MATS UNIVERSITY

SCHOOL OF ENGINEERING AND INFORMATION TECHNOLOGY

Department of Computer Science and Engineering

Syllabus

For

(Two-Year Full-Time Degree Programme)

Master of Technology (M .Tech.)

Computer Science and Engineering

(2025-2027)

(Semester Based Course)

SEMESTER - I

S. No.	Code	Subject	Periods per week			Scheme of marks		Total Credit
			L	T	P	ESE	IM	
1.	MTDSCBSC100	Research Methodology and IPR	3	-	-	70	30	3
2.	MTDSCCSE120	Mobile Communication	3	-	-	70	30	4
3.	MTDSCCSE121	Advanced Computer Architecture	3	-	-	70	30	4
4.	MTDSCCSE122	Data Structures and Algorithms	3	-	-	70	30	3
5.	MTDSCCSE123	Computer Network and Management	3	-	-	70	30	3
6.	MTDSCCSE124	Data Structures Lab	-	-	2	30	20	2
7.	MTDSCCSE125	Networking Lab	-	-	2	30	20	2
Total			**15**	**-**	**4**	**410**	**190**	**21**

L – Lecture,
T – Tutorial,
P – Practical,
ESE – End Semester Examination,
IM – Internal Marks (Include Class Test & Teacher's Assessments)

Semester	I	**Lecture**	48
Branch	M. Tech. CSE	**Tutorial**	00
Subject Name	Research Methodology and IPR	**Practical**	00
Subject Code	MTDSCBSC100	**Credit**	03

Unit 1: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations.

Unit 2: Effective literature studies approaches, analysis Plagiarism, Research ethics,

Unit 3: Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

Unit 4: Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit 5: Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

Unit 6: New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

References:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall, "Industrial Design", McGraw Hill, 1992.
6. Niebel, "Product Design", McGraw Hill, 1974.
7. Asimov, "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property
9. in New Technological Age", 2016.
10. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

Course Outcomes:

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

1. Understand research problem formulation.
2. Analyze research related information
3. Follow research ethics
4. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
5. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
6. Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

Semester	I	Lecture	48
Branch	M. Tech. CSE	Tutorial	00
Subject Name	Mobile Communication	Practical	00
Subject Code	MTDSCCSE120	Credit	04

Course Objective:

1. To familiar with the fundamentals of Mobile Communication Systems.
2. To learn how to choose mobile communication system according to the complexity, installation cost, speed of transmission, channel properties etc.
3. To identify the requirements of mobile communication as compared to static communication
4. As a prerequisite for the course in Wireless Systems.

UNIT – I WIRELESS COMMUNICATION FUNDAMENTALS

Introduction, Wireless transmission, Frequencies for radio transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulations, Spread spectrum, MAC, Cellular Wireless Networks.

UNIT – II TELECOMMUNICATION SYSTEMS

GSM, System Architecture, Protocols, Connection Establishment, Frequency Allocation, Routing, Handover, Security, GPRS.

UNIT – III WIRELESS NETWORKS

Wireless LAN, IEEE 802.11 Standards, Architecture, Services, HIPERLAN, Adhoc Network, Blue Tooth, Future Wireless Network, Case study on 4G, Architecture of Wireless Network, Wireless ATM.

UNIT – IV NETWORK LAYER

Mobile IP, Dynamic Host Configuration Protocol, Routing Protocols.

UNIT – V TRANSPORT AND APPLICATION LAYERS

TCP over Wireless Networks, Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/Fast Recovery, Transmission/Timeout Freezing, Selective Retransmission, Transaction Oriented TCP, WAP, WAP Architecture, WDP, WTLS, WTP, WSP, WML, WML Script, WAE, WTA.

Text Books:

1. Mobile Communications, Jochen Schiller, Second Edition, Pearson Education, 2003.
2. Wireless Communications and Networks, William Stallings, Pearson Education, 2002.

Reference Books:

1. Principles of Wireless Networks, Kaveh Pahlavan, Prasanth Krishnamoorthy, First Edition, Pearson Education, 2003.
2. Principles of Mobile Computing, Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, Springer, 2003.
3. AdHoc Mobile Wireless Networks, C.K.Toh, First Edition, Pearson Education, 2002.
4. Pervasive Computing, Burkhardt, First Edition, Pearson Education, 2003.

Course Outcome:

After completion of the course study, students will be able

1. To explain fundamentals of mobile communication systems.
2. To choose mobile communication system according to the complexity, installation cost, speed of transmission, channel properties etc.
3. To identify the requirements of mobile communication as compared to static communication.

Semester	I	**Lecture**	48
Branch	M. Tech. CSE	**Tutorial**	00
Subject Name	Advanced Computer Architecture	**Practical**	00
Subject Code	MTDSCCSE121	**Credit**	04

Course Objective:

1. To endow with in detail coverage of current and budding trends in computer architectures, focusing on performance and the hardware/software interface.
2. To analyze basic issues in architecture design and their impact on application performance.

UNIT – I FUNDAMENTALS OF COMPUTER DESIGN AND PIPELINING

Fundamentals of Computer Design, Measuring and reporting performance, Quantitative principles of computer design, Instruction set principles, Classifying ISA, Design issues, Pipelining, Basic concepts, Hazards, Implementation, Multicycle operations.

