraphs, essays, précis, and draft letters.
5. Utilize abstracts and reports in various contexts

MODULE–I

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 BlackSwan 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.

MODULE–II

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.

MODULE–III

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.

MODULE–IV

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.

MODULE–V

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.***

Note: ***Listening and Speaking skills which are given under Unit-6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.***

- (**Note**: As the syllabus of English given in AICTE *Model Curriculum-2018 for B.Tech First Year is* ***Open-ended***, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.)

Prescribed Textbook

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

References:

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 Univeristy 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.

Useful Links

- **https://owl.purdue.edu/owl/general_writing/grammar/index.html?utm_source=chatgpt.com**
- **https://www.ego4u.com/?utm_source=chatgpt.com**
- **https://www.eslfast.com/?utm_source=chatgpt.com**
- **https://learnenglish.britishcouncil.org/skills/reading?utm_source=chatgpt.com**

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MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

25X0071: ADVANCED ENGINEERING PHYSICS LAB

(Civil, EEE, Mech, ECE, CSE, CSM & CSD**)**

	L	T	P	C
I Year B.Tech. I/II SEM	**0**	**0**	**2**	**1**

Pre-requisites:10+2 Physics

Course Objectives: The student will try to

1. Capable of handling instruments related to the Hall effect Experiment and their measurements.
2. Understand the characteristics of various devices such as solar cell, lasers and optical fiber.
3. Apply the analytical techniques & graphical analysis for Stewart Gees, B-H curve.
4. Synthesize and study the physical properties of materials like semiconductors ferromagnetic and ferroelectric substances.
5. Develop intellectual communication skills through discussion on basic principles of scientific concepts in a group.

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

CO1: Demonstrate the Planck's constant using Photo electric effect and Apply the Hall effect and band gap measurement techniques to examine semiconductor properties.

CO2: Determine key electrical, magnetic and optical properties of semiconductors and other functional materials.

CO3: Describe the steps involved in the Synthesis of magnetic nanomaterials using chemical methods.

CO4: Compare the variation of magnetic and electric field and the behaviors of hysteresis curve. Interpret data analysis.

CO5: Demonstrate working of laser systems, optical fiber and solar cell parameters through experimental study.

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List of Experiments: (Any 8 experiments are to be performed)

1. Determination of work function and Planck's constant using photo electric effect
2. Determination of Hall coefficient and carrier concentration of a given semiconductor
3. Determination of energy gap of a semiconductor
4. Synthesis of magnetic (Fe_3O_4) nanoparticles using sol-gel method.
5. Study of B-H curve of a ferromagnetic material
6. Determination of magnetic field induction along the axis of a current carrying coil.
7. Determination of dielectric constant of a given material.
8. Study of V-I and P-I characteristics of solar cell.
9. Determination of wavelength of a laser using diffraction grating and to study of V-I & 55L-I characteristics of a given laser diode
10. Determination of numerical aperture of a given optical fibre and to determination of bending losses of a given optical fibre.

Open Ended Experiments: (Any 2 experiments are to be performed)

1. To calculate the concentration of charge carriers in the sample using Hall effect - NITK, Surathkal Virtual Lab.
2. To draw hysteresis (B-H curve) of a specimen in the form of a transformer and to determine its hysteresis loss - IIT Kanpur Virtual Lab.
3. To calculate the beam divergence and spot size of the given laser beam - Amritha Viswa Vidya Peetham Virtual Lab
4. To study various crystals structures - Amritha Viswa Vidya Peetham Virtual Lab

References / E-sources:

1. Kittel, Charles, and Paul McEuen. Introduction to solid state physics. John Wiley & Sons, 2018. https://ph1-nitk.vlabs.ac.in/exp/hall-effect/references.html.
2. Kasap S O., Principles of Electronic Materials and Devices, 3rd Ed, Mcgraw Hill, 2006). https://bop2-iitk.vlabs.ac.in/exp/hysteresis-loss/references.html.
3. Koechner, Walter. Solid-State Laser Engineering. Berlin: Springer, 2006. https://lo-amrt.vlabs.ac.in/exp/laser-beam-divergence/references.html.
4. Pillai, SO. Solid State Physics, City: New Age Publications (Academic), India, 2005. https://ssp-amrt.vlabs.ac.in/exp/crystal-structure/references.html.

25X0571 : PROGRAMMING FOR PROBLEM SOLVING LAB

L	T	P	C
0	0	2	1

Course Objectives: The students will learn the following:

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

Course Outcomes: After Completion of the Course, Students should be able to:

1. Solve simple numeric problems using C programs involving conditional statements, loops, arithmetic operations, number systems, and series generation.
2. Evaluate expressions and implement logic using decision making, switch cases, looping constructs, recursion, and problem-solving techniques such as prime checking, palindrome detection, and digit manipulation.
3. Develop modular programs using arrays, pointers, and functions for data processing tasks including statistical computation, matrix operations, and array traversal techniques.
4. Implement string manipulation and file handling programs for text processing, character analysis, file copying, merging, and data validation operations.
5. Apply searching and sorting algorithms on integer and string datasets using linear search, binary search, bubble sort, selection sort, and insertion sort techniques.

PRACTICE SESSIONS:

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.

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.

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.

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).

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.

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:

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 code	Course name	L	T	P	C
2510073	English Language and Communication Skills Lab Civil, EEE, Mech, ECE,CSE, CSM & CSD	0	0	2	1

The **English Language and Communication Skills (ELCS) Lab** focuses on listening and speaking skills, particularly on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Objectives: This course will enable the students to:

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

Course Outcomes: After successful completion of the course, student will be able to:

1. **Identify** key information while listening to spoken texts.
2. **Interpret** the speaker's intention from the speech.
3. **Apply** pronunciation techniques to improve intelligibility.
4. **Demonstrate** fluency, clarity, and confidence while speaking.
5. **Use** English effectively in real-life situations.

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

a. Computer Assisted Language Learning (CALL) Lab which focusses on listening skills
b. Interactive Communication Skills (ICS) Lab which focusses on speaking skills

The following course content is prescribed for the **English Language and Communication Skills Lab**.

Exercise – I

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

Exercise – II

CALL Lab:

Instruction: Listening vs. Hearing - Barriers to Listening

Practice: Listening for General Information - Multiple Choice Questions - Listening Comprehension Exercises (It is essential to identify a suitable passage with exercises for practice.)

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

Exercise - III

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 (A wide range of Materials / Handouts are to be made available in the lab.)

Exercise – IV

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

Exercise – V

CALL Lab:

Instruction: Identifying the literal and implied meaning

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

(It is essential to identify a suitable passage with exercises for practice.)

ICS Lab:

Instruction: Understanding Non-Verbal Communication

Practice: Silent Speech - Dumb Charades Activity

- Post-Assessment Test on 'Express Your View'

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software

for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

i)Computers with Suitable Configuration

ii) High Fidelity Headphones

1. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo – audio & video system and camcorder etc.

- **Note: English Language Teachers are requested to prepare Materials / Handouts for each Activity for the Use of those Materials in CALL & ICS Labs.**

Suggested Software:

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10th Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).

