

K.L.N. COLLEGE OF ENGINEERING

Pottapalayam, Sivagangai District

(An Autonomous Institution, Affiliated to Anna University, Chennai)



Estd: 1994

FOURTH SEMESTER CURRICULUM AND SYLLABUS REGULATIONS 2024

For Under Graduate Program

B.E. COMPUTER SCIENCE AND ENGINEERING

CHOICE BASED CREDIT SYSTEM

(For the students admitted from the academic year 2024-2025 onwards)



K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM

(An Autonomous Institution, Affiliated to Anna University, Chennai)



VISION OF THE INSTITUTION

To become a Centre of Excellence in Technical Education and Research in producing Competent and Ethical professionals to the society

MISSION OF THE INSTITUTION

To impart Value and Need based curriculum to the students with enriched skill development in the field of Engineering, Technology, Management and Entrepreneurship and to nurture their character with social concern and to pursue their career in the areas of Research and Industry.

VISION OF THE DEPARTMENT

To evolve in the field of Computer Science & Engineering through sustainable technical education with innovative research and to foster competent professionals to serve and lead the society

MISSION OF THE DEPARTMENT

- Imparting demand based proficient education through quality teaching – learning process in tune with the interdisciplinary needs of global work environment.
- Inculcating the attitude of continuous learning through industry institution interaction, consultancy and research activities.
- Cultivating professionalism, ethics and integrity of character for positive contributions to society.



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PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1: Contribute effectively to the society by applying principles of Computer Science and Engineering for analyzing the real world problems to produce optimal and sustainable technical solutions.

PEO 2: Sustain as good professionals by pursuing career / advanced studies and practice innovation in emerging technologies and current trends through lifelong learning.

PEO 3: Build professionalism, team work, effective communication, ethical values and leadership qualities.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO1. Ability to apply good analytical, design and implementation skills to formulate and solve scientific and business applications pertaining to Algorithms, Computer Systems, Networks, Security, Data Analytics and Artificial Intelligence.

PSO2. Ability to update knowledge continuously in various domains like Virtualization, Mobile Application Development, Data Visualization, Machine Learning and Technologies like Storage, Computing, Communication to meet the industry requirements



KNOWLEDGE AND ATTITUDE PROFILE

- WK1** A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.
- WK2** Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.
- WK3** A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.
- WK4** Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
- WK5** Knowledge, including efficient resource use, environmental impacts, whole-life cost, re- use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.
- WK6** Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
- WK7** Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.
- WK8** Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.
- WK9** Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.



PROGRAM OUTCOMES (POs)

PO 1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, and engineering fundamentals, and an engineering specialization as specified in WK1 to WK4, respectively, to develop solutions to complex engineering problems.

PO 2: Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems, reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences with holistic considerations for sustainable development* (WK1 to WK4).

PO3: Design/development of solutions: Design creative solutions for Complex engineering problems and design systems, components, or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon, as well as resource, cultural, societal, and environmental considerations as required (WK5).

PO 4: Investigation: Conduct investigations of complex engineering problems using research methods, including research-based knowledge, design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions (WK8).

PO 5: Tool Usage: Create, select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering problems (WK2 and WK6).

PO 6: The Engineer and the World: When solving complex engineering problems, analyze and evaluate sustainable development impacts to society, the economy, sustainability, health and safety, legal frameworks, and the environment (WK1, WK5, and WK7).

PO 7: Ethics: Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion (WK9).

PO 8: Individual and Collaborative Team work: Function effectively as an individual and as a member or leader in diverse and inclusive teams and in multidisciplinary, face- to-face, remote, and distributed settings (WK9).

PO 9: Communication: Communicate effectively and inclusively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, taking into account cultural, language, and learning differences.

PO 10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO 11: Lifelong learning: Recognize the need for and have the preparation and ability for (i) independent and life-long learning (ii) adaptability to new and emerging technologies and (iii) critical thinking in the broadest context of technological change (WK8).