UNIT – II INSTRUCTION LEVEL PARALLELISM WITH DYNAMIC APPROACHES

Concepts, Dynamic Scheduling, Dynamic hardware prediction, Multiple issue, Hardware based speculation, Limitations of ILP, Case studies.

UNIT – III INSTRUCTION LEVEL PARALLELISM WITH SOFTWARE APPROACHES

Compiler techniques for exposing ILP, Static branch prediction, VLIW, Advanced compiler support, Hardware support for exposing more parallelism, Hardware versus software speculation mechanisms, Case studies.

UNIT – IV MULTIPROCESSORS AND MULTICORE ARCHITECTURES

Symmetric and distributed shared memory architectures, Performance issues, Synchronization issues, Models of memory consistency, Software and hardware multithreading, SMT and CMP architectures, Design issues, Case studies.

UNIT – V MEMORY AND I/O

Cache performance, Reducing cache miss penalty and miss rate, Reducing hit time, Main memory and performance, Memory technology, Types of storage devices, Buses, RAID –Reliability, availability and dependability, I/O performance measures, Designing an I/O system.

Text/Reference Books:

1. Computer Architecture, A Quantitative Aapproach, John L. Hennessey and David A. Patterson, Morgan Kaufmann / Elsevier, 4th Edition, 2007.
2. Parallel Computing Architecture: A Hardware/ Software Approach, David E. Culler, Jaswinder Pal Singh, Morgan Kaufmann / Elsevier, 1997.
3. Computer Organization and Architecture–Designing for Performance, William Stallings, Pearson Education, Seventh Edition, 2006.
4. Computer Architecture, Behrooz Parhami, Oxford University Press, 2006.

Course Outcome:

After completion of the course study, students will be able

1. Confer the organization of computer-based systems and how a range of design choices are inclined by applications.
2. Differentiate diverse processor architectures and system-level design processes.
3. Recognize the components and operation of a memory hierarchy and the series of performance issues influencing its design.
4. Recognize the organization and operation of modern generation parallel computer systems, including multiprocessor and multi core systems.
5. Recognize the ethics of I/O in computer systems, counting feasible mechanisms for I/O and secondary storage organization.

Semester	I	**Lecture**	48
Branch	M. Tech. CSE	**Tutorial**	00
Subject Name	Data Structures and Algorithms	**Practical**	00
Subject Code	MTDSCCSE122	**Credit**	03

Course Objective:

1. To understand the data organization and basic concepts of data structure.
2. To study the classifications of data structures.
3. To study the memory representation of all types of data structures.
4. To implement the all kinds of data structures.

UNIT – I COMPLEXITY ANALYSIS & ELEMENTARY DATA STRUCTURES

Asymptotic notations, Properties of big oh notation, asymptotic notation with several parameters, conditional asymptotic notation, amortized analysis, NP, completeness, NP hard– recurrence equations, solving recurrence equations, arrays, linked lists, trees.

UNIT – II HEAP STRUCTURES

Min-Max heaps, Deaps, Leftist heaps, Binomial heaps, Fibonacci heaps, Skew heaps, Lazy-binomial heaps.

UNIT – III SEARCH STRUCTURES

Binary search trees, AVL trees, 2-3 trees, 2-3-4 trees, Red, black trees, B trees, splay trees, Tries.

UNIT – IV GREEDY & DIVIDE AND CONQUER

Quicksort, Strassen's matrix multiplication, Convex hull, Tree-vertex splitting, Job sequencing with deadlines, Optimal storage on tapes.

UNIT – V DYNAMIC PROGRAMMING AND BACKTRACKING

Multistage graphs,0/1 knapsack using dynamic programming, Flow shop scheduling,8,queens problem, graph coloring, knapsack using backtracking

Text/Reference Books:

1. Fundamentals of Data structures in C++, E. Horowitz, S. Sahni and Dinesh Mehta, Galgotia, 1999.
2. Computer Algorithms / C++, E. Horowitz, S.Sahni and S. Rajasekaran, Galgotia, 1999.
3. Data Structures and algorithms in C++, Adam Drozdex, Second Edition, Thomson learning–vikas publishing house, 2001.
4. Algorithmics: Theory and Practice, G. Brassard and P. Bratley, Printice –Hall, 1988.
5. Introduction to Algorithms,Thomas H.Corman, Charles E.Leiserson, Ronald L. Rivest, Second Edition, PHI 2003.

Course Outcome:

After completion of the course study, students will be able to

1. Have a comprehensive knowledge of the data structures and algorithms.
2. Understand the importance of data and identify the data requirements for an application.
3. Have in depth understanding and practical experience of algorithmic design and implementation.
4. Understand the issues involved in algorithm complexity and performance.

Semester	I	**Lecture**	48
Branch	M. Tech. CSE	**Tutorial**	00
Subject Name	Computer Network and Management	**Practical**	00
Subject Code	MTDSCCSE123	**Credit**	03

Course Objective:

1. Provide students with an improved foundation of knowledge in current and reflective practice necessary to hold up a career in indulging the different protocols, software, and network architectures.
2. Understanding theory of local area networks, their topologies, protocols and applications.
3. Computer networking at sophisticated professional level.

