GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3140702
Semester – IV
Subject Name: Operating System

Type of course: Undergraduate

Prerequisite: Linear and non-liner data structures, working experience of any one structured programming language

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	2	5	70	30	30	20	150

Syllabus:

Sr. No.	Content	Total Hrs	% Weightage
1	**Introduction:** Computer system overview, Architecture, Goals & Structures of O.S, Basic functions, Interaction of O.S. & hardware architecture, System calls, Batch, multiprogramming. Multitasking, time sharing, parallel, distributed & real-time O.S.	5	10
2	**Process and Threads Management:** Process Concept, Process states, Process control, Threads, Uni-processor Scheduling: Types of scheduling: Preemptive, Non preemptive, Scheduling algorithms: FCFS, SJF, RR, Priority, Thread Scheduling, Real Time Scheduling. System calls like ps, fork, join, exec family, wait.	8	15
3	**Concurrency:** Principles of Concurrency, Mutual Exclusion: S/W approaches, H/W Support, Semaphores, Pipes, Message Passing, Signals, Monitors.	4	08
4	**Inter Process Communication:** Race Conditions, Critical Section, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc., Scheduling, Scheduling Algorithms.	8	15
5	**Deadlock:** Principles of Deadlock, Starvation, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, System calls.	4	08
6	**Memory Management:** Memory Management requirements, Memory partitioning: Fixed and Variable Partitioning, Memory Allocation: Allocation Strategies (First Fit, Best Fit, and Worst Fit), Swapping, Paging and Fragmentation. Demand Paging, Security Issues. **Virtual Memory:** Concepts, VM management, Page Replacement Policies (FIFO, LRU, Optimal, Other Strategies), Thrashing.	8	15
7	**I/O Management & Disk scheduling:** I/O Devices, Organization of I/O functions, Operating System Design issues, I/O Buffering, Disk Scheduling (FCFS, SCAN, C-SCAN, SSTF), RAID, Disk Cache.	6	10

8	**Security & Protection:** Security Environment, Design Principles Of Security, User Authentication, Protection Mechanism : Protection Domain, Access Control List	4	07
9	**Unix/Linux Operating System:** Development Of Unix/Linux, Role & Function Of Kernel, System Calls, Elementary Linux command & Shell Programming, Directory Structure, System Administration Case study: Linux, Windows Operating System	4	07
10	**Virtualization Concepts:** Virtual machines; supporting multiple operating systems simultaneously on a single hardware platform; running one operating system on top of another. True or pure virtualization.	3	05

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	**35**	**15**	**0**	**0**	**0**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Course outcomes: Students will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Analyze the structure of OS and basic architectural components involved in OS design	10
CO-2	Compare and contrast various CPU scheduling algorithms.	20
CO-3	Evaluate the requirements for the process synchronization and co-ordination in contemporary operating system.	30
CO-4	Analyze various algorithms for memory management, I/O management and security aspects of operating system.	30
CO-5	Write shell scripts in Unix/Linux O.S and write simple programs using kernel system calls. Also understand virtualization concept.	10

Reference Books:

1. Operating Systems: Internals & Design Principles, 9th Edition, William Stallings, Pearson Education India
2. Operating System Concepts, 9th edition Peter B. Galvin, Greg Gagne, Abraham Silberschatz, John Wiley & Sons, Inc.
3. Modern Operating Systems-By Andrew S. Tanenbaum (PHI)

List of Experiments: Study of Basic commands of Linux/UNIX.

1. Study of Advance commands and filters of Linux/UNIX.
2. Write a shell script to generate marksheet of a student. Take 3 subjects, calculate and display total marks, percentage and Class obtained by the student.
3. Write a shell script to display multiplication table of given number
4. Write a shell script to find factorial of given number n.
5. Write a shell script which will accept a number b and display first n prime numbers as output.

