Course Title	BASICS OF ELECTRONICS ENGINEEING				B.Tech CSE III Sem		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
1804302	**PC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	--	--	3	30	70	100
Mid Exam Duration: 2Hrs					**End Exam Duration: 3Hrs**		

Course Objectives:

- To learn the working of Diode and its Applications.
- To learn the working of transistor and its circuits.
- To teach feedback amplifiers and its applications.
- To Know about the microprocessor and microcontroller

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

CO 1	**Understand** the operation of various Diodes and their applications
CO 2	**Explain** the operation of transistor circuits under different configurations
CO 3	**Analyze** the performance of feedback amplifiers
CO 4	**Illustrate** the architecture of Microprocessor and Microcontroller

Unit-1

PN Junction Diode & Applications: Introduction, Junction Theory, barrier Potential, Biasing the p-n Junction, Forward Biased p-n Junction, Reverse Biased p-n Junction, Effect of temperature on diode characteristics, V-I Characteristics of p-n Junction Diode, Diode Symbol, Zener Diode, V-I Characteristics of Zener Diode, Rectifiers: Half-wave Rectifier, Full-wave Rectifier, Bridge Rectifier.

Unit-II

Transistor- Introduction, Bipolar Junction Transistor, Unbiased Transistor, Biased Transistor, Transistor Operation, Working of an n-p-n Transistor, Transistor Currents, Transistor as an Amplifier, Transistor Circuit configurations, Current relations in CB, CE Configuration, Transistor Leakage Currents, CB,CE characteristics of a transistor, FET and its Characteristics.

Unit-III

Feedback Amplifiers- Concept of feedback in amplifiers, types of feedback, Voltage gain of feedback amplifiers, Advantages and disadvantages of feedback amplifiers, types of feedback amplifiers, Oscillator principle, Classification of Oscillators, LC Oscillators, RC Oscillators, Crystal Oscillator.

Unit-IV

Microprocessors- Introduction, History of Microprocessors, Features of 8086, Architecture of 8086-Bus Interface Unit-Execution Unit, Register Organization- General Purpose Registers, Segment registers, Pointers and Index Registers, Flag register, Memory Segmentation, Minimum mode 8086 system, Maximum mode 8086 system, Interrupt, types of interrupts-software and Hard ware interrupts.

Unit-V

Microcontrollers- Introduction, Features of 8051, Architecture of 8051, Memory organization of 8051, Timer / Counter Operation in 8051, 8051 Interrupts, Microcontroller-8096, Architecture of 8096, ARM Microcontroller, its features, ARM core data flow model, Versions of ARM .

TEXT BOOKS:

1. R.L. Boylestad and Louis Nashelsky, "Electronic devices and circuits", 9th Edition, 2006, PHI.
2. S. Salivahanan – "Electronic Devices and Circuits" – TMH
3. A.K. Ray and K.M. Bhurchandi "Advanced Microprocessors and Pheripherals" Secon Edition, TMH,2006

REFERENCE BOOKS:

1. G.K.Mittal, "Industrial Electronics".
2. N N Bhargava, D C Kulshreshtha, S C Guptha, 'Basic Electronics and Linear Circuits', Technical Education Series,TMH. 2000

Course Title	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS				B. Tech. III Sem ECE & CSE			
Course Code	Category	Hours/Week			Credits			
1825307	Humanities and social sciences	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	--	--	3	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs			

Course Objectives:

- To equip the budding engineering student with an understanding of concepts and tools of economic analysis.
- Provide knowledge of managerial economics through differential economics concepts, accounting concepts are necessary to analyze and solve complex problems relating financial related matters in bog industries.
- An understanding of professional and ethical responsibility and ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global and societal context.
- Recognition of the need for, and an ability to engage in life-long learning and to meet contemporary issues.

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

CO 1	**Acquire knowledge** in principles and concepts of Managerial Economics and Accountancy
CO 2	**Understand** the Economic theories i.e., Demand, Production, Cost, Markets and Price.
CO 3	**Describe** different types of Markets and competition, forms of organization and Methods of Pricing.
CO 4	**Examine** the profitability of various Projects.
CO 5	**Utilize** tools and techniques to analyze and interpret the key parameters of financial performance.

