R24

SCHEMEOFINSTRUCTION&EXAMINATION
B.E (Group A- IT, CSE(AI), CSE(AI&ML),CSE(DS) ECE, ETE, ME,CE) SEMESTER-I

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
Three Week Induction Program										
1	MC801PO	Indian Constitution	2	-	-	2	30	70	3	-
2	BS201MT	Matrices & Differential Calculus	3	1	-	4	30	70	3	4
3	BS202PH	Engineering Physics	3	1	-	4	30	70	3	4
4	ES302CS	Programming for Problem Solving	3	-	-	3	30	70	3	3
5	ES301EE	Basic Electrical Engineering	3	1	-	4	30	70	3	4
Practical/Laboratory Courses										
6	BS251PH	Engineering Physics Lab	-	-	3	3	25	50	3	1.5
7	ES351CS	Programming for Problem Solving Lab	-	-	3	3	25	50	3	1.5
8	ES353CE	Engineering Graphics	-	-	2x2	4	50	50	3	2
9	ES354EE	Basic Electrical Engineering Lab	-	-	2	2	25	50	3	1
Total			**14**	**3**	**12**	**29**	**275**	**550**	**27**	**21**

B.E (Group A- IT, CSE(AI), CSE(AI&ML), CSE(DS) ECE, ETE, ME,CE) SEMESTER-II

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	MC802CE	Environmental Sciences	2	-	-	2	30	70	3	-
2	MC803PY	Essence of Indian Traditional Knowledge	2	-	-	2	30	70	3	-
3	HS101EG	English	2	-	-	2	30	70	3	2
4	BS204CH	Engineering Chemistry	3	1	-	4	30	70	3	4
5	BS203MT	Differential Equations &Numerical Methods	3	1	-	4	30	70	3	4
6	ES303CS	Scientific Programming	3	-	-	3	30	70	3	3
Practical/Laboratory Courses										
7	HS151EG	English Lab	-	-	2	2	25	50	3	1
8	BS252CH	Engineering Chemistry Lab	-	-	3	3	25	50	3	1.5
9	ES352ME	Engineering Workshop Practice	-	-	2x3	6	50	50	3	3
10	ES353CS	Scientific Programming Lab	-	-	2	2	25	50	3	1
Total			**15**	**2**	**13**	**30**	**305**	**620**	**30**	**19.5**

BS: Basic Science ES: Engineering Science MC: Mandatory Course
L: Lecture T: Tutorial P: Practical D: Drawing
CIE: Continuous Internal Evaluation SEE: Semester End Evaluation

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INDIAN CONSTITUTION

MC 801 PO

Instruction: 2 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 0

Objectives:

1. To create awareness among students about the Indian Constitution.
2.To acquaint the working conditions of union, state, local levels, their powers and functions
3. To create consciousness in the students on democratic values and principles articulated in the constitution.
4.To expose the students on the relations between federal and provincial units.
5.To divulge the students about the statutory institutions.

Outcomes: Student will be able to:

1. Know the background of the present constitution of India
2.Understand the working of the union, state and local levels
3.Gain consciousness on the fundamental rights and duties
4.Be able to understand the functioning and distribution of financial resources between the centre and states
5.Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way.

UNIT – I
Evolution of the Indian Constitution: 1909 Act, 1919 Act and 1935 Act. Constituent Assembly: Composition and Functions; Fundamental features of the Indian Constitution
UNIT – II
Union Government: Executive-President, Prime Minister, Council of Minister ***State Government***: Executive: Governor, Chief Minister, Council of Minister ***Local Government***: Panchayat Raj Institutions, Urban Government
UNIT – III
Rights and Duties: Fundamental Rights, Directive principles, Fundamental Duties
UNIT – IV
Relation between Federal and Provincial units: Union-State relations, Administrative, legislative and Financial, Inter State council, NITI Ayog, Finance Commission of India.
UNIT – V
Statutory Institutions: Elections-Election Commission of India, National Human Rights Commission, National Commission for Women.

Suggested Readings:

1	Durga Das Basu, "*Introduction to the Constitution of India*", Lexis Nexis Butterworths Wadhwa Nagpur, 2008
2	Subhash Kashyap, "*Our Parliament*", National Book Trust, India, 2004.
3	Peu Ghosh, "*Indian Government and Politics*", Prentice Hall of India, New Delhi,2012.

BE I-Semester syllabus for affiliated engineering colleges of Osmania University
(wef: academic year 2024-2025)
Common to all branches
MATRICES &DIFFERENTIAL CALCULUS

BS201MT	**MATRICES &DIFFERENTIAL CALCULUS**	**3L:1T:0P**	**4 credits**

Course objectives:

- To study matrix algebra and its use in solving system of linear equations and in solving eigen values problems
- To introduce the concepts of functions of one variable
- To introduce the concepts of functions of several variables
- To introduce and Interpret Multiple Integrals
- To Understand Vector Derivatives, Vector Integration techniques to solve real-world problems.

Outcomes :After completing this course, the students will be

- Solve system of linear equations and eigen value problems
- Understand and Apply Mean value theorems
- Understand partial derivatives, Maxima and minima of function of two and three variables
- Evaluate multiple integrals
- Analyze and Interpret Vector Derivatives& Vector Integration to Real-World Problems

UNIT-I

Matrices: Rank of a matrix, Echelon form, System of linear equations, Linearly dependence and independence of vectors, Linear transformation, Orthogonal transformation, Eigen values, Eigen vectors, Properties of eigen values, Cayley-Hamilton theorem(without proof), Reduction of quadratic form to canonical form by orthogonal transformation, Nature of quadratic forms.

UNIT-II

Calculus of one Variable: Rolle's theorem, Lagrange's Mean-value theorem, Cauchy's mean value theorem, Taylor's series(All theorems without proof), Curvature, Radius of Curvature, Circle of Curvature, Envelope of a family of curves.

UNIT-III

Multivariable Calculus (Differentiation): Functions of two variables, Limits and Continuity, Partial derivatives, Total derivative, Derivatives of composite and implicit functions (Chain rule), Change of variables, Jacobians, Higher order partial derivatives, Taylor's series of functions of two variables, Maximum and minimum of values of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT-IV

Multivariable Calculus(Integration): Double integrals, Change of order of integration, Change of variables from Cartesian to plane polar coordinates, Triple integrals.

UNIT-V

Vector calculus: Scalar and vector fields, Gradient of a scalar field, Directional derivative, Divergence and Curl of a vector field, Line, Surface and Volume integrals, Green's theorem in a plane, Gauss's divergence theorem, Stoke's theorem(without proofs) and their verification.

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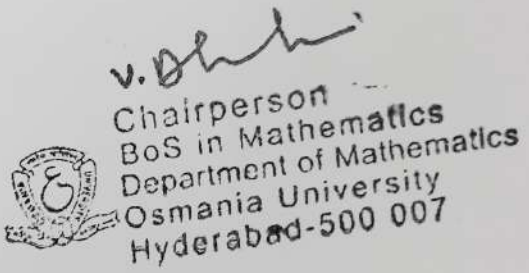
TEXT BOOKS:

1. R.K.Jain&S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa Publications, 2014.
2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publications, 43rd Edition, 2014.

REFERENCE BOOKS:

1. N.P.Bali&Dr.ManishGoyal, A textbook of Engineering Mathematics (Volume I), 10th Edition, Laxmi Publications, 2022.
2. B.V.Ramana, Higher Engineering Mathematics, 23rd edition, 2015.



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NO 09/cBOSP/2024 DATE 2024/8/2

Engineering Physics Syllabus for Osmania University Affiliated Engineering Colleges
B.E (SEM–I & II) AICTE
Academic Year 2024-2025 onwards (Common to All Branches)

CourseCode: BS202PH	CourseTitle : Physics						Core/Elective: Core
Prerequisite	ContactHoursper Week				CIE	SEE	Credits
	L	T	D	P			
	3	1	-	-	30	70	04

Course objectives

- Understand the Fundamental Principles and Applications of Lasers, Fiber Optics & Ultrasonics
- Explore Semiconductor Physics and Electromagnetic Theory
- Analyze Magnetic Materials and Superconductors
- Investigate Wave Mechanics and Quantum Computation
- Explore Nano Materials and Thin Film Technologies

Course outcomes

Upon successful completion of the course student will able to:

- Understand and apply the principles of lasers, fiber optics & ultrasonics, including their construction, types, and engineering applications.
- Gain thorough knowledge of semiconductor physics, including key devices and energy harvesting technologies, and understand fundamental electromagnetic theory.
- Analyze magnetic materials and superconductors, including their properties, theories, and technological applications.
- Grasp wave mechanics concepts and quantum computing fundamentals, including quantum gates and their practical applications.
- Explore nano materials and thin film technologies, including preparation methods, characterization techniques, and their engineering uses.

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UNIT I

Lasers, Fiber Optics & Ultrasonics

Characteristics of Lasers, Stimulated Emission, Population Inversion, Einstein's Coefficients, CO2 Laser, Semiconductor Laser, working of Laser Induced Breakdown Spectroscopy (LIBS) Instrument, Engineering Applications of Lasers.

Construction of Optical Fiber, Types of Optical Fibers (Refractive Index Profiles), Fiber Drawing Process (Double Crucible Method), Basic Principles of Fiber Optics Sensors, Construction and Working of Pressure Sensors, Applications of Optical Fibers in Engineering.

Introduction to Ultrasonic Waves, Production of Ultrasonic Waves - Magnetostriction Method, Ultrasonic Pulse-Echo Testing Method, Engineering Applications of Ultrasonics.

UNIT II

Semiconductor Physics and EM Theory

Types of Semiconductors, Direct and Indirect Bandgap Semiconductors, Hall Effect, Construction and Working of Quantum Light Emitting Diodes (QLEDs) & Solar Cells, Applications of Semiconductor Devices, Concept of Harvesting Energy Devices (Piezoelectric Generators, Thermoelectric Generators), Properties and Advantages of Graphene.

Basic Laws of Electricity and Magnetism, Displacement Current, Maxwell's Equations, Expression for Maxwell's Integral to Differential Equations, Poynting Theorem.

UNIT III

Magnetic Materials & Superconductors

Types of Magnetic Materials, Weiss Molecular Field Theory, Magnetic Domains, Hysteresis Curve, Soft and Hard Magnetic Materials, Magneto-Resistance Materials (CMR & GMR), Applications of Magnetic Materials.

Superconductors, Properties of Superconductors, Meissner Effect, Type I and Type II Superconductors, BCS Theory (Qualitative), High-Tc Superconductors, Applications of Superconductors.

UNIT IV

Wave Mechanics & Quantum Computation

Matter Waves, de-Broglie Wavelength, Physical Significance of Wave Function, Schrödinger Time-Independent Wave Equation, Energy of Particle in 1-D Potential Box, Kronig-Penney Model (Qualitative).

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Introduction to Quantum Computing, Idea of Classical Bits and Qubits, Basics of Quantum Gates (Hadamard, CNOT), Comments on No-Cloning Theorem, Basic Idea of Quantum Teleportation, Applications of Quantum Computing.

UNIT V

Nano Materials & Thin Films

Introduction, Properties of Materials at Reduced Size, Surface-to-Volume Ratio at Nano Scale, Classification of Nano Materials, Preparation Techniques: Bottom-Up Method (Sol-Gel), Top-Down Methods (Ball Milling), Principles of Characterization Techniques (X-ray Diffraction, Scanning Electron Microscope, Transmission Electron Microscope), Applications of Nano Materials.

Distinction between Bulk and Thin Films, Thin Film Preparation Techniques: Thermal Evaporation Method, Electron Beam Evaporation Method, Applications of Thin Films.

PRESCRIBED BOOKS

1. Modern Engineering physics-I &II : S. Chandralingam, K. Vijayakumar, S Chand Co.
2. Engineering Physics: P.K.Palanisamy, Scitech Publishers.
3. Engineering Physics: S.O.Pillai, New age International.
4. Nielsen M. A., I. L Chung, Quantum Computation & Quantum Information, Cambridge Univ. Press
5. Thin Film Fundamentals, A. Goswami , New Age International New Delhi
6. Nano Materilas, A.K. Bandyopadhyay, Newagepublishers

REFERENCE BOOKS

1. Solid State Physics: Charles Kittel, Wiley & Sons (Asia) Pvt. Ltd.
2. Fundamentals of physics:Halliday,Resnick,Walker.
3. Engineering Physics – By V Rajendran, McGraw Hill Edn.
4. Solar Photovoltaics – Fundamentals, Technologies and Applications 3rd Edition, PHI
5. Principles of Quantum computation and Information – By G. Benenti, G. Casati, G. Strini, World scientific.

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ES 302 CS	PROGRAMMING FOR PROBLEM SOLVING					
Pre-requisites			**L**	**T**	**P**	**C**
			3	-	-	3
Evaluation	**SEE**	70 Marks	**CIE**		30 Marks	

Course Objectives :	
1	To introduce the basic concepts of Computing environment, number systems and flowcharts
2	To familiarize the basic constructs of C language – data types , operators and expressions
3	To understand modular and structured programming constructs in C
4	To learn the usage of structured data types and memory management using pointers
5	To learn the concepts of data handling using files

Course Outcomes :	
On completion of this course, the student will be able to :	
CO-1	Explain various functional components in computing environment
CO-2	Develop algorithmic solutions to problems and draw the flow charts
CO-3	Explain and use basic constructs of C in writing simple programs
CO-4	Use standard library functions in C and develop modular programs using user defined functions and structured data types

UNIT – I

Introduction to Computers: Computer Systems, Computing Environments, Computer Languages, Creating and Running Programs, Software Development, Flow charts. **Number Systems**: Binary, Octal, Decimal, And Hexadecimal.

Introduction to C Language - Background, C Programs, Identifiers, Data Types, Variables, Constants, Input / Output Statements

Arithmetic Operators and Expressions: Evaluating Expressions, Precedence and Associativity of Operators, Type Conversions.