6. Write a shell script which will generate first n fibonnacci numbers like: 1, 1, 2, 3, 5, 13, …
7. Write a menu driven shell script which will print the following menu and execute the given task.
    a. Display calendar of current month
    b. Display today's date and time
    c. Display usernames those are currently logged in the system
    d. Display your name at given x, y position
    e. Display your terminal number
8. Write a shell script to read n numbers as command arguments and sort them in descending order.
9. Write a shell script to display all executable files, directories and zero sized files from current directory.
10. Write a shell script to check entered string is palindrome or not.
11. Shell programming using filters (including grep, egrep, fgrep)
12. Study of Unix Shell and Environment Variables.
13. Write a shell script to validate the entered date. (eg. Date format is : dd-mm-yyyy).
14. Write an awk program using function, which convert each word in a given text into capital.
15. Write a program for process creation using C. (Use of gcc compiler).
16. Study of Basic commands of Linux/UNIX.
17. Study of Advance commands and filters of Linux/UNIX.
18. Write a shell script to generate marksheet of a student. Take 3 subjects, calculate and display total marks, percentage and Class obtained by the student.
19. Write a shell script to display multiplication table of given number
20. Write a shell script to find factorial of given number n.
21. Write a shell script which will accept a number b and display first n prime numbers as output.
22. Write a shell script which will generate first n fibonnacci numbers like: 1, 1, 2, 3, 5, 13, …
23. Write a menu driven shell script which will print the following menu and execute the given task.
    a. Display calendar of current month
    b. Display today's date and time
    c. Display usernames those are currently logged in the system
    d. Display your name at given x, y position
    e. Display your terminal number
24. Write a shell script to read n numbers as command arguments and sort them in descending order.
25. Write a shell script to display all executable files, directories and zero sized files from current directory.
26. Write a shell script to check entered string is palindrome or not.
27. Shell programming using filters (including grep, egrep, fgrep)
28. Study of Unix Shell and Environment Variables.
29. Write a shell script to validate the entered date. (eg. Date format is : dd-mm-yyyy).
30. Write an awk program using function, which convert each word in a given text into capital.
31. Write a program for process creation using C. (Use of gcc compiler).

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3140707
Semester – IV
Subject Name: Computer Organization & Architecture

Type of course: core course

Prerequisite: None

Rationale:

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	5	70	30	30	20	150

Syllabus:

Sr. No.	Content	Total Hrs
1	Computer Data Representation Basic computer data types, Complements, Fixed point representation, Register Transfer and Micro-operations: Floating point representation, Register Transfer language, Register Transfer, Bus and Memory Transfers (Tree-State Bus Buffers, Memory Transfer), Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logical shift unit	4
2	Basic Computer Organization and Design Instruction codes, Computer registers, computer instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Input-output and interrupt, Complete computer description, Design of Basic computer, Design of Accumulator Unit.	4
3	Assembly Language Programming Introduction, Machine Language, Assembly Language Programming: Arithmetic and logic operations, looping constructs, Subroutines, I-O Programming.	8
4	Micro programmed Control Organization: Control Memory, Address sequencing, Micro program example, Design of Control Unit	4
5	Central Processing Unit Introduction, General Register Organization, Stack Organization, Instruction format, Addressing Modes, Data transfer and manipulation, Program control, Reduced Instruction Set Computer (RISC) & Complex Instruction Set Computer (CISC)	5
6	Pipeline And Vector Processing Flynn's taxonomy, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction, Pipeline, RISC Pipeline, Vector Processing, Array Processors	5
7	Computer Arithmetic Introduction, Addition and subtraction, Multiplication Algorithms (Booth Multiplication Algorithm), Division Algorithms, Floating Point Arithmetic operations, Decimal Arithmetic Unit.	4
8	Input-Output Organization Input-Output Interface, Asynchronous Data Transfer, Modes Of Transfer, Priority Interrupt, DMA, Input-Output Processor (IOP), CPUIOP Communication, Serial communication.	4
9	Memory Organization Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.	6

10	Multiprocessors Characteristics of Multiprocessors, Interconnection Structures, Inter-processor Arbitration, Inter-processor Communication and Synchronization, Cache Coherence, Shared Memory Multiprocessors.	4

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	**30**	**15**	**15**	**15**	**5**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. M. Morris Mano, "Computer System Architecture", Pearson Education
2. Yale N. Patt, Sanjay J. Patel, "Introduction to Computing Systems" McGraw Hill.
3. Hamacher, Vranesic, Zaky, "Computer Organization", McGraw Hill.
4. Andrew S. Tanenbaum and Todd Austin, "Structured Computer Organization", Pearson Education
5. N. D. Jotwani, "Computer system organization", McGraw Hill
6. R.S.Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085A", Penram International
7. Douglas Hall, Microprocessors and Interfacing, TMH.