References:

- Shobha, KN &Rayen, J. Lourdes. (2019). Communicative English – A workbook. Cambridge University Press
- Board of Editors. (2016). ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient BlackSwan Pvt. Ltd.
- Mishra, Veerendra et al. (2020). English Language Skills: A Practical Approach. Cambridge University Press
- (2022). English Language Communication Skills – Lab Manual cum Workbook. Cengage Learning India Pvt. Ltd.
- Ur, Penny and Wright, Andrew. 2022. Five Minute Activities – A Resource Book for Language Teachers. Cambridge University Press.

2510371: ENGINEERING WORK SHOP

L	T	P	C
0	0	2	1

B.Tech. I Year I Sem

Course Objectives:

1. To Study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at work place.
5. It explains the construction, function, use and application of different working tools, Equipment and machines

Course Outcomes:

1. Explain the design and model different prototypes in the carpentry trade such as Cross lap joint, Dove tail joint. (L4)
2. Demonstrate the design and model various basic prototypes in the trade of fitting such as Straight fit, V- fit. (L4)
3. Understand to make various basic prototypes in the trade of Tin smithy such as rectangular tray, and open Cylinder. (L4)
4. Demonstrate the design and model various basic prototypes in the trade of Welding. (L4)
5. Explain to make various basic prototypes in the trade of Black smithy such as J shape, and S shape. (L4)
6. Understand to perform various basic House Wiring techniques such as connecting one lamp with one switch, connecting two lamps with one switch, connecting a fluorescent tube, Series wiring, Go down wiring. (L4)

UNIT I - CARPENTRY & FITTING

- **Carpentry** – Introduction, Carpentry tools, sequence of operations and applications (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
- **Fitting** – Introduction, fitting tools, sequence of operations and applications (V- Fit, Dovetail Fit & Semi-circular fit)

Learning Outcomes: Students should be able to,

- Understand the trade of carpentry and fitting. (L2)
- Explain the tools involved in manufacturing operations. (L3)

- Evaluate the applications of carpentry and fitting. (L4)

UNIT II - TIN SMITHY AND BLACKSMITHY

- **Tin-Smithy** –Introduction, Tin smithy tools, sequence of operations and applications (Square Tin, Rectangular Tray & Conical Funnel).
- **Blacksmith**-Introduction, Blacksmith tools, sequence of operations and applications (Round to Square, Fan Hook and S-Hook)

Learning Outcomes: Students should be able to,

- Understand the oldest manufacturing methods. (L2)
- Describe the sequence of operations involved. (L3)
- Explain the safety precautions and tools usage. (L4)

UNIT III - HOUSE WIRING AND WELDING

- **House-wiring** – Introduction, Electrical wiring tools, sequence of operations and applications (Parallel & Series, Two-way Switch and Tube Light)
- **Welding Practice** – Introduction, electrode, welding tools, and sequence of operations. Advantages and applications (Arc Welding)

Learning Outcomes:

- Students should be able to,
- Discuss the topic of House Wiring(L3)
- Explain Safety precautions of welding (L4)

Text Books:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

References:

1. Work shop Manual – P. Kannaiah/ K. L. Narayana/ SciTech
2. Workshop Manual / Venkat Reddy/ BSP

I-II

2520002: ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

I Year B.Tech. II – Sem	**L**	**T**	**P**	**C**
(CSE, CSD, CSM, ECE, EEE, MECH, CIVIL)	**3**	**0**	**0**	**3**

Pre-requisites: Mathematics courses of 10+2 year of study.

Course Objectives: The student will try to learn

- Methods of solving the differential equations of first order and first degree.
- Concept of higher order liner differential equations.
- Concept, properties of Laplace transforms, solving ordinary differential equations by using Laplace transforms techniques.
- The physical quantities involved in engineering field related to vector valued functions.
- The basic properties of vector valued functions and their applications to line, surface and volume integrals.

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

CO1: Utilize the methods of differential equations for solving Newton's law of cooling and Law of Natural growth and decay.

CO2: Understand the solutions of linear differential equations with constant coefficients.

CO3: Explain the concept of the Laplace transforms and its significance in solving differential equations and evaluating integrals.

CO4: Interpret the vector differential operators and their relationships for solving engineering problems.

CO5: Apply the integral transformations to line, surface and volume of different geometrical models.

UNIT-I: First Order ODE **8L**

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.

UNIT-II: Ordinary Differential Equations of Higher Order **10L**

Second 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, Equations reducible to linear ODE with constant coefficients: Cauchy-Euler equation, Legendre's equation.

UNIT-III: Laplace transforms **10L**

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Second shifting theorem, Unit step function, Dirac delta function, Laplace transforms of

functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function (All without proof), Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

UNIT-IV: Vector Differentiation **10L**

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration **10L**

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

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dassand Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.

2520009: ENGINEERING CHEMISTRY

L	T	P	C
3	0	0	3

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, biosensors, and analytical techniques applicable in engineering, industrial, environmental, and biomedical fields.

Course Outcomes: After Completion of the course, students should be able to

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

CO2: Acquire the knowledge of electrochemical processes and their relevance to corrosion and its control methods.

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

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

CO5: Apply the medicinal values in daily life

UNIT-I: Water and its treatment: [8]

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 break- point chlorination.

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.

UNIT-II: Electrochemistry and Corrosion: [8]

Introduction- Electrode potential, standard electrode potential, Nernst equation (no derivation), electrochemical cell - Galvanic cell, cell representation, EMF of cell - Numerical problems. Types of electrodes, reference electrodes - Primary reference electrode - Standard Hydrogen Electrode (SHE), Secondary reference electrode - Calomel electrode. Construction, working and determination of pH of unknown solution using SHE and the Calomel electrode.

Corrosion: Introduction- Definition, causes and effects of corrosion – Theories of corrosion, chemical and electrochemical theories of corrosion, Types of corrosion: galvanic, water-line and pitting 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.

UNIT–III: Energy sources: [8]

Batteries: Introduction – Classification of batteries - Primary, secondary and reserve batteries with examples. Construction, working and applications of Zn-air 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, Cracking - Types of cracking- Moving bed catalytic cracking. LPG and CNG composition and uses.

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

UNIT - IV: Polymers: [8]

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, Buna-S, Nylon-6,6). Differences between thermoplastics and thermo setting plastics, Fiber reinforced plastics (FRP).

Conducting polymers: Definition and Classification with examples - Mechanism of conduction in trans- poly-acetylene and applications of conducting polymers.

Biodegradable polymers: Polylactic acid and its applications.

UNIT-V- Advanced Functional Materials: [8]

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

Biosensor - Definition, Amperometry Glucose monitor sensor.

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

Lubricants: Definition and characteristics of a good lubricant — thin film mechanism of lubrication, properties of lubricants - viscosity, cloud and pour point, flash and fire point.

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.

2520507: OBJECT ORIENTED PROGRAMMING THROUGH JAVA

B.Tech. I Year II Sem.