UNIT – II

Conditional Control Statements: Bitwise Operators, Relational and Logical Operators, If, If-Else, Switch-Statement and Examples. Loop Control Statements: For, While, Do-While and Examples. Continue, Break and Go to statements

Functions: Function Basics, User-defined Functions, Inter Function Communication, Standard Functions, Methods of Parameter Passing. **Recursion-** Recursive Functions. **Storage Classes:** Auto, Register, Static, Extern, Scope Rules, and Type Qualifiers

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UNIT– III
Preprocessors: Preprocessor Commands **Arrays** - Concepts, Using Arrays in C, Inter-Function Communication, Array Applications, Two- Dimensional Arrays, Multidimensional Arrays, Linear and Binary Search, Selection and Bubble Sort.

UNIT – IV
Pointers - Introduction, Pointers for Inter-Function Communication, Pointers to Pointers, Compatibility, L -value and R-value, Arrays and Pointers, Pointer Arithmetic and Arrays, Passing an Array to a Function, Memory Allocation Functions, Array of Pointers, Programming Applications, Pointers to void, Pointers to Functions, Command-line Arguments. **Strings** - Concepts, C Strings, String Input/Output Functions, Arrays of Strings, String Manipulation Functions

UNIT –V
Structures: Definition and Initialization of Structures, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Pointers to Structures, Self Referential Structures, Unions, Type Definition (typedef), Enumerated Types. **Input and Output:** Introduction to Files, Modes of Files, Streams, Standard Library Input/Output Functions, Character Input/Output Functions.

Suggested Reading:

1	B.A. Forouzan and R.F. Gilberg, "*A Structured Programming Approach in C*" , Cengage Learning, 2007
2	Kernighan BW and Ritchie DM, "*The C Programming Language*", 2nd Edition, Prentice Hall of India, 2006.
3	Rajaraman V, "*The Fundamentals of Computer*", 4th Edition, Prentice-Hall of India, 2006.
4	Dromey " *How to Solve it By Computer* , Pearson education, 2006

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BASIC ELECTRICAL ENGINEERING

Common to All Branches

ES 301 EE

Instruction: 3+1 periods per week
CIE: 30 marks
Credits: 4

Duration of SEE: 3 hours
SEE: 70 marks

Objectives:

1. To provide an understanding of basics in Electrical circuits.
2. To provide an overview of ordinary differential equations

Outcomes: Student will be able to:

1. To analyse Electrical circuits to compute and measure the parameters of Electrical Energy
2.To comprehend the working principles of Electrical DC Machines
3. To Identify and test various Electrical switchgear, single phase transformers and assess the ratings needed in given application
4.To comprehend the working principles of electrical AC machines

UNIT – I
DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Network Reduction Technique, Mesh and Nodal Analysis, Superposition, Thevenin and Norton Theorems.
UNIT – II
AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, and RL, RC, RLC combinations (series only). Three phase balanced circuits, voltage and current relations in star and delta connections.
UNIT – III
Transformers and 3-ph Induction Motors: Transformers: Electromagnetic induction, Faradays laws, statically induced emf, Lenz law, BH characteristics, ideal and practical transformer, losses and efficiency (simple Problems only), three-phase transformer connections. ***Three Phase Induction motor:*** Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, squirrel cage IM, slip-ring IM, Applications
UNIT – IV
Single-phase induction motor and DC Machines: Single-phase induction motor: Construction and principle of operation, Capacitor start & capacitor run motor, applications. ***DC Generators***: Dynamically induced emf, Flemming's Right hand and Left hand rules, Construction and principle of operation of DC generator, EMF equation, Types of DC Generators, OCC characteristics, applications. ***DC Motors:*** principle of operation of DC Motor, Types of DC motors, applications
UNIT – V
Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption, power factor improvement.

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Suggested Readings:

1	N. K. De, *"Basic Electrical Engineering"*, Universities Press, 2015.
2	J.B. Gupta, *"Fundamentals of Electrical Engineering and Electronics"*, S.K. Kataria & Sons Publications, 2002
3	J.B. Gupta, *"Utilization of Electric Power and Electric Traction"*, S.K. Kataria & Sons Publications, 2010
4	Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, *"Basic Electrical Engineering"*, Tata McGraw Hill, Publications, 2009
5	Hughes, *"Electrical Technology"*, 7th Edition, Addison Welsey Longman Inc., 1995

1) Prof. E. Vidya Sagar
2) Prof. G. Mallesham
3) Dr. Md. Haseeb Ikram, Head, EED MJCET
4) Dr. FATIMA AZRA, Head EED, DCET
5) P. Sirisha, Incharge EEE, GLWEC
6) K. Vijay Rathna Babu Incharge EEE, NGIT
7) P Jagadeesh Dr. JAGADEESH.P Incharge EEE, KMEC

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Engineering Physics Lab Syllabus for Osmania University Affiliated Engineering Colleges
B.E (SEM-I&II) AICTE
Academic Year 2024-2025 Onwards (Common to All Branches)

CourseCode: BS251PH	CourseTitle: Physics Lab						Core/Elective : Core
Prerequisite	ContactHoursper Week				CIE	SEE	Credits
	L	T	D	P			
	-	-	-	3	25	50	1.5

Course Objective

- Master experimental procedures and programming techniques.
- Conduct experiments independently with precision and measurement accuracy
- Analyze data graphically and derive conclusions from graphs
- Evaluate experiment results critically and draw meaningful conclusions.
- Improve communication skills through group work and effective laboratory report writing.

Course Outcomes

- Apply the various procedures and programming techniques for the experiments.
- Demonstrate the experiment with task and take the measurement independently
- Examine the graphical representation data and estimate results from the graph.
- Compare and evaluate the results of the experimentand draw relevant conclusions
- Develop communication skills through working ingroups in performing the laboratory Experiments andby writing laboratory reports.

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Listof Experiments

1. Determination of Dielectric Constant and Phase Transition Temperature of Dielectric Materials
2. To study the I-V Characteristics of P-N Junction Diode and Resistance Evaluation
3. Find the Electrical Conductivity and Energy Gap of Germanium (Ge) Crystal
4. Study Hall Effect in Semiconductors & find Hall Coefficients, Hall Voltage, and Conductivity
5. Study Characteristics of Thermistor: Determination of Constants A and B
6. Draw Hysteresis Loop for Ferromagnetic Material (B-H Curve)
7. Study V-I Characteristics of Solar Cell: Fill Factor and Series Resistance Calculation
8. Visualization Energy Levels of 1-Dimensional Potential Box Using Schrödinger Wave Equation in Python
9. Visualization of Allowed Energy Levels and Kronig-Penney Model in Python/MATLAB
10. Determine the Density and Elastic Properties of Oxide Glasses/polymers Using Machine learning algorithms
11. Calculate the Numerical Aperture (NA) and Acceptance Angle of Optical Fiber
12. Find the Wavelength of Laser Source using diffraction grating
13. To study the Transition Temperature Measurement of High-Temperature Superconductor
14. Find the Rigidity Modulus of Wire Using Torsional Pendulum
15. To estimate the pressure using optical fiber sensor.

Note: **Minimum Eight experiments should be conducted in the semester**

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ES351CS	Programming for Problem Solving Lab					
Pre-requisites			**L**	**T**	**P**	**C**
			-	-	2	1
Evaluation	**SEE**	50 Marks	**CIE**		25 Marks	

Course Objectives :	
1	To use tools available under LINUX for C programming
2	To gain hands-on experience on basic constructs of C programming
3	To formulate problems and implement algorithmic solutions in C
4	To write modular programs in C using structure programming techniques and data files.

Course Outcomes :	
On completion of this course, the student will be able to:	
CO-1	Write, compile and debug C programs in Linux environment
CO-2	Write simple programs using control structures, user defined functions and data manipulation using arrays
CO-3	Use standard C library functions to develop modular programs in C

1. Introducing to programming Environment(Linux commands, editing tools such as vi editor, sample program entry, compilation and execution)
2. Write programs using arithmetic, logical, bitwise and ternary operators.
3. Write programs simple control statements : Roots of a Quadratic Equation, extracting digits of integers, reversing digits ,finding sum of digit ,printing multiplication tables, Armstrong numbers, checking for prime, magic number,
4. Sin x and Cos x values using series expansion
5. Conversion of Binary to Decimal, Octal, Hexa and Vice versa
6. Generating a Pascal triangle and Pyramid of numbers
7. Recursion: Factorial, Fibonacci, GCD
8. Finding the maximum, minimum, average and standard deviation of given set of numbers using arrays
9. Reversing an array ,removal of duplicates from array
10. Matrix addition , multiplication and transpose of a square matrix .using functions
11. Bubble Sort, Selection Sort ,
12. Programs on Linear Search and Binary Search using recursion and iteration

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13. Functions of string manipulation: inputting and outputting string , using string functions such as strlen( ),strcat( ),strcpy( )……etc
14. Writing simple programs for strings without using string functions.
15. Finding the No. of characters, words and lines of given text file
16. File handling programs : student memo printing
17. Create linked list, traverse a linked list, insert a node, delete a node, reversing list .

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ENGINEERING GRAPHICS

ES 353 CE

Instruction:6 periods per week *Duration of SEE: 3 hours*
CIE: 50 marks *SEE: 50 marks*
Credits: 3

Objectives:

1.To prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
2. To prepare you to use the techniques, skills, modern engineering tools to use for Engineering practice.

Outcomes: Student will be able to:

1. Introduction to engineering design and its place in society
2. Exposure to the visual aspects of engineering design
3. Exposure to engineering graphics standards
4. Exposure to solid modelling
5. Exposure to computer-aided geometric design
6. Exposure to creating working drawings
7. Exposure to engineering communication

S.No	Description	Lectures	Drawing
1	Principles of Engineering Graphics and their significance, usage of drawing instruments	1	
2	Conic Sections – I, Construction of ellipse, parabola and hyperbola given focus and eccentricity.	1	2
3	Conic Sections – II, Construction of ellipse (given major and minor axis), parabola (given bas and height), rectangular hyperbola	-	2
4	Cycloids (cycloid & epicycloid)	1	2
5	Involutes (involute of triangle, square & circle)	-	2
6	Scales (plain & diagonal scales)	1	2+2
7	Introduction to AutoCAD –Basic commands and simple drawings	-	2+2
8	Orthographic Projection , Projection of points situated in different quadrants	1	2
9	Projections of straight lines-I Lines parallel to both the reference planes, lines perpendicular or inclined to one reference plane	1	2
10	Projections of straight lines-II Lines parallel to both the reference planes	1	2
11	Projections of planes-I Perpendicular planes	1	2
12	Projections of planes-II Oblique planes	-	2
13	Projections of solids – I Polyhydra and solids revolution, projections of solids in simple position	1	2
14	Projections of solids – II	1	2

	Polyhydra and solids when the axes inclined to one or both the reference planes.		
15	Section of solids – I When the sectional plane is parallel or perpendicular to one reference plane	1	2
16	Section of solids – II When the sectional plane is inclined to one reference plane	-	2
17	Development of surfaces – I Prisms and Cylinders	1	2
18	Development of surfaces – II Pyramids and Cones	-	2
19	Intersection of surfaces – I Intersection of cylinder and cylinder	1	2
20	Intersection of surfaces – I Intersection of cylinder and cones	-	2
21	Isometric projection – I- planes and simple solids	1	2
22	Isometric projection – I – Combination of two or three solids	-	2
23	Conversion of Isometric Views to Orthographic Views	1	2
24	Floor plans of 2 or 3 rooms including windows, doors, and fixtures such as WC, bath, sink, shower, etc.	1	2

Suggested Readings:

1	Bhatt N.D., Panchal V.M. & Ingle P.R.,"*Engineering Drawing"*, Charotar Publishing House, 2014
2	Shah, M.B. & Rana B.C., " *Engineering Drawing and Computer Graphics"*, Pearson Education, 2008
3	S.N Lal, " *Engineering Drawing with Introduction to Auto CAD"*, Cengage Learning India Pvt Ltd, New Delhi, 2018
4	Agarwar B. & Agrawal C. M., "*Engineering Graphics*", TMH Publication, 2012
5	Narayana, K.L. & P Kannaiah," *Text book on Engineering Drawing*", Scitech Publishers, 2008
6	(Corresponding set of) CAD Software Theory and User Manuals

NOTE:

1. At least 20 sheets must be covered.
2. Sheet number 1 to 6 (Graph sheets / drawing sheets)
3. Sheet number 7 to 24 (AutoCAD drawings.

BASIC ELECTRICAL ENGINEERING LAB

Common to All Branches

Duration of SEE: 3 hours

ES 354 EE *SEE: 50 marks*

Instruction:2 periods per week

CIE: 25 marks

Credits: 1

Objectives:

1. To impart the practical knowledge on testing of DC and AC Machines.
2. To learn the usage of common electrical measuring instruments

Outcomes: Student will be able to:

1. Get an exposure to common electrical components and their ratings
2. Analyze the performance of DC and AC Machines
3. Comprehend the usage of common electrical measuring instruments
4. Test the basic characteristics of transformers and electrical machines

List of Experiments:

Dem1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.

Exp 1. Verification of KVL and KCL, superposition theorem (with DC excitation)

Exp 2 Verification of Thevenin's and Norton's theorems (with DC excitation)

Exp 3. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Power factor calculation

Exp 4. Transformers: Observation of the no-load current waveform on an oscilloscope (non sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics).

Exp 5. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.

Exp 6. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents).

Exp 7. Measurement of phase voltage/current, line voltage/current and power in a balanced three-phase circuit connected in star and delta.

Dem2. Demonstration of cut-out sections of machines: dc machine (commutator- brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.

Exp 8. OCC characteristics of DC Generator

Exp 9. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections.

