DEPARTMENT OF

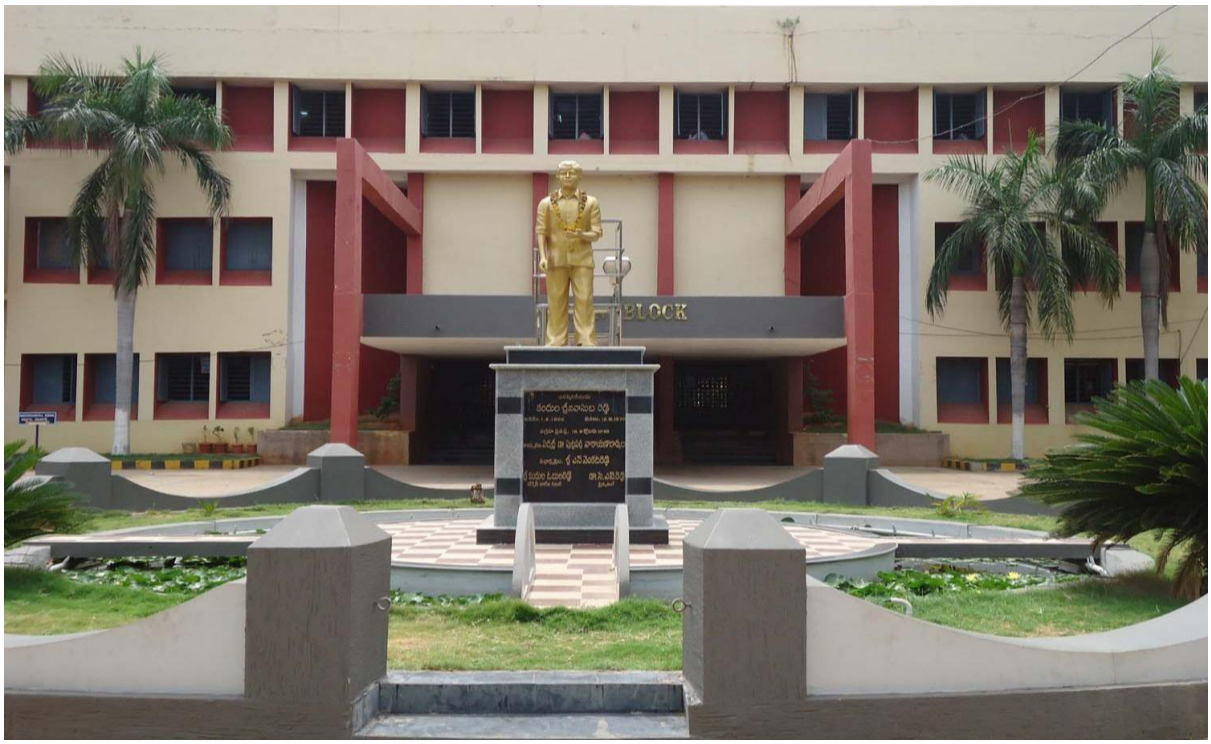
COMPUTER SCIENCE AND ENGINEERING

COURSE STRUCTURE AND SYLLABUS

FOR

B.Tech CSE (III Sem - IV Sem) (R18 Regulations)

(Effective from 2018-19 for Regular students and from 2019-20 for Later Entry students)



KANDULA SREENIVASA REDDY MEMORIAL COLLEGE OF ENGINEERING(AUTONOMOUS)

KADAPA - 516005, AP

(Approved by AICTE, Affiliated to JNTUA, Ananthapuramu, Accredited by NAAC)
(An ISO 9001-2008 Certified Institution)

COMPUTER SCIENCE AND ENGINEERING

III Semester

Subject Code	Subject Category	Course Name	L	T	P	IM	EM	CR
18993M1	MC	Environmental Science (Mandatory Course-1)	2	0	0	30	--	0
1804302	PN	Basics of Electronics Engineering	3	0	0	30	70	3
1805303	PCC	Data Structures	3	0	0	30	70	3
1805304	PCC	Discrete Mathematics	3	0	0	30	70	3
1805305	PCC	Digital Logic Design	3	0	0	30	70	3
1805306	PCC	Python Programming	3	0	0	30	70	3
1825307	HSMC	Managerial Economics and Financial Accounting	3	0	0	30	70	3
1814311	PN	Basics of Electronics Engineering Lab	0	0	2	50	50	1
1805309	PCC	Data Structures Lab	0	0	3	50	50	1.5
1805310	PCC	Python Programming Lab	0	0	3	50	50	1.5
		TOTAL	**20**	**0**	**8**	**360**	**570**	**22**