UNIT – I

INTRODUCTION TO MANAGERIAL ECONOMICS

Definition, nature and scope of Managerial Economics –Demand analysis – Determinants, Law of Demand and its exceptions – Elasticity of Demand – Types and Measurement of Elasticity of Demand – Methods of Demand Forecasting (Statistical mehtods) – Supply Analysis.

UNIT – II

THEORY OF PRODUCTION AND COST ANALYSIS

Production Functions: Law of variable proportion, Isoquants and Isocost, least cost combination of inputs, Returns to Scale and Cobb- Douglas production function. Internal and external economies of scale.

Cost Analysis: Cost concepts – Break-Even Analysis (BEA) – Break Even Point – significance and limitations of BEA.

UNIT – III

INTRODUCTION TO MARKETS AND PRICING

Markets structures: Perfect and Imperfect competition – Features of Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly. Price- Output determination under perfect competition, monopoly and monopolistic competition – Price rigidity in Oligopoly.

Methods of pricing – cost plus pricing, marginal cost pricing, skimming pricing, penetration pricing, differential pricing and administrative pricing.

UNIT – IV

BUSINESS ORGINATIONS AND CAPITAL BUDGETING

Business Organizations: Types of business organizations- Sole Proprietorship, Partnership, Joint Stock Company, Public Ltd and Private Ltd companies, Public Private Partnership (PPP).

Capital Budgeting: Types of capital, methods and sources of raising Capital. Capital Budgeting Techniques: Payback Period Method, Accounting Rate of return (ARR) and Net Present Value Method (NPV) (simple problems).

UNIT – V

FINANCIAL ACCOUNTING AND ANALYSIS

Double Entry Book keeping, Journal, Ledger, Trail Balance – Final Accounts (Preparation of Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Analysis and interpretation of financial statements through ratios (Liquidity, Profitability and Activity Ratios) (Simple problems).

TEXT BOOKS:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand Publishers, 2009.
2. Prasad and K.V.Rao: Financial Accounting, jaibharth Publishers, Vijayawada.

REFERENCES:

1. P.L Mehtha: Managerial Economics, Sulthan Chand Publishers
2. K K Dewett - Managerial Economics ,S. Chand Publishers
3. S.P Jain & K.L Narang: Financial Accounting, Kalyani publishers.
4. M.Sugunatha Reddy: Managerial Economics and Financial Analysis, Research India Publication, New Delhi, 2013.
5. Paul A Samuleson and William nordhaus : Economics, Oxford University Publications.
6. M L Jhingan : Micro Economics & Macro Economics, Vrinda Publacations (P) Ltd.

Course Title	DATA STRUCTURES				B.Tech CSE III Sem (R18)		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1805303	PJ	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs		

Course Objectives:

- To develop skills and analyze linear and non linear data structures.
- To understand basic concepts about linked lists, stacks, queues.
- To study algorithms as they apply to trees and graphs.
- To study in detail about sorting, searching and hashing.

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

CO 1	Understand the variety of abstract data types and data structures.
CO 2	Analyze data structures such as linked list, Stacks and Queues.
CO 3	Apply and analyze tree traversal algorithms and graph traversal algorithms.
CO 4	Organize data in order using various sorting algorithms.
CO 5	Ability to understand the concept of hashing, B-Trees and B+-Trees.

UNIT-I

Introduction: Data structures, Primitive & Non Primitive data structures, Linear & Non Linear data structures, **Linear Lists:** Definition, **Arrays:** Definition, **Linked Lists:** Single Linked List-Definition, Insertion and Deletion operations**,** Doubly Linked List- Definition, Insertion and Deletion operations.

UNIT-II

Stacks: Definition, Array & Linked representations, Operations, Applications, **Queues:** Definition, Array & Linked representations, Operations, Circular Queues & Dequeues .

UNIT-III

Trees: Basic terminology, Binary Trees- Definition, Properties, Representation, Complete and Full Binary Tree, **Tree Traversal Algorithm:** In order, Preorder and Postorder, **Priority Queues:** Definition, Heaps, Leftist Trees, **Binary Search Tree(BST):** Definition, Operations & Implementations, BST with Duplicates, Indexed BST.

UNIT-IV

Balanced Search Trees: AVL, Red-Black & Splay Trees, Graphs: Terminology, Representations, **Graph Traversal:** Depth First Search (DFS), Breadth First Search (BFS), Minimum Spanning T*r*ee.