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Identify and explain the basic structure and functional units of a digital computer.	10
CO-2	Write assembly language programs and identify the role and working of various functional units of a computer for executing an instructions.	30
CO-3	Design processing unit using the concepts of ALU and control logic design.	25
CO-4	Design circuits for interfacing memory and I/O with processor.	25
CO-5	Comprehend the features and performance parameters of different types of computer architectures.	10

List of Practical:

Sr. No.	Practical Title	CO
1	Implement Booth's Algorithm	CO-1
2	Write the working of 8085 simulator GNUsim8085 and basic architecture of 8085 along with small introduction.	CO-2, CO-6
3	Write an assembly language code in GNUsim8085 to store numbers in reverse order in memory location.	CO-5
4	Write an assembly language code in GNUsim8085 to implement arithmetic instruction	CO-2
5	Write an assembly language code in GNUsim8085 to find the factorial of a number.	CO-5
6	Write an assembly language code in GNUsim8085 to implement logical instructions.	CO-2
7	Design ALU using Logisim.	CO-6
8	Implement 16-bit single-cycle MIPS processor in Verilog HDL	CO-6

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3140708
Semester – IV
Subject Name: Discrete Mathematics

Type of course: Undergraduate

Prerequisite : Algebra, Logic

Rationale : This course introduces the basic concepts of discrete mathematics in the field of computer science. It covers sets, logic, functions, relations, graph theory and algebraic structures. These basic concepts of sets, logic functions and graph theory are applied to Boolean Algebra and logic networks, while the advanced concepts of functions and algebraic structures are applied to finite state machines and coding theory.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total
L	T	P	C	Theory Marks		Practical Marks		
				ESE(E)	PA (M)	ESE(V)	PA(I)	
3	2	0	5	70	30	0	0	100

Contents:

Sr. No.	Content	Total Hrs.	% weightage
01	**Set Theory**: Basic Concepts of Set Theory: Definitions, Inclusion, Equality of Sets, Cartesian product, The Power Set, Some operations on Sets, Venn Diagrams, Some Basic Set Identities **Functions**: Introduction & definition, Co-domain, range, image, value of a function; Examples, surjective, injective, bijective; examples; Composition of functions, examples; Inverse function, Identity map, condition of a function to be invertible, examples; Inverse of composite functions, Properties of Composition of functions; **Counting:** The Basics of Counting, The Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients, Generalized Permutations and Combinations, Generating Permutations and Combinations	06	12%
02	**Propositional Logic**: Definition, Statements & Notation, Truth Values, Connectives, Statement Formulas & Truth Tables, Well-formed Formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Examples **Predicate Logic:** Definition of Predicates; Statement functions, Variables, Quantifiers, Predicate Formulas, Free & Bound Variables; The Universe of Discourse, Examples, Valid Formulas & Equivalences, Examples	06	13%
03	**Relations**: Definition, Binary Relation, Representation, Domain, Range, Universal Relation, Void Relation, Union, Intersection, and Complement Operations on Relations, Properties of Binary Relations in a Set: Reflexive, Symmetric, Transitive, Anti-symmetric Relations, Relation Matrix and Graph of a Relation; Partition and Covering of a Set, Equivalence Relation, Equivalence Classes, Compatibility Relation, Maximum Compatibility Block, Composite Relation, Converse of a Relation, Transitive Closure of a Relation R in Set X **Partial Ordering**: Definition, Examples, Simple or Linear Ordering, Totally Ordered Set (Chain), Frequently Used Partially Ordered Relations, Representation of Partially Ordered Sets, Hesse Diagrams, Least & Greatest Members, Minimal & Maximal Members, Least Upper Bound (Supremum), Greatest Lower Bound (infimum), Well-ordered Partially Ordered Sets (Posets). Lattice as Posets, complete, distributive	10	25%