IV SEMESTER

Subject Code	Subject Category	Course Name	L	T	P	IM	EM	CR
1823401	BSC	Biology for Engineers	2	0	0	30	70	2
1821402	BSC	Probability & Statistics	3	0	0	30	70	3
1805403	PCC	Computer Organization	3	0	0	30	70	3
1805404	PCC	Operating Systems	3	0	0	30	70	3
1805405	PCC	Design and Analysis of Algorithms	3	0	0	30	70	3
1805406	PCC	Java Programming	3	0	0	30	70	3
1805407	PCC	Formal Languages and Automata Theory	3	0	0	30	70	3
1805408	PCC	Java Programming lab	0	0	2	50	50	1
1805410	PCC	Operating Systems Lab	0	0	2	50	50	1
		TOTAL	**20**	**0**	**4**	**310**	**590**	**22**

R18-CSE- III Semester

Course Title	ENVIRONMENTAL SCIENCE					B. Tech III Sem (R18) CSE		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
18993M1	MC-1	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		2	--	--	0	30	--	30
Mid Exam Duration: 2Hrs								

Course Objectives:

- To make the students to get awareness on importance of environment in our life.
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life to save earth from the inventions by the engineers.

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

CO 1	Influence the society in proper utilization of Natural resources.
CO 2	Understand the interconnection of human dependence on this ecosystem.
CO 3	Recall the concepts of biodiversity & gain knowledge on distribution at different levels.
CO 4	Analyze the impact of environmental pollution on environment & solving environmental problems
CO 5	Discuss environmental laws & analyze the environmental concerns and follow sustainable developmental activities.

UNIT - I

Introduction to Environmental Studies- Natural Resources

Multidisciplinary nature of environmental studies. Scope and Importance.

Natural resources and associated problems – Renewable and non-renewable Resources

(a) Forest resources –Deforestation: Causes and impacts due to mining, dams – benefits and problems

(b) Water resources – Use and over utilization of surface and ground water – Floods, drought, and conflicts over water

(c) Energy resources –Renewable and Non Renewable energy resources, use of alternate energy resource

(d) Land resources -Soil erosion and desertification, Land degradation.

Role of an individual in conservation of natural resources.

UNIT - II

Ecosystem

Ecosystem- Definition – Structure and function of an ecosystem – Energy flow in the ecosystem – Food chains, food webs, Ecological succession.

Introduction, types, characteristic features of the following ecosystem:

(a) Forest ecosystem, (b)Grassland ecosystem,(c)Desert ecosystem,(d)Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT - III

Biodiversity and its conservation

Levels of Biodiversity: genetic, species and ecosystem diversity – Bio-geographical classification of India – Hotspots .Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – India as a mega-diversity nation – Endangered and endemic species. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT - IV

Environmental Pollution

Definition, Cause, effects and control measures of (a) Air Pollution,(b)Water pollution,(c)Soil pollution (d)Noise pollution. Nuclear hazards –Risks to human health .Solid waste management: Control measures of urban and industrial wastes. Pollution case studies. Global Warming, Ozone layer depletion, acid rains and impacts on human communities and environment .Disaster management: floods, earthquakes, cyclones.

UNIT - V

Environmental policies

Environment Protection Act – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act .International agreements: Montreal and Kyoto protocols and conservation on Biological Diversity (CBD).

Human communities and Environment

Human population and growth: impacts on environment, human health and welfares.

Environmental movements: chipko, silent valley.

Environmental Ethics: Role of individual in environmental conservation. Public awareness.

FIELD WORK: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds – Study of simple ecosystems-pond, river, hill slopes, etc..

Text Books:

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharuchafor University Grants Commission, Universities Press.
2. Environmental studies by Benny Joseph, Mc, Graw Hill Publications.
3. Principles and a basic course of Environmental science for under graduate course by Kousic,KouShic.
4. Text book of Environmental science and Technology by M. Anji Reddy,BS Publication.