UNIT-V

Sorting: Selection, Insertion, Bubble, Heap, **Searching:** Sequential & Binary Search.
Hashing:

Introduction, Hash Table representation, Hash Functions , **Collisions:** Introduction, Separate Chaining, Open Addressing , B-Trees, Operations on B-Trees, B+-Trees.

Text books:

1. An Introduction to Data Structures with applications, Jean Paul Trembley and Paul G. Sorenson, McGraw Hill.
2. Fundamentals of Data Structures in C, Horowitz, Sahni, Anderson Freed, Universities press.
3. Data Structures using C++, Varsha H.Patil, Oxford University Press.

Reference books:

1. Data Structures, Algorithms and Applications in C++, Ananda Rao Akepogu and Radhika Raju Palagiri, Pearson Education.
2. Data Structures and Algorithms in C++, S.Sahni, University Press (India) Private Limited, Second Edition.
3. Data Structures, Seymour Lipschutz, Schaum's Outlines, McGraw Hill.
4. Data Structures and Algorithms, G.A.V.Pai, Tata McGraw Hill.
5. Data Structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
6. Data Structures and algorithms in C++, Mark Allen Weiss, Pearson Education Limited, Second Edition.

Course Title	DISCRETE MATHEMATICS				B.Tech CSE III Sem (R18)		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1805304	PJ	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs		

Course Objectives:

- .To introduce the concepts of mathematical logic.
- To introduce the concepts of sets, relations and functions.
- To perform the operations associated with sets, functions and relations.
- To introduce generating functions and recurrence relations.
- To use Graph Theory for solving problems.

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

CO 1	Demonstrate knowledge on mathematical logic and Analyze truth tables, normal forms, implications, rules of inference
CO 2	Understand the basic principles of mathematical objects such as sets, relations
CO 3	Apply basic counting techniques to solve combinatorial problems.
CO 4	Able to solve recurrence relations.
CO 5	Demonstrate different traversal methods for trees and graphs

UNIT-I

Mathematical Logic: Introduction, Statements and notations, Connectives, Well-formed formulas, Tautologies and contradictions, Equivalence of Formulas, duality law, Tautological Implications, Normal forms, The theory of inference for the statement calculus, rules of inference.

UNIT-II

Relations and Ordering: Relations, Properties of Binary Relations in a Set, Equivalence Relations, operations on relations, representations of relations, Composition of Binary Relations, Compatibility Relations, , Partial Ordering relations, Hasse diagram (or) Poset diagram.

Lattices as Partially Ordered Sets: Definition and Examples, Some Properties of Lattices.

UNIT-III

Elementary Combinatorics: Basics of counting, Combinations and Permutations, Enumeration of Combinations and Permutations (without repetition), Enumerating Combinations and Permutations with repetitions, Enumerating Permutations with Constrained repetitions, Binomial Coefficients, The Binomial and Multinomial theorems, the principles of Inclusion– Exclusion.

UNIT-IV

Recurrence Relations

Generating functions of sequences, calculating coefficients of generating functions, Recurrence relations, solving recurrence relations by substitution and generating functions, The method of characteristic roots, solutions of Inhomogeneous Linear recurrence relations.

UNIT-V

Graphs: Basic Concepts, Isomorphism and Sub graphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers, The Four-Colour Problem.

Text books:

1. Discrete mathematical structures with applications to computer science - J PTremblay and Manohar Mc Graw Hill

2. Discrete Mathematics for Computer Scientists & Mathematicians, 2/e, J.L.Mott, A.Kandel, T.P. Baker, PHI

Reference books:

1. Elements of Discrete Mathematics- A Computer Oriented Approach,C.L.Liu,D.P. Mohapatra, 3/e,TMH.

2. Discrete and Combinatorial Mathematics- An Applied Introduction, Ralph.P.Grimaldi,5/e,Pearson Education.

3. Discrete Mathematics and its applications, 6th edition, K.H.Rosen, TMH.

4. Discrete Mathematical Structures, Mallik and Sen, Cengage Learning.

5. Discrete Mathematical Structures, BernandKolman, Robert C. Busby, SharonCutler Ross, PHI/ Pearson Education.

6. Discrete Mathematics with Applications, ThomasKoshy,Elsevier.

7. Discrete Mathematics, Lovasz, Springer.

Course Title	DIGITAL LOGIC DESIGN				B.Tech CSE III Sem (R18)		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1805305	PJ	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs		

Course Objectives:

- . To study the basic philosophy underlying the various number systems, Complements and binary codes.
- To study the theory of Boolean algebra and acquire the skills to manipulate and examine Boolean algebraic expressions.
- To study the design principles of combinational and sequential circuits.