UNIT – I HIGH SPEED NETWORKS

Frame Relay Networks, Asynchronous transfer mode, ATM Protocol Architecture, ATM logical Connection, ATM Cell, ATM Service Categories–AAL, High Speed LAN's: Fast Ethernet, Gigabit Ethernet, Fiber Channel, Wireless LAN's.

UNIT – II CONGESTION AND TRAFFIC MANAGEMENT

Queuing Analysis, Queuing Models, Single Server Queues, Effects of Congestion, Congestion Control, Traffic Management, Congestion Control in Packet Switching Networks, Frame Relay Congestion Control.

UNIT – III TCP AND ATM CONGESTION CONTROL

TCP Flow control, TCP Congestion Control, Retransmission, Timer Management, Exponential RTO back off, KARN's Algorithm, Window management, Performance of TCP over ATM. Traffic and Congestion control in ATM, Requirements, Attributes, Traffic Management Frame work, Traffic Control, ABR traffic Management, ABR rate control, RM cell formats, ABR Capacity allocations, GFR traffic management.

UNIT – IV INTEGRATED AND DIFFERENTIATED SERVICES

Integrated Services Architecture, Approach, Components, Services, Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ, Random Early Detection, Differentiated Services.

UNIT – V PROTOCOLS FOR QoS SUPPORT

RSVP, Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms, Multiprotocol Label Switching, Operations, Label Stacking, Protocol details, RTP, Protocol Architecture, Data Transfer Protocol, RTCP.

Text Books:

1. High Speed Networks And Internet, William Stallings, Pearson Education, Second Edition, 2002.

Reference Books:

1. High Performance Communication Networks, Warland & Pravin Varaiya, Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
2. MPLS and VPN architecture, Irvan Pepelnjk, Jim Guichard and Jeff Apcar, Cisco Press, Volume 1 and 2, 2003.

Course Outcome:

After completion of the course study, students will be able to

1. To classify and relate vital theorems and formulae for the information-theoretic basis of communication and the performance of TCP/IP network protocols.
2. Depict the basis and organization of conceptually layered Network protocol model.

Semester	I	Lecture	00
Branch	M. Tech. CSE	Tutorial	00
Subject Name	Data Structures Lab	Practical	28
Subject Code	MTDSCCSE124	Credit	02

1. Write C/C++ programs to implement the following using an array.
    a) Stack ADT
    b) Queue ADT
2. Write a C/C++ program to perform Min Heap.
3. Write a C/C++ program to perform Min Deaps.
4. Write a C/C++ program to perform the following operations:
    a) Insert an element into a binary search tree.
    b) Delete an element from a binary search tree.
    c) Search for a key element in a binary search tree.
5. Write a C/C++ program to perform the following operations on B,Trees:
    a) Insertion
    b) Deletion
6. Write a C/C++ program to perform the following operations on AVL,Trees:
    a) Insertion
    b) Deletion
7. Write a C/C++ program to perform Tries.
8. Write a C/C++ program for sorting a given list of elements in ascending order using Quick sort method.
9. Write a C/C++ program to implement convex hull
10. Write a C/C++ program to perform 0/1 Knapsack using Dynamic Programming.
11. Write a C/C++ program to perform Graph coloring using backtracking.
12. Consider the problem of eight queens on an (8x8) chessboard. Two queens are said to attack each other if they are on the same row, column, or diagonal. Write a C++ program that implements backtracking algorithm to solve the problem i.e. place eight non-attacking queens on the board.

Semester	I	**Lecture**	00
Branch	M. Tech. CSE	**Tutorial**	00
Subject Name	Networking Lab	**Practical**	28
Subject Code	MTDSCCSE125	**Credit**	02

1. WAP for implementation of Socket Programming Concepts.
2. WAP to implement TCP Sockets
3. WAP to implement UDP Sockets
4. WAP for implementation of Socket Applications.
5. WAP for Simulation of Sliding Window Protocol.
6. WAP for Simulation of Routing Protocols.
7. WAP for development of applications such as DNS/ HTTP/ E-mail/ Multi-user Chat.
8. WAP for simulation of Network Management Protocols.
9. Study of Network Simulator Packages-such as OPNET, NS-2 etc.

SEMESTER - II

S. No.	Code	Subject	Periods per week			Scheme of marks		Total Credit
			L	T	P	ESE	IM	
1	MTDSCCSE220	Advanced Database System	3	-	-	70	30	3
2	MTDSCCSE221	Advanced Operating System	3	-	-	70	30	4
3	MTDSCCSE222	Network Security	3	-	-	70	30	4
4	MTDSCCSE223	Cloud Computing	3	-	-	70	30	3
5	MTPDSCCSE2XX	Professional Elective - I	3	-	-	70	30	3
6	MTDSCCSE224	Operating System Lab	-	-	2	30	20	2
7	MTDSCCSE225	Advanced DBMS Lab	-	-	2	30	20	2
Total			**15**	**-**	**4**	**410**	**190**	**21**

L – Lecture,
T – Tutorial,
P – Practical,
ESE – End Semester Examination,
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Semester	II	**Lecture**	60
Branch	M.Tech. CSE	**Tutorial**	00
Subject Name	Advanced Database System	**Practical**	00
Subject Code	MTDSCCSE220	**Credit**	04

Course Objective:

1. To discuss the requirements for advanced database features in database applications.
2. To study the concept of Distributed Database and Object Oriented Database.
3. To understand the enhanced data models for advanced applications of DBMS.
4. To examine the concepts of various emerging database technologies.