Reference Books:

1. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
2. Environmental Studies by Anindita Basak – Pearson education.
3. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.
4. Environmental Science, A Global Concerns, William P. Cunningham, Mary Ann Cunningham, Mc Graw Hill publications

Course Title	BASICS OF ELECTRONICS ENGINEEING				B.Tech III Sem (R18) CSE		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1804302	PN	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 - I

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	DATA STRUCTURES				B.Tech III Sem (R18) CSE		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1805303	PCC	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 nonlinear 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.

4. Data Structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.

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 and algorithms in C++, Mark Allen Weiss, Pearson Education Limited, Second Edition.

Course Title	DISCRETE MATHEMATICS				B.Tech III Sem (R18) CSE		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1805304	PCC	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 P Tremblay and Manohar Mc Graw Hill

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

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

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

Reference Books:

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

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

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

4. Discrete Mathematics with Applications, ThomasKoshy,Elsevier.

5. Discrete Mathematics, Lovasz, Springer.

Course Title	DIGITAL LOGIC DESIGN				B.Tech III Sem (R18) CSE		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1805305	PCC	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.
2. Fundamentals of digital logic design with VHDL By Stephen Brown and I Zvonko Vranesic, second edition, The McGraw-Hill.
3. Fundamentals of logic design, Roth, 5th edition,Thomson.
4. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.

Reference Books:

1. Switching and Logic Design, C.V.S. Rao, Pearson Education
2. Digital Principles and Design –Donald D.Givone, Tata McGraw Hill, Edition.
3. Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M. Rafiquzzaman John Wiley.
4. Digital Circuits and Design, S. Salivahanan, Arivazhagan, 5th Edition, Oxford University Press.

Course Title	PYTHON PROGRAMMING				B.Tech III Sem (R18) CSE		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1805306	PCC	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.

Text Books:

1. Core python programming by Wesley J Chun, Prentice Hall, Second edition.
2. Introduction to Computation and Programming using Python, by John Guttag, PHI Publisher.
3. Learning python, Mark Lutz, O'Reilly publications, 5th edition, 2013.
4. Core python programming by Dr. R. Nageswara Rao, Dreamtech press, second edition, 2018

Reference Books:

1. Python: The complete reference by Martin C Brown, McGraw-Hill Publication, 2018.
2. Programming Python, Mark Lutz,4th Edition, O'Reilly publications.
3. Dive into Python, Mark Pilgrim, APress Media, LLC.

Course Title	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS				B.Tech III Sem (R18) CSE		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1825307	HSMC	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 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. Paul A Samuleson and William nordhaus : Economics, Oxford University Publications.
2. M L Jhingan : Micro Economics & Macro Economics, Vrinda Publacations (P) Ltd.
3. Varshney & Maheswari: Managerial Economics, Sultan Chand Publishers, 2009.
4. Prasad and K.V.Rao: Financial Accounting, jaibharth Publishers, Vijayawada.

Reference Books:

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.

Course Title	BASIC ELECTRONICS ENGINEERING LAB				B.Tech III Sem (R18) CSE		
Course Code	**Category**	**Hours/Week**		**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
1814311	**PN**	**--**	**--**	**2**	**1**	**50**	**50**	**100**
					End Exam Duration: 3Hrs		

Course Objectives:

- To verify the characteristics of different diodes and transistors.
- To verify the performance of amplifier and oscillator.

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

CO 1	Verify the Characteristics of diodes, transistors.
CO 2	Demonstrate the applications of diodes.
CO 3	Examine the operation of oscillators.

LIST OF EXPERIMENTS

1. Study of CRO
2. V-I Characteristics of PN Diode
3. V-I Characteristics of Zener diode
4. Zener diode as a voltage regulator.
5. V-I Characteristics of LED
6. HWR with and without Capacitor filter
7. FWR with and without Capacitor filter
8. Bridge Rectifier with and without Capacitor filter
9. I/P & O/P Characteristics of BJT in CB Configuration
10. I/P & O/P Characteristics of FET
11. RC Phase shift Oscillator
12. Collpits Oscillator.