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

CO 1	Recall Binary Number systems
CO 2	Understand Boolean algebra and apply to the Boolean functions.
CO 3	Apply different optimization techniques to construct effective logic circuit.
CO 4	Model combinational and sequential circuits.
CO 5	Illustrating different registers, counters, Memory Concepts.

UNIT-I

BINARY SYSTEMS: Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, complements, Binary codes.

BOOLEAN ALGEBRA AND LOGIC GATES: Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, other logic operations, Digital logic Gates.

UNIT-II

GATE-LEVEL MINIMIZATION: The map method, Four-variable map, Five-variable map, Product of sums(POS) simplification , Don't-Care conditions, NAND and NOR implementation, Other Two-level implementations, Exclusive –OR function.

UNIT-III

COMBINATIONAL LOGIC: Combinational Circuits, Design procedure, Code -converters, Binary adder-subtractor, Decimal Adder, Binary multiplier, Magnitude -comparator, Decoders, Encoders, Multiplexers.

UNIT-IV

SYNCHRONOUS SEQUENTIAL LOGIC: Sequential circuits, latches, Flip-Flops, Analysis of clocked sequential circuits, State Reduction and Assignment, Design Procedure.

UNIT-V

REGISTERS AND COUNTERS: Registers, Shift Registers, Ripple counters, synchronous counters, Johnson counter.

MEMORY AND PROGRAMMABLE LOGIC: Random-Access memory, Read-Only memory, Programmable Logic Array, Programmable Array Logic.

Text books:

1. Digital Design with an introduction to the Verlog HDL – Fifth edition, M.Morris Mano and Michael D. Ciletti, Pearson Education/PHI.

Reference Books:

1. Fundamentals of digital logic design with VHDL By Stephen Brown and I Zvonko Vranesic, second edition, The McGraw-Hill.
2. Fundamentals of logic design, Roth, 5th edition,Thomson.
3. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
4. Switching and Logic Design, C.V.S. Rao, Pearson Education
5. Digital Principles and Design –Donald D.Givone, Tata McGraw Hill, Edition.
6. Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M. Rafiquzzaman John Wiley.

Course Title	PYTHON PROGRAMMING				B.Tech CSE III Sem (R18)		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1805306	PJ	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs			

Course Objectives:

- Understand programming skills using basics of Python language
- To introduce the object-oriented programming concepts.
- Acquire basics of how to translate problem into object-oriented form
- To understand object-oriented programming concepts, and apply them in solving problems.

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

CO 1	Demonstrate and acquire knowledge on usage of Data types, operators, input and output statements in python programming.
CO 2	Analyze the given problem and develop python program to solve the problem
CO 3	Able to use proper iterative statements in problem solving
CO 4	Identify the right sequence to solve the real-world problems
CO 5	Apply object-oriented features to solve real time applications

UNIT-I

Features of python, Execution of a python program, comments, identifiers and variables, classification of data types, keywords, constants, Naming conventions in python, Operators and expressions, operator precedence and associativity, input and output statements.

UNIT- II

Control statements: simple if, if..else, nested if, if..elif..else statement. **Loops:** while loop, for loop, nested loops, break , continue , pass and assert statements, Arrays in python, Strings and their operations,

UNIT-III

Functions: define and calling a function, return statement, formal and actual arguments, local and global variables, passing arguments to function, anonymous functions, example programs on functions, recursion.

UNIT-IV

Sequences: Lists, Tuples, Sets, Dictionaries, Operations and methods on Tuples, Lists, Dictionaries. **Files:** Types of files, opening file, closing a file, write data into a file, read data from a file.

UNIT-V

Introduction to Oops:, Introduction to class and objects, self variable in python, constructor, types of variables and methods, Inheritance and polymorphism, abstract class.