UNIT – I INTRODUCTION

DBMS Concept introduction, Data Models, E-R diagram, Keys, Relational Database Schemas, Integrity Constraints, Relational Algebra and Calculus, Normalization, Normal Form.

UNIT – II QUERY PROCESSING AD TRANSACTION

Indexing, Query Processing and Optimization, Concurrency Control, Distributed Database, Fragmentation, Transparency, Distributed Query Processing and Optimization, Distributed Transaction Model and Concurrency Control, Distributed Deadlock and Commit Protocol.

UNIT – III OBJECT ORIENTED DATABASE

Object Oriented and Object Relational Databases: Specialization, Generalization, Aggregation, Association, Object, Object Identity, Architecture of Object Oriented and Object Relational Databases.

UNIT – IV WEB DATABASES

Web Databases: Accessing Databases through Web, Web Server, XML Database.

UNIT – V MULTIMEDIA DADABASE

Introduction to Image and Multimedia Database and Data Structure, Data StructureS: R Tree, K-D tree, Quad Tree, Content Based Retrieval: Color Histogram.

Text/Reference Books:

1. Fundamentals of Database System, R. Elmasri, S. Navathe, Benjamin Cumming,
2. Database concept, H.F. Korth and A. Silberschatz, (II ed) McGraw Hill, 1991
3. An Introduction to Database System, C.J. Date, Volume I (V ed), Addision Wesley
4. Object Oriented Database, Narang, Prentice – Hall of India, New Delhi.
5. Modern Database System, W. Kim, 1995, Acin Press, Addision – Wesley.

Course Outcome:

After completion of the course study, students will be able to

1. Explain the needs and concepts of object-oriented database, spatial database, web database, data warehousing and data mining.
2. Analyze, design and evaluate the construct of various advanced databases topics such as Object Oriented, Object Relational, Semi Structured, Unstructured and Distributed Databases.
3. Implement practical solutions to complex database problems using OO/OR database, spatial database, data warehousing and data mining approaches.

Semester	II	**Lecture**	60
Branch	M.Tech. CSE	**Tutorial**	00
Subject Name	Advanced Operating System	**Practical**	00
Subject Code	MTDSCCSE221	**Credit**	04

Course Objective:

1. To give basics of Distributed Operating System.
2. To study the communication in distributed system.
3. To learn about inter-process communication in distributed environment.
4. To have concepts of distributed shared memory and distributed file systems.

UNIT – I MULTIPROCESSOR SYSTEM

Multiprocessor Operating System: Multiprocessor System Architecture, Structure, Processor Scheduling and Allocation, Memory Management.

UNIT – II DISTRIBUTED OPERATING SYSTEM

Distributed Operating System: Characteristics, Design Issues, Communication Models, Clock Synchronization, Mutual Exclusion, Election Algorithms.

UNIT – III DISTRIBUTED OPERATING SYSTEM FUNCTIONS

Distributed Deadlocks Detection, Distributed Scheduling, Distributed File System, Distributed shared Memory.

UNIT – IVFILE/DISK PROCESSING

Multimedia Files, Video compression, Process Scheduling, File System, File placement, Caching, Disk Scheduling.

UNIT – V REAL TIME OPERATING SYSTEM

Real Time Operating System: Scheduling mechanisms, Interrupts, Memory management, I/O & networking, resource reservation.

Case studies: Open source software, LINUX, Open SOLARIS, Amoeba, Mach, chorus etc.

Text Books:

1. Advanced Concepts in Operating Systems, M Singhal and NG Sivaratri, Tata McGraw Hill Inc., 2001
2. Distributed Operating System, A.S. Tanenbaum, Pearson Education Asia, 2001.

Reference Book:

1. Operating System Concepts, Silberschatz And P. Galvin, Addison Wesley 2004.

Course Outcome:

After completion of the course study, students will be able to

1. Explain the concepts of Distributed System, Real Time Systems (Hardware, Software, and Operating System).
2. Summarize the major security issues associated with distributed systems along with the system security techniques.
3. Apply standard design principles in the construction of Advanced Operating Systems.

Semester	II	Lecture	60
Branch	M.Tech. CSE	Tutorial	00
Subject Name	Network Security	Practical	00
Subject Code	MTDSCCSE222	Credit	04

Course Objective:

1. To understand the principles and practices of cryptography and network security.
2. To understand the practical applications that has been implemented and is in use to provide network security.

UNIT – I INTRODUCTION

Introduction to Classical and Modern Techniques: Attacks, Services and Mechanisms, Classical Encryption Techniques, DES, Block Cipher, Design Principles and Modes of Operation.

UNIT – II ENCRYPTION TECHNIQUES

Encryption Algorithms and Hash Functions: Triple DES, RC5, Key Management, Public Key Cryptography, RSA Algorithm, Digital Signatures and Authentication Protocols.

UNIT – III SYSTEM SECURITY

System Security: Backups, integrity Management, Protecting against Programmed Threats, Viruses and Worms, Physical Security, Personnel Security.