Exp 10. Power factor improvement of Induction Motor using static capacitors

Exp 11. Load Test of DC Motor

Note - : Minimum Eight Experiments should be conducted in the semester

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2) Prof. G. Mallesham

3) Dr. Md. Haseeb Ikram, Head, EED, MJCET

4) 27/8/24 DR. FATIMA AZRA, Head EED, DCET

5) Sirisha 27/8/24 P. Sirisha, Incharge EEE, GLNEC

6) K. Vijay Ratna Raju, Incharge EEE, NBRIT

7) P. Jagadeesh Dr JAGADEESH.P Incharge EEE, KMEC

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Suggested Readings:

1	N. K. De, –*Basic Electrical Engineering*‖ Universities Press, 2015.
2	J.B. Gupta, –*Fundamentals of Electrical Engineering and Electronics*‖ S.K. Kataria & Sons Publications, 2002
3	J.B. Gupta, –*Utilization of Electric Power and Electric Traction*‖ S.K. Kataria & Sons Publications, 2010
4	Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, –*Basic Electrical Engineering*‖ Tata McGraw Hill, Publications, 2009
5	Hughes, "*Electrical Technology*", 7th Edition, Addison Welsey Longman Inc., 1995

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3) Dr. Md. Haseeb Ikram, Head, EED MJCET
4) Dr. FATIMA AZRA, Head EED, DCET
5) P. Sirisha, Incharge EEE, GLWEC
6) K. Vijay Ratna Babu Incharge EEE, NGIT
7) P Jagadeesh Dr. JAGADEESH.P Incharge EEE, KMEC

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ENVIRONMENTAL SCIENCES

MC 802CE

Instruction: 2 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 0

Objectives:

1. To create awareness and impart basic knowledge about the environment and its allied problems.
2. To know the functions of ecosystems, social and environment related issues and their preventive measures
3. To understand importance of biological diversity, different pollutions and their impact on environment

Outcomes: Student will be able to:

1. Adopt environmental ethics to attain sustainable development
2. Develop an attitude of concern for the environment
3. Conservation of natural resources and biological diversity
4. Creating awareness of Green technologies for nation's security
5. Imparts awareness for environmental laws and regulations

UNIT – I

The Multidisciplinary Nature of Environmental Studies: Definition, scope and importance, need for public awareness.

***Natural Resources*:** Water Resources – Use and over utilization of surface and ground water, flood, drought, conflicts over water, Dams: Benefits and Problems. Food Resources –World Food Problems, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, Forest Resources – Use and over exploitation, deforestation & its effect on tribal people.Land Resources –Land Degradation, environmental effect of mining, man induced landslides, soil erosion and desertification. Energy Resources –Growing energy needs, Renewable and Non-renewable energy resources.

UNIT – II

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in ecosystem, food chains, ecological pyramids, ecological succession, types of ecosystems (marine, pond, river, forest, grassland, desert)

UNIT – III

Biodiversity: Levels of Biodiversity, Bio-geographical classification of India, Value of biodiversity, Threats to biodiversity, endangered and endemic species of India, Conservation of biodiversity, global and national efforts.

UNIT – IV

Environmental Pollution: Definition, Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution, solid waste management.

Environment Protection Act: Air, water, forest and wildlife Acts, issues in the enforcement of environmental legislation

UNIT – V

Social Issues and the Environment: Watershed management and environmental ethics. Climate change, global warming, acid rain, ozone layer depletion.

Environmental Disaster Management: Types of disasters, impact of disasters on environment, infrastructure, and development. Basic principles of disaster mitigation, disaster management, and methodology. Disaster management cycle and disaster management in India.

Field Work:Visit to a local area to document environmental issues- agricultural area/ pond/lake/terrestrial ecosystem.Visit to a local polluted area- market/slum area/Industrial area/traffic area.

Suggested Readings:

1	De Anil Kumar, "*Environmental Chemistry",* New Age Publisher International Pvt Ltd, New Delhi , 2016
2	E.P. Odum, '*Fundamentals of Ecology',* W.B. Sunders Co., USA.,1971
3	M.N. Rao and A.K. Datta, "*Waste Water Treatment",* Oxford and IBK Publications, New Delhi, 2009.
4	Benny Joseph, "*Environmental Studies",* Tata McGraw Hill, New Delhi, 2009
5	V.K. Sharma, "*Disaster Management",* National Centre for Disaster Management, IIPE, New Delhi, 1999

ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

MC 803 PY

Instruction: 2 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 0

Objectives:

1. To get a knowledge in Indian Culture
2. To Know Indian Languages and Literature and the fine arts in India
3. To explore the Science and Scientists of Medieval and Modern India

Outcomes: Student will be able to:

1. Understand philosophy of Indian culture
2. Distinguish the Indian languages and literature.
3. Learn the philosophy of ancient, medieval and modern India.
4. Acquire the information about the fine arts in India
5. Know the contribution of scientists of different eras.

UNIT – I

Introduction to Culture: Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India

UNIT – II

Indian Languages, Culture and Literature: Indian Languages and Literature-I: the role of Sanskrit, significance of scriptures to current society, Indian philosophies, other Sanskrit literature, literature of south India.

Indian Languages and Literature-II: Northern Indian languages & literature

UNIT – III

Religion and Philosophy: Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious Reform Movements in Modern India (selected movements only)

UNIT – IV

***Fine Arts in India (Art, Technology& Engineering*)**: Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in India, development of science in ancient, medieval and modern India.

UNIT – V

Education System in India: Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India

Suggested Readings:

1	Kapil Kapoor, "*Text and Interpretation*: *The India Tradition*", D. K. Print world, 2005
2	Gopala Krishnan , "*Science in Samskrit*", Samskrita Bharti Publisher, New Delhi, 2017
3	NCERT, "*Position paper on Arts, Music, Dance and Theatre*" NCERT, New Delhi, 2010.
4	S. Narain, "*Examinations in Ancient India*", Arya Book Depot, New Delhi, 1993
5	Satya Prakash, "*Founders of Sciences in Ancient India*", Vijay Kumar Publisher, New Delhi, 1989
6	M. Hiriyanna, "*Essentials of Indian Philosophy*", Motilal Banarsidass Publishers, New Delhi, 2005

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Syllabus with effect from the Academic Year 2024-25

BE I year | **English (Theory)** | **HS101EG**
(Common to all branches of BE)

Instruction: 2 hours per week
CIE: 30 marks

Credits: 2
SEE: 70 marks
Duration of the SEE: 3 hours

Course Objectives

To enhance the English language abilities of Engineering students, especially in reading and writing by

- using authentic material for language learning and exposing them to a variety of content-rich texts
- strengthening their vocabulary and grammar
- improving their reading and comprehension skills and honing their writing skills
- encouraging them to think creatively and critically

Course Outcomes

On successful completion of the course, the student will be able to

- read, understand, and interpret a variety of written texts
- use appropriate vocabulary and correct grammar
- undertake writing with confidence

Unit 1

Reading: Rudyard Kipling, "If"
Vocabulary: Word Formation: Root Words, Affixes, Compounding, Standard Abbreviations
Grammar: Basic Sentence, Sentence Structures and Types; Tenses
Writing: Note-taking, Note-making

Unit 2

Reading: Satyajit Ray, "Anukul"
Vocabulary: Synonyms, Antonyms, Homophones, Homographs, Homonyms
Grammar: Linkers and Connectives; Combining Sentences
Writing: Paragraph Writing – Structure and Development

Unit 3

Reading: Adrienne Rich, "Planetarium"
Vocabulary: Phrasal Verbs, Collocation
Grammar: Determiners and Modifiers, Comparison, Concord
Writing: Essay Writing, Paraphrasing, Summarizing

Unit 4

Reading: Martha Nussbaum, "The Silent Crisis" (From *Not for Profit: Why Democracy Needs the Humanities)*
Vocabulary: Formal/Informal Vocabulary, Inclusive Language
Grammar: Voice, Reported Speech, Prepositions
Writing: Formal Letters, Letters of Application, Curriculum Vitae/Resume

Unit 5

Reading: Chimamanda Ngozi Adichie, "The Danger of a Single Story" (TED Talk)
Vocabulary: Words often Confused; One Word Substitutes
Grammar: Punctuation, Common Errors (covering errors in all items of grammar)
Writing: Coherence and Cohesion in Writing; Avoiding Redundancy and Ambiguity

Suggested Reading

Board of Editors. *Language and Life: A Skills Approach*". Orient Black Swan, 2018.
Kumar, Sanjay and Pushp Lata. *English Language and Communication Skills for Engineers*. Oxford University Press, 2018.
Sudarshana, NP and C. Savitha. *English for Engineers*. Cambridge University Press, 2018.
Wood, F.T. *A Remedial English Grammar for Foreign Students*. Trinity Press, 2022.

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Chemistry

BS104CH
Instruction : 3+1 periods per week Duration of
SEE : 3 hours
CIE : 30marks
SEE : 70 marks
Credits : 4

Objectives:

1. Explain the principles of electrochemical processes and study analyze working principles and applications of various batteries.
2. Gain knowledge about the causes of corrosion and its prevention. Attain knowledge about the hard water and treatment of water for drinking purpose
3. Appraise Engineering materials their classifications, structure-property relationship.
4. Expose to qualitative and quantitative parameters of chemical fuels and awareness of eco-friendly materials, fuels and processes.
5. Understand the concepts and applications of spectroscopy

Outcomes: Student will be able to:

1. **Apply** concept of electrode potential in identifying feasibility of electrochemical reaction; **develop** a more in-depth perception on working of various types of batteries and their applications especially in electric vehicles (EVs).
2. **Identify** the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods. **Estimate** the physical & chemical parameters of quality of water and explain the process of water treatment
3. **Classify** chemical fuels and grade them through qualitative analysis and **acquire** knowledge on environment-friendly bio diesel
4. **Explain** the influence of chemical structure on properties of materials and their choice in engineering applications
5. **Relate** the concept of green chemistry to **modify** engineering processes and

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materials. **Understand** the concepts and applications of spectroscopy

BS104CH

UNIT – I

Electrochemistry: Electrolytic conductance, its types, factors affecting electrolytic conductance. Electrochemical cells: Electrolytic and Galvanic cells. Cell notation, cell reaction and cell potentials. Nernst equation and its derivation. Applications of Nernst equation to electrode potential and emf of cells. Numerical problems. Types of electrodes, Calomel, Quinhydrone and Glass electrodes. Determination of pH of a solution by using Quinhydrone electrode.

Battery Chemistry: Construction and Applications of Primary batteries: Zn-Carbon battery. Secondary batteries : Pb-Acid battery and Li-Ion battery, Flow Batteries (Fuel cells): Methanol-Oxygen fuel cells.

UNIT – II

Corrosion: Causes and its effects. Types of Corrosion-Dry or Chemical Corrosion and Wet or Electrochemical corrosion and their mechanism. Electrochemical corrosion – Galvanic and Waterline Corrosion. Factors influencing rate of corrosion.

Corrosion control methods: Cathodic protection methods - Sacrificial anodic and Impressed current Cathodic protection methods.

Surface coating methods: Hot Dipping-Galvanizing.

Water Chemistry: Hardness of Water-Types and units of hardness of water, estimation of hardness of water by EDTA method - Numerical problems. Alkalinity of water and its sources. Water softening by Ion exchange and Reverse Osmosis methods. Specifications of potable water. Sterilization by Chlorination. Break Point of Chlorination.

UNIT – III

Engineering Materials: Polymers: Monomer and its functionality, Polymers and degree of polymerization. Types of Polymerization - Addition, Condensation and Co-Polymerization with one example each. Classification of polymers–Plastics: (Thermoplastics &Thermosetting resins - PVC and Bakelite), Fibers: (Nylon-6:6)

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Elastomers: (Buna-S and Buna –N rubber). ***Conducting polymers***: Introduction, classification, properties and applications of conducting polymers. ***Biomaterials:*** Introduction .Definition of Biomaterials , Preparation, properties and applications of Poly lactic acid (PLA)
UNIT – IV ***Chemical Fuels:*** Introduction, definition and classification of chemical fuels.- primary and secondary – solid ,liquid and gaseous fuels Requirements of a good fuel. Calorific Value – HCV and LCV. Theoretical calculations of calorific value by Dulong's formula – Numerical problems. ***Solid Fuels:*** Coal and its Ranking. Analysis of coal-Proximate and Ultimate analysis. ***Liquid Fuels:*** Composition and uses of Gasoline, Diesel and Kerosene. Knocking. .Fuel-rating– Octane and Cetane numbers. ***Gaseous Fuels***: LPG, CNG-Composition and Uses. ***Biodiesel:*** Sources, Concept of Trans esterification, properties and applications of biodiesel. Carbon neutrality and its significance. Ethanol – Biodiesel, sources and uses.
Unit V **Spectroscopy**- Description of Electromagnetic spectrum. **Principles of UV-Visible Spectroscopy**: Statement of Beer-Lambert Law. Absorption and intensity shifts: Bathochromic, Hypsochromic, Hyperchromic and Hypochromic shifts with one example each.
Principle and applications of UV – Visible Spectroscopy.
IR Spectroscopy: Principle of IR Spectroscopy. Principle and applications of IR.
NMR Spectroscopy: Principle of H 1 -NMR Spectroscopy. Multiplicity, Chemical Shift. Principle and Applications of MRI
Green Chemistry: Concept, Mention - Principles of Green chemistry – example Diels – Alder reaction

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Suggested Readings

1	. *Principles of Physical Chemistry*‖ ,S.N. Chand &Co. New Delhi,1987
2	PCJain and M Jain ,—*Engineering Chemistry*‖ ,DhanpatRai&Sons ,15th Edition, New Delhi, 2004
3	JCKuriacoseandJRajaram,—*ChemistryinEngineeringandTechnology*—,TataMcGrawHill , New Delhi,2010
4	OG Palanna, —*Engineering Chemistry*‖,TataMcGrawHill, New Delhi, 2009
5	S SDaraand SSU mare, —*Engineering Chemistry*‖ ,S.N. Chand & Co. New Delhi, 2004
6	SashiChawla,—*Engineering Chemistry*‖, DhanpatRai&Sons, New Delhi, 2017
7	PrasantaRath,—*Engineering Chemistry*‖,Cengage Learning India Pvt. Ltd, 2015
8	Dr. Kishore Palle, Dr. V. Shanthi , Dr. A. Kishore Kumar and K. Ramesh -Engineering Chemistry.