Textbooks:

1. Core python programming by Dr. R. Nageswara Rao, Dreamtech press, second edition, 2018
2. Core python programming by Wesley J Chun, Prentice Hall, Second edition.

Reference Books:

1. Introduction to Computation and Programming using Python, by John Guttag, PHI Publisher
2. Learning python, Mark Lutz, O'Reilly publications,5th edition, 2013
3. Python: The complete reference by Martin C Brown, McGraw-Hill Publication, 2018

IV Sem

<table>
<tr><td>Course Title</td><td colspan="4">COMPUTER ORGANIZATION</td><td colspan="3">B.Tech CSE IV Sem (R18)</td></tr>
<tr><td>Course Code</td><td>Category</td><td colspan="3">Hours/Week</td><td>Credits</td><td colspan="3">Maximum Marks</td></tr>
<tr><td rowspan="2">1805403</td><td rowspan="2">PJ</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Continuous Internal Assessment</td><td>End Exams</td><td>Total</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td colspan="5">Mid Exam Duration: 2 Hours</td><td colspan="4">End Exam Duration: 3Hrs</td></tr>
<tr><td colspan="9">Course Objectives:
• To make the students understand the structure of computers and internal organization of different units like memory, I/O devices, registers.
• To study in detail the operation of arithmetic unit including the algorithms and implementation of fixed and floating point addition, subtraction, multiplication and division operations.</td></tr>
<tr><td colspan="9">Course Outcomes: On successful completion of this course, the students will be able to</td></tr>
<tr><td>CO 1</td><td colspan="8">Perform arithmetic operations of binary number system.</td></tr>
<tr><td>CO 2</td><td colspan="8">Understand the organization of the Control unit, Arithmetic and Logical unit, Memory unit and the I/O unit.</td></tr>
<tr><td>CO 3</td><td colspan="8">Use memory and I/O devices effectively and to explore the hardware requirements for cache memory and virtual memory.</td></tr>
<tr><td>CO 4</td><td colspan="8">Understand the concept of pipelining and multiprocessors.</td></tr>
</table>

UNIT I

Basic concepts of computers: Computer Types, Functional units, Basic operational concepts, Bus Structures, Performance. **Data Representation-** Fixed Point Representation, Floating Point Representation.

UNIT II

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

UNIT III

Basic computer organization and Design: Instruction codes, Computer instructions, Memory reference instructions, Input – Output and Interrupt, Addressing modes. **Micro programmed Control:** Control memory, Address sequencing, Micro program example, Design of control unit, Hard wired control, Micro programmed control. **Computer Arithmetic:** Addition and subtraction, multiplication Algorithms, Division Algorithms.

UNIT IV

Pipeline: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline.

Memory: Basic concepts, Memory Hierarchy, Cache memory, Performance considerations, Virtual memory.

UNIT V

Input-Output Organization: Peripheral Devices, Input- Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt, Direct memory Access (DMA).

Multiprocessors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor Arbitration, Inter Processor Communication and Synchronization.

TEXT BOOKS:

1. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI.

REFERENCE BOOKS:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.
3. Fundamentals of Computer Organization and Design, - Sivaraama Dandamudi, Springer Int. Edition.
4. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition, Elsevier.

5. Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publication.

Course Title	OPERATING SYSTEMS				B.Tech CSE IV Sem (R18)		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
1805404	**PJ**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	0	0	3	30	70	100
Mid Exam Duration: 2 Hours					**End Exam Duration: 3Hrs**		

Course Objectives:

- Have an overview of functions of operating systems.
- Have a thorough knowledge of process management and memory management.
- To have a thorough knowledge of how handle to deadlocks.
- Learn the concepts of files, protection and security.

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

CO 1	Understand the basic concepts related to the operating systems.
CO 2	Analyze the various process scheduling algorithms and process synchronization mechanisms.
CO 3	Analyze the various memory management schemes.
CO 4	Understand the ways to deal the deadlocks and the basic concepts related to files in the system.
CO 5	analyze the protection and security mechanisms

UNIT-I

Operating Systems Basics: Operating systems functions, Overview of computer operating systems, distributed systems, operating system services and systems calls, system programs, operating system structure.

UNIT-II

Process Management: Process concepts, scheduling-criteria, algorithms, their evaluation.