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REGULATIONS 2024

For Under Graduate Program

B.E. COMPUTER SCIENCE AND ENGINEERING

CHOICE BASED CREDIT SYSTEM

CATEGORY OF COURSES

- i. **Humanities and Social Sciences (HS) Courses** include Technical English, Environmental Science and Engineering, Engineering Ethics and human values, Communication Skills and Management courses.
- ii. **Basic Sciences (BS) Courses** include Mathematics, Physics, and Chemistry.
- iii. **Engineering Sciences (ES) Courses** include Engineering Practices, Engineering physics, Basics of Electrical / Electronics / Mechanical / Computer Engineering / Instrumentation etc.
- iv. **Professional Core (PC) Courses** include the core courses relevant to the chosen programme of study.
- v. **Professional Elective (PE) Courses** include the elective courses relevant to the chosen programme of study.
- vi. **Open Elective (OE) Courses** include courses from other departments which a student can choose from the list specified in the curriculum of the students B.E. / B.Tech. Programmes.
- vii. **Employability Enhancement Courses (EEC)** include Project Work and/or Internship, Seminar, Professional Practices, Case Study and Industrial/Practical Training.
- viii. **Mandatory (MC) Courses** include Personality and Character development and the courses recommended by the regulatory bodies such as AICTE, UGC, etc



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REGULATIONS 2024
CHOICE BASED CREDIT SYSTEM
B.E. COMPUTER SCIENCE AND ENGINEERING
CURRICULUM AND SYLLABUS
SEMESTER IV

S. No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	24BS402	Probability and Statistics (Common to B.E. CSE, CSE(CS), CSE (IoT) & B.Tech IT, AI&DS programmes)	BS	4	3	1	0	4
2.	24CS304	Computer Organization and Architecture (Common to B.E. CSE, CSE (IoT) & B.Tech IT)	PC	3	3	0	0	3
3.	24CS401	Database Management Systems (Common to B.E. CSE, CSE(CS), CSE (IoT) & B.Tech IT, AI&DS programmes)	PC	3	3	0	0	3
4.	24CS402	Design and Analysis of Algorithms	PC	3	3	0	0	3
5.	24CS403	Computer Networks (Common to B.E. CSE, CSE(CS) & B.Tech IT, AI&DS programmes)	PC	3	3	0	0	3
THEORY CUM PRACTICAL								
6.	24CS404	Operating Systems (Common to B.E. CSE, CSE(CS)), CSE (IoT) and B.Tech IT Programmes)	PC	5	3	0	2	4
PRACTICAL								
7.	24CS4L1	Database Management Systems Laboratory (Common to B.E. CSE, CSE(CS), CSE (IoT) & B.Tech IT, AI&DS programmes)	PC	3	0	0	3	1.5
8.	24CS4L2	Computer Networks Laboratory (Common to B.E. CSE, CSE(CS), programmes)	PC	3	0	0	3	1.5
9.	24HS4L1	Aptitude and Soft Skills – III (Common to all B.E. / B.Tech programmes)	EEC	2	0	0	2	1 [#]
TOTAL				29	18	1	10	23

[#]The grades earned by the students will be recorded in the mark sheet, however the same shall not be Considered for the computation of CGPA

24BS402	PROBABILITY AND STATISTICS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- This course aims at providing the required skill to apply the statistical tools in engineering problems.
- To introduce the basic concepts of probability and random variables of one and two
- To acquaint the knowledge of testing of hypothesis for small and large samples and to introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control

UNIT - I PROBABILITY AND RANDOM VARIABLES 9+3

Probability–Discrete and continuous random variables –Moments–Moment generating functions– Binomial, Poisson, Uniform, Exponential and Normal distributions (Except derivations).

UNIT - II TWO-DIMENSIONAL RANDOM VARIABLES 9+3

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression –Transformation of random variables–Central limit theorem (for independent and identically distributed random variables).

UNIT - III TESTING OF HYPOTHESIS 9+3

Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean and difference of means-Tests based on t,Chi-square and F distributions for mean, variance and proportion-Contingency table (test for independence)-Goodness of fit.