L	T	P	C
3	0	0	3

Prerequisite: Programming for Problem Solving

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

Course Outcomes: After Completion of the Course, Students Should be able to:

1. Understand object-oriented principles, Java language fundamentals, class structures, object creation, memory management, and core language features.
2. Analyze inheritance mechanisms, polymorphism concepts, packages, interfaces, and access control rules within Java applications.
3. Apply exception handling techniques and multithreading concepts for robust and concurrent Java program development.
4. Examine core Java libraries including String, Object, java.util, and java.io, along with event handling and layout management mechanisms.
5. Design graphical user interfaces using Swing components, MVC architecture, menus, containers, and event-driven programming models.

UNIT - I

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 - II

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 - III

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 - IV

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 - V

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 BOOKS:

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.
3. Introduction to Java programming, Y. Daniel Liang, Pearson education.
4. An introduction to Java programming and object-oriented application development, R.A. Johnson- Thomson.
5. Core Java 2, Vol 1, Fundamentals, Cay.S. Horstmann and Gary Cornell, eighth Edition, Pearson Education.
6. Core Java 2, Vol 2, Advanced Features, Cay.S. Horstmann and Gary Cornell, eighth Edition, Pearson Education
7. Object Oriented Programming with Java, R.Buyya, S.T.Selvi, X.Chu, TMH.
8. Java and Object Orientation, an introduction, John Hunt, second edition, Springer.
9. Maurach's Beginning Java2 JDK 5, SPD.

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25X0201: BASIC ELECTRICAL ENGINEERING
(Common to CSE, CSD and CSM)

I Year B. Tech **L T P C**
3 0 0 3

Prerequisite: Mathematics

Course Objectives:

- To understand the fundamental principles of electrical circuits and apply Kirchhoff's laws and network theorems for DC and AC circuit analysis.
- To develop analytical skills in evaluating current, voltage, power, and power factor in single-phase and three-phase AC circuits.
- To explain the construction, working principles, equivalent circuits, and performance characteristics of electrical transformers.
- To comprehend the operating principles, characteristics, and applications of DC machines, induction motors, and synchronous machines.
- To familiarize with the components of electrical installations, wiring systems, earthing methods, and perform basic energy and power factor calculations.

Course Outcomes: After completion of this course the student will be able to

- Apply Kirchhoff's laws and network theorems for analyzing DC circuits and determine transient responses of first-order RL and RC circuits.
- Analyze single-phase and three-phase AC circuits for compute voltage, current, power, and power factor, and identify resonance conditions.
- Evaluate the performance of single-phase and three-phase transformers in terms of efficiency, voltage regulation, and losses.
- Explain the construction, working principles, and performance characteristics of DC machines, induction motors, and synchronous generators.
- Perform basic electrical installation calculations involving wiring, earthing, energy consumption, and power factor improvement.

MODULE-I

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.

MODULE-II

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 (only series), resonance in series R-L-C circuit.

MODULE-III

Transformers: Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

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MODULE-IV

Electrical Machines: Construction and working principle of dc machine, Construction and working of a three-phase induction motor, Significance of torque-slip characteristics. Construction and working of Single-phase induction motor, Construction and working of synchronous generator.

MODULE-V

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Characteristics of batteries and battery backup.

TEXT BOOKS:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS:

1. P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, "Basic Electrical Engineering", S. Chand, 2nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989

2510301: ENGINEERING DRAWING AND COMPUTER AIDED DRAFTING

I YEAR II SEM

L	T	P	C
2	0	2	3

Course Overview:
Engineering Drawing and Computer Aided Drafting is a fundamental subject that trains students in the visualization and representation of engineering objects using both conventional methods and modern CAD tools. It begins with geometrical constructions, scales, and engineering curves such as conic sections and cycloidal curves. Students then progress to orthographic projections of points, lines, planes, and solids, including auxiliary and sectional views. The subject also introduces development of surfaces and isometric projections, enabling conversion between 2D and 3D representations. Overall, it builds essential skills in technical drawing, spatial visualization, and CAD, preparing learners for advanced design applications.

Prerequisite: Nil

Course Objective: The students will try to learn
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.

Course Outcomes: After successful completion of the course, students should be able to
1. Understand and apply the principles of orthographic and isometric projections.
2. Create sectional views and dimensioned drawings using BIS standards.
3. Use CAD software to generate 2D engineering drawings.
4. Visualize and construct solid models from 2D views.
5. Interpret and produce engineering drawings of mechanical components and assemblies for practical and industrial applications.

Module-I: Introduction to Engineering Graphics (Conventional) [12]

Principles of Engineering Graphics and their Significance, Geometrical Constructions, Scales, Plain and Diagonal, Conic Sections (Ellipse, Parabola and Hyperbola) General method only. Cycloid, Epicycloid and Hypocycloid.

Module-II: Orthographic Projections (Conventional and Computer Aided) [14]
Principles of Orthographic Projections, Conventions, Projections of Points and Lines, Projections of Plane regular geometric figures. Planes inclined one Plane. Computer aided orthographic projections, points, lines and planes. Introduction to Computer aided drafting, views, commands.

Module-III: Projections of Regular Solids (Conventional and Computer Aided) [12]
Auxiliary Views, Sections or Sectional views of Right Regular Solids, Prism, Cylinder, Pyramid, Cone, Auxiliary views, Computer aided projections of solids, sectional views.

Module-IV: Development of Surfaces (Conventional) [10]
Prism, Cylinder, Pyramid and Cone.

Module-V: Isometric Projections (Conventional and Computer Aided) [12]
Principles of Isometric Projection, Isometric Scale, Isometric Views, Conventions, Isometric Views of Lines, Plane Figures, Conversion of Isometric Views to Orthographic Views and Vice- versa, Conventions. 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 Edition, 2015.

2520072: ENGINEERING CHEMISTRY LAB

L	T	P	C
0	0	2	1

Course Description: The course includes experiments based on fundamental principles of chemistry essential for engineering students, aiming to develop practical skills and reinforce theoretical concepts.

Course Objectives

1. Students will understand and perform experiments based on core chemical principles relevant to engineering applications.
2. Students will learn to estimate the hardness of water to assess its suitability for drinking purposes.
3. Students will acquire the ability to perform acid-base titrations using instrumental methods such as conductometry, potentiometry, and pH metric.
4. Students will gain hands-on experience in synthesizing polymers like Bakelite and Nylon – 6, 6 in the laboratory.
5. Students will learn to determine the unknown concentration of potassium permanganate (KMnO4) using a calibration curve.

Course Outcomes:

CO1: Develop the p r a c t i c a l skills through hands-on chemistry experiments relevant to engineering.
CO2: Determine the i m p o r t a n t parameters such as water hardness and the corrosion rate of mild steel under various conditions.
CO3: Apply the techniques like conductometry, potentiometry, and pH metric to determine concentrations or equivalence points in acid base reactions.
CO4: synthesize the polymers such as Bakelite and Nylon-6,6.
CO5: Determine the unknown concentration of strong acid with strong base by Potentiometry using quinhydrone

List of Experiments:

I. Volumetric Analysis: Estimation of Hardness of water by EDTA Complexometric method.

II. Conductometry:
1. Estimation of the concentration of strong acid by Conductometry.
2. Estimation of the concentration of strong and weak acid in an acid mixture by Conductometry.