UNIT – IV NETWORK SECURITY

Network Security: Protection against Eavesdropping, Security for Modems, IP Security, Web Security, Electronic Mail Security, Authentication, Applications.

UNIT – V SECURITY TOOLS

Security Tools: Firewalls, Wrappers, Proxies, Discovering a Break-in, Denial of Service Attacks and Solutions, Cryptographic Security Tools: KERBEROS, PGP, SSH, SRP, OPIE.

Text Books:

1. Cryptography and Network Security Principles and Practice, William Stallings, Pearson Education.
2. Practical UNIX and Internet Security, Simson Garjainkal, and Gene Spafford, Oreilly Pule Pvt. Ltd. 2000.

Reference Books:

1. RSA Security 's official guide to cryptography, Steve Burnett and Stephene Paine, RSA Press, Tata McGraw Hill Edition, 2001.
2. Cryptography and Network Security, Atul Kahate, McGraw Hill Education (India) Private Limited.

Course Outcome:

After completion of the course study, students will be able to

1. Explain the concepts of various Encryption techniques
2. Summarize the major security issues associated with systems along with the system security techniques.
3. Apply standard security tools.

Semester	II	**Lecture**	60
Branch	M.Tech. CSE	**Tutorial**	00
Subject Name	Cloud Computing	**Practical**	00
Subject Code	MTDSCCSE223	**Credit**	04

Course Objective:

1. To give the idea of cloud computing.
2. To provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real-life scenarios.

UNIT – I INTRODUCTION

History of Cloud Computing, Cloud Architecture, Cloud Storage, Cloud Computing Matters, Advantages of Cloud Computing, Disadvantages of Cloud Computing, Companies in the Cloud Today, Cloud Services.

UNIT – II CLOUD APPLICATIONS

Web Based Application, Pros and Cons of Cloud Service Development, Types of Cloud Service Development, Software as a Service, Platform as Service, Web Services, On-Demand Computing, Discovering Cloud Services, Development Services and Tools, Amazon EC2- Google App Engine, IBM Clouds.

UNIT – III EXTENDED APPLICATIONS

Centralizing emails communications: Collaborations on schedules, Collaborating on To-do lists, Collaborating contacts lists, Cloud computing for the community, collaborating on group projects and events, Cloud computing for the corporation.

UNIT – IV SCHEDULING AND MANAGEMNET

Collaborating on Calendars: Schedules and Task Management, Exporting Online Scheduling Applications, Exploring Online Planning and Task management, Collaborating on Event Management, Collaborating on Contact Management, Collaborating on Project Management, Collaborating on Word Processing, Collaborating on Databases, Storing and Sharing Files.

UNIT – V WEB SERVICES

Collaborating via Web-Based communication tools, Evaluating web mail services, Evaluating web conference tools, Collaborating via Social Networks and Groupware, Collaborating via Blogs and Wikis.

Text/Reference Books

1. Cloud Computing: Web-Based Applications that change the way you work and Collaborate Online, Michael Miller, Que Publishing, 2008.
2. Cloud Computing Best Practices for Managing and Measuring Processes for On-Demand Computing, Haley Beard, Applications and Data Centers in the Cloud with SLAs", Emereo Pty Limited, 2008.

Course Outcome:

After completion of the course study, students will be to

1. Understand the key dimensions of the challenges of cloud computing.
2. Students will be able to perform cloud oriented analysis.
3. Assess economics, financial, and technological implications for selecting cloud computing for an organization.
4. Design the composition of a cloud services.
5. Design application services for technology abstraction.

Semester	II	Lecture	00
Branch	M.Tech. CSE	Tutorial	00
Subject Name	Operating System Lab	Practical	28
Subject Code	MTDSCCSE224	Credit	02

MULTIPROCESSOR OPERATING SYSTEMS

PROGRAM 1 – Semaphores - Multiprocessor operating systems

Assume there are three processes: P_a, P_b, and P_c. Only Pa can output the letter A, P_b B, and P_c C. Utilizing only semaphores (and no other variables) the processes are synchronized so that the output satisfies the following conditions:

a) A B must be output before any C's can be output.
b) B's and C's must alternate in the output string, that is, after the first B is output, another B cannot be output until a C is output. Similarly, once a C is output, another C cannot be output until a B is output.
c) The total number of B's and C's which have been output at any given point in the output string cannot exceed the number of A's which have been output up to that point.

Examples
AACB -- invalid, violates a)
ABACAC -- invalid, violates b)
AABCABC -- invalid, violates c)
AABCAAABC -- valid
AAAABCBC -- valid
AB – valid

PROGRAM 2 – Multithreading - Multiprocessor operating systems

The Cigarette Smokers Problem

Consider a simulation with three *smoker* threads and one *agent* thread. Each smoker continuously makes a cigarette and smokes it. But to make a cigarette, a smoker needs three ingredients: tobacco, paper, and matches. One of the smoker threads has only paper, another has only tobacco and the third has only matches. The agent thread has an infinite supply of all three materials. The three smoker threads are initially blocked. The agent places two randomly chosen (different) ingredients on the table and unblocks the one smoker who has the remaining ingredient. The agent then blocks. The unblocked smoker removes the two ingredients from the table, makes a cigarette, and smokes it for a random amount of time, unblocking the agent on completion of smoking the cigarette. The agent then puts out another random two of the three ingredients, and the cycle repeats.