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	DATA STRUCTURES LAB				B.Tech III Sem (R18) CSE		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1805309	PCC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		0	0	3	1.5	50	50	100
					End Exam Duration: 3Hrs		

Course Objectives:

- To make the students learn the implementation of insertion, deletion and display operations on various linear and nonlinear data structures.

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

CO 1	Understand and implement stack ADT, queue ADT and linked list.
CO 2	Able to understand and implement tree traversal algorithms and graph traversal algorithms.
CO 3	Able to implement various sorting algorithms.
CO 4	Analyze and implement searching techniques.

LIST OF EXPERIMENTS

1) Write a program for stack operations by using arrays.
2) Write a program for stack operations by using linked list.
3) Write a program to convert given infix expression to postfix expression.
4) Write a program for queue operations by using arrays.
5) Write a program for queue operations by using linked list.
6) Write a program for circular queue operations by using arrays.
7) Write a program to implement operations on single linked list.
8) Write a program to implement operations on doubly linked list.
9) Write a program to implement insertion, deletion and traversal operations on trees.
10) Write a program to implement Breadth First Search (BFS) traversal algorithm.
11) Write a program to implement Depth First Search (DFS) traversal algorithm.
12) Write a program to implement operations on AVL tree.
13) Write a program that implement selection sort, to sort a given list of elements in ascending order.
14) Write a program that implement insertion sort, to sort a given list of elements in ascending order.
15) Write a program that implement bubble sort, to sort a given list of elements in ascending order.
16) Write a program that implement merge sort, to sort a given list of elements in ascending order.

17) Write a program that implement quick sort, to sort a given list of elements in ascending order.

18) Write a program that implement heap sort, to sort a given list of elements in ascending order.

19) Write a program for linear search using arrays.

20) Write a program for binary search using arrays.

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.
4. Data Structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.

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 and algorithms in C++, Mark Allen Weiss, Pearson Education Limited, Second Edition.

Course Title	PYTHON PROGRAMMING LAB				B.Tech III Sem (R18) CSE		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1805310	PCC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		0	0	3	1.5	50	50	100
					End Exam Duration: 3Hrs		

Course Objectives:

- To write, test, and debug simple Python programs.
- Know when and how to use the appropriate statements available in the python
- To implement Python programs with conditionals and loops
- Use functions for structuring Python programs
- Represent compound data using Python lists, tuples and dictionaries.
- Read and write data from/to files in Python

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

CO 1	Understand and solve the basics of python programming.
CO 2	Learn and implement iterative as well as recursive programs in python
CO 3	Able to represent heterogeneous data with right sequence in python
CO 4	Develop Programs using object-oriented features in python

LIST OF EXPERIMENTS

1. Calculate the following programs using Python
   a) Area of Circle
   b) Simple and Compound Interest
   c) Celsius to Fahrenheit
   d) Volume of Sphere

2. Write a Python program to find distance between two points (X1, Y1) and (X2, Y2).

3. Implement the following programs using Python
   a) To find given number is Even or Odd number
   b) Find Maximum of Two numbers
   c) Find given number is Zero, Positive or Negative
   d) Find Minimum of Two numbers
   e) Find given year is leap year or not

4. Write a Python program to find Roots of Quadratic equation.

5. Write a Python program to read credits and grades of five different subjects and display SGPA based on the following table.

Class	SGPA
Distinction	>=7.5
First Class	>=6.5 <7.5
Second Class	>=5.5 <6.5
Pass	>=4.5 <5.5
Fail	<4.5

$$SGPA=\frac{\sum}{\sum}$$

6. Write a Python program to design arithmetic calculator based on user choice like 1. Addition 2. Subtraction 3. Multiplication 4. Division.

7. Implement the following programs using Python
   a) Sum of Digits of a given number
   b) Given number is Palindrome or not
   c) Find given number is Armstrong number or not
   d) Factorial of a given number

8. Write a Python program to display sum of even valued terms and odd valued terms individually by considering terms of Fibonacci series upto n.