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BE II-Semester syllabus for affiliated engineering colleges of Osmania University
(wef: academic year 2024-2025)
Common to all branches

DIFFERENTIAL EQUATIONS&NUMERICAL METHODS

BS203MT	DIFFERENTIAL EQUATIONS & NUMERICAL METHODS	3L:1T:0P	4 credits

Course objectives:

- To Develop strong problem-solving skills by tackling a variety of problems involving first-order differential equations
- To Develop strong problem-solving skills by tackling a variety of problems involving higher order differential equations
- To familiarizes concept of Laplace Transforms
- To Understand the Limitations and Applicability of Numerical Methods
- To Understand the Limitations and Applicability of Numerical Differentiation & Integration

Outcomes: After completing this course, the students will able to

- Students will enhance their problem-solving skills by applying the methods learned involving first-order differential equations.
- Students will enhance their problem-solving skills by applying the methods learned involving higher order differential equations.
- To learn Laplace transform and its properties
- Analyze and Interpret Interpolation
- Analyze and Interpret Numerical differentiation & integration

UNIT-I

Differential Equations of First Order: Exact differential equations, Integrating factors, Linear differential equations, Bernoulli's, Riccati's and Clairaut's differential equations, Orthogonal trajectories of a given family of curves.

UNIT-II

Differential Equations of Higher Orders: Solution of second and higher order linear homogeneous equations with constant coefficients, Method of reduction of order for the linear homogeneous second order differential equations with variable coefficients, Solutions of non-homogeneous linear differential equations, Method of variation of parameters, solution of Euler-Cauchy equation.

UNIT-III

Laplace Transforms: Laplace Transforms, Inverse Laplace Transforms, Properties of Laplace Transforms and inverse Laplace Transforms, Convolution Theorem (without proof), Solution of ordinary differential equations using Laplace Transforms.

UNIT-IV

Numerical Methods-I: Solution of polynomial and transcendental equations- Bisection method, Iteration Method, Newton-Raphson Method and Regula-Falsi method. Finite differences-forward differences-backward differences-central differences-symbolic relations and separation of symbols, Interpolation using Newton's forward and backward formulae: Lagrange's method of interpolation.

UNIT-V

Numerical Methods-II: Numerical Integration: Trapezoidal rule and Simpson's $1/3^{rd}$ and $3/8^{th}$ rules. Ordinary differential equations: Taylor's series; Picard's method; Euler and modified Euler's methods; Runge-Kutta method of fourth order.

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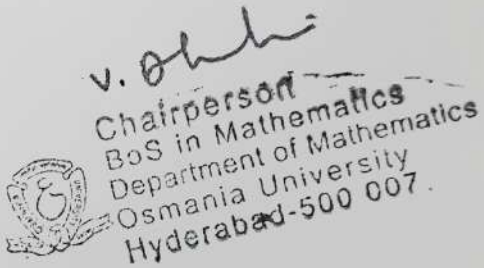
TEXT BOOKS:

1. R.K.Jain&S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa Publications, 2014
2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publications, 43rd Edition, 2014.

REFERENCE BOOKS:

1. S.S.Sastry, Introductory Methods of Numerical Analysis, 5th edition, PHI Private Limited, 2012.
2. Dr.B.S.Grewal, Numerical Methods in Engineering and Science, Khanna Publishers, 2014.
3. H.K.Dass, Er.RajnishVarma, Higher Engineering Mathematics, S.Chand Publishers, 3rd Edition.



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ES 303 CS	Scientific Programming					
Pre-requisites			**L**	**T**	**P**	**C**
			3	-	-	3
Evaluation	**SEE**	70 Marks	**CIE**		30 Marks	

Course Objectives :	
1	**Introduce basic scientific programming** concepts using Python and MATLAB
2	**Teach effective use of data structures** within Python and MATLAB environments.
3	**Develop competence in applying numerical methods** to solve mathematical problems.
4	**Enable data manipulation and visualization** using Python and MATLAB tools.
5	**Expose students to emerging technologies** like machine learning, IoT, and big data

Course Outcomes :	
On completion of this course, the student will be able to :	
CO-1	**Proficiency in Scientific Programming** using Python and MATLAB for computational tasks.
CO-2	**Implementation of Data Structures and Algorithms** to solve computational problems.
CO-3	**Understanding and Application of Numerical Methods** and linear algebra in scientific computing.
CO-4	**Ability to Analyze and Visualize Data** using Python and MATLAB tools.
CO-5	**Introduction to Emerging Technologies** and project development in scientific computing.

UNIT – I
Introduction to Scientific Programming and Python Basics: Overview of Scientific Computing, Introduction to Python Programming, Basic Syntax, Variables, and Data Types, Control Structures (if-else, loops), Functions and Modules, Introduction to MATLAB.

UNIT – II
Data Structures and Algorithms: Lists, Tuples, Dictionaries, and Sets in Python, Arrays and Matrices in MATLAB, Basic Algorithms (Searching and Sorting), Complexity Analysis.

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UNIT– III
Numerical Methods and Linear Algebra: Introduction to Numerical Methods, Root Finding Algorithms (Bisection, Newton-Raphson), Numerical Integration and Differentiation, Basics of Linear Algebra, Matrix Operations and Solving Linear Systems.

UNIT – IV
Data Analysis and Visualization: Importance of Data Analysis, Data Manipulation using Pandas (Python) and MATLAB, Data Visualization Techniques, Introduction to Matplotlib, Seaborn (Python), and MATLAB Plotting.

UNIT –V
Emerging Technologies and Project Work: Overview of Emerging Technologies (Machine Learning, IoT, Big Data), Introduction to Machine Learning using Scikit-Learn (Python), Basics of IoT and Big Data Applications in Engineering, Guidelines for Scientific Projects, Report Writing and Presentation Skills

Suggested Reading:

1	**Python Programming and Numerical Methods: A Guide for Engineers and Scientists"** by Qingkai Kong, Timmy Siauw, and Alexandre Bayen
2	**Introduction to Scientific Programming with Python"** by Joakim Sundnes
3	**MATLAB for Engineers"** by Holly Moore
4	**Learning MATLAB** by Tobin A. Driscoll

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Wef AY 2024-25

Department of English
Osmania University
Syllabus with effect from the Academic Year 2024-25

BE I year | **English (Laboratory)** | **HS151EG**

(Common to all branches of BE)

Instruction: 2 hours per week
CIE: 25 marks

Credits: 1
SEE: 50 marks

Course Objectives

To enhance the listening and speaking skills of students by

- Giving them adequate practice in listening with comprehension
- Providing them ample opportunities to improve their public speaking skills
- Training them in the use of correct pronunciation, stress, and intonation
- Sensitizing them to the use of verbal and non-verbal communication appropriate to the context
- Encouraging them to learn the art of conversation to suit formal and informal situations
- Preparing them to make formal presentations and face interviews

Course Outcomes

On successful completion of the course, students will be able to

- Listen, understand, and interpret formal and informal spoken language
- Speak English with acceptable pronunciation, stress, and intonation
- Present themselves with confidence in formal situations
- Participate in individual and group activities with relative ease

Interactive Sessions in Language Lab:

Experiments and Practice Sessions to Enhance Listening and Speaking Skills

1. Listening Skills, Barriers to Listening, Listening for Comprehension
2. English Phonology; Varieties of English-Indian, British, American
3. Intelligible Pronunciation, Intonation, Word Stress and Sentence Stress
4. Conversation Skills: Face-to-Face and Telephone
5. Introducing Oneself and Others, Asking for and Giving Information
6. Making Requests and Responding to them Appropriately
7. Giving Instructions and Responding to them Appropriately
8. Agreeing and Disagreeing, Seeking Clarification
9. Making Formal Announcements and Emceeing
10. JAM; Role Play
11. Group Discussions
12. Debate
13. Public Speaking Skills and Body Language
14. Interviews
15. Formal Presentations

Suggested Reading

Balasubramanian, T. *A Textbook of English Phonetics for Indian Students*. Macmillan, 1981.

Board of Editors. *Language and Life: A Skills Approach.* Orient Black Swan, 2018.

CIEFL. *Exercises in Spoken English. Parts. I-III.* Oxford University Press.

Pillai, Radhakrishna G. *Spoken English For You - Level II.* 8th Edition. Emerald Publishers, 2014.

Sethi, J, PV Dhamija. *A Course in Phonetics and Spoken English.* 2nd Edition, Prentice Hall, 1999.

Shinde, Maithry et al. *Life Skills and Personality Development*. Cambridge University Press, 2022.

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Course Code	Course Title						Core/ Elective
BS153CH	Chemistry Lab (Common to All Branches)						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	3	25	50	1.5

Course Objectives

- Conduct experiments, take measurements and analyze the data through hands-on experience n order to demonstrate understanding of the theoretical concepts of quantitative Analysis while working in small group.
- Interpret the electro analyticalprinciples with experimental results graphically
- Demonstrate writing skills through clear laboratory reports
- **Course Outcomes**

On successful completion of this course, students will be able to:

- Apply the principles of Colourimetryand Electrochemistry in quantitative estimations.
- Estimate the rate constants of reactions from concentration of reactants/products as a function of time.
- Synthesize small drug molecules.

List of Experiments:

- Introduction to Chemical Analysis.
- Techniques of Weighing

.Volumetric Analysis:

- Preparation of Standard Mohr's salt solution, Standardization of $KMnO_4$ and estimation of ferrous ion.by Permanganometry,
- Estimation Iron(II) by Dichromatometry

Water Analysis:

- Preparation of Standard Magnesium sulphate solution, Standardization of EDTA and Estimation of Total Hardness.
- Preparation of Standard Sodium Carbonate Solution, Standardization of HCl and Estimation of Carbonate and Bicarbonate Alkalinity.

Conductometry:

- Estimation of HCl
- Estimation of CH_3COOH
- Estimation of mixture of acids

Potentiometry

- Estimation of HCl
- Estimation of Iron

pHMetry:

- Estimation of HCl

Colorimetry:

- Verification of Beer-Lambert's law and estimation of Manganese
- **Drug Synthesis** Preparation of Aspirin and paracetamol.

Note: Minimum ten experiments should be conducted in the semester **Suggested Readings:**

- SeniorPracticalPhysicalChemistry,B.D.Khosla,A.GulatiandV.Garg(R.Chand& Co.,Delhi)
- AnIntroductiontoPracticalChemistry,K.K.SharmaandD.S.Sharma(Vikaspublishing,N.Delhi)

01/07/2024

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Dept of Chemistry
Osmania University, Hyd-07.

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ENGINEERING WORKSHOP PRACTICE

ES 352 ME

Instruction:6 periods per week *Duration of SEE: 3 hours*
CIE: 50 marks *SEE: 50 marks*
Credits: 3

Objectives:

1.Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.
2.To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
3.To gain a good basic working knowledge required for the production of various engineering products.
4.To Study different hand operated power tools, uses and their demonstration.
5.Adopt safety practices while working with various tools

Outcomes: Student will be able to:

1. Demonstrate an understanding of and comply with workshop safety regulations.
2. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
3. Study and practice on machine tools and their operations
4.Undertake jobs connected with Engineering Workshop trades including fitting, carpentry, sheet metal, house wiring, welding, smithy and foundry.
5.Apply basic electrical engineering knowledge for house wiring practice

List of Experiments:

A. TRADE FOR EXERCISES:

1. Carpentry
2. Fitting
3. House wiring
4. Sheet metal working
5. Smithy
6. Welding
7. Plumbing

B. TRADES FOR DEMONSTRATION AND EXPOSURE:

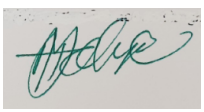
1. Machining (Lathe & Drilling)
2. Injection moulding
3. Mould making and casting
4. Basic Electronics lab instruments

C. PRESENTATIONS AND VIDEO LECTURES

1. Manufacturing Methods
2. Rapid Prototyping
3. Glass Cutting
4. 3D printing
5. CNC LATHE

D. IT WORKSHOP: Computer hardware, identification of parts, Disassembly, Assembly of computer to working condition, operating system installation.

Note: At least two exercises from each trade.



Suggested Readings:

1	Venugopal, K, "*Workshop Manual*", Anuradha Publications, Kumbakonam, TN, 2012
2	K.C. John, "*Mechanical Workshop*" 2nd Edn., PHI, 2010.
3	Hajra Choudary, "*Elements of Workshop Technology*" Vol. 1, Asian Publishers, Edn., 1993.
4	G.S. Sawhney, "*Mechanical Experiments and Workshop Practice*", I.K. International Publishing House, New Delhi, 2009.

ES353CS	**Scientific Programming Lab**					
Pre-requisites			**L**	**T**	**P**	**C**
			-	-	2	1
Evaluation	**SEE**	50 Marks	**CIE**		25 Marks	

Course Objectives :	
1	Enable students to install and use Python and MATLAB for writing and debugging programs.
2	To implement control structures, data structures, and algorithms and analyze their complexities.
3	Train students to perform data manipulation and create customized visualizations using Python and MATLAB tools.

Course Outcomes :	
On completion of this course, the student will be able to:	
CO-1	Set up and use Python and MATLAB for scientific programming.
CO-2	Implement and analyze data structures, control structures, and algorithms.
CO-3	Gain skills in data manipulation, visualization, and analysis using Python and MATLAB.

1. Python and MATLAB Installation and IDE Setup
2. Writing Simple Python and MATLAB Programs
3. Implementing Control Structures and Functions
4. Implementing Data Structures in Python and MATLAB
5. Writing and Testing Search and Sort Algorithms
6. Analyzing Algorithm Complexity in Practical Problems
7. Implementing Numerical Methods in Python and MATLAB
8. Performing Matrix Operations and Solving Linear Systems
9. Case Studies and Applications in Engineering
10. Data Manipulation and Analysis using Pandas and MATLAB
11. Creating Various Plots (Line, Scatter, Bar, Histogram)
12. Customizing and Interpreting Plots for Engineering Data
13. Implementing Basic Machine Learning Algorithms in Python
14. Exploring IoT and Big Data Tools
15. Working on Individual/Group Projects
16. Preparing Project Reports and Presentations
17. Final Project Presentation

Prepared and Compiled By
Dr.Syed Shabbeer Ahmad
Professor and Head-CSED
MJCET,HYD-34

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4/9/24
Prof. K. Shyamala
I/c. DEAN
Faculty of Engineering
Osmania University,
Hyderabad-500 007.