III. Potentiometry:
1. Estimation of concentration of Fe^{+2} ion by Potentiometry using KMnO4.
2. Estimation of concentration of strong acid with strong base by Potentiometry using quinhydrone

IV. pH Metry: Determination of an acid concentration using pH meter.

V. Preparations:
1. Preparation of Bakelite.
2. Preparation Nylon – 6, 6.

VI. **Corrosion:** Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.

VI Lubricants:
1. Estimation of acid value of given lubricant oil.
2. Estimation of viscosity of lubricant oil using Ostwald's Viscometer.

VII Virtual lab experiments:
1. Construction of Fuel cell and it's working.

2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

OPEN ENDED EXPERIMENTS:

1. Aspirin
2. Paracetamol

REFERENCE BOOKS:

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

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25X0271: BASIC ELECTRICAL ENGINEERING LAB
(Common to CSE, CSD and CSM)

I Year B.Tech **L T P C**
0 0 2 1

Co requisite: Basic Electrical Engineering.

Course Objectives:

- Understand and verify the fundamental electrical laws and theorems governing DC circuits through practical experiments.
- Develop analytical skills in applying circuit analysis methods and network theorems to determine loop currents and voltages.
- Explore the behavior of RLC series circuits and determine their impedance and resonance characteristics using simulation.
- Investigate the resonance conditions in parallel RLC circuits and analyze waveform parameters such as RMS and average values using simulation.
- Measure and evaluate active and reactive power for different electrical loads through simulations.

Course Outcomes: After going through this lab the student will be able to

- Verify fundamental electrical laws and theorems such as KVL, KCL, Ohm's Law, Thevenin's and Norton's theorems through practical experiments.
- Demonstrate network theorems by applying the Superposition theorem and mesh analysis
- Analyze impedance and frequency response characteristics of RLC series circuits using simulation.
- Evaluate resonance conditions and waveform parameters in RLC circuits using simulation.
- Evaluate active and reactive power for various types of electrical loads using simulation.

From the below 12 experiments minimum 10 experiments are required to be conducted as compulsory experiments:

1. Verification of Kirchhoff's Voltage Law (KVL) and Kirchhoff's Current Law (KCL).
2. Verification of Ohm's Law.
3. Verification of Thevenin's Theorem and Norton's Theorem.
4. Verification of Superposition Theorem.
5. Determination of Loop Currents using Mesh Analysis.
6. Computation and Verification of Impedance in RLC Series Circuits using digital simulation.
7. Study of Resonance in Series RLC Circuit using digital simulation.
8. Study of Resonance in Parallel RLC Circuit using digital simulation.
9. Determination of RMS and Average values of a Sinusoidal Waveform using digital simulation.
10. Measurement of Active and Reactive Power for different Loads (R and RL) using digital simulation.
11. Verification of Kirchhoff's voltage law providing basic series DC Circuit with resistors using digital simulation. Where Vs= 6 V, R_1 = 100 Ω, R_2 = 220 Ω, R_3 = 1k Ω.
12. Verification of Kirchhoff's current law providing basic parallel DC Circuit with resistors using digital simulation. Where Vs = 6V, R_1 = 100 Ω, R_2 = 220 Ω, R_3 = 1k Ω.

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Proposed open ended experiments:

1. Verification of current division in circuits by using digital simulation.
2. Verification of voltage division in circuits by using digital simulation.

TEXT BOOKS:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS:

1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker, "Basic Electrical Engineering", S. Chand, 2nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

B.Tech. I Year II Sem.

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.

Course Outcomes: After Completion of the Course, Students Should be able to:

1. Demonstrate proficiency with Java development environments, debugging tools, code refactoring features, and basic program execution workflows.
2. Develop Java applications using GUI components, layout managers, event handling mechanisms, and exception handling techniques.
3. Apply object-oriented programming concepts such as classes, inheritance, abstraction, polymorphism, and data structures within Java programs.
4. Implement multithreading concepts including thread creation, synchronization, inter-thread communication, and concurrent problem solving.
5. Design Java programs for file handling, directory traversal, data storage using collections, and user interaction through event-driven 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 following:
   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 a name 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
15. concept of inter thread communication.

16. 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.

25X0573 : 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: After Completion of the Course, Students should be able to:

- Identify computer peripherals, internal CPU components, and explain their functions through block diagrams and hands-on PC assembly and disassembly activities.
- Perform operating system installations including Windows and Linux, and configure dual-boot systems demonstrating system setup and troubleshooting skills.
- Configure network connectivity, TCP/IP settings, web browsers, and demonstrate effective use of internet services, search engines, and cyber hygiene practices.
- Create professional documents using LaTeX and Word incorporating advanced formatting, tables, styles, references, newsletters, and document collaboration features.
- Develop spreadsheets and presentations using Excel and PowerPoint involving data analysis, formulas, charts, conditional formatting, and interactive presentation techniques.

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.*

Course code	Course name	L	T	P	C
25X0028	Indian Knowledge System	1	0	0	1

Bharat is considered one of the oldest civilizations of the world. Some of the archaeological evidences proved the existence of Indus Valley Civilization in 7000 B.C. Bhartiya traditions, culture, cultural activities, rituals, sacraments, painting, art of dancing, art of singing etc. is being practiced till the modern times without knowing scientific approaches behind that. Eternity of Indian knowledge system proved itself that not only many rituals but also many traditions, many streams of knowledge like astrology, mathematics, physics, chemistry, biology, language studies, yoga and meditation had been following from the starting till now with some changes, in the form of traditions.
This course is for undergraduate students to inculcate Indian values. It will promote advance study and inter disciplinary research on all aspects of the Indian knowledge system.

Course Objectives: This course aims:

1. To provide a tribune of the rich culture and traditions of Indian knowledge system to studentsof various disciplines.
2. To introduce historical account on the education and scientific literature available in ancientIndian traditions and its connections with ancient Indian Philosophy
3. To give insights about the applications of Bharatiya Jnana Parampara
4. To introduce Indian approach towards health and wellbeing
5. To elaborate vast contribution of ancient Indian researchers, engineers, scientists and architects to the modern world.

Course Outcomes: After completion of the course, Students should be able to

1. Understand nature, scope and related fields of Indian knowledge system.
2. Demonstrate the scientific literature available in ancient Indian traditions
3. Understanding the application of Bharatiya Jnana Parampara
4. Understand Indian approach towards Wellbeing
5. Appreciate vast contribution of ancient Indian researchers, engineers, scientists and architectsto the modern world

Syllabus:

Unit 1: Introduction to Indian Knowledge Systems
Meaning, Nature, Scope and Salient Aspects of Bharatiya Jnana Parampara - Introduction to Vedas, Upanishads, Vidya, Kala, Jnana, Shastra - Practices and Continuity of Tradition.