Write a multi-class multithreaded Java program that uses a monitor to synchronize the agent thread and the three smoker threads. **Do not mechanically translate semaphore code into monitor code!** The agent thread executes in an agent object created from an agent class. Each smoker thread executes in a smoker object. All smoker objects are created from one smoker class whose constructor is used to specify the ingredient possessed by the smoker object. A driver class with a main method constructs the objects and starts the threads.

Use a single monitor object instantiated from a class Control for synchronization. Each of the four threads invokes a synchronized monitor method for its synchronization. No semaphores are allowed. No synchronized blocks are allowed, only synchronized methods. No busy waiting is allowed. No calls to nap inside a synchronized method are allowed (do not nap while holding the monitor object's lock, that is, while inside a synchronized method or while inside a method called by a synchronized method).

PROGRAM 3 – Multiple sleeping barbers - Multiprocessor operating systems
Write a multi-class multithreaded Java program that simulates multiple sleeping barbers, all in one barbershop that has a finite number of chairs in the waiting room. Each customer is instantiated from a single Customer class; each barber is instantiated from a single Barber class.

PROGRAM 4 – Network operating systems
Establish a Lab setup for the following network operating systems based programs based on the skills in networking on your own. E.g. for identifying networking hardware, identifying different kinds of network cabling and network interface cards can be done.
Exercises

1. Identifying Local Area Network Hardware
2. Exploring Local Area Network Configuration Options
3. Verifying TCP/IP Settings
4. Sharing Resources
5. Testing LAN Connections

REAL TIME OPERATING SYSTEMS

PROGRAM 5 – Real time operating systems

A real-time program implementing an alarm clock shall be developed.
[Alarm clock, using C and Simple_OS]

The program shall fulfill the following requirements:
Clock with alarm functionality shall be implemented, It shall be possible to set the time, It shall be possible to set the alarm time, the alarm shall be *enabled* when the alarm time is set, the alarm shall be *activated* when the alarm is enabled, and when the current time is equal to the alarm time, an activated alarm must be acknowledged. Acknowledgement of an alarm shall lead to the alarm being *disabled, the* alarm is enabled again when a new alarm time is set, an alarm which is not acknowledged shall be repeated every 10 seconds. The program shall communicate with a graphical user interface, where the current time shall be displayed, and where the alarm time shall be displayed when the alarm is enabled. It shall be possible to terminate the program, using a command which is sent from the graphical user interface.

DATABASE OPERATING SYSTEMS

PROGRAM 6 – Transactions and Concurrency -Database operating systems
Exercises

Assume any application (e.g. banking) on your own and do the following exercises.

1. Investigate and implement the Object Store's concurrency options.
2. Implement the concurrency conflict that occurs between multiple client applications.
3. Observe and implement the implication of nested transactions.

DISTRIBUTED OPERATING SYSTEMS

PROGRAM 7 – Distributed operating systems

1. Design a RMI Lottery application. Each time you run the client program -- "**java Lottery Client n**", the server program "**Lottery Server**" will generate **n** set of Lottery numbers. Here **n** is a positive integer, representing the money you will spend on Lottery in sterling pounds. Write this program in a proper engineering manner, i.e. there should be specifications, design (flow chart, FD, or pseudo code), coding, test/debug, and documentation.

2. Consider a distributed system that consists of two processes which communicate with each other. Let P be a state predicate on the local state of one process and Q be a state predicate on the local state of the other process. Assume that neither P nor Q are stable (i.e. closed).

Semester	II	Lecture	00
Branch	M.Tech. CSE	Tutorial	00
Subject Name	Advanced DBMS Lab	Practical	28
Subject Code	MTDSCCSE225	Credit	02

Topic: **Distributed Databases**

Software used: Oracle 9.2

1. Create a global conceptual schema Emp(Eno;Ename;Address;Email;Salary) and insert 10 records. Divide Emp into vertical fragments Emp1(Eno;Ename;Address) and Emp2(Eno;Email;Salary) on two different nodes. Fire the following queries:
   (i) Find the salary of an employee where employee number is known.
   (ii) Find the Email where the employee name is known.
   (iii) Find the employee name and Email where employee number is known.
   (iv) Find the employee name whose salary is > 2000.
2. Create a global conceptual schema Emp(Eno;Ename;Address;Email;Salary) and insert 10 records. Divide Emp into horizontal fragments using the condition that Emp1 contains the tuples with salary = 10,000 and Emp2 with 10,000< salary = 20,000 on two different nodes. Fire the following queries:
   (i) Find the salary of all employees.
   (ii) Find the Email of all employees where salary = 15,000
   (iii) Find the employee name and Email where employee number is known.
   (iv) Find the employee name and address where employee number is known.
3. Create a global conceptual schema Emp (Eno; Ename; Address;Email ;Salary) and insert 10 records. Store the replication of Emp into two different nodes and fire the following queries:
   (i) Find the salary of all employees.
   (ii) Find the Email of all employees where salary = 15,000
   (iii) Find the employee name and Email where employee number is known.
   (iv) Find the employee name and address where employee number is known.