SCHEME OF INSTRUCTION & EXAMINATION
B.E CSE(AI&ML)
SEMESTER-III

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	BS 207 MT	Probability & Statistics	3	1	-	4	30	70	3	4
2	PC 304 CS	Logic and Switching Theory	3	-	-	3	30	70	3	3
3	PC 301 CS	Data Structures	3	-	-	3	30	70	3	3
4	PC 302 CS	Discrete Mathematics	3	-	-	3	30	70	3	3
5	PC 303 CS	OOP using JAVA	3	-	-	3	30	70	3	3
6	PC 301 DS	Introduction to Data Science	3	-	-	3	30	70	3	3
7	HS 201 EG	Effective Technical Communication in English	3	-	-	3	30	70	3	3
Practical / Laboratory Courses										
8	PC 351 CS	Data Structures Lab	-	-	2	2	25	50	3	1
9	PC 351 DS	Data Science Lab	-	-	2	2	25	50	3	1
10	PC 352 CS	OOP using JAVA Lab			2	2	25	50	3	1
Total			**21**	**1**	**6**	**28**	**285**	**640**	**30**	**25**

SEMESTER-IV

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	ES 301 EC	Basic Electronics	3	-	-	3	30	70	3	3
2	HS 406 CM	Managerial Economics and Accountancy	3	-	-	3	30	70	3	3
3	ES301ME	Applied Operations Research	3	-	-	3	30	70	3	3
4	PC 402 CS	Operating Systems	3	-	-	3	30	70	3	3
5	PC 401 AI	Artificial Intelligence	3	-	-	3	30	70	3	3
6	PC 503 CS	Computer Networks	3	-	-	3	30	70	3	3
7	PC 404 CS	Database Management Systems	3	-	-	3	30	70	3	3
Practical / Laboratory Courses										
8	PC 451 AI	Artificial Intelligence Lab	-	-	2	2	25	50	3	1
9	PC 452 AI	CN & OS Lab	-	-	2	2	25	50	3	1
10	PC 453 CS	Database Management Systems Lab	-	-	2	2	25	50	3	1
Total			**21**	-	**6**	**27**	**285**	**640**	**30**	**24**

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PC304CS	Logic and Switching Theory					
Prerequisites			**L**	**T**	**P**	**C**
			3	**-**	**-**	**3**
Evaluation	**CIE**	**30 Marks**	**SEE**		**70 Marks**	

Objectives

1. To impart knowledge on the fundamentals of digital computers, number systems, arithmetic operations, and information representation using digital codes.
2. To develop the ability to simplify Boolean expressions using algebraic and Karnaugh Map (K-Map) techniques and implement logic functions using universal gates.
3. To introduce combinational logic design, including standard building blocks such as adders, multiplexers, encoders, and decoders, and foster hierarchical design using hardware description languages.
4. To provide insights into sequential circuits through the design and analysis of flip-flops, latches, and synchronous state machines.
5. To explain the concepts of counters, registers, and symmetric networks and their synthesis in practical digital systems.

Course Outcomes:

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

1. Represent numerical and character data using various number systems and codes, and perform basic arithmetic operations using digital methods.
2. Simplify and implement Boolean expressions using K-Maps, tabulation methods, and universal gates such as NAND and NOR.
3. Design combinational logic circuits such as multiplexers, decoders, and arithmetic comparators using gate-level dataflow.
4. Distinguish between combinational and Sequential circuit operations.
5. Simulate and implement sequential circuits using latches and flip-flops.

UNIT-I

Digital Computers and Information: Information Representation, Computer Structure.
Number Systems: Binary Numbers, Octal and Hexadecimal Numbers, Number Ranges.
Arithmetic Operations: Conversion from Decimal to other bases.
Decimal Codes: BCD Addition and Subtraction. Alphanumeric Codes: ASCII Character Code, Parity Bit.
Binary Logic and Gates: Binary Logic, Logic Gates. Boolean Algebra: Basic Identifiers, Algebraic Manipulation, Complement of a Function.
Standard Forms: Minterms and Maxterms, Sum of Product and Products of Sums.

UNIT-II

Minimization of Boolean Functions: Introduction, the map methods (Karnaugh Map) and Minimal Functions and their Properties, the tabulation procedure (Quine McCluskey Method),
NAND and NOR Gates: Nand Circuits, Two-level Implementation, Multilevel NAND Circuits, NOR Circuits. Exclusive OR Gates: Odd Function, Parity Generation and Checking.

UNIT-III

Combination Logic Design: Combinational Circuits, Design Topics: Design Hierarchy, Top-Down design, Computer Aided Design, Hardware Description Languages, Logic Synthesis. Analysis Procedure: Derivation of Boolean Functions, Derivation of the Truth Table, Logic Simulation, Design Procedure, Decoders, Encoders, Multiplexers, Binary Adders, Binary Subtraction, Binary Multipliers,

UNIT-IV

Sequential Circuits: Sequential Circuit definitions, latches, Flip-Flops, Sequential circuit analysis,

Sequential circuit design, design with SR Flip-Flop, D Flip-Flop, and T Flip-Flop, design with JK Flip-Flops, Registers and Counters: registers, Shift registers, Synchronous Binary counters, Ripple Counter.

UNIT-V

Design of Sequential Circuits: Basic Design Steps, Finite State Machine representation using Moore and Mealy State Models, State Minimization, Design of FSM for Sequence generation and Algorithmic State Machine Charts, Symmetrical functions and their representations

Suggested Reading:

1. M. Moris Mano, Charles R. Kime, Logic and Computer Design Fundamentals, 5th edition, Pearson Education Asia, 2001.
2. Zvi Kohavi, Switching and Finite Automata Theory, 2nd edition, Tata McGraw Hill, 1995.
3. Charles H. Roth, Jr Fundamentals of Logic Design, 5th edition, Thomson, Brook, Cole, 2005.
4. Ref: AICTE e-Kumbha portal (Digital Electronics and Systems by Dr. Abhisek Bhatt)

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PC301CS	DATA STRUCTURES					
Prerequisites			**L**	**T**	**P**	**C**
			3	**-**	**-**	**3**
Evaluation	**CIE**	**30 Marks**	**SEE**		**70 Marks**	

Objectives:

1. To develop proficiency in the specification, representation, and implementation of abstract data types and data structures.
2. To discuss the linear and non-linear data structures and their applications
3. To introduce the creation, insertion and deletion operations on binary search trees and balanced binary search trees.
4. To introduce various internal sorting, searching techniques and their time complexities

Course Outcomes:

1. Understand the fundamentals of algorithm analysis and evaluate performance using time and space complexity along with asymptotic notations.
2. Implement linear data structures such as arrays, stacks, and queues, including their applications in expression evaluation, pattern matching, and sparse matrix handling.
3. Apply various types of linked lists (singly, circular, doubly) and perform dynamic memory management and operations such as polynomial manipulation and sparse matrix representation.
4. Design hierarchical data structures like trees and perform operations on BSTs and AVL trees for efficient searching, insertion, and deletion.
5. Apply graph traversal algorithms and internal sorting/searching techniques to solve computational problems using suitable data structures and efficient algorithms.

UNIT I

Algorithms: Introduction, Algorithm Specifications, Recursive Algorithms, Performance Analysis of an algorithm- Time and Space Complexity, Asymptotic Notations.

Arrays: Arrays ADT, Polynomials, Sparse matrices, Strings-ADT, Pattern Matching.

UNIT-II

Stacks and Queues: Stacks, Stacks using Arrays, Stacks using dynamic arrays, Evaluation of Expressions Evaluating Postfix Expression, Infix to Postfix. Queues: Queues ADT, operations, Circular Queues, Applications.

UNIT-III

Linked Lists: Singly Linked Lists and Chains, Linked Stacks and Queues, Polynomials, Operations for Circularly linked lists, Equivalence Classes, Sparse matrices, Doubly Linked Lists.

Hashing: Static Hashing, Hash Tables, Hash Functions, Overflow Handling, Theoretical Evaluation of Overflow Techniques.

UNIT - IV

Trees: Introduction, Binary Trees, Binary Tree Traversals, Heaps, Binary Search trees (BST): Definition, Searching an element, Insertion into a BST, Deletion from a BST.

Efficient Binary Search Trees: AVL Trees: Definition, Searching an element, Insertion into a AVL.

UNIT-V

Graphs: Graph Abstract Data Type, Elementary Graph operations (DFS and BFS), Minimum Cost

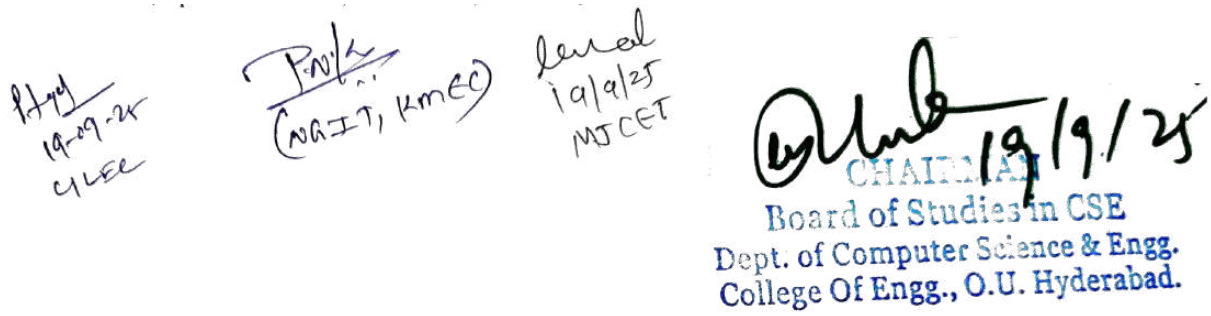
Spanning Trees (Prim's and Kruskal's Algorithms).
Sorting and Searching: Insertion sort, Quick sort, Best computing time for Sorting, Merge sort, Heap sort, shell sort, Sorting on Several Keys, List and Table Sorts, Summary of Internal Sorting, Linear and Binary Search algorithms.

Suggested Books:

1. Horowitz E, Sahni S and Susan Anderson-Freed, Fundamentals of Data structures in C, 2nd Edition (Reprint 2024), Universities Press.

Reference Books:

1. Mark A Weiss, Data Structures and Algorithm Analysis In C, Second Edition (2002), Pearson.
2. Kushwaha D. S and Misra A.K, Data structures A Programming Approach with C, Second Edition (2014), PHI.
3. Gilberg R. F and Forouzan B. A, Data structures: A Pseudocode Approach with C, Second Edition (2007), Cengage Leaming
4. Tanenbaum A. M, Langsam Y. Augenstein M. J, Data Structures using C, Second Edition (2008), Pearson.
5. Thomas H. Cormen, Charles E. Leiserson, Ronald L Rivest, Clifford Stein, Introduction to Algorithms, Fourth Edition (2022), MIT Press
6. YedidyahLangsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Data Structures Using C and C++, Second Edition (2009), PHI.



PC302CS	DISCRETE MATHEMATICS					
Prerequisites			**L**	**T**	**P**	**C**
			3	**-**	**-**	**3**
Evaluation	**CIE**	**30 Marks**	**SEE**		**70 Marks**	

Objectives:

1. To understand the concepts of propositional and predicate logic and their applications in theorem proving.
2. To explore the properties of relations, functions, and algebraic structures such as groups and lattices.
3. To develop skills in combinatorics and counting principles for solving real-world problems.
4. To solve recurrence relations using generating functions and other algebraic techniques.
5. To apply graph theory concepts to solve problems in networks, trees, and coloring using traversal and optimization algorithms.

Course Outcomes:

1. Analyze logical arguments using truth tables, normal forms, quantifiers, and perform proof strategies such as contradiction and consistency.
2. Apply properties of binary relations and functions, including partial orders, equivalence relations, lattices, and algebraic structures.
3. Solve counting problems using combinations, permutations, binomial/multinomial theorems, and the principle of inclusion-exclusion.
4. Apply recurrence relations and generating functions to model and solve discrete problems
5. Analyse graphs using DFS and BFS and identify spanning trees and graph isomorphism.

UNIT-1

Mathematical Logic: Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Quantifiers, universal quantifiers. Predicates: Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving

UNIT-II

Relations: Properties of Binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Lattices, Hasse diagram. Functions: Inverse Function Composition of functions, recursive Functions, Lattice and its Properties, Algebraic structures: Algebraic systems Examples and general properties, Semi groups and monads, groups sub groups' homomorphism, Isomorphism.

UNIT-III

Elementary Combinatorics: Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of Inclusion - Exclusion. Pigeon hole principles and its application.

UNIT-IV

Recurrence Relation: Generating Functions, Function of Sequences Calculating Coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating. funds. Characteristics solution of in homogeneous Recurrence Relation.

UNIT-V

Graph Theory: Representation of Graph, DFS, BFS, Spanning Trees, planar Graphs. Graph Theory and Applications, Basic Concepts Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

Suggested Readings:

1. Elements of Discrete Mathematics- A Computer Oriented Approach- CL Liu, D P Mohapatra. Third Edition, Tata McGrawHill.
2. Discrete Mathematics for Computer Scientists & Mathematicians, J.L. Mott, A. Kandel, T.P. Baker, PHI.
3. Discrete Mathematics and its Applications, Kenneth H. Rosen, Fifth Edition. TMH.
4. Discrete Mathematical Structures Theory and Application-Malik & Sen, Cengage.
5. Discrete Mathematics with Applications, Thomas Koshy, Elsevier
6. Logic and Discrete Mathematics, Grass Man & Trembley, Pearson Education.

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PC303CS	OOP using JAVA					
Prerequisites			**L**	**T**	**P**	**C**
			3	**-**	**-**	**3**
Evaluation	**CIE**	**30 Marks**	**SEE**		**70 Marks**	

Objectives:

1. To understand fundamentals of object-oriented programming in Java which includes defining classes, invoking methods, difference between applet and application programs, using class libraries
2. To create Java application programs using sound OOP practices such as interfaces, exception handling, multi threading.
3. To understand fundamentals of object-oriented programming in Java which includes defining classes, invoking methods, difference between applet and application programs, using class libraries
4. Use Collection framework, AWT and event handling to solve real world problems.
5. Exploring Swing, and implementing Servlets.