Unit 2: Overview of History of Indian Education and Scientific Literature

Gurukul System - Role of Sanskrit in Natural Language Processing - Scientific Literature - Vedic Literature - Available Scientific Treatises –Interlinking

Unit 3: Introduction to Scientific Theories from Pure Sciences from Ancient Indian Knowledge Systems
Overview of theories from available ancient Indian Literature about Physics, Chemistry and Mathematics –Interlinking and applications

Unit 4: Introduction to Ancient Indian Wellness Systems
Concept of Wellness – Yoga System - Ayurveda System - Ancient Indian Aesthetics

Unit 5: Development of Engineering, Science, Technology & Fine Arts in India
Various Industries - Silk, Cotton and Ship Building - Evolution of Indian Fine Arts – Cave and Temple Architecture, Vastu - Vidya, Sculpture, Forts and Step-wells, Observatories and Paintings - Music and Natyakala - Cultural Traditions & Folk Arts

Pedagogy for Teachers: Apart from Class Room Instruction, the following Methods are Suggested
1. Project based activities and learning.
2. Presentation and case studies.
3. Film screening and book reviews.
4. Visit to historical places, archives centre, research centre or library nearby.

Note: Activities mentioned above are only suggestive. Teacher-educators should encourage students to be innovative.

Suggested Readings:
1. B. Mahadevan, Bhat Vinayak and Nagendra Pavan R.N., (2022) 'Introduction to Indian Knowledge Systems: Concepts and Applications' PHI learning PVT, New Delhi ISBN [9789391818203]
2. Dharmapal (1971) 'Indian Science and Technology in the Eighteenth Century'. Other India Press, Goa.
3. Kapil Kapoor, Singh Avdhesh Kumar, (2005) 'Indian Knowledge Systems' D.K. Print world (P) Ltd. ISBN 10: 8124603367 / ISBN 13: 9788124603369
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5. D.N. Bose, S.N. Sen and B. V. Subbarayappa, A Concise History of Science in India, Indian National Science Academy, New Delhi, 2009.
6. Datta B. and A. N. Singh, History of Hindu Mathematics: Parts I and II, Asia Publishing House,
Bombay, 1962.
7. Kapoor, K. (2021), Indian Knowledge System: Nature, Philosophy, Character in Indian Knowledge System, vol. 1, Pub. Indian Institute of Advanced Studies, Shimla
8. Mahadevan, B., Bhat, V.R., Pavana, N. (2022), Philosophical Systems, in Introduction to IndianKnowledge System, Pub. PHI Learning, New Delhi.
9. Mahadevan, B., Bhat, V.R., Pavana, N. (2022), Knowledge: Framework and Classification, in

Introduction to Indian Knowledge System, Pub. PHI Learning, New Delhi.

Video Resources:

1. Introductory lectures by Prof. Gauri Mahulikar
2. Introductory lectures by Prof. Kapil Kapoor

Websites:

- https://iksin dia.org/index.php
- Official Website of IKS- Indian Knowledge System
- https://www.youtube.com/watch?v=uKcf-hSlcUE
- Address by Prof Kapil Kapoor | Indian Institute of Advanced Study (FDP 2021)
- https://www.youtube.com/watch?v=MDJTXNiH2_A
- Mukul Kanitkar on Bharatiya Knowledge System
- https://www.youtube.com/watch?v=uARMhv97pjk
- https://www.youtube.com/watch?v=oTwgf56GbsA
- Scientific History of India | Mukul Kanitkar Lecture in DTU
- https://youtu.be/gNJNmPJqXJc?si=WFBbuUT65mLZzpOW
- Ancient India's Scientific Achievements & Contribution in Mathematics, Astronomy, Science &Medicine

II – I

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

2530005 MATHEMATICAL AND STATISTICAL FOUNDATIONS

II Year B.Tech. I Sem (CSM, CSD)

L	T	P	C
3	0	0	3

Pre-requisites: Mathematics courses of first year of study

Course Objectives: The student will try to learn

- The concept of Random variables.
- Expectation and correlation.
- Probability distributions of single random variables.
- The sampling theory and the concept of Estimation.
- Testing of hypothesis and making statistical inferences.

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

CO1: Formulate and solve real world problems involving Random variables.
CO2: Identify probability distributions to various case studies.
CO3: Apply the concept of testing a hypothesis to case studies.
CO4: Correlate the material of unit to the material in other units.
CO5: Apply the number theory concepts o cryptography domain.

UNIT-I: Random Variables and Probability Distributions **8 L**

Random Variable, Discrete Probability Distributions, Continuous Probability Distributions - Mean of a random variable - Variance of a random variable.
Discrete Probability distributions: Binomial and Poisson distributions

UNIT-II: Continuous Distributions and Sampling **10L**

Uniform distribution - Normal distribution - Area 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-III: Test of Hypothesis **10L**

Statistical Hypothesis, General Concepts, Testing a Statistical Hypothesis, Test of a single mean, difference of means, single proportion and difference of proportion for large samples, F- distribution.

UNIT-IV: Applied Statistics **10L**

Curve fitting by the method of least squares – Fitting of straight lines – Second degree parabolas and more general curves – Correlation and Regression – Rank correlation.

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UNIT-V: Basics of Number Theory **10L**

Greatest Common Divisors and Prime Factorization: Greatest common divisors – The Euclidean algorithm – The fundamental theorem of arithmetic – Factorization of integers and the Fermat numbers. Congruences: Introduction to congruences – Linear congruences.

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. Kenneth H. Rosen, Elementary Number Theory & its Applications, sixth edition, Addison Wesley, ISBN 978 0-321-50031-1

REFERENCE BOOKS:

1. T.T. Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons, Ltd, 2004.
2. Sheldon M Ross, Probability and Statistics for Engineers and Scientists, Academic press.
3. Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, Pearson Educations.

25X0506: COMPUTER ORGANIZATION AND ARCHITECTURE

B.Tech. II Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives:

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

Course Outcomes: After Completion of the Course, Students Should be able to:

- Understand binary data representation, logic gates, Boolean algebra, and internal functional units of digital computers.
- Analyze and design combinational and sequential logic circuits using standard components and hardware description language concepts.
- Apply register transfer language, micro-operations, and basic computer organization principles in instruction execution and control flow.
- Examine microprogrammed control, CPU organization, instruction formats, addressing modes, and program control mechanisms.
- Evaluate computer arithmetic operations, memory hierarchy, and input-output organization for efficient data processing.

UNIT - I:

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 - II:

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 III

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 - IV

Microprogrammed 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 - V

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 BOOKS:

1. Digital Design – M. Morris Mano, Third Edition, Pearson/PHI.
2. Computer System Architecture – M. Morris Mano, Third Edition, Pearson/PHI.

REFERENCE BOOKS:

1. Switching and Finite Automata Theory, ZVI. Kohavi, Tata Mc Graw Hill.
2. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5th Edition, McGraw Hill.
3. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
4. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.

25X0504 : DATA STRUCTURES

L	T	P	C
3	0	0	3

Prerequisites: A course on "Programming for Problem Solving

Course Objectives

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

Course Outcomes: After Completion of the Course, Students should be able to:

- Explain fundamental data structure concepts, abstract data types, and linear data structures including linked lists, stacks, and queues along with their operations and applications.
- Construct and analyze tree-based data structures such as binary trees, binary search trees, balanced trees, and multi-way search trees for efficient data organization.
- Apply heap structures and searching techniques including interpolation and jump search for priority management and efficient data retrieval.
- Represent graphs using appropriate data models and implement graph traversal algorithms for solving real-world computational problems.
- Implement advanced data handling techniques using hashing methods, collision resolution strategies, sorting algorithms, and file organization concepts.