Topic: **Object Oriented Databases**

Software used: Oracle 9.2

4. Using Object Oriented databases create the following types:
   a) AddrType1 (Pincode: number, Street :char, City : char, state :char)
   b) BranchType (address: AddrType1, phone1: integer, phone2: integer)
   c) AuthorType (name:char,,addr AddrType1)
   d) PublisherType (name: char, addr: AddrType1, branches: BranchTableType)
   e) AuthorListType as array, which is a reference to AuthorType

   Next create the following tables:
   f) BranchTableType of BranchType
   g) authors of AuthorType
   h) books(title: varchar, year : date, published_by ref PublisherType, authors AuthorListType)
   i) Publishers of PublisherType

   Insert 10 records into the above tables and fire the following queries:
   a) List all of the authors that have the same pin code as their publisher:
   b) List all books that have 2 or more authors:
   c) List the name of the publisher that has the most branches
   d) Name of authors who have not published a book

e) List all authors who have published more than one book:
f) Name of authors who have published books with at least two different publishers
g) List all books (title) where the same author appears more than once on the list of authors (assuming that an integrity constraint requiring that the name of an author is unique in a list of authors has not been specified).

Topic: **Multimedia Database**

Software used: Oracle 9.2, J2SDK 1.4.2, Java Media Framework 2.

5. [A] Create a table Emp with the attributes Eno as employee number, Ename as employee name, Eaddress as employee address and photo as an employee picture. Also create a table Company with attributes Eno, designation and age. Fire the following queries
   a) Find name and designation of all the employees
   b) Find name and age of all the employees
   c) Find name and photo of a particular employee

   [B] Create a table Singer with the attributes sno as singer number, Sname as singer name, Saddress as singer address and audio as an audio clip. Also create a table Company with attributes Sno,age. Fire the following queries
   a) Find name and age of all the singer
   b) Find name and audio clip of a particular singer

   [C] Create a table Singer with the attributes sno as singer number, Sname as singer name, Saddress as singer address and video as an audio clip. Also create a table Company with attributes Sno, age. Fire the following queries
   a) Find name and age of all the singer
   b) Find name and video clip of a particular singer

Topic: **Temporal Databases**

Software used: Oracle 9.2

6. [A] Create a table tblEmp_Appnt, which stores the account number, name, and valid time say, recruitment date and retirement date. Insert 10 records and fire the following queries
   a) Find all the employees who join the company on 2/3/2011
   b) Find all the employees who will retired on 2/3/2011

   [B] Create a table tbl_shares, which stores the, name of company, number of shares, and price per share at transaction time. Insert 10 records and fire the following queries
   a) Find all the names of a company whose share price is more than Rs. 100 at 11:45 A.M.
   b) Find the name of company which has highest share price at 5.00 P.M.

   [C] Create a table tblEmp_Appnt, which stores the account number, name, and valid time say, recruitment date and retirement date. Create a trigger for valid time to check that no two records of same employee have common employment period and does not allow the user to update the records. Trigger should also fill up the empty retirement date.

   Topic: **Active Databases**

   Software used: Oracle 9.2

7. Create a table emp (eno, ename, hrs, pno, super_no) and project (pname, pno, thrs, head_no) where this is the total hours and is the derived attribute. Its value is the sum of hrs of all employees working on that project. eno and pno are primary keys, head_no is foreign key to emp relation. Insert 10 tuples and write triggers to do the following:
   a) Creating a trigger to insert a new employee tuple and display the new total hours from project table.
   b) Creating a trigger to change the hrs of existing employee and display the new total hours from project table.
   c) Creating a trigger to change the project of an employee and display the new total hours from project table.
   d) Creating a trigger to deleting the project of an employee.

Topic: **XML databases**

Software used: Oracle 9.2

8. Create a table employee having dept_id as number datatype and employee_spec as XML datatype (XMLType).The employee_spec is a schema with attributes emp id, name, email, acc_no, managerEmail, dateOf Joning. Insert 10 tuples into employee table. Fire the following queries on XML database.
    a) Retrieve the names of employee.
    b) Retrieve the acc_no of employees.
    c) Retrieve the names,acc_no, email of employees.
    d) Update the 3rd record from the table and display the name of an employee.
    e) Delete 4 th record from the table.

Topic: **Spatial databases**
Software used: Oracle 9.2

9. Create a spatial database table that stores the number, name and location, which consists of four different areas say abc, pqr, mno and xyz. Fire the following queries

    a) Find the topological intersection of two geometries.
    b) Find whether two geometric figures are equivalent to each other.
    c) Find the areas of all different locations.
    d) Find the area of only one location.
    Find the distance between two geometries

SEMESTER - III

S. No.	Code	Subject	Periods per week			Scheme of marks		Total Credit
			L	T	P	ESE	IM	
1	MTPDSCCSE209	Software Project Management	3	-	-	70	30	3
2	MTPDSCCSE211	Data Warehousing & Data Mining	3	-	-	70	30	4
3	MTDSCCSE320	Computational Techniques Using MATLAB	-	-	2	30	30	4
4	MTPR321	Project Work Phase - I	-	-	-	140	30	3
Total			**6**	**-**	**2**	**310**	**140**	**21**