9. Implement the following search strategies using Python
   a) Linear search b) Binary search

10. Perform the following sorting techniques using Python
   a) Selection sort b) Insertion sort c) Merge sort

11. Implement the following programs using Python
   a) Given number is Prime or not
   b) Display Prime numbers upto given number n

12. Implement the following programs using Python
   a) Addition of Two Matrices
   b) Multiplication of Two Matrices

13. Implement the following programs using Python
   a) Count number of Even and Odd numbers in list
   b) Remove all duplicate elements in a list
   c) Find Second smallest element in a list
   d) Find Second largest element in a list

14. Implement the following programs using Python
    a) Reverse elements of a list without using reverse( ) function
    b) Find GCD, LCM of two numbers. Each function should not exceed one line
    c) Write a Python function, that takes two lists and returns True if they have at least one common number.

15. Implement the following programs using Python
    a) Reverse the string without reverse( ) function
    b) Find list of words that are larger than n from a given list of words

16. Write a Python program to build Stack data structure using list.
    (Hint: 1. Push 2. Pop 3. Peep 4. Display 5. Exit)

17. Write a Python program to build Queue data structure using list.
    (Hint: 1. Insert 2. Delete 3. Display 4. Exit)

18. Write a Python program to check whether a list contains a sub list.

19. Write a Python program to perform the following operations on Tuple based on the user choice. (Hint: 1. Insert 2. Delete 3. Search 4. Display 5. Exit)

20. Implement the following programs using Python
    a) Create a dictionary with student names and marks. Retrieve marks by entering the student name.
    b) Find the number of occurrences of each letter in a string using dictionary.

21. Write a Python program to create a student class, that reads n student details like name, marks, gender etc. Calculate and display total marks, percentage and grade.

22. Write a Python program to create a parent class and child class along with their own methods. Access parent class members in child class to implement the following sceneries.
    a) Single level Inheritance
    b) Multi level Inheritance
    c) Multiple Inheritance

23. a) Write a Python program to overload the addition operator '+' to make it act on class objects.
    b) Write a Python program to overload sum( ) method of class student
    c) Write a Python program to override the area( ) method of square class.
    (Hint: parent class ⇢ square, child class⇢ circle)

24. Create a 'car' abstract class, which contains abstract methods along with concrete methods. Write a Python program to implement super class 'car' in sub class 'Maruthi'.

25. a) Write a program to print each line of a file in reverse order
    b) Write a program to compute the number of characters, words and lines in a file.

Text Books:

1. Core python programming by Wesley J Chun, Prentice Hall, Second edition.
2. Introduction to Computation and Programming using Python, by John Guttag, PHI Publisher.
3. Learning python, Mark Lutz, O'Reilly publications, 5th edition, 2013.
4. Core python programming by Dr. R. Nageswara Rao, Dreamtech press, second edition, 2018

Reference Books:

1. Python: The complete reference by Martin C Brown, McGraw-Hill Publication, 2018.
2. Programming Python, Mark Lutz,4th Edition, O'Reilly publications.
3. Dive into Python, Mark Pilgrim, APress Media, LLC.

R18-CSE- IV Semester

Course Title	BIOLOGY FOR ENGINEERS				B.Tech IV Sem (R18) CSE		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1823401	BSC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		2	0	0	2	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs		

Course Objectives:

- Introduction to Basics of Biology which includes cell, the unit of life, Different types of cells and classification of living organisms.
- Understanding what are biomolecules present in a cell, their structure function and their role in a living organism. Application of certain bio molecules in Industry.
- Brief introduction to human physiology, which is essential for bioengineering field.
- Understanding the hereditary units, that is genes and genetic materials (DNA and RNA) present in living organisms and how they replicate and pass and preserve vital information in living organisms.
- How biology can be applied in our daily life using different technology, for production of medicines to transgenic plants and animals to designing new biotechnological products

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

CO 1	Define the cells, its structure and function, and Different types of cells and basis for Classification of living organisms.
CO 2	Explain about biomolecules its structure and function and their role in a living organism How biomolecules are useful in Industry & explain about human physiology.
CO 3	Demonstrate the concept of biology and its uses in combination with different technologies for production of medicines and production of transgenic plants and animals.
CO 4	Illustrate about genes and genetic materials (DNA & RNA) present in living organisms and how they replicate, transfer & preserve vital information in living organisms.
CO 5	Understand the importance of transgenic plants and animals in synthesis of proteins .