UNIT – I

Introduction to Data Structures: 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 - II

Trees: 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 – III

Multi way Search Trees: 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 - IV

Graphs: Introduction, Directed Graphs, Bi connected Components, Representation of Graphs, Graph Traversal Algorithms, Graph ADT, Applications of Graphs
Sorting: Radix Sort, Heap sort, Shell Sort, Tree Sort,

UNIT – V

Hashing and Collision: 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

TEXTBOOKS:

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

REFERENCE:

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

25X0508: SOFTWARE ENGINEERING

B.Tech. II Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives

- 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.
- Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

Course Outcomes: After Completion of the Course, Students Should be able to:

- Understand the role of software engineering, software process frameworks, maturity models, and major software development life cycle models.
- Analyze functional and non-functional requirements, requirements engineering activities, and preparation of software requirements documentation.
- Apply design engineering principles, architectural styles, UML modeling techniques, and design quality concepts within software systems.
- Examine software testing strategies, debugging practices, and software metrics associated with process performance and product quality.
- Evaluate risk management strategies, software quality assurance practices, reliability concepts, and international quality standards within software projects.

UNIT - I

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 - II

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 - III

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 - IV

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 - V

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 BOOKS:

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.

25X0509: DATA BASE MANAGEMENT SYSTEMS

B.Tech. II Year I Sem.

L	T	P	C
3	0	0	3

Prerequisites: A course on "Data Structures".

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.

Course Outcomes: After Completion of the Course, Students Should be able to:

1. Understand database system concepts, data models, levels of abstraction, data independence, and conceptual database design using ER modeling.
2. Analyze the relational model, integrity constraints, relational algebra, relational calculus, and logical database design principles.
3. Apply SQL features including queries, constraints, triggers, and schema refinement techniques through normalization and dependency analysis.
4. Examine transaction management concepts, concurrency control protocols, serializability, recovery mechanisms, and failure handling.
5. Evaluate file organization techniques, indexing methods, hashing strategies, and tree-based index structures within database systems.

UNIT - I

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 - II

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 - III

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 - IV

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 - V

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 BOOKS:

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.

2530075: COMPUTATIONAL MATHEMATICS LAB

(Using Python software)

B.Tech. II Year I Sem.

L	T	P	C
0	0	2	1

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

Course Objectives: To learn

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

Course outcomes: After Completion of the Course, Students should be able to:

1. Analyze and compute Eigenvalues and Eigenvectors, including both real and complex cases, and represent them graphically using programming.
2. Apply numerical methods like Bisection and Newton-Raphson to determine roots of algebraic and transcendental equations and visualize the solutions.
3. Solve systems of linear equations using iterative techniques such as Jacobi and Gauss-Seidel methods and interpret the convergence graphically.
4. Implement solutions to first-order differential equations, including exact, non-exact, exponential growth/decay, and Newton's law of cooling, with graphical representation.
5. Solve higher-order linear differential equations with constant coefficients, both homogeneous and non-homogeneous, and present the results through programming plots.

* **Visualize all solutions Graphically through programmes**

UNIT - I: Eigen values and Eigenvectors: **6P**

Programs:

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

UNIT-II: Solution of Algebraic and Transcendental Equations **6P**

Bisection method, Newton Raphson Method

Programs:

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

UNIT-III: Linear system of equations: **6P**

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-IV: First-Order ODEs **8P**

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-V: Higher order linear differential equations with constant coefficients **6P**

Programs:

- Solving homogeneous ODEs
- Solving non-homogeneous ODEs

TEXT BOOKS:

1. Kenneth A. Lambert, The fundamentals of Python: First Programs, 2011, Cengage Learnings.
2. Think Python First Edition, by Allen B. Downey, Orielly publishing.
3. Introduction to Python Programming, William Mitchell, Povel Solin, Martin Novak et al., NCLab Public Computing, 2012.
4. 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.

25X0574 : DATA STRUCTURES LAB

L	T	P	C
0	0	2	1

Prerequisites: 1. A Course on "Programming for problem solving".

Course Objectives:

1. It introduces searching and sorting algorithms
2. It provides an understanding of data structures such as stacks and queues.

Course Outcomes: After Completion of the Course, Students should be able to:

1. Design and implement linear data structures including singly, doubly, and circular linked lists with standard operations using functions.
2. Implement stack and queue data structures using arrays and abstract data type models demonstrating proper data access mechanisms.
3. Apply advanced sorting algorithms such as radix, heap, shell, and tree sort for organizing data efficiently.
4. Construct and traverse tree and graph data structures using recursive and non-recursive techniques across various balanced and multiway trees.
5. Develop hashing techniques using multiple hash functions and collision-handling strategies for efficient data storage and retrieval.

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 , 2nd Edition, E. Horowitz, S. Sahni and Susan

Anderson Freed, Universities Press.
2. Data Structures – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, PHI/Pearson Education.

REFERENCE BOOK:

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

25X0579: SOFTWARE ENGINEERING LAB

B.Tech. II Year I Sem.

L	T	P	C
0	0	2	1

Prerequisites: A course on "Programming for Problem Solving".
Co-requisite: A Course on "Software Engineering".

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.

Course Outcomes: After Completion of the Course, Students Should be able to:

- Understand software project problem identification, requirement analysis, and structured documentation practices across development phases.
- Analyze software requirement specifications, design documents, testing artifacts, configuration management plans, and risk management records.
- Apply CASE tools for software design activities, modeling techniques, and structured system representation.
- Develop unit testing and integration testing cases aligned with functional and design requirements.
- Evaluate software quality through white box and black box testing techniques within structured software projects.

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 BOOKS:

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

25X0580: DATA BASE MANAGEMENT SYSTEMS LAB

B.Tech. II Year I Sem.

L	T	P	C
0	0	2	1

Course Objectives:

- Introduce ER data model, database design and normalization
- Learn SQL basics for data definition and data manipulation

Course Outcomes: After Completion of the Course, Students Should be able to:

- Understand conceptual database design using E-R modeling and relational database structure principles.
- Apply relational model concepts, normalization techniques, and dependency rules for efficient schema design.
- Execute database definition and manipulation commands for schema creation, data insertion, modification, and retrieval.
- Develop complex SQL queries using joins, subqueries, set operations, aggregate functions, views, and constraints.
- Implement database programming constructs including triggers, procedures, and cursors for automated data processing.

List of Experiments:

1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. A) Querying (using ANY, ALL, UNION, INTERSECT, JOIN, Constraints etc.) B) Nested, Correlated subqueries
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors

TEXT BOOKS:

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

REFERENCES 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.

25X0575 : 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

Course Outcomes: After Completion of the Course, Students should be able to:

- Apply Python language fundamentals, interpreter features, control structures, functions, recursion, and modules for solving computational problems.
- Develop Python programs using lists, tuples, arrays, dictionaries, and strings for data manipulation and validation tasks.
- Implement file handling, exception handling, and text processing techniques for data analysis and information retrieval.
- Design object-oriented Python programs using classes, attributes, and methods including graphical object representation and GUI components.
- Utilize Python libraries and packages such as NumPy, SciPy, Plotting tools, and logic gate simulations for scientific computing and visualization.