L – Lecture,
T – Tutorial,
P – Practical,
ESE – End Semester Examination,
IM – Internal Marks (Include Class Test & Teacher's Assessments)

Semester	III	**Lecture**	00
Branch	M. Tech. CSE	**Tutorial**	00
Subject Name	Computational Techniques using MATLAB	**Practical**	28
Subject Code	MTPDSCCSE320	**Credit**	02

1. WAP to use MATLAB tool box for ANN.
2. WAP to use MATLAB tool box for Fuzzy Logic.
3. WAP to use MATLAB tool box for Optimization.
4. WAP to use MATLAB tool for implementing Neural Network.
5. WAP to use MATLAB tool for generating different types of activation functions in ANN.
6. WAP in MATLAB for training and testing of ANN.
7. WAP in MATLAB for load forecasting using ANN.
8. WAP in MATLAB for generating different types of Fuzzy membership functions.
9. WAP in MATLAB for feeder load balancing problem by fuzzy logic.
10. WAP in MATLAB for solving standard benchmark functions using Genetic algorithm.
11. WAP in MATLAB for solving economic load dispatch problem using Genetic Algorithm.

Semester	III	Lecture	00
Branch	M. Tech. CSE	Tutorial	00
Subject Name	Project Work Phase - I	Practical	144
Subject Code	MTPR321	Credit	12

Allocation of project:

1. Information regarding broad area must be made available to the students well in advance.
2. Information must cover following parameters.
   i. **Broad Area**: Subject or expertise/application area.
   ii. **Required skills**: Knowledge of subject(s), software, tools & other characteristics.
   iii. **Type of project**: Hardware, Software, Design, Survey, Study Based etc.
   iv. **Guide Available**: Name of Guide (S) from Department & Institute.
3. It is also recommended to give proper counseling to pick up suitable project.
4. Students must get chance to select projects as per their choice or decided mutually between students and department faculty (HOD) concern.
5. Every student will make the project individually. No grouping of students for single project is allowed under any circumstances.

Monitoring of project:

1. It is recommended to give projects as per the specializations of existing faculty of the department instead of outside person/agency.
2. Project must be allocated, developed and monitored by department / institution itself, but not by outside agencies.
3. Regular review by guide is recommended to ensure development & contribution of students.

Internal Evaluation & Submission of project:

1. Evaluation of project would be as per the examination scheme of the University, which is based on internal as well as external evaluation.
2. Internal assessment requires submission of project report for getting approved by the concern authority. However, printing and binding would be as per the conventional format.
3. Evaluation will be based on live demonstration / presentation and Viva.
   - **1st presentation (Registration Seminar)** after 6 weeks from the commencement of the semester.
   - **2nd presentation (Progress Seminar)** after 12 weeks from the commencement of the semester.
   - **Registration Seminar:** Project proposal (problem specification, expected outcome)
4. Final submission of project is expected as:
   i. One copy to the Institution central library,
   ii. One copy to the department.

External Evaluation:

External assessment of project would be like conduction of practical exams of university, and must be executed as per the norms of practical exams.

SEMESTER - IV

S. No.	Code	Subject	Periods per week			Scheme of marks		Total Credit
			L	T	P	ESE	IM	
1	MTPR420	Project Work Phase - II + Seminar	-	-	-	315	135	18
Total			**-**	**-**	**-**	**315**	**135**	**18**

L – Lecture,
T – Tutorial,
P – Practical,
ESE – End Semester Examination,
IM – Internal Marks (Include Class Test & Teacher's Assessments)

Semester	IV	**Lecture**	00
Branch	M.Tech. CSE	**Tutorial**	00
Subject Name	Project Work Phase – II + Seminar	**Practical**	36
Subject Code	MTPR420	**Credit**	18

Guidelines for Dissertation:

The Department Post-Graduate Review committee is to be constituted with 5 members i.e., Chairman – Head of the Department, Convenor – M.Tech. Coordinator and 3 other faculty members including supervisor. The committee is to evaluate the progress of the Dissertation conducting monthly presentations in fourth semester.

Progress Seminar:

Status of the dissertation- work already carried out, balance of work to be carried out.

Progress seminars are to be carried out every month between 1st and 5th.

Synopsis Seminar:

Together with synopsis a presentation to be made and the dissertation should be demonstrated two weeks before the submission date. Supervisors are to evaluate the Dissertation regularly, based on the progress report submitted by the students in every week and the same should be recorded. The committee should give final marks (evaluation and supervisor marks) and grade them into the following categories.

A - Excellent (90 +)

B - Good (60 – 89)

C - Satisfactory (40 – 59)

D - Not Satisfactory (< 39)

Project work will be carried out under the supervision of a faculty member from within the respective department. Students may be permitted to work under the joint guidance of two members of the faculty – in which case, one of the guides may be from an allied department.

A student may, however, be permitted by the Head of the Department concerned to work on a project in an Industrial / Research organization, in the project semesters. In such case, the faculty guiding the student shall be called the internal guide and the scientist / manager guiding, the student (at site) shall be called the external guide.

The student will have to submit typewritten or printed report on the work done by him / her according to a schedule to be announced by the department. The project-report should be duly approved by the supervisor concerned and should embody results of research / development work carried out by the student.