UNIT - IV DESIGN OF EXPERIMENTS 9+3

One way and Two way classifications – Completely randomized design–Randomized block design–Latin square design-2² factorial design.

UNIT - V STATISTICAL QUALITY CONTROL 9+3

Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts)–Tolerance limits-Acceptance sampling.

TOTAL: 45+15 PERIODS**TEXT BOOKS:**

1. Johnson.R.A.,Miller ,I and Freund J.,"Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia,8th Edition, 2015.
2. Veerarajan.T.,"Probability, Statistics and Random Processes", Tata Mc Graw Hill, New Delhi, 2006.

REFERENCES:

1. Papoulis.A. and Unnikrishnapillai.S., "Probability, Random Variables and Stochastic Processes", McGraw Hill Education India, New Delhi, 4thEdition, 2002.
2. Spiegel.M.R.,Schiller.J and Srinivasan.R.A.,"Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGrawHill,3rdEdition,2004.
3. Walpole.R.E.,Myers.R.H.,Myers.S.L. and Ye.K., "Probability and Statistics for Engineers and Scientists",Pearson Education,Asia,8thEdition,2011
4. Gupta.S.C., Kapoor.V.K., "Fundamental of Mathematical Statistics", Sultanch and & Sons Educational Publishers, New Delhi, Reprint 2013.
5. Kandasamy.P.,Thilagvathi. K.,Gunavathi.K., "Probability Random Variables& Random Processes",S.Chand&Co.Ltd.,Reprint2008.

OUTCOMES:**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

Course Name : PROBABILITY AND STATISTICS		Course Code : 24BS402	
CO	Course Outcomes	Unit	K –CO
C208.1	Build the parameters of statistical distributions using basic probability theory concepts.	I	K3
C208.2	Calculate the statistical measures for two dimensional random variables.	II	K3
C208.3	Apply the concepts of testing of hypothesis for large and small samples.	III	K3
C208.4	Apply the basic concepts of design of experiments in the field of agriculture.	IV	K3
C208.5	Use control charts for quality control problems.	V	K3


HoD/CSE

TEXT BOOKS:

1. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.

REFERENCES:

1. John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.
2. John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill, 2012.
3. William Stallings, Computer Organization and Architecture – Designing for Performance, Eighth Edition, Pearson Education, 2010.
4. Learning Computer Architecture using Raspberry pi – Eben Upton, Jeffrey Duntemann 2016 (1st Edition)

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name : COMPUTER ORGANIZATION AND ARCHITECTURE		Course Code : 24CS304	
CO	Course Outcomes	Unit	K –CO
C402.1	Explain the computer organization components, instructions and addressing modes.	I	K2
C402.2	Compute the arithmetic operations such as Addition, Subtraction, Multiplication and Division.	II	K3
C402.3	Discuss the basics of MIPS implementation and pipelining.	III	K2
C402.4	Illustrate the basic concepts of parallelism and multi-core processor.	IV	K2
C402.5	Utilize Raspberry-pi for demonstrating memory systems.	V	K3

HoD/CSE

24CS401

DATABASE MANAGEMENT SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn the fundamentals of data models and to depict a database system using ER Diagrams
- To study relational database model and to write SQL queries for store/retrieve database
- To understand Normalization technique to improve the performance data base design
- To understand the concepts of Transaction processing, concurrency control techniques and recovery procedures for real time applications.
- To understand working procedures of query processing and internal storage structures using different file and indexing techniques which will help in physical DB design

UNIT - I DATABASE FUNDAMENTALS 9

Purpose of Database System – Views of data – Data abstraction and data independence- Instances and schemas- Database System Architecture – Difference between File system and DBMS, Compare Centralized vs Distributed database, Data Models –Constraints- Keys with its types, Entity Relationship Model: Entity Sets – Relationship sets-Types of mapping constraints-Attributes–Relationships in ER diagram- E-R design issues– Extended ER features: Generalization, Specialization and Aggregation in ER model