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 returns True 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

II-II

25X0505: DISCRETE MATHEMATICS

B.Tech. II Year II Sem.

L	T	P	C
3	0	0	3

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.

Course Outcomes: After Completion of the Course, Students Should be able to:

1. Understand propositional logic, predicate logic, normal forms, and inference mechanisms applied in mathematical reasoning and problem solving.
2. Analyze sets, relations, functions, and ordering concepts used in representing discrete structures within computational systems.
3. Apply algebraic structures such as semigroups, monoids, lattices, and Boolean algebra in modeling logical and digital systems.
4. Solve counting problems involving permutations, combinations, binomial coefficients, and inclusion-exclusion principles for discrete problem scenarios.
5. Examine graph structures including trees, spanning trees, planar graphs, Euler and Hamiltonian graphs, and chromatic numbers relevant in network and algorithm design.

UNIT - I

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 - II

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

UNIT - III

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

UNIT - IV

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 - V

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 BOOKS:

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.

25X0510: OPERATING SYSTEMS

B.Tech. II Year II Sem.

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

Course Outcomes: After Completion of the Course, Students should be able to:

1. Understand operating system concepts, system structures, services, system calls, and process management fundamentals.
2. Analyze CPU scheduling algorithms, multiprocessor scheduling issues, and deadlock handling strategies within operating systems.
3. Apply process synchronization techniques, interprocess communication mechanisms, semaphores, monitors, and concurrency control concepts.
4. Examine memory management strategies including paging, segmentation, virtual memory, demand paging, and page replacement algorithms.
5. Evaluate file system interfaces, directory structures, allocation methods, protection mechanisms, and file-related system calls.

UNIT - I

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 - II

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 - III

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 - IV

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 - V

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.

25X0511: ALGORITHMS DESIGN AND ANALYSIS

B.Tech. II Year II Sem.

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.

Course Outcomes: After Completion of the Course, Students should be able to:

1. Understand algorithmic concepts, performance analysis techniques, complexity measures, and asymptotic notations.
2. Apply divide and conquer strategies, disjoint set operations, heap-based structures, and backtracking techniques for problem solving.
3. Analyze dynamic programming approaches and algorithmic solutions for optimization problems.
4. Examine greedy algorithms, graph traversal techniques, shortest path methods, and spanning tree constructions.
5. Evaluate branch and bound strategies, computational complexity classes, NP-hard and NP-complete problem characteristics.

UNIT - I

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 - II

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 - III

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

UNIT - IV

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 - V

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 BOOK:

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.

25X0512: COMPUTER NETWORKS

B.Tech. II Year II Sem.

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,

Course Outcomes: After Completion of the Course, Students should be able to:

1. Explain fundamental concepts of computer networks including Internet structure, protocol models, packet switching, performance metrics, network attacks, and historical evolution.
2. Analyze application-layer principles, architectures, and protocols such as HTTP, FTP, SMTP, DNS, peer-to-peer systems, and socket-based network applications.
3. Describe transport-layer mechanisms including UDP, TCP, reliable data transfer protocols, flow control, congestion control, and fairness concepts.
4. Interpret network-layer functions such as IP addressing, routing algorithms, intra-AS and inter-AS routing protocols, multicast and broadcast routing, and security mechanisms.
5. Evaluate link-layer technologies including error detection and correction, multiple access protocols, Ethernet, VLANs, MPLS, wireless LANs, and end-to-end data communication processes.

UNIT - I

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-II

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 - III

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 - IV

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 - V

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 BOOK:

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

25X0513: MACHINE LEARNING

B.Tech. II Year II Sem.

L	T	P	C
3	0	0	3

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

Course Outcomes: After Completion of the Course, Students should be able to:

1. Explain core concepts of machine learning including learning types, problem formulation, model preparation, evaluation techniques, and feature engineering principles.
2. Analyze feature transformation and selection techniques along with probability foundations and Bayesian models for classification and reasoning under uncertainty.
3. Apply supervised learning methods involving regression and classification algorithms such as linear models, kNN, decision trees, support vector machines, and ensemble techniques.
4. Examine unsupervised learning approaches including clustering methods such as k-Means, hierarchical clustering, and density-based algorithms for pattern discovery.
5. Interpret artificial neural networks, deep learning fundamentals, reinforcement learning concepts, and real-world machine learning applications.

UNIT - I

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 - II

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 - III

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 - IV

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 - V

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.

INNOVATION AND ENTREPRENEURSHIP

B.Tech. II Year II Sem.

L	T	P	C
2	0	0	2

Course Objectives:

1. To familiarize on the basic concepts of innovation, entrepreneurship and its importance.
2. To Identify and analyze the process of problem-opportunity identification, market segmentation, and idea generation techniques.
3. To initiate prototype development and understand minimum viable product.
4. To develop initial Business and financial planning and Go-to-Market strategies
5. To impart knowledge on establishing startups, venture pitching and IPR

Course Outcomes: After Completion of the Course, Students Should be able to:

1. Understand innovation concepts, types of innovations, entrepreneurial mindset, leadership attributes, and the role of entrepreneurship in economic development.
2. Analyze real-world problems, customer needs, market segmentation, competition, industry trends, and opportunity identification using structured frameworks.
3. Apply opportunity assessment techniques, market sizing methods, and prototype or MVP development practices for solution validation.
4. Develop business models, lean canvas representations, financial plans, unit economics analysis, and go-to-market strategies for startup ventures.
5. Examine startup formation processes, funding mechanisms, pitching readiness, legal frameworks, and intellectual property rights within national and international contexts.

Unit I: Fundamentals of Innovation and Entrepreneurship

Innovation: Introduction, need for innovation, Features, Types of innovations, innovations in manufacturing and service sectors, fostering a culture of innovation, planning for innovation.

Entrepreneurship: Introduction, types of entrepreneurship attributes, mindset of entrepreneurial and intrapreneurial leadership, Role of entrepreneurs in economic development. Woman Entrepreneurship, Importance of on-campus startups. Understanding to build entrepreneurial mindset, attributes and networks individuals while on campus.

Core Teaching Tool: Simulation, Game, Industry Case Studies (Personalized for students – 16 industries to choose from), Venture Activity.

Unit II: Problem and Customer Identification

Identification of gap, problem, analyzing the problem from a industry perspective, real-world problems**,** market and customer segmentation, validation of customer problem fit, Iterating problem-customer fit, Competition and Industry trends mapping and assessing initial opportunity, Porter's Five Force Model. Idea generation, Ideation techniques: Brainstorming, Brain writing, Round robin, and SCAMPER, Design thinking principles, Mapping of solution to problem.

Core Teaching Tool: Several types of activities including: Class, game, Gen AI, 'Get out of the Building' and Venture Activity.

Unit III: Opportunity assessment and Prototype development

Identify and map global competitors, review industry trends, and understand market sizing: TAM, SAM, and SOM. Assessing scope and potential scale for the opportunity.

Understanding prototyping and Minimum Viable Product (MVP). Developing a prototype: Testing, and validation.