UNIT - I

Introduction to Basic Biology

Cell: What is a Cell, Cell theory, Cell shapes, structure of a Cell, Cell cycle chromosomes

The Plant Cell and animal Cell, protoplasm, prokaryotic and eukaryotic Cell, Plant Tissue and Animal Tissue. Brief introduction to five kingdoms of classification.

UNIT - II

Introduction to Bio-molecules

Carbohydrates, proteins, Amino acid, nucleic acid (DNA and RNA) and their types.

Enzymes and their application in Industry. Large scale production of enzymes by Fermentation.

UNIT - III

Human Physiology

Nutrition (Classes of nutrients or food substances), Digestive systems, Respiratory system (two kinds of respiration – aerobic and anaerobic) Respiratory organs, respiratory cycle. Excretory system.

UNIT - IV

Genes, Replication of DNA, And Introduction to recombinant DNA Technology:

Prokaryotic gene and Eukaryotic gene structure, gene replication, Transcription and Translation in Prokaryote and Eukaryote and synthesis of protein in Eukaryotes. Recombinant DNA technology and cloning introduction.

UNIT-V

Application of Biology

Brief introduction to Production of vaccines, Enzymes, antibodies, Cloning in microbes, plants and animals, Basics of biosensors, biochips, Bio fuels, and Biosensors. What is Tissue engineering? And its application, transgenic plants and animals, Bio engineering (production of artificial limbs, joints and other parts of body).

Text Books:

1. Applied cell and Molecular Biology for Engineers, 1ST Edition , Gabi Nindl Waite , Lee R. Waite ISBN-13:978-0071472425,ISBN-10:0071472428 .
2. Biology for Engineers, S.ThyagaRajan, N . Selvamurugan, M.P. Rajesh, R.A.Nazeer, Richard W. Thilagaraj , S.Barathi , M.K.Jaganathan. MCGrawHill custom publishing,ISBN-13:978-1-12-143993-1.
3. Biology for Engineers , 2nd Edition, Arthur T.Johnson , CRC press Taylor & Francis group.
4. Biology for Engineers , Wiley precise Textbook series ISBN :9788126576340.

Reference Books:

1. Cell and Molecular Biology-P.K.Gupta, Rastogi publications, 2005. ISBN 9788171338177
2. AlbertsEt.Al. The molecular biology of the cell, 6/e, Garland Science, 2014
3. John Enderle and Joseph Bronzino Introduction to Biomedical Engineering, 3/e, 2012
4. Introductory Microbiology. 1995, by Trevor Gross.

Course Title	PROBABILITY & STATISTICS				B.Tech IV Sem (R18) CSE		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exams	Total
1821402	BSC	3	0	0	3	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs			

Course Objectives:

- To help the students in getting a thorough understanding of the fundamentals of probabilities.
- To help the students in getting a thorough understanding and usage of statistical techniques like testing of hypothesis and statistical control.

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

CO 1	Understand the concepts of Probability.
CO 2	Interpret the properties of probability distributions and their applications.
CO 3	Analyze the problems of engineering and industry using the techniques of testing of Hypo thesis for large and small samples.
CO 4	Apply statistical quality control and draw appropriate inferences for engineering problems

UNIT - I

Random variables: Discrete random variables – Continuous random variables –Probability distribution function – Discrete and continuous probability distribution – Mathematical Expectation, Variance and standard deviation of probability distribution.

Learning Outcomes:

At the end of this unit, the student will be able to

- explain the notion of random variable, distribution functions and expected value

UNIT - II

Discrete distributions: Binomial and Poisson distributions with related properties.

Continuous distributions: Uniform and Normal distributions with related properties.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply Binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies
- interpret the properties of normal distribution and its applications

UNIT - III

Testing of Hypothesis: Formulation of null hypothesis, critical regions, level of significance. Large sample tests. Tests based on normal distribution – z -test for means and proportions.

Learning Outcomes:

At the end of this unit, the student will be able to

- explain the concept of estimation, interval estimation and confidence intervals
- apply the concept of hypothesis testing for large samples.

UNIT - IV

Small samples: t-test for one sample, two samples problems and paired t-test. F-test – Chi-square test (testing of goodness of fit and independence).