UNIT - II RELATIONAL DATABASE 9

Relational Algebra: Relational operators- Joins - Relational Calculus: Tuple relational calculus and Domain relational calculus, SQL: Types of commands- set operations, Constraints- Aggregate Functions- Clauses– operators, Subqueries: Correlated and Nested Subqueries – Joins – Views – Authorization – Advanced SQL – Triggers – Cursors – Procedure – Functions – Embedded SQL – Dynamic SQL

UNIT - III RELATIONAL DATABASE DESIGN 9

Need for Database Design – Functional Dependencies – Closure of Functional Dependencies – Canonical Cover – Armstrong Axioms - Problem of Redundancy in database-Lossless join and Dependency Preserving decomposition, Normalization: First Normal Form– Second Normal Form – Third Normal Form –Boyce Code Normal Form – Fourth Normal Form – Fifth Normal Form

UNIT - IV TRANSACTIONS AND CONCURRENCY CONTROL 9

Transaction: ACID properties and their necessity – Transaction States – Schedule and conflict: Types of schedules–Conflict Serializable schedule–View Serializable schedule–Conflict equivalent schedule-Recoverability in DBMS: Recoverable and Irrecoverable Schedule- Cascading rollback, Cascade less and strict schedule, Equivalence of schedule, Concurrency Control: Lock Based Protocols–Time stamp based Protocols –Validation Based Protocols - Deadlock handling

UNIT - V STORAGE AND QUERY PROCESSING 9

File Organization – RAID- Indexing and Hashing: Ordered Indices – Static Hashing – Dynamic Hashing, Comparison of Ordered indexing and Hashing, B+ tree Index Files, Query Processing – Measures of Query cost, Algorithms for SELECT and JOIN operations – Evaluation of expressions.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan — Database System Concepts, Seventh Edition, Tata McGraw Hill, 2019.
2. Ramez Elmasri, Shamkant B. Navathe — Fundamentals of Database Systems, Seventh Edition, Pearson Education, 2016.

REFERENCES:

1. Raghu Ramakrishnan — Database Management Systems, Fourth Edition, McGraw-Hill College Publications, 2015.
2. C.J.Date, A.Kannan, S.Swamynathan -An Introduction to Database Systems, Eighth Edition, Pearson Education, 2006

OUTCOMES:**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

Course Name : DATABASE MANAGEMENT SYSTEMS		Course Code : 24CS401	
CO	Course Outcomes	Unit	K –CO
C403.1	Illustrate the fundamental elements of relational database management systems and also ability to design the database using	I	K3
C403.2	Apply SQL queries to interact with database.	II	K3
C403.3	Apply normalization to design the database efficiently through elimination of anomalies	III	K3
C403.4	Analyze database transactions and can control them by applying ACID properties and also Summarize concurrency control protocols.	IV	K3
C403.5	Illustrate database storage structures and access techniques: file organization, indexing methods including B+ tree and hashing.	V	K3



HoD/CSE

24CS402	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
		3	0	0	3

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.

UNIT - I INTRODUCTION 9

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithmic Efficiency –Asymptotic Notations and their properties. Analysis Framework – Empirical analysis - Mathematical analysis for Recursive and Non-recursive algorithms - Visualization

UNIT - II BRUTE FORCE AND DIVIDE-AND-CONQUER 9

Brute Force – String Matching - Closest-Pair and Convex-Hull Problems - Exhaustive Search - Travelling Salesman Problem - Knapsack Problem - Assignment problem. Divide and Conquer Methodology – Binary Search – Finding the Maximum and Minimum-Merge sort – Quick sort.

UNIT - III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE 9

Dynamic programming – Principle of optimality – Multi stage graph - Optimal Binary Search Trees – Floyd’s algorithm –The Travelling Salesperson Problem. Greedy Technique - Prim’s algorithm and Kruskal's Algorithm – Knapsack problem-Optimal Merge pattern - Huffman Trees.

UNIT - IV ITERATIVE IMPROVEMENT 9

The Simplex Method - The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs-The Stable marriage Problem.