Core Teaching Tool: Venture Activity, no-code Innovation tools, Class activity

Unit IV: Business & Financial Models

Introduction to Business Model and types, Lean Canvas Approach: 9-block lean canvas model, building lean canvas for your startup. Business planning: components of Business plan- Sales plan, People plan and financial plan, Financial Planning: Types of costs, preparing a financial plan for profitability using a financial template, understanding the basics of Unit economics, Economies of Scale

and analyzing financial performance. Go-To-Market (GTM) approach – Selecting the Right Channel, creating digital presence, and building customer acquisition strategy.
Core Teaching Tool: Founder Case Studies – Sama and Securely Share; Class activity and discussions; Venture Activities.

Unit V: Startups and IPR

Startup requirements, building founding team members and mentors, pitch preparation, start-up registration process, funding opportunities and schemes, institutional support to entrepreneurs, startup lifecycle, documentation, legal aspects in startup, venture pitching readiness, National Innovation Startup Policy (NISP) and its features.
Patents, Designs, Patentability, Procedure for grants of patents. Indian Scenario of Patenting, International Scenario: International cooperation on Intellectual Property. Patent Rights: Scope of Patent Rights. Copyright, trademark, and GI. Licensing and transfer of technology.
Core Teaching Tool: Expert talks; Cases; Class activity and discussions; Venture Activities.

Suggested Readings:

1. John R Bessant, Joe Tidd, Innovation and Entrepreneurship, 4E, Wiley, Latest Edition.
2. Ajay Batra, The Stratup Launch Book- A Practical Guide for Launching Customer Centric Ventures, Wiley, 2020. (For Core Teaching Tool).
3. Entrepreneurship Development and Small Business Enterprises, Poornima M Charantimath, 3E, Pearson, 2018.
4. D.F. Kuratko and T.V. Rao, Entrepreneurship: A South-Asian Perspective, Cengage Learning, 2013.
5. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Sabyasachi Sinha (2020). Entrepreneurship, McGrawHill, 11th Edition.
6. NISP -Brochure inside pages - startup_policy_2019.pdf

25X0582: OPERATING SYSTEMS LAB

B.Tech. II Year II Sem.

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.

Course Outcomes: After Completion of the Course, Students should be able to:

1. Apply various CPU scheduling algorithms and analyze their performance using C programming.
2. Develop C programs utilizing UNIX/Linux system calls to perform file operations, process control, and I/O management.
3. Simulate deadlock avoidance and resource allocation strategies such as the Bankers Algorithm effectively.
4. Implement inter-process communication and synchronization mechanisms including semaphores, pipes, FIFOs, message queues, and shared memory.
5. Demonstrate memory management and page replacement techniques through C programming, analyzing efficiency and system behavior.

List of Experiments:

1. Write C programs to simulate the following CPU Scheduling algorithms a) FCFS b) SJF c) Round Robin d) priority
2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, lseek, stat, fork, exit)
3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance.
4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.
5. Write C programs to illustrate the following IPC mechanisms a) Pipes b) FIFOs c) Message Queues d) Shared Memory
6. Write C programs to simulate the following memory management techniques a) Paging b) Segmentation
7. Write C programs to simulate Page replacement policies a) FCFS b) LRU c) Optimal

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.

25X0583: COMPUTER NETWORKS LAB

B.Tech. II Year II Sem.

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

Course Outcomes: After Completion of the Course, Students should be able to:

- Implement and analyze data link layer techniques including framing, error detection using CRC, and flow control with sliding window protocols.
- Apply routing algorithms to compute efficient network paths and routing tables.
- Develop programs for network performance optimization including congestion control, buffer management, and data encryption/decryption.
- Analyze network traffic using tools like Wireshark and Nmap to understand packet behavior and network security.
- Simulate network scenarios in NS2 to evaluate packet transmission, throughput, congestion, and overall network performance.

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.
1. How to run Nmap scan
2. Operating System Detection using Nmap
3. 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.

25X0584: MACHINE LEARNING LAB

B.Tech. II Year II Sem.

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.

Course Outcomes: After Completion of the Course, Students should be able to:

- Perform statistical analysis and compute central tendency and dispersion measures using Python programming.
- Utilize Python libraries such as NumPy, SciPy, Pandas, and Matplotlib for data manipulation, visualization, and analysis.
- Implement and evaluate supervised learning algorithms including Linear Regression, Logistic Regression, Decision Trees, and K-Nearest Neighbors.
- Apply unsupervised learning techniques such as K-Means clustering to extract patterns from datasets.
- Analyze and compare the performance of machine learning models on real-world datasets to draw meaningful insights.

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.

25X0585: DATA VISUALIZATION - R PROGRAMMING/ POWER BI

B.Tech. II Year II Sem.

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Course Objectives:

- Effective use of Business Intelligence (BI) technology (Tableau) to apply data visualization
- To discern patterns and relationships in the data.
- To build Dashboard applications.
- To communicate the results clearly and concisely.
- To be able to work with different formats of data sets.

Course Outcomes: After Completion of the Course, Students should be able to:

- Understand different types of data and create effective visual representations to convey insights clearly.
- Connect, manipulate, and structure datasets in Tableau to build basic and advanced visualizations.
- Apply calculations, aggregations, and custom fields to enhance data analysis and visualization.
- Design interactive dashboards and storytelling visualizations with formatting, filtering, and tooltips.
- Publish, share, and export Tableau visualizations while creating custom charts for complex data analysis.

Lab Problems:

1. Understanding Data, What is data, where to find data, Foundations for building Data Visualizations, Creating Your First visualization?
2. Getting started with Tableau Software using Data file formats, connecting your Data to Tableau, creating basic charts(line, bar charts, Tree maps),Using the Show me panel.
3. Tableau Calculations, Overview of SUM, AVR, and Aggregate features, Creating custom calculations and fields.
4. Applying new data calculations to your visualizations, Formatting Visualizations, Formatting Tools and Menus, Formatting specific parts of the view.
5. Editing and Formatting Axes, Manipulating Data in Tableau data, Pivoting Tableau data.
6. Structuring your data, Sorting and filtering Tableau data, Pivoting Tableau data.
7. Advanced Visualization Tools: Using Filters, Using the Detail panel, using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colors.
8. Creating Dashboards & Storytelling, creating your first dashboard and Story, Design for different displays, adding interactivity to your Dashboard, Distributing & Publishing your Visualization.
9. Tableau file types, publishing to Tableau Online, Sharing your visualizations, printing, and Exporting.
10. Creating custom charts, cyclical data and circular area charts, Dual Axis charts.

REFERENCES:

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.

25X0581: NODE JS/ REACT JS/ DJANGO

B.Tech. II Year II Sem. **L T P C**
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Prerequisites: Object Oriented Programming through Java, HTML Basics.

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.

Course Outcomes: After Completion of the Course, Students Should be able to:

1. Design responsive web applications using HTML5, CSS3, Flexbox, Grid, Bootstrap, and client-side scripting techniques.
2. Apply JavaScript and ES6 features including validation logic, asynchronous programming, API consumption, and graphical data representation.
3. Develop server-side applications using Java, Servlets, Node.js, Express framework, and database connectivity with CRUD functionality.
4. Implement session management, authentication mechanisms, secure RESTful services, and authorization using JWT for web applications.
5. Build single-page applications using React components, routing, services, state management, external APIs, and deployment practices.

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.