Concurrency: Process synchronization, the critical-section problem, Peterson‘s Solution, semaphores, classic problems of synchronization, monitors.

UNIT-III

Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page-replacement, algorithms, Allocation of frames.

UNIT-IV

Deadlocks: system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock.

Files: The concept of a file, Access Methods, Directory structure, File system mounting, File sharing, protection.

UNIT-V

Protection: Protection, Goals of Protection, Principles of Protection, Domain of protection Access Matrix, Implementation of Access Matrix.

Security: The Security problem, program threats, user authentication.

TEXT BOOKS:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, "Operating System Concepts", Eighth edition, John Wiley.

REFERENCE BOOKS:

1. Andrew S Tanenbaum, "Modern Operating Systems", Fourth Edition, Pearson Education
2. William Stallings, "Operating Systems: Internals and Design Principles", Sixth Edition2009, Pearson Education.
3. D.M.Dhamdhere, "Operating Systems, A Concept based Approach", Third Edition, TMH
4. A.S.Godbole, "Operating Systems", Second Edition, TMH.

Course Title	DESIGN AND ANALYSIS OF ALGORITHMS				B.Tech CSE IV Sem (R18)		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1805405	PJ	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	30	70	100
Mid Exam Duration: 2 Hours					End Exam Duration: 3Hrs		

Course Objectives:

- To understand and apply the algorithm analysis techniques.
- To critically analyze the efficiency of alternative algorithmic solutions for the same problem
- To understand different algorithm design techniques.
- To understand the limitations of Algorithmic power.

Course Outcomes: On successful completion of this course, the students will be able to	
CO 1	Prove the correctness and analyze space and time complexity of an algorithm
CO 2	Apply the algorithms to solve the problems
CO 3	Understand different algorithm design strategies and apply to real time problems.
CO 4	know the limitations of various design strategies.

UNIT-I

Introduction: What is an Algorithm? , Algorithm Specification, Performance Analysis: Space complexity, Time Complexity, Asymptotic Notations: Big-Oh notation (O), Omega notation (Ω), Theta notation (Θ), and Little-oh notation (o).**Elementary Data structures**: set and Disjoint set union

UNIT-II

Divide and Conquer: General method, Binary search, Finding the maximum and minimum, Merge sort, Quick sort, Strassen's matrix multiplication.

Greedy Method: General method, Knapsack Problem, Job sequencing with deadlines. Minimum cost spanning trees: Prim's Algorithm, Kruskal's Algorithm.

UNIT-III

Dynamic Programming: General method with Examples, Multistage Graphs, All Pairs Shortest Paths, Single source shortest path, Optimal Binary Search Trees,0/1Knapsack problem), Travelling Sales Person problem , Reliability design .

UNIT-IV

Search and Traversal techniques: techniques for binary tree, Technique for graphs, connected components and spanning tree, Bi connected components and DFS.

Backtracking: General method, N-Queens problem, Sum of subsetsproblem, Graph coloring , Hamiltonian cycles).

UNIT-V

Branch andBound: Travelling Sales Person problem, 0/1Knapsack problem : LC Branch and Bound solution, FIFO Branch and Bound solution . **NP-Complete and NP-Hard problems:** Basic concepts on-deterministic algorithms, P, NP, NP-Complete, and NP-Hard classes,cook's theorem.

Text Books:

1.Ellis *Horowitz*, Sartaj *Sahni* and Sanguthevar Rajasekaran,"Fundamentals of Computer Algorithms" , Galgotia Publications.

Refference Books:

1.Levitin, Anany." Introduction to the design & analysis of *algorithms"* pearson Education ,2008

2.Parag H.Dave Himanshu B.Dave "Design and Analysis of Algorithms" pearson Education 2008.

3.Aho , Hopcroft,ulman," the Design and Analysis of Computer Algorithms" pearson Education,2000

Course Title	JAVA PROGRAMMING					B.Tech CSE IV Sem (R18)		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1805406	PJ	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	30	70	100
Mid Exam Duration: 2 Hours						End Exam Duration: 3Hrs		

Course Objectives:

- To give the students a firm foundation on Java concepts like Primitive data types, Java control flow, Methods, Object-oriented programming, Core Java classes, packages and interfaces, multithreading.
- To provide the students with an understanding of Java applets, Abstract Window, Toolkit and exception handling.