UNIT - V COPING WITH THE LIMITATIONS OF ALGORITHM POWER 9

Lower - Bound Arguments - P, NP NP- Complete and NP Hard Problems. Backtracking – n-Queen problem - Hamiltonian Circuit Problem – Subset- Sum Problem. Branch and Bound – Assignment problem – Knapsack Problem – Travelling Salesman Problem - Approximation Algorithms for NP-Hard Problems – Travelling Salesman problem – Knapsack problem.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Third Edition, Pearson Education, 2017.
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran “Computer Algorithms/C++” Orient Blackswan, 2nd Edition, 2019

REFERENCES:

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data Structures and

Algorithms”, Pearson Education, Reprint 2006.

3. Harsh Bhasin, “Algorithms Design and Analysis”, Oxford university press, 2016.
4. S. Sridhar, “Design and Analysis of Algorithms”, Oxford university press, 2014.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name : DESIGN AND ANALYSIS OF ALGORITHMS		Course Code : 24CS402	
CO	Course Outcomes	Unit	K –CO
C404.1	Identify the efficiency of algorithms using various frameworks.	I	K3
C404.2	Make use of algorithm design techniques like Brute Force and divide and conquer to solve problems.	II	K3
C404.3	Apply dynamic programming and greedy techniques to solve various problems.	III	K3
C404.4	Make use of iterative improvement algorithms for solving various optimization problems.	IV	K3
C404.5	Apply Backtracking, Branch and Bound design technique and approximation algorithms to solve NP-Hard Problems.	V	K3



HoD/CSE

24CS403	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To understand the concept of layering and functions of each layers of the protocol suits
- To be familiar with the components required to build different types of networks
- To learn concepts related to network addressing and routing
- To familiarize the functions and protocols of the layer of Transport layer
- To understand the working of various application layer protocols

UNIT - I INTRODUCTION TO NETWORKS 8

Network Introduction: Evolution of Computer Networks, Classification of computer Networks LAN, WAN, MAN, Software Defined Networks (SDN), Network Topology: BUS, STAR, RING, MESH, OSI Layered Architecture, TCP/IP Protocol Suite.

UNIT - II MEDIA ACCESS & INTER NETWORKING 12

Medium Access Control Techniques: Random, Round Robin, Reservation: ALOHA Pure and Slotted, CSMA/CD-CSMA/CA- Ethernet-Token Ring-Token Bus-ARQ 3 Types, Data Link Layer design issues: Error Detection Codes, Parity Check, Checksum Error Correction Codes, Hamming codes, IEEE Standards: Bluetooth (802.15), Basic Internetworking: IP - CIDR - ARP -DHCP - ICMP.

UNIT - III NETWORK DEVICES AND NETWORK LAYER 8

Network Devices: Router, Switch, HUB, Bridge, Routing: Static Routing, Dynamic Routing, Categories of Routing – RIP v1 and RIP v2- IPV4 Addressing - IPV6 Addressing

UNIT - IV TRANSPORT LAYER 9

Overview of Transport layer: UDP - Reliable byte stream (TCP), Connection Management: Flow control – Retransmission – TCP Congestion control, Congestion avoidance

UNIT - V APPLICATION LAYER 8

Traditional applications: SSH – HTTP – FTP –DNS – SNMP - Telnet

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.

REFERENCES:

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
2. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
3. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An OpenSource Approach, McGraw Hill Publisher, 2011.
4. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.

OUTCOMES:**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

Course Name : COMPUTER NETWORKS		Course Code : 24CS403	
CO	Course Outcomes	Unit	K –CO
C405.1	Identify the different types of computer networks and their layered architectures to determine suitable networking solutions.	I	K3
C405.2	Analyze various MAC techniques and apply link-layer error-handling methods in communication scenarios.	II	K4
C405.3	Apply routing concepts to evaluate the functioning of network devices and analyze IPv4/IPv6 addressing schemes	III	K4
C405.4	Generalize the transport-layer mechanisms by applying TCP/UDP concepts to real-time data transmission problems	IV	K4
C405.5	Illustrate application-layer protocols to analyze how common network services enable end-to-end communication.	V	K4


HoD/CSE

24CS404	OPERATING SYSTEMS	L	T	P	C
		3	0	2	4

OBJECTIVES:

- To understand the basic concepts and functions of operating systems.
- To understand Processes, Threads and Scheduling algorithms.
- To understand the concept of Deadlocks.
- To analyze various memory and I/O management schemes.
- To study various operating systems like Distributed OS, Real-Time OS, Virtual machine and basic concepts of virtualization.