Outcomes:

1. CO1: Apply object-oriented programming principles such as encapsulation, inheritance, and polymorphism to solve basic problems using Java.
2. CO2: Develop and debug Java programs using classes, methods, constructors, arrays, exception handling, and interfaces.
3. CO3: Use multithreading and exception handling mechanisms to enhance performance and robustness of Java applications.
4. CO4: Employ Java Collection Framework and utility classes to manage and manipulate data efficiently.
5. CO5: Design and implement GUI-based applications using AWT and handle user events through event-driven programming.

UNIT-I

Object Oriented Programming: Principles, Benefits of Object Oriented Programming.

Introduction to Java: Java buzzwords, bytecode. Java Programming Fundamentals: Applet and Application program using simple java program, data types, variables, arrays, operators, expressions, control statements, type conversion and casting, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, introducing access control, static, final, nested and inner classes, exploring string class, using command-linear arguments.

Inheritance: Inheritance concept, types of inheritance, Member access rules, use of super and final. Polymorphism - dynamic binding, method overriding, abstract classes and methods.

UNIT-II

Interfaces: Defining an interface, implementing interfaces, extending interface.

Packages: Defining, Creating and Accessing a Package, importing packages

Exception handling: Benefits of exception handling, classification, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, built in exceptions, creating own exception sub classes

Multithreading: Java Thread Model, The Main Thread, creating a Thread, creating multiple threads, using is Alive() and join(), thread priorities, synchronization, inter thread communication, deadlock

UNIT-III

Collections: Overview of Java Collection frame work, commonly used Collection classes Array List, Linked List, Hash Set, Tree Set, Collection Interfaces Collection, List, Set. Accessing Collection via iterator, working with Map. Legacy classes and interfaces Vector, Hashtable, Stack, Dictionary, Enumeration interface.

Other Utility classes: String Tokenizer, Date, Calendar, Gregorian Calendar, ScannerJava Input/Output: exploring java.io, Java I/O classes and interfaces, File, Stream classes, byte stream, character stream, serialization.

UNIT-IV

GUI Programming with java: The AWT class hierarchy, MVC architecture. Applet Revisited: Basics, architecture and skeleton, simple applet program.

Event Handling: Delegation Event Model, Event Classes, Source of Events, Event Listener Interfaces. Handling mouse and keyboard events, Adapter classes.

Database Programming using JDBC: Introduction to JDBC, JDBC Drivers & Architecture, CURD operation Using JDBC, Connecting to non-conventional Databases.

UNIT V

Exploring Swing: JLabel, Imagelcon, JTextField, the Swing buttons, JTabbedpane, JScrollPane, JList, JComboBox.

Servlet: Life cycle, using tomcat, simple servlet, servlet API, javax.servlet package, reading servletparameters, javax.servlet.http package, handling HTTP requests and responses

Suggested Readings:

1. Herbert Scheldt, "The Complete Reference Java, 13th th Edition, Tata McGraw Hill, 2023.
2. James M Slack, Programming and Problem Solving with JAVA, Thomson Learning, 2002.
3. C Thomas Wu, An Introduction to Object Oriented Programming with Java 5th Edition, McGraw Hill Publishing, 2010.
4. H. M. Dietel and P. J. Dietel, Java How to Program, Sixth Edition, Pearson Education /PHI.

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Course Code	Course Title						Core/Elective
PC301DS	**Introduction to Data Science**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	3	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

- To learn the core concepts, processes, technologies, and applications of data science along with data types and collection techniques.
- To differentiate among types of data analytics and statistical attributes, and analyze data using measures of central tendency and dispersion.
- To apply data cleaning techniques, detect outliers, and analyze relationships in data through correlation and sampling methods.
- To perform hypothesis testing and ANOVA to evaluate the significance of data-driven assumptions.
- To implement supervised and unsupervised learning algorithms and develop predictive models through real-world case studies.

Course Outcomes

After completing this course, the student will be able to:

1. Understand core concepts of Data Science and data management techniques.
2. Apply statistical and analytical techniques for data summarization and interpretation.
3. Analyze and preprocess data using cleaning, outlier detection, and transformation methods.
4. Evaluate hypotheses using statistical methods including hypothesis testing and ANOVA.
5. Build predictive models using supervised and unsupervised machine learning techniques.

Unit-I

Introduction to Data Science: Introduction, core concepts and technologies, data science process and toolkits, data science applications. Data: Data and Information, Data and its importance, Data Types. Data Collection and Management: Data Sources, Data Collection Techniques, Data Storage.

Unit-II

Data Analytics: Importance of Data Analytics, Types of Data Analytics-Descriptive, Diagnostics, Predictive and Prescriptive. Statistics: Understanding attributes, Types of Attributes- Discrete and Continuous Attributes. Measure of Central Tendency: Mean, Median, Mode. Measure of Dispersion: Skewness and Kurtosis.

Unit-III

Data Cleaning and Preparation: Exploring Data, Handling Missing Data, Discretization and Binning. Outliers: Introduction, Detecting and Filtering Outliers. Correlation Analysis: Correlation Coefficients, Sampling: Random Vs. Non Random .

Unit-IV

Hypothesis Testing: Introduction, Developing Hypothesis, Null and Alternate Hypothesis, Type-I, Type-II error, Approaches to Hypothesis Testing. Analysis of Variance (ANOVA): Introduction to ANOVA, One Way ANOVA, Two Way ANOVA.

Unit-V

Supervised Vs. Unsupervised Learning - Supervised Learning: Regression-Simple and Multiple Linear Regression, Case Study: House Price Prediction.
Classification: Logistic Regression, CART, Case Study: Credit Card Approval.
Unsupervised Learning: Clustering: KMeans Clustering, Case Study: Customer Segmentation.

Suggested Reading:

1. A Hands-on introduction to data science by chirag shah, Cambridge University Press.
2. Python Data Analysis: Perform data collection, data processing, wrangling, visualization, and model building using Python, Avinash Navlani, Armando Fandango, Ivan Idris, 3rd Edition.
3. Hands-On Exploratory Data Analysis with Python: Suresh Kumar Mukhiya, Usman Ahmed.
4. Python for Data Analysis, 3E, Wes McKinney.

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PC351CS	Data Structures Lab					
Prerequisites			**L**	**T**	**P**	**C**
			-	**-**	**2**	**1**
Evaluation	**CIE**	**25 Marks**	**SEE**		**50 Marks**	

Objectives:

1. To develop skills to design and analyse simple linear and nonlinear data structures.
2. To gain programming skills to implement sorting and searching algorithms
3. To Strengthen the ability to identify and apply the suitable data structures for the given real world problem
4. To Gain knowledge in practical applications of data structures

Outcomes:

Essential Outcomes:

After completing this course, the student will be able to:

1. Implement linear data structures such as arrays, stacks, queues, and their variations to perform basic operations like insertion, deletion, and traversal.
2. Apply linked lists (singly, doubly, and circular) for dynamic memory management and use them to implement linear data structures such as stacks and queues.
3. Use standard searching (linear and binary) and sorting techniques (selection, insertion, merge, quick, heap) to process and organize data efficiently.
4. Construct tree structures such as binary trees, binary search trees, and AVL trees, and apply recursive traversal techniques.
5. Apply graph traversal (DFS and BFS), hashing techniques, and minimum spanning tree algorithms (Prim's and Kruskal's) for solving computing problems.

List of Experiments:

1. Write a program to represent arrays for the following:
    a. To check whether the given matrix is sparse or not and display triplet representation.
    b. To add two given polynomials.
2. Write a program to apply arrays to perform operations on the following linear data structures:
    a. Stacks
    b. Queues
    c. Circular Queue
3. Write a program to implement following stack applications:
    a. String Reversal.
    b. Infix to Postfix Conversion.
    c. Postfix Expression Evaluation.
    d. Balanced Parenthesis
4. Write a program to implement the operations of Singly Linked List
5. Write a program to implement the operations of Doubly Linked List.
6. Write a program to implement the operations of Circular Linked List.
7. Write a program to apply linked list to perform operations on the following data structures:
    a. Stacks
    b. Queues

8. Write a program to search for a an element given in an array using following search techniques:
    a. Linear search
    b. Binary search
9. Write a program to build a hash table using linear probing and search for a given element.
10. Write a program to construct a Binary Tree and implement display in-order, pre-order and post-order traversal.
11. Write a program to construct a Binary Search Tree and implement insertion, deletion and search operations on it.
12. Write a program to construct a AVL tree and implement insertion, deletion and search operations on it.
13. Write a program to connect a graph and traverse the graph using DFS and BFS.
14. Write a program to design a minimum spanning tree from a given graph using Prims and Kruskals Algorithm.
15. Write a program to sort given set of elements using following sorting techniques:
    a. Selection sort
    b. Insertion sort
    c. Merge sort
    d. Quick sort
    e. Heap sort

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Board of Studies in CSE
Dept. of Computer Science & Engg.
College Of Engg., O.U. Hyderabad.

PC352CS	**OOP using JAVA Lab**					
Prerequisites			**L**	**T**	**P**	**C**
			-	**-**	**2**	**1**
Evaluation	**CIE**	**25 Marks**	**SEE**		**50 Marks**	

Objectives:

The objectives of the course are to impart knowledge of:
1. To build software development skills using java programming for real world applications.
2. To implement frontend and backend of an application
3. To implement classical problems using java programming.

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

1. Develop Java applications using the concepts of Inheritance, interfaces, packages, access control specifiers.
2. Implement the concepts of Exception Handling in java Applications.
3. Read and write data using different Java I/O streams.
4. Create graphical user interfaces and Applets by applying the knowledge of Event Handling.
5. Create robust applications using Java standard class libraries and retrieve data from a database with JDBC.
6. Ability to solve real-world problems by designing user friendly GUI with befitting backend through the APIs of Java.

List of Experiments:

1. Write a Java program to illustrate the concept of class with method overloading
2. Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use String Tokenizer class of java.util)
3. Write a Java program to illustrate the concept of Single level and Multi level Inheritance.
4. Write a Java program to demonstrate the Interfaces & Abstract Classes.
5. Write a Java program to implement the concept of exception handling.
6. Write a Java program to illustrate the concept of threading using Thread Class and runnable Interface.
7. Write a Java program to illustrate the concept of Thread synchronization.
8. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
9. Write a Java program to illustrate collection classes like Array List, LinkedList, Treemap and Hash map.
10. Write a Java program to illustrate Legacy classes like Vector, Hash table, Dictionary & Enumeration interface.
11. Write a Java program to implement iteration over Collection using Iterator interface and List Iterator interface.
12. Write a Java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
13. Write a Java program to illustrate the concept of I/O Streams

14. Write a Java program to implement serialization concept
15. Write a Java applet program to implement Colour and Graphics class
16. Write a Java applet program for handling mouse & key events
17. Write a Java applet program to implement Adapter classes
18. 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.
19. Write an example for JDBC prepared statement with ResultSet
20. Write a Java Program to get primary key value (auto-generated keys) from inserted queries using JDBC
21. Write a Java Program to create a simple JList
22. Write a Java Program to create a simple checkbox using JCheckBox
23. Write a Java Program to create a checkbox and Item Listener toit.
24. 1. Write Servlet application to print current date &time
2. Html & Servlet Communication
3. Auto refresh a page
4. Demonstrate session tracking
5. Select record from database
6. Application for login page
7. Insert record into database
8. Count the visits on webpage
9. Insert teacher record in Database.

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PC351DS	**DATA SCIENCE LAB**					
Prerequisites			**L**	**T**	**P**	**C**
			0	**0**	**2**	**1**
Evaluation	**CIE**	**25 Marks**	**SEE**		**50 Marks**	

Course Objectives:

1 To provide students with a comprehensive understanding of Python/R programming, covering fundamental concepts, control structures, functions, data manipulation, object-oriented programming, GUI development, data analysis, and practical application of various libraries.

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

CO1: Show the installation of Python/R Programming Environment.
CO2: Utilize and Python/ R Data types for developing programs.
CO3: Make use of different Python/R Data Structures.
CO4: Develop programming logic using Pyhton/R Packages.
CO5: Apply Python/R programming for reading, cleaning, visualizing and analyzing data
CO6: Engage in multivariate analysis, exploratory data analysis, and statistical analysis on complex datasets
CO7:Analyze the datasets using Python/ R programming capabilities

List of Experiments

1. Introduction to Python/R Programming
2. Download and install R-Programming environment and install basic packages in Python/ R.
3. Learn all the basics of Python/R-Programming (Data types, Variables, Operators etc.)
4. Implement Python/R-Loops with different examples.
5. Learn the basics of functions in Python/R and implement with examples.
6. Implement different String Manipulation functions in Python/ R.
7. Implement different data structures in Python/ R
8. Implement various Data Visualization Techniques
9. Demonstrate various operations on Toyota Corolla dataset (Kaggle) Reading files Exploratory data analysis Data preparation and pre-processing
10. Write a Program to apply multivariate analysis with Titanic data set.
11. Write a Program to perform time series analysis with Open Power System data.
12. Write a Program to predict price of pre-owned cars using Regression –

Kaggle data set

13. Demonstrate Customer Segmentation. using Clustering Technique
14. Program to Wine quality data analysis: loading, applying descriptive statistics, finding correlated columns, analysing columns, adding new attributes, grouping columns, concatenating data frames, univariate analysis, multivariate analysis.