	modular and complemented lattices Boolean and pseudo Boolean lattices. (Definitions and simple examples only) **Recurrence Relation:** Introduction, Recursion, Recurrence Relation, Solving, Recurrence Relation		
04	**Algebraic Structures:** Algebraic structures with one binary operation- Semigroup, Monoid, Group, Subgroup, normal subgroup, group Permutations, Coset, homomorphic subgroups, Lagrange's theorem, Congruence relation and quotient structures. Algebraic structures (Definitions and simple examples only) with two binary operation- Ring, Integral domain and field.	**10**	**25%**
05	**Graphs:** Introduction, definition, examples; Nodes, edges, adjacent nodes, directed and undirected edge, Directed graph, undirected graph, examples; Initiating and terminating nodes, Loop (sling), Distinct edges, Parallel edges, Multi-graph, simple graph, weighted graphs, examples, Isolated nodes, Null graph; Isomorphic graphs, examples; Degree, Indegree, out-degree, total degree of a node, examples; Subgraphs: definition, examples; Converse (reversal or directional dual) of a digraph, examples; Path: Definition, Paths of a given graph, length of path, examples; Simple path (edge simple), elementary path (node simple), examples; Cycle (circuit), elementary cycle, examples; **Reachability:** Definition, geodesic, distance, examples; Properties of reachability, the triangle inequality; Reachable set of a given node, examples, Node base, examples; **Connectedness:** Definition, weakly connected, strongly connected, unilaterally connected, examples; Strong, weak, and unilateral components of a graph, examples, Applications to represent Resource allocation status of an operating system, and detection and correction of deadlocks; Matrix representation of graph: Definition, Adjacency matrix, boolean (or bit) matrix, examples; Determine number of paths of length n through Adjacency matrix, examples; Path (Reachability) matrix of a graph, examples; Warshall's algorithm to produce Path matrix, Flowchart. **Trees:** Definition, branch nodes, leaf (terminal) nodes, root, examples; Different representations of a tree, examples; Binary tree, m-ary tree, Full (or complete) binary tree, examples; Converting any m-ary tree to a binary tree, examples; Representation of a binary tree: Linked-list; Tree traversal: Pre-order, in-order, post-order traversal, examples, algorithms; Applications of List structures and graphs	**10**	**25%**

Reference Books:

1. J. P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw-Hill,1997.
2. S. Lipschutz and M. L. Lipson, Schaum's Outline of Theory and Problems of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill,1999.
3. K. H. Rosen, Discrete Mathematics and its applications, Tata McGraw-Hill, 6th Ed., 2007.
4. David Liben-Nowell, Discrete Mathematics for Computer Science, Wiley publication, July 2017.
5. Eric Gossett, Discrete Mathematics with Proof, 2nd Edition,Wiley publication, July 2009.

Suggested Specification table with Marks (Theory):					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	20	10	10	

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy).

Course Outcomes:

After Completion of this course students will be able

Sr. No.	Course Outcomes	Weightage in %
1	Understand the basic principles of sets and operations in sets and apply counting principles to determine probabilities, domain and range of a function, identify one-to- one functions, perform the composition of functions and apply the properties of functions to application problems.	12%
2	Write an argument using logical notation and determine if the argument is or is not valid. To simplify and evaluate basic logic statements including compound statements, implications, inverses, converses, and contra positives using truth tables and the properties of logic. To express a logic sentence in terms of predicates, quantifiers, and logical connectives.	13%
3	Apply relations and to determine their properties. Be familiar with recurrence relations	25%
4	Use the properties of algebraic structures.	25%
5	Interpret different traversal methods for trees and graphs. Model problems in Computer Science using graphs and trees.	25%

List of Open Source Software/learning website: NPTEL Discrete Mathematics lectures

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3140709
Semester – IV
Subject Name: PRINCIPLES OF ECONOMICS AND MANAGEMENT

Type of course: Undergraduate

Prerequisite: Linear and non-liner data structures, working experience of any one structured programming language

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Content:

Sr. No	Topics	Hrs.	Module Weightage
1.	Introduction to Economics; Definitions, Nature, Scope, Difference between Microeconomics & Macroeconomics Theory of Demand & Supply; law of demand, law of supply, equilibrium between demand & supply Elasticity; elasticity of demand, price elasticity, income elasticity, cross elasticity	5	12
2.	Theory of production; production function, meaning, factors of production (meaning & characteristics of Land, Labour, capital & entrepreneur), Law of variable proportions & law of returns to scale Cost; meaning, short run & long run cost, fixed cost, variable cost, total cost, average cost, marginal cost, opportunity cost. Break even analysis; meaning, explanation, numerical	4	12
3.	Markets; meaning, types of markets & their characteristics (Perfect Competition, Monopoly, Monopolistic Completion, Oligopoly) National Income; meaning, stock and flow concept, NI at current price, NI at constant price, GNP, GDP, NNP,NDP, Personal income, disposal income.	4	12
4.	Basic economic problems; Poverty-meaning, absolute & relative poverty, causes, measures to reduce Unemployment: meaning, types, causes, remedies Inflation; meaning, types, causes, measures to control	4	12
5.	Money; meaning, functions, types, Monetary policy- meaning, objectives, tools, fiscal policy-meaning, objectives, tools Banking; meaning, types, functions, Central Bank- RBI; its functions, concepts; CRR, bank rate, repo rate, reverse repo rate, SLR.	4	12
6.	Introduction to Management; Definitions, Nature, Management Difference between Management & administration, skill, types and roles of managers Management Principles; Scientific principles, Administrative principles, Maslow's Hierarchy of needs theory	5	12
7.	Functions of Management; Planning, Organizing, Staffing, Directing, Controlling (meaning, nature and importance) Organizational Structures; meaning, principles of organization, types-formal and informal, line, line & staff, matrix, hybrid (explanation with merits and demerits), span of control, departmentalization, chain of command, centralization and decentralisation	6	12
8.	Organisational culture of Environment concept of culture and its importance,	4	10