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

CO 1	solve problems using object oriented approach and implement them using Java
CO 2	develop efficient programs with multitasking ability and handle exceptions

CO 3	develop user friendly interface
CO 4	create AWT components

UNIT-I

Object Oriented Programming basics: Need for OOP paradigm, Principles of OOP concepts

Java Basics: History of Java, Java buzzwords, Simple java program, classes and objects – concepts of classes, objects, constructors, methods, Introducing access control, **this** keyword, overloading methods and constructors.

UNIT-II

Inheritance: Hierarchical abstractions, Types of Inheritance, benefits of inheritance, **super** uses, using **final** with inheritance, polymorphism- method overriding, abstract classes.

Packages and Interfaces: Defining, Creating and Accessing a Package, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT-III

Exception handling and multithreading: Concepts of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally, creating own exception sub classes. Differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads.

UNIT-IV

Event Handling : Events, Event sources, Event classes, Event Listeners, Delegation event model, handling Mouse and Keyboard events, Adapter classes, The AWT class hierarchy, user interface components- Labels, Button, Scrollbars, Text Components, Check box, Choices, Graphics, Layout manager types – Flow, Border, Grid, Card and Grid bag.

UNIT-V

Applets: Concepts of Applets, differences between applets and applications, life cycle of an Applet, creating applets, passing parameters to applets.

Swings: Introduction, JApplet, JFrame and JComponent, Icons and Labels, text fields, JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, and Tables.

Text Books:

1. Java; the complete reference, 7th editon, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.

Reference Books:

1. An Introduction to programming and OO design using Java, J.Nino and F.A.Hosch, John wiley & sons.
2. An introduction to Java programming and object oriented application development, R.A. Johnson- Thomson.
3. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, eighth Edition, Pearson Education.
4. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell, eighth Edition, Pearson Education.
5. Object Oriented Programming through Java, P. Radha Krishna, University Press.

Course Title	FORMAL LANGUAGES AND AUTOMATA THEORY				B.Tech CSE IV Sem (R18)			
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
1805407	**PJ**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	0	0	3	30	70	100
Mid Exam Duration: 2 Hours					**End Exam Duration: 3Hrs**			

Course Objectives:

- To be able to construct finite state machines and the equivalent regular expressions and prove the equivalence of languages described by finite state machines and regular expressions.
- To be able to construct pushdown automata and the equivalent context free grammars, Turing machines and Post machines.

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

CO 1	Understand of the notion of a regular set and its representation by DFA's, NFA's and regular expressions.
CO 2	Understand of the notion of a context-free language and its representation by

	context-free grammars and push-down automata.
CO 3	Identify the applications of regular expressions and context-free grammars
CO 4	Solve to the problems using Turing machines.

UNIT-I

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

Finite Automata: NFA with Є transitions - Significance, acceptance of languages. Conversions and Equivalence : Equivalence between NFA with and without Є transitions, NFA to DFA conversion, minimization of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Mealy machines.

UNIT-II

Regular Languages: Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Pumping lemma of regular sets, closure properties of regular sets (proofs not required).

UNIT-III

Grammar Formalism: Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, sentential forms. Right most and leftmost derivation of strings.

Context Free Grammars: Ambiguity in context free grammars. Minimisation of Context Free Grammars. Chomsky normal form, Greiback normal form, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted).

UNIT-IV

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

UNIT-V

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

Computability Theory: Chomsky hierarchy of languages, linear bounded automata and context sensitive language, LR(0) grammar, decidability of problems, Universal Turing Machine, undesirability of post's Correspondence problem, Turing reducibility, Definition of P and NP problems, NP complete and NP hard problems.

Text Books: 1. “Introduction to Automata Theory Languages and Computation”. Hopcroft H.E. and Ullman J. D. Pearson Education.
2. Introduction to Theory of Computation - Sipser 2nd edition Thomson

Reference Books: 1. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
2. Introduction to languages and the Theory of Computation ,John C Martin, TMH
3. “Elements of Theory of Computation”, Lewis H.P. & Papadimition C.H. Pearson /PHI.
4 Theory of Computer Science and Automata languages and computation -Mishra and Chandrashekaran, 2nd edition, PHI. 5. Theory of Computation, By K.V.N. Sunitha and N.Kalyani