19-09-25 CMRCET

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SEMESTER-IV

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	ES 301 EC	Basic Electronics	3	-	-	3	30	70	3	3
2	HS 406 CM	Managerial Economics and Accountancy	3	-	-	3	30	70	3	3
3	ES301ME	Applied Operations Research	3	-	-	3	30	70	3	3
4	PC 402 CS	Operating Systems	3	-	-	3	30	70	3	3
5	PC 401 AI	Artificial Intelligence	3	-	-	3	30	70	3	3
6	PC 503 CS	Computer Networks	3	-	-	3	30	70	3	3
7	PC 404 CS	Database Management Systems	3	-	-	3	30	70	3	3
Practical / Laboratory Courses										
8	PC 451 AI	Artificial Intelligence Lab	-	-	2	2	25	50	3	1
9	PC 452 AI	CN & OS Lab	-	-	2	2	25	50	3	1
10	PC 453 CS	Database Management Systems Lab	-	-	2	2	25	50	3	1
Total			**21**	**-**	**6**	**27**	**285**	**640**	**30**	**24**

19-09-25 CHEE

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Course Code	Course Title						Core/PE/OE
ES301EC	BASIC ELECTRONICS						Core
	Contact Hours per Week				CIE	SEE	Credits
Prerequisite	L	T	D	P/D			
BS202PH	3	-	-	-	30	70	3

Course Objectives: The course is taught with the objectives of enabling the student to:

1. Understand the characteristics of diodes and its applications.
2. Understand the design concepts of biasing of BJT and FET
3. Understand the design concepts of feedback amplifiers and oscillators
4. Study the design concepts of OPAmp.
5. Understand the concepts of Data Acquisition Systems and data converters

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

1. Study and analyze the rectifiers and regulator circuits.
2. Study and analyze the performance of BJTs, FETs on the basis of their operation And working.
3. Study&designoscillatorcircuits.
4. Study and analyze different Opamps and its applications.
5. Study and analyze different data acquisition systems

UNITI

PN Junction Diode: Characteristics, Half wav erectifier, Full wave rectifier, filters, ripple, regulation, TIF and efficiency, Zener diode and Zener diode regulators. CRT construction and CRO applications.

UNITII

Transistors: BJT construction and working, modes of operation, configurations of BJT (CB,CE,CC),small signal h-parameter model of CE, CE amplifier analysis. Construction and working of JFET, V-I characteristics of JFET.

UNITIII

Feedback concepts: Types of negative feedback– modification of gain, bandwidth, input and output impedances, applications.
Oscillators: RC Phase shift, Weinbridge, LC and crystal Oscillators (Qualitative treatment only).

UNITIV

Operational Amplifier: OP-AMP Blockdiagram, Ideal OP-AMP, DC and AC Characteristics, Inverting and Non-Inverting Amplifiers, Adder/Subtractor, Integrator, Differentiator, Precision rectifier , Schmit trigger and its applications.

UNITV

Data Acquisition Systems: Construction and Operation of transducers-Strain guage LVDT, Thermocouple, Instrumentation systems.
Data Converters: R-2R Ladder DAC, Successive approximation and Flash ADC.

Suggested TextBooks:
1.Robert BoylestadL. And Louis Nashelsky, Electronic Devices and Circuit Theory, PHI,2007.2st Edition, Prentice HallofIndia,2006.
2.Helfrick Dand David Cooper, Modern Electronic Instrumentation and MeasurementsTechniques,1st edition
3.Salivahanan, Suresh Kumar and Vallavaraj, Electronic Devices and Circuits,2nd Edition, TataMcGraw-Hill,2010.
Reference TextBooks:
1.David A. Bell, *Electronic Devices and Circuits*,5th ed., Oxford University Press, 2009
2.JBGupta, Electronic Devices and Circuits, S. K Kataria & sons,5thEdition,2012
3.The Art of Electronics, Horowitz,3rdEditionCambridgeUniversityPress
4.Electronic Devices and Circuits, A. P Godse, U. A Bakshi, Technical Publications

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MANAGERIAL ECONOMICS AND ACCOUNTANCY

HS406CM

Instruction: 3 periods per week — Duration of SEE:3 hours

CIE:30marks — SEE:70 marks Credits:3

Course Objectives:

To understand responsibilities of a manager of a business undertaking.

To analyze various factors influencing demand elasticity

To Forecast & compute the future sales level.

To understand the features, steps, merits, uses & limitations of Pay Back, ARR, NPV, PI & IRR methods of Capital Budgeting

To understand the principles of accounting and prepare Journal, Ledger, Trial Balance, Manufacturing A/c, Trading A/c., Profit & LossA/c. and Balance Sheet of an enterprise.

Course Outcomes:

Upon successful completion of this course, the student will be able to

Understand the responsibilities of a manager of a business undertaking

Able to Forecast & compute the future sales level

Outline the features, steps, merits, uses & limitations of Pay Back, ARR, NPV, PI& IRR methods of Capital Budgeting

Assess various factors influencing demand elasticity and determine Break Even Point (BEP) of an enterprise.

Understands the principles of accounting and prepare Journal, Ledger, Trial Balance, Manufacturing A/c, Trading A/c., Profit & LossA/c. and Balance Sheet of an enterprise.

UNIT-I

Introduction to economics and its evolution: Managerial Economics its Scope, Importance and relation to other sciences, its usefulness to engineers-Basic concepts of Managerial Economics.

UNIT-II

Demands: Analysis-concept of demand, determinants, law of demand, its assumptions, elasticity of demand, price, income and cross elasticity, demand forecasting-markets competitive structure, price- output determination under perfect competition and Monopoly.

UNIT-III

Theory of Production: Firm and industry-production function-input-output relations-laws of returns- internal and external economics of scale. Cost analysis-Cost concepts-fixed and variable costs-explicitly and implicitly costs-out pocket of costs and imputed costs-opportunity cost-cost output relation- ship-break even analysis.

UNIT-IV

Capital management: Significance, determinates and estimation of fixed and working capital requirements, sources of capital. Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems.

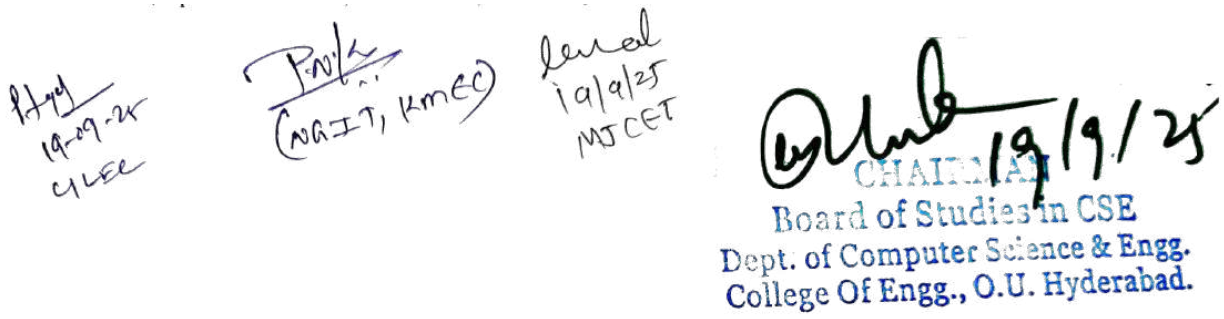
UNIT-V

Book-keeping: Principles and significance of double entry book keeping, journal, subsidiary books,

ledger accounts, trial balance concepts and preparation of final accounts with simple adjustments- analysis and interpretation of financial statements through ratios.

SuggestedReadings:

1. Varshney, R. L., and K. L. Maheshwari. Managerial Economics. Sultan Chand& Sons. 2010.
2. Eugene F. Brigham, James L. Pappas, Managerial economics, DrydenPress,1979
3. Grawal T.S.S C Gupta, Introduction to Accountancy, S Chand Publications,1978
4. I. M. Panday I.M., Financial Management, Vikas Publishing House Pvt Limited, 11th Ed. 2015
5. S K Maheshwari S N Maheshwari, An Introduction to Accountancy, 8th Ed.Vikas Publishing House Pvt Limited, 2006



APPLIED OPERATIONS RESEARCH

ES301ME **Instruction: 3 periods per week** **Duration of SEE: 3 hours**
CIE: 30 marks **SEE: 70 marks** **Credits: 3**

Objectives:
Use variables for formulating complex mathematical models in management science, industrial engineering and transportation models
Use the basic methodology for the solution of linear programming problems
Understandthemathematicaltoolsthatareneededtosolveoptimizationproblemslike Transportationmodels andAssignmentmodels
Understandthereplacementmodelswithchangeinmoneyvalueconsideringwithtimeand without time
Modelasystemasaqueuingmodelandcomputeimportantperformancemeasures

Course Outcomes: at the end of the course student will be able to:
Understand the basics of Operations Research and solve linear programming problems using graphical, simplex method and dual simplex methods.
Use PERT and CPM techniques for project planning
Solve transportation and assignment problems using methods like MODI and Hungarian, including special cases like unbalanced and maximization problems
Understand how to plan for replacing equipment and use game theory to make decisions in competitive situations
Use sequencing methods to plan jobs on machines and study queuing models to understand and improve waiting line systems.

UNIT–I
Introduction: Definition and Scope of Operations Research. Linear Programming: Introduction, Formulation of linear programming problems, graphical method of solving LP problem, simplex method, maximization and minimization, Degeneracy in LPP, Unbounded and, Infeasible solutions

UNIT–II
Duality: Definition, Relationship between primal and dual solutions, Dual Simplex Method. Network Analysis in Project Planning: PERT&CPM–Cost Analysis and Crashing the network

UNIT–III
Transportation Models: Finding an initial feasible solution-North West corner method, least cost method, Vogel's Approximation method, Finding the optimal solution by MODI methods, Unbalanced Transportation problem. Assignment Problems: Hungarian method of Assignment problem, Maximization in Assignment problem, unbalanced problem, travelling salesman problems.

UNIT–IV
Replacement Models: Introduction, Replacement Policy for Items Whose Running Cost Increases with Time and Value of Money Remains Constant During a Period, Running Cost Increases with Time but Value of Money Changes with Constant Rate During a Period, Individual replacement policy, Group replacement policy.
Game Theory: Introduction, person zero sum games, Maximin -Minimax principle, Principle of Dominance, Solution for mixed strategy problems, Graphical method for 2xn and mx2 games.

UNIT–V
Sequencing Models: Introduction, General assumptions, processing n jobs through 2 machines, processing 'n' jobs through 3 machines, Processing 2 jobs through m machines. Queuing Theory: Introduction, single channel-Poisson arrivals with Exponential Service Time -Infinite Population and

Service in Random Order, Generalization of Model(Birth and Death Process).

Suggested Readings:

1. Hamdy, A. Taha, "Operations Research-An Introduction", Sixth Edition, Prentice Hall of India Pvt. Ltd.,1997
2. J.B.Gupta, "Utilization of Electric Power and Electric Traction"S.K.Kataria & Sons Publications, 2010
3. V.K.Kapoor, Operations Research,S.ChandPublishers,NewDelhi,2004
4. Hrvey M.Wagner, Principles of Operations Research, Second Edition, Prentice Hall of India Ltd., 1980.
R.Paneer Selvam, Operations Research, Second Edition, PHIL earning Pvt. Ltd., New Delhi, 2008.

19-09-25 CHEE

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PC402CS	OPERATING SYSTEMS					
Prerequisites			**L**	**T**	**P**	**C**
			3	**-**	**-**	**3**
Evaluation	**CIE**	**30 Marks**	**SEE**		**70 Marks**	

Objectives:

1. To Understand the fundamental components and structures of operating systems
2. To Comprehend the concept of processes, threads, and CPU scheduling techniques.
3.To learn the inter-process communication and synchronization techniques to avoid concurrency issues.
4. To gain knowledge to apply concepts of memory and virtual memory management for efficient process execution..
5. To know the I/O systems, file systems, and storage management techniques

Course Outcomes:

On completion of this course, the student will be able to

CO1. Describe the evolution, types, and structure of operating systems including system calls and Virtual Machine.

CO2. Identify and explain the lifecycle of processes and threads along with scheduling techniques

CO3. Apply various synchronization mechanisms to resolve concurrency problems in operating systems and Deadlock conditions

CO4. Demonstrate different memory management schemes including paging and virtual memory concepts.

CO5. Analyze and compare different file systems and I/O management techniques.

UNIT-1

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine.

UNIT-II

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads, Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling Criteria, Scheduling algorithms, multiprocessor scheduling.

UNIT-III

Process Synchronization: Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Peterson's Solution, classical problems of synchronization: The Bounded buffer problem, Producer Consumer Problem, reader's & writer problem, Dinning philosopher's problem. Semaphores, Event Counters, Monitors, Message Passing, Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Methods for Handling: Deadlocks: Deadlock prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

UNIT-IV

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation, fragmentation, and Compaction; Paging: Principle of operation - Page allocation - Hardware support for paging, structure of page table, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory - Hardware and control structures - Locality of reference, Page fault, Working Set, Dirty page/Dirty bit - Demand paging, Page Replacement

algorithms, Trashing.

UNIT - V

I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software,

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods, Free-space management, directory implementation, efficiency, and performance.

Secondary-Storage Structure: Disk structure, Disk scheduling algorithms, Disk Management, RAID structure.

Suggested Readings:

1. Avi Silberschatz, Peter Galvin, Greg Gagne, Operating System Concepts Essentials, 9th Edition, Wiley Asia Student Edition, 2017.
2. William Stallings, Operating Systems: Internals and Design Principles, 5th Edition, Prentice Hall of India, 2016.
3. Maurice Bach, Design of the Unix Operating Systems, 8th Edition, Prentice-Hall of India, 2009.
4. Daniel P. Bovet, Marco Cesati, Understanding the Linux Kernel, 3rd Edition,, O'Reilly and Associates.

19-09-25 CVSEC

(NGIT, KMEC)

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PC401AI	ARTIFICAL INTELLIGENCE					
Prerequisites			**L**	**T**	**P**	**C**
			3	**0**	**-**	**3**
Evaluation	**CIE**	**30 Marks**	**SEE**		**70 Marks**	

Course Objectives

1 To become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.

2 To Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.

3 Explore the current scope, potential, limitations, and implications of intelligent systems

Course Outcomes:

Upon successful completion of this course, students will be able to:

1. Describe the historical background, scope, and applications of AI and intelligent agents.
2. Apply uninformed and informed search algorithms to solve problem-solving tasks.
3. Explain the fundamentals of propositional and predicate logic, and demonstrate basic logic programming.
4. Represent knowledge using semantic networks and frames for reasoning tasks.
5. Compare different uncertainty handling mechanisms including Bayesian belief networks and fuzzy logic.

UNIT – I

Introduction to Artificial Intelligence: Introduction, Brief History, Intelligent Systems, foundations of AI, Sub-Areas of AI, Applications, Tic-Tac Game Playing, Development of AI Languages, Current Trends in AI.

Agents: Agents and Environments, Good Behavior: The concept of Rationality, Performance measures, The nature of Environments, The Structure of Agents, Simple agents, Rational agents, problem solving agents, intelligent agents.