Learning Outcomes:

At the end of this unit, the student will be able to

- apply the concept of testing hypothesis for small samples to draw the inferences
- estimate the goodness of fit

UNIT - V

Statistical Quality Control: Concept of quality of a manufactured product – defect and defectives – Causes of variation – Random and assignable causes – The principle of Shewhart control chart – Charts for attributes and variable quality characteristics – Construction and operation of X-bar chart and R-chart, p-chart and c-chart.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply the concept of statistical quality control to draw different charts and draw the inferences from them.

Text Books:

1. Higher Engineering Mathematics, Dr. B.S.Grewal, Khanna Publishers-42 edition.
2. Probability and Statistics for Engineers and Scientists, Walpole and Myers, Seventh edition, Pearson Education Asia, 2002
3. Probability and Statistics for Engineers, Johnson, Fifth edition, Prentice Hall of India.

Reference Books:

1. Probability and Statistics by E. Rukmangadachari & E. Keshava Reddy, Pearson Publishers.
2. Statistical Methods by S.P.Gupta, S Chand Publications.

Course Title	COMPUTER ORGANIZATION				B.Tech IV Sem (R18) CSE		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
1805403	**PCC**	**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 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.

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

CO 1	Perform arithmetic operations of binary number system.
CO 2	Understand the organization of the Control unit, Arithmetic and Logical unit, Memory unit and the I/O unit.
CO 3	Use memory and I/O devices effectively and to explore the hardware requirements for cache memory and virtual memory.
CO 4	Understand the concept of pipelining and multiprocessors.

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.'

3. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.

4. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.

Reference Books:

1. Fundamentals of Computer Organization and Design, - Sivaraama Dandamudi, Springer Int. Edition.

2. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition, Elsevier.

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

4. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software interface", Elsevier, Third Edition, 2005.

Course Title	OPERATING SYSTEMS				B.Tech IV Sem (R18) CSE		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
1805404	PCC	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:

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

Reference Books:

1. A.S.Godbole, "Operating Systems", Second Edition, TMH.
2. Operating Systems: A Spiral Approach – Elmasri, Carrick, Levine, TMH Edition
3. Operating Systems – H.M. Deitel, P. J. Deitel, D. R. Choffnes, 3rd Edition, Pearson
4. Operating Systems: A Practical Approach, Rajiv Chopra, 4th Edition, S Chand Publishers

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

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

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

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

Reference Books:

1.Introduction to Algorithms, 2/e ,T.H.Cormen,C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd. / Pearson Education.

2.Algorithm Design: Foundations, Analysis and Internet examples, M.T.Goodrich and R.Tomassia, John Wiley and sons.

3.Design and Analysis of Algorithms, S. Sridhar, Oxford Higher Education.

Course Title	JAVA PROGRAMMING				B.Tech IV Sem (R18) CSE		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1805406	PCC	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 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.

3. An Introduction to programming and OO design using Java, J.Nino and F.A.Hosch, John wiley & sons.

4. An introduction to Java programming and object oriented application development, R.A. Johnson-Thomson.

Reference Books:

1. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, eighth Edition, Pearson Education.

2. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell, eighth Edition, Pearson Education.

3. Object Oriented Programming through Java, P. Radha Krishna, University Press.

4. Java and Object-Oriented programming Paradigm, Debasish Jana, PHI Learning Pvt. Ltd.

Course Title	FORMAL LANGUAGES AND AUTOMATA THEORY				B.Tech IV Sem (R18) CSE		
Course Code	**Category**	**Hours/Week**		**Credits**	**Maximum Marks**		
1805407	**PCC**	**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 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.

3. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.

4. Introduction to languages and the Theory of Computation ,John C Martin, TMH

Reference Books:

1. "Elements of Theory of Computation", Lewis H.P. & Papadimition C.H. Pearson /PHI.

2. 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.

3. Formal Languages and Automata Theory, C. K. Nagpal, Oxford Higher Education.

4. Introduction to Automata Theory, Formal Languages and Computations, Shyamlendu Kandar, Pearson.

Course Title	JAVA PROGRAMMING LAB				B.Tech IV Sem (R18) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1805408	PCC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		0	0	2	1	50	50	100
					End Exam Duration: 3Hrs			

Course Objectives:

To be able to understand and implement Java applications and applets, Primitive data types, Java control flow, Methods, classes, packages, multithreading and exception handling

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

CO 1	Create, compile, and run Java programs.
CO 2	Write java programs using primitive data types, control statements, methods, and arrays.
CO 3	Implement Packages, Interfaces and Exception handling.
CO 4	Develop a GUI interface and Java applets.