	attributes culture, How does culture affect managers and employees		
9.	Corporate Social Responsibility; meaning, importance Business Ethics; meaning, importance.	03	6%

Reference Books:

1. Engineering Economics, R.Paneerselvam, PHI publication
2. Fundamentals of Management: Essential Concepts and Applications, Pearson Education, Robbins S.P. and Decenzo David A.
3. Economics: Principles of Economics, N Gregory Mankiw, Cengage Learning
4. Principles and Practices of Management by L.M.Prasad
5. Principles of Management by Tripathy and Reddy
6. Modern Economic Theory, By Dr. K. K. Dewett & M. H. Navalur, S. Chand Publications

Course Outcomes:

After learning the course the students will be able to

Sr. No.	CO statements	Marks %Weightage
CO-1	Analyze how elasticity affects revenue.	25
CO-2	Relate production function and cost function.	20
CO-3	Analyze the optimal quantity and pricing decisions of firms in different market structures (perfect competition, monopoly, monopolistic competition) to achieve profit maximization.	20
CO-4	Describe the basic principles of management: planning, organizing, controlling, and directing	25
CO-5	Analyze ethical dilemmas faced by business and managers	10

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
0	0	20	55	25	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code:3143201
Semester – IV
Subject Name: Data Communication & Computer Networks

Type of course: Undergraduate

Prerequisite: Basics of analog and digital communication and computer hardware and software

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	2	5	70	30	30	20	150

Syllabus:

Sr. No.	Content	Total Hrs	% Weightage
1	**Introduction:** Data communications, networking & the Internet, Data Transmission - transmission techniques, Topologies & Transmission Media, switched networks- circuit & packet switching. Digitization. OSI model, TCP/IP protocol architecture.	6	11
2	**Signals, Analog and Digital transmission:** Analog signal, Digital Signal, Analog vs Digital, Data rate, Transmission impairments, Propagation delay, sampling, serial transmission, parallel transmission, ASK, FSK, PSK, QAM, modems	6	11
3	**Data Link Layer Protocols:** Data link layer fundamentals-error detection, error correction. Flow control- Stop & wait, Sliding Window Protocols. Error Control - Go-Back-N ARQ, Selective Reject ARQ .High level Data Link Control (HDLC)	8	14
4	**Network Layer & Transport Layer Protocols:** Routing protocols-Distance vector routing, Link state routing, Path vector Routing. Internet protocols-ICMP, IPv4& IPv6, Connection Oriented & Connectionless services-UDP, TCP	14	25
5	**LAN & MAN Protocols:** Channel Allocation, Multiple Access, LAN protocols - Ethernet, CSMA/CD, Token bus, Token ring, FDDI. MAN Protocols- IEEE 802.6(DQDB), SMDS, Frame Relay & ATM.	8	14
6	**Application Layer Protocols:** Internet Applications, Electronic Mail (SMTP, MIME) & Management, FTP, CMIP, SNMP, HTTP.	6	14
7	**Network Security:** Cryptography, Symmetric key Algorithms (DES, AES), Public key Algorithms-RSA, Digital Signatures, IPSec ,Firewall	6	11

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code:3143201

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Course Outcomes:

After learning the course the students will be able to

Sr. No.	CO statements	Marks %Weightage
CO-1	Understand the architecture of various networking technologies	
CO-2	Analyze the requirements of the organization and able to select the appropriate topology and structure of networks.	
CO-3	Have operational knowledge of managing the networks of organization.	
CO-4	Design the network for organization with better network efficiency parameters	

References:

1. Data Communication & Networking: By Behrouz A. Forouzan. Tata McGraw Hill.
2. Data & Computer Communications: By William Stallings. Prentice Hall India.
3. Communication Networks: Fundamental concepts and Key architectures: By Alberto Leon-Garcia and Indra Widjaja, McGraw Hill
4. Computer Networks: By Andrew S. Tanenbaum. Prentice Hall India.