UNIT – II

Solving Problem by Searching: Problem-Solving Agents, Searching for Solutions, Uninformed search strategies.

Informed Search and Exploration: Informed Search Strategies, Heuristic Functions, Local-Search Algorithms and Optimization Problems.

Adversarial Search: Games, Optimal Decisions in Games, Alpha-Beta Pruning, Iterative Deepening.

UNIT – III

Logic Concepts and Logic Programming: Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Predicate Logic, Logic Programming.

Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Knowledge Representation using Frames.

UNIT – IV

Probabilistic Reasoning

Expert System: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert System versus Traditional Systems, Rule-Based Expert Systems.

Uncertainty Measures: Introduction, Probability Theory, Bayesian Belief Networks.

Fuggy Logic Systems: Introduction, Crisp Sets, Fuzzy Sets, Fuzzy Terminology, Fuggy Logic Control, Neuro Fuzzy Systems.

UNIT – V

Connectionist Models: Introduction: Hopfield Networks, learning in Neural Networks, Applications of Neural Networks, Recurrent Networks, Distributed Representations, Connectionist AI and Symbolic AI.

Suggested Reading:

1 "Artificial Intelligence" by Saroj Kaushik, Cengage Learning.

2 "Artificial Intelligence" Third Edition by Elaine Rich, Kevin Knight, Shivashankar B Nair, tatamcgrawhill.

3 "Artificial Intelligence-A Modern Approach" Second Edition by Stuart Russell, Peter Norvig.

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PC 503 CS	Computer Networks					
Prerequisites			**L**	**T**	**P**	**C**
			3	**0**	**-**	**3**
Evaluation	**CIE**	**30 Marks**	**SEE**		**70 Marks**	

Course Objectives

1. To develop an understanding of communication in modern network architectures from a design and performance perspective.
2. To understand Data Transmission standards and MAC protocols.
3. To introduce the protocols functionalities in Network Layer and Transport Layer.
4. To understand DNS and supportive application protocols.
5. To provide basic concepts of cryptography.

Course Outcomes:

After completing this course, the student will be able to:

1. Explain the functions of the different layer of the OSI and TCP/IP Protocol.
2. Understand wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of each block.
3. Illustrate network layer and transport layer protocols. For a given problem related TCP/IP protocol developed the network programming.
4. Identify the communication protocols and QoS
5. Identify the types of encryption techniques.

UNIT-I

Data communication Components: Representation of data communication, flow of Networks, Layered architecture, OSI and TCP/IP model, Transmission Media. (William stalling)

Techniques for Bandwidth utilization: Line configuration, Multiplexing - Frequency division, Time division and Wave division, Asynchronous and Synchronous transmission, XDSL , Introduction to Wired and Wireless LAN

UNIT-II

Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC;

Flow Control and Error control protocols: Stop and Wait, Go back - N ARQ, Selective Repeat ARQ, Sliding Window, and Piggybacking.

Multiple access protocols: Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA

UNIT-III

Network Layer: Switching techniques (Circuit and Packet) concept,

Logical addressing: IPV4(Header), IPV6(Header), NAT, Sub-Netting concepts.

Inter-Networking: Tunneling, Fragmentation, congestion control (Leaky Bucket and Token Bucket algorithm), Internet control protocols: ARP, RARP, BOOTP and DHCP.

Network Routing Algorithms: Delivery, Forwarding and Unicast Routing protocol, Gateway protocols.

UNIT-IV

Transport Layer: Process to Process Communication, Elements of transport protocol, Internet Transport Protocols: UDP, TCP. Congestion and Quality of Service, QoS improving techniques.

UNIT-V

Application Layer: Domain Name Space (DNS), EMAIL, SNMP, Bluetooth. Basic concepts of Cryptography: Network Security Attacks, firewalls, symmetric encryption, Data encryption Standards, public key Encryption (RSA), Hash function, Message authentication, Digital Signature.

Suggested books:

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.
3. W. Richard Stevens, Unix Network Programming, Prentice Hall/ Pearson Education, 2009.

19-09-25 CLEE

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PC404CS	**Database Management Systems**					
Prerequisites			**L**	**T**	**P**	**C**
			3	**-**	**-**	**3**
Evaluation	**CIE**	**30 Marks**	**SEE**		**70 Marks**	

Course Objectives:

1. Understand core database concepts, including file organization methods, database architecture, schema levels, and relational algebra operations.
2. Model real-world scenarios using E-R diagrams and convert them into normalized relational schemas following Codd's rules.
3. Construct advanced SQL queries using joins, subqueries, set operations, and aggregation to retrieve and manipulate data effectively.
4. Apply normalization techniques to refine database design, eliminate redundancy, and maintain data consistency and integrity.
5. Develop PL/SQL programs using control structures, triggers, procedures, and indexing to enhance database functionality and performance.

Course Outcomes:

CO1: Understand database systems fundamentals for file organization, database environment, schemas, and relational algebra operations.
CO2: Design E-R models and convert them into normalized relational schemas using E.F. Codd's rules and solve complex SQL queries.
CO3: Analyze the need for and apply normalization techniques to remove data redundancy and ensure data integrity.
CO4:. Develop PL/SQL programs using control structures, cursors, triggers, procedures, and functions; apply indexing techniques to optimize database performance and enforce complex integrity constraints
CO5: Understand the concepts of transactions and develop an overview of diverse databases.

UNIT – I
Introduction to Database: File System Organization: Sequential - Pointer - Indexed – Direct, Purpose of Database System, Database Characteristics, Users of Database System, Advantages of DBMS Approach, Schemas and Instances - Three Schema Architecture and Data Independence, Database System Environment. Relational Algebra – Selection and projection, Renaming, Set operations Joins, Expressive Power of Algebra and calculus
UNIT – II
Logical Database Design: Design of Relational Database – E.F. Codd's Rule - Entity-Relationship model, Weak Entity, Strong Entity, Attributes, Extended ER Diagrams. Structured Query Language: Structured Query Language (SQL): Form of Basic SQL Query, Examples of Basic SQL Queries, Introduction to Sub-Queries and Nested Queries, Set operations in SQL , Comparison Operators and Single row & Multi-row operators,, Aggregative Operators, NULL value, , Disallowing NULL values, Logical connectivity's – AND, OR and NOT, Logical Operators - ALL, ANY, IN, BETWEEN, EXISTS, LIKE, NOT, SOME , Joins – LEFT, RIGHT, OUTER, NATURAL
UNIT – III
Integrity constraints: Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical database Design – Introduction to Views – Destroying /altering Tables and Views, User-level and System-level privileges. Normalization: Introduction to Lossless and Lossy decomposition and functional dependencies, First, Second, and third normal forms – dependency preservation, Boyee/Codd normal form, and other normal forms examples. (4th and 5th Normal forms).

UNIT – IV
Introduction to PL/SQL: Control Structures, Cursors, SQL Triggers, Procedures, and Functions, Complex Integrity Constraints in SQL Triggers and Active Data bases. Indexing:Types of Single Level Ordered Indexes - Multilevel Indexes - Dynamic Multilevel Indexes
UNIT – V
Transaction Processing and Concurrency Control: Transaction Concepts - ACID Properties – Transaction States - Concurrency Control Problems - Serializability - Recoverability - Pessimistic and Optimistic Concurrency Control Schemes. Advanced Topics: Overview: Parallel Database - Multimedia Database - Mobile Database - Web Database - Multidimensional Database. Data Warehouse - OLTP Vs OLAP - NoSQL Database.

Suggested Reading:

1. Abraham Silberschatz, Henry F Korth, S. Sudarshan, Database System Concepts, Sixth Edition, McGrah-Hill International Edition, 2010.
2. Ramakrishnan, Gehrke, Database Management Systems, Third Edition, McGrah-Hill International Edition, 2003.
3. Elmasri Navathe, Somayajulu, Fundamentals of Database System, Fourth Edition, Pearson Education, 2006.
4. Patric O'Neil, Elizabeth O'Neil, Database--principles, programming, and performance, Morgan Kaufmann Publishers, 2001.

Reference Book from ekumb-AICTE :
1. Dr. Madhu Bala Myneni , Introduction to DBMS: Theory & Practicals, Language- English & Telugu url link: https://ekumbh.aicte-india.org/allbook.php#

19/9/25
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PC451AI	ARTIFICAL INTELLIEGENCE LAB					
Prerequisites			**L**	**T**	**P**	**C**
			0	**0**	**2**	**1**
Evaluation	**CIE**	**25 Marks**	**SEE**		**50 Marks**	

Course Objectives:

1 Develop the ability to design and implement solutions for both informed and uninformed search problems in Artificial Intelligence (AI)

2 Acquire proficiency in using Prolog to express and reason about knowledge in first-order logic

3 Utilize the Natural Language Toolkit (NLTK) and advanced techniques to implement Natural Language Processing (NLP) solutions

4 Select and apply relevant Python libraries to synthesize information and construct supervised learning models

5 Develop a comprehensive case study in a multidisciplinary domain, showcasing the integration of AI techniques to solve complex problems.

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

CO1 Design and develop solutions for informed and uninformed search problems in Al

CO2 Demonstrate reasoning in first order logic using Prolog.

CO3 Utilize advanced package like NLTK for implementing natural language processing

CO4 Demonstrate and enrich knowledge to select and apply python libraries to synthesize information and develop supervised learning models

CO5 Develop a case study in multidisciplinary areas to demonstrate use of AI

List of Programs

1. Write a program to implement Uninformed search techniques:

a. BFS

b. DFS

2. Write a program to implement Informed search techniques

a. Greedy Best first search

b. A algorithm

3. Study of Prolog its facts, and rules.

a. Write simple facts for the statements and querying it.

b. Write a program for Family-tree.

4. Write a program to train and validate the following classifiers for given data (scikit-learn):

a. Decision Tree

b. Multi-layer Feed Forward neural network

5. Text processing using NLTK

a. Remove stop words

b. implement stemming

c. POS (Parts of Speech) tagging

6. In addition to the above programs, students should be encouraged to study implementations of one of the following

Game bot (Tic Tac toe, 7 puzzle)

Expert system (Simple Medical Diagnosis)

Text classification

Chat bot

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PC 452 AI	Computer Networks & Operating Systems LAB					
Prerequisites			**L**	**T**	**P**	**C**
			0	**0**	**2**	**1**
Evaluation	**CIE**	**25 Marks**	**SEE**		**50 Marks**	

Course Objectives:

1. Learn to communicate between two desktop computers.
2. Learn to implement the different protocols
3. Be familiar with socket programming.
4. Be familiar with the various routing algorithms Be familiar with simulation tools.
5. To use simulation tools to analyze the performance of various network protocols
6. Learn different types of CPU scheduling algorithms
7. Demonstrate the usage of semaphores for solving synchronization problem
8. Understand memory management techniques and different types of fragmentation that occur in them and various page replacement policies Learn various disk scheduling algorithms.

Course Outcomes: After completing this course, the student will be able to:

1. Implement various protocols using TCP and UDP. Program musing sockets.
2. Use simulation tools to analyze the performance of various network protocols.
3. Implement and Analyze various routing algorithms.
4. Evaluate the performance of different types of CPU scheduling algorithms.
5. Implement producer-consumer problem, reader-writers problem, Dining philosopher's problem.
6. Implement paging replacement and disk scheduling techniquesUse different system calls for
7. writing application programs.

Part – A

Computer Networks Lab

1. Configuration of router, hub, switch etc. (using real devices or simulators)
2. Running and using services/commands like ping, traceroute, nslookup, arp, telnet, ftp, etc.
3. Network packet analysis using tools like Wireshark, tcpdump, etc.
4. Network simulation using tools like Cisco Packet Tracer, NetSim, OMNeT++, NS2, NS3, etc.
5. Socket programming using UDP and TCP (e.g., simple DNS, data & time client/server, echo client/server, iterative & concurrent servers)
6. Programming using raw sockets
7. Programming using RPC

Part -B

Operating Systems Lab:

1. Write C programs to Simulate the following CPU scheduling algorithms
   a) FCFS b) SJF c)Round Robin d) Priority
2. Write C programs to Simulate IPC techniques
   a) Pipes b) Message Queues c) Shared Memory
3. Write C Programs to Simulate Classical Problems of Synchronization
   a) Readers-Writers b) Producers-Consumers C) Dining Philosophers
4. Write C Program to simulate Bankers Algorithm for Dead Lock Avoidance
5. Write C Programs to Simulate all page replacement algorithms
   a) FIFO b) LRU c) Optimal etc.
6. Write C program to Simulate Disk Scheduling Algorithms
   a) FCFS b) SSTF etc.
7. Write Unix Shell Programs

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PC453CS	Database Management Systems Lab					
Prerequisites			**L**	**T**	**P**	**C**
			-	**-**	**2**	**1**
Evaluation	**CIE**	**25 Marks**	**SEE**		**50 Marks**	

Objectives:
The objectives of the course are to impart knowledge of:
1. To practice various DDL commands in SQL
2. To write simple and Complex queries in SQL
3. To familiarize PL/SQL

Outcomes:
After the completion of the course, the student will be able to:
1. Design and implement a database schema for a given problem
2. Develop the query statements with the help of structured query language.
3. Populate and query a database using SQL and PL/SQL
4. Develop multi-user database application

Design GUI using forms and implement database connectivity:

List of Programs
1. Creation of database (exercising the commands for creation)
2. Simple condition query creation using SQL Plus
3. Complex condition query creation using SQL Plus
4. Usage of Triggers and Stored Procedures.
5. Creation of Forms for student Information, library information, Pay roll etc.
6. Writing PL/SQL procedures for data validation
7. Generation using SQL reports
8. Creating Password and Security features for applications.
9. Usage of File locking table locking, facilities in applications.
10. Creation of small full pledged database application spreading over to 3sessions.

Suggested Readings:
1. Nilesh Shah, Database System Using Oracle, PHI, 2007.
2. Rick F Vander Lans, Introduction to SQL, Fourth edition, Pearson Education, 2007.
3. Benjamin Rosenzweig, Elena Silvestrova, Oracle PL/SQL by Example, Third edition, Pearson Education, 2004.
4. Albert Lulushi, Oracle Forms Developer's Handbook, Pearson Education, 2006.

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