LIST OF SAMPLE EXPERIMENTS

1. Write a Java program that prints the Fibonacci series.
2. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer.
3. Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers
4. Write a Java program to addition of two given Matrices.
5. Write a Java program to perform Transpose of given Matrix.
6. Write a Java program that checks whether a given string is a palindrome or not.
7. Write a Java program to find the factorial of a given number using recursion
8. Write a Java program for sorting a given list of names in ascending order.
9. Write a Java program to make frequency count of words in a given text.
10. Write a Java program that implements stack ADT.
11. Write a Java program that implements Queue ADT.
12. Write a Java program to implement packages.
13. Write a Java program to implement interfaces.
14. Write a Java program to implement exception handling.
15. Write a Java program to implement multithreading.

16. Write a Java program to implement abstract methods and abstract classes.
17. Write a Java program to develop an applet that displays a simple message.
18. Write a Java program to develop an applet that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked.
19. Write a Java program for handling mouse events.
20. Write a Java program for handling keyboard events.
21. 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.

Text Books:

1. Java; the complete reference, 7th editon, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.
3. An Introduction to programming and OO design using Java, J.Nino and F.A.Hosch, John wiley & sons.
4. An introduction to Java programming and object oriented application development, R.A. Johnson-Thomson.

Reference Books:

1. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, eighth Edition, PearsonEducation.
2. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell, eighth Edition,Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, University Press.
4. Java and Object-Oriented programming Paradigm, Debasish Jana, PHI Learning Pvt. Ltd.

Course Title	OPERATING SYSTEMS LAB				B.Tech IV Sem (R18) CSE		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1805410	PCC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		0	0	2	1	50	50	100
					End Exam Duration: 3Hrs		

Course Objectives:

- Have a thorough knowledge of process management and memory management.
- To have a thorough knowledge of how handle to deadlocks.
- Have a thorough knowledge on paging and segmentation concepts.

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

CO 1	Design, implement and analyze the various process scheduling algorithms and process synchronization mechanisms.
CO 2	Understand, implement and analyze the various memory management schemes.
CO 3	Design, implement and analyze the ways to deal the deadlocks in the system.
CO 4	Understand, analyze and implement the protection and security mechanisms
CO 5	Understand and analyze the paging and segmentation schemes.

LIST OF SAMPLE EXPERIMENTS

1. Write a Java program to simulate the following CPU scheduling algorithms to find the average turnaround time and average waiting time of process.
   (a) First Come First Serve
   (b) Shortest Job First
   (c) Priority
   (d) Round Robin Scheduling

2. Write a Java program to simulate the following contiguous memory allocation techniques.
   (a) First Fit
   (b) Best Fit
   (c) Worst Fit

3. Write a Java program to simulate the following page replacement algorithms to find the total number of page faults for given page reference string.
   (a) First in First out
   (b) Least Recently Used
   (c) Optimal

4. Write a Java Program to simulate Producer Consumer Problem.

5. Write a Java program to simulate the following:
   (a) Deadlock avoidance
   (b) Deadlock detection

6. Write a Java program to simulate the paging and segmentation concepts.

Text Books:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, "Operating System Concepts", Eighth edition, John Wiley.
2. Andrew S Tanenbaum, "Modern Operating Systems", Fourth Edition, Pearson Education
3. William Stallings, "Operating Systems: Internals and Design Principles", Sixth Edition2009, Pearson Education.
4. D.M.Dhamdhere, "Operating Systems, A Concept based Approach", Third Edition, TMH

Reference Books:

1. A.S.Godbole, "Operating Systems", Second Edition, TMH.
2. Operating Systems: A Spiral Approach – Elmasri, Carrick, Levine, TMH Edition
3. Operating Systems – H.M. Deitel, P. J. Deitel, D. R. Choffnes, 3rd Edition, Pearson
4. Operating Systems: A Practical Approach, Rajiv Chopra, 4th Edition, S Chand Publishers.