UNIT-I OPERATING SYSTEM OVERVIEW 6

Operating System Overview - Objectives and Functions, Evolution of Operating Systems, Operating System Structure and Operations- System Calls, System Programs, Operating Systems Generation and System Boot.

LAB COMPONENT 6

- Basic Linux Commands and Overview
- Write Shell Script to experiment with system calls like fork, grep, pipe, open, create read, write, etc.

UNIT-II PROCESS MANAGEMENT AND CONCURRENCY CONTROL 10

Processes - Process Concept and Scheduling, Operations on Processes, Inter Process Communication - CPU Scheduling - Scheduling criteria, Scheduling algorithms; Threads- Overview, Multithreading models, Threading issues - Process Synchronization - The critical-section problem, Mutex locks, Semaphores, Classic problems of synchronization, critical region, Monitors.

LAB COMPONENT 6

- Implementation of FCFS, SJF, Round Robin, Priority Scheduling Algorithms and analyzing their performance
- Implement semaphore for solving producer-consumer problem using threads.

UNIT - III DEADLOCK AND STORAGE MANAGEMENT 10

Deadlock - System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock; Main Memory - Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation; Virtual Memory - Background, Demand Paging, Page Replacement, Allocation, Thrashing - Allocating Kernel Memory.

LAB COMPONENT 6

- Simulate situations for testing Deadlock avoidance algorithm.
- Implementation Of FIFO, LRU, Optimal Page Replacement Algorithms

UNIT - IV MASS STORAGE AND FILE SYSTEMS 10

Overview of Mass Storage System and Structure- Disk Structure, Disk Scheduling and Management Swap space management; File-System-Interface- File concept, Access methods, File Sharing and Protection, Allocation Methods, Free Space Management; Directory- Structure, organization, implementation.

LAB COMPONENT 6

- Implementation of Directory organizations like - single, two-level, hierarchy
- Implementation of Allocation methods used for files like - sequential, indexed, linked

UNIT - V ADVANCED OPERATING SYSTEMS AND VIRTUALIZATION 9

Basics of Network Operating System, Server Operating System, Real Time Operating System and Distributed Operating Systems - Virtual Machines - Types and Structure - virtualization - Types, Techniques and Application - supporting multiple operating systems simultaneously on a single hardware platform; Running one operating system on top of another.

LAB COMPONENT

6

- Case Study to Learn Virtualization platforms - VM Ware, etc.
- Installation of Raspbian OS in Raspberry pi and execute OS services using simple C programs

TOTAL: 45+30 PERIODS

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, - Operating System Concepts, 10th Edition, John Wiley and Sons Inc., 2018.
2. William Stallings, "Operating Systems - Internals and Design Principles", 9th Edition, Prentice Hall, 2018.

REFERENCES:

1. Andrew S. Tanenbaum, "Modern Operating Systems", Fifth Edition, Pearson Publications, 2022.
2. Achyut S. Godbole, Atul Kahate, - Operating Systems II, McGraw Hill Education, 2016.
3. Ramaz Elmasri, A. Gil Carrick, David Levine, - Operating Systems - A Spiral Approach, Tata McGraw Hill Edition, 2010.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name : OPERATING SYSTEMS		Course Code : 24CS404	
CO	Course Outcomes	Unit	K -CO
C406.1	Explain the basic functions, structure and operations of Operating System.	I	K2
C406.2	Analyze process synchronization methods and performance of CPU scheduling algorithms like FCFS, SJF, Priority and Round Robin.	II	K4
C406.3	Apply the concept of deadlock avoidance and memory management schemes using paging and segmentation.	III	K3
C406.4	Generalize the concepts of mass storage systems, various file allocation methods and directory structures.	IV	K3
C406.5	Classify different operating systems based on application requirements and utilize virtualization platform to build virtual machines.	V	K3

HoD/CSE

24CS4L1 DATABASE MANAGEMENT SYSTEMS LABORATORY

L	T	P	C
0	0	3	1.5

OBJECTIVES:

- To write and debug Database commands.
- To implement advanced query in Database tool.
- To use functions and procedures for implementing simple logics in Database.
- To design real time applications using front end tool and Database.
- To implement Database connectivity for real time application.

LIST OF EXPERIMENTS

1. Implementation of Data Definition and Data Manipulation Language Commands of SQL with suitable examples.
2. Implementation of Data Control and Transaction Control Language Commands of SQL with suitable examples.
3. Implementation of Aggregate Functions and Set Operations with suitable examples.
4. Implementation of different types of constraints and Group by, Order by, Having clause with suitable examples
5. Implementation of different types of Joins with suitable examples.
6. Implementation of Nested Sub queries and Views.
7. Study of PL/SQL programs
8. PL/SQL - procedures
9. PL/SQL - Functions
10. PL/SQL – Triggers and Cursor
11. Front end application development – Create Forms, Menu and Reports.
12. Implementation of Database Connectivity


PLATFORM NEEDED: Oracle/Mysql/Visual Basics/Netbeans IDE

TOTAL: 45 PERIODS

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name : DATABASE MANAGEMENT SYSTEMS LABORATORY		Course Code : 24CS4L1	
CO	Course Outcomes	Exp.No	K –CO
C407.1	Develop simple Database using DDL, DML and TCL commands.	1,2	K3
C407.2	Create Relational Database for real time application through Database constraints.	3,4	K3
C407.3	Write and execute nested sub queries and join queries with privileges.	5,6	K3
C407.4	Develop PL/SQL programs using Procedure, Functions, Triggers and Cursor.	7-10	K3
C407.5	Design real time applications with Database Connectivity.	11,12	K3


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24CS4L2

COMPUTER NETWORKS LABORATORY

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OBJECTIVES:

- To learn and use network commands.
- To learn socket programming.
- To implement and analyze various network protocols.
- To implement various applications using sockets.

LIST OF EXPERIMENTS

1. Study of Network Devices
2. Identify the IP address of a workstation and the class of the address and configure the IP Address on a workstation.
3. Learn to use commands like TCP dump, netstat, ifconfig, nslookup and traceroute. Capture ping and trace route PDUs using a network protocol analyzer and examine
4. Configure a Network topology using packet tracer software
5. Write a code simulating ARP /RARP protocols
6. Configure Network using Link State Vector Routing protocol & Distance Vector Routing protocol.
7. Echo client and server Applications using TCP sockets
8. Chat Applications using UDP sockets
9. File Transfer Applications using TCP sockets
10. Simulation of DNS using UDP sockets.

TOTAL: 45 PERIODS

LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS:

1. Windows 7 or higher
2. C / C++ / Java / Python / Equivalent Compiler
3. Network simulator Cisco Packet Tracer/GNS3

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name : COMPUTER NETWORKS LABORATORY		Course Code : 24CS4L2	
CO	Course Outcomes	Exp.No	K –CO
C408.1	Demonstrate the configuration of network devices and IP addressing in basic networking scenarios.	1,2	K3
C408.2	Use network diagnostic commands and tools to examine, capture, and interpret protocol operations.	3	K3
C408.3	Demonstrate network topologies and protocol behaviors using simulation tools such as Packet Tracer.	4	K3
C408.4	Make use of routing and address-resolution protocols (ARP, RARP, LS, DV) to validate network connectivity and routing decisions.	5,6	K3
C408.5	Develop client–server network applications using TCP and UDP socket programming.	7-10	K3

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