



# Department of Computer Science & Engineering

## MATs University

Aarang, Raipur (C.G.)



### Syllabus Scheme of M. Tech. in Computer Science & Engineering

#### II – Semester

S. No.	Code	Subject	Periods Per Week			Scheme of Marks		Total Credit
			L	T	P	ESE	IM	
1.	MTCSE 220	Advanced Database System	4	-	-	70	30	4
2.	MTCSE 221	Advanced Operating System	4	-	-	70	30	4
3.	MTCSE 222	Network Security	4	-	-	70	30	4
4.	MTCSE 223	Cloud Computing	4	-	-	70	30	4
5.	MTCSE 234X	Elective – I	4	-	-	70	30	4
6.	MTCSE 225	Operating System Lab	1	-	2	30	20	2
7.	MTCSE 226	Network Security Lab	1	-	2	30	20	2
8.	MTCSE 227	Advanced DBMS Lab	1	-	2	30	20	2
<b>Total</b>			<b>23</b>	<b>0</b>	<b>6</b>	<b>440</b>	<b>210</b>	<b>26</b>

#### Elective – I

S. No	Subject Code	Name Of Subject
1.	MTCSE2340	Distributed Computing
2.	MTCSE2341	Soft Computing
3.	MTCSE2342	Multimedia System
4.	MTCSE2343	Natural Language Processing
5.	MTCSE2344	System Simulation

L – Lecture, T – Tutorial, ESE – End Semester Examination,

P – Practical, IM – Internal Marks (Include Class Test & Teacher’s Assessments)



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### ADVANCED DATABASE SYSTEM (MTCSE220)

#### 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 AND 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 DATABASE

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), Addison Wesley
4. Object Oriented Database, Narang, Prentice – Hall of India, New Delhi.
5. Modern Database System, W. Kim, 1995, Acin Press, Addison – 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.



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#### ADVANCED OPERATING SYSTEM (MTCSE221)

##### 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 – IV FILE/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.



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#### NETWORK SECURITY (MTCSE222)

##### 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.



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#### CLOUD COMPUTING (MTCSE223)

##### 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.



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#### OPERATING SYSTEM LAB (MTCSE225)

#### MULTIPROCESSOR OPERATING SYSTEMS

##### PROGRAM 1 – Semaphores - Multiprocessor operating systems

Assume there are three processes:  $P_a$ ,  $P_b$ , and  $P_c$ . Only  $P_a$  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 B must be output before any C's can be output.
- 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.
- 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).



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#### **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.

#### **NETWORK OPERATING SYSTEMS**

#### **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.



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#### 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). Design a superimposed computation which detects that there exists an interleaving of underlying events in this system where at some state  $P \wedge Q$  holds. (A superposed computation is one that does not act the underlying system; it may “read” but not “write” the state of the underlying system. Events in a superposed computation may occur in at the same instant as the underlying events and/or at different instants.) State any assumptions you make. [Hint: Use vector clocks.]





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#### NETWORK SECURITY LAB (MTCSE226)

1. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should XOR each character in this string with 0 and displays the result.
2. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should
  - a) AND
  - b) XOR

Each character in this string with 127 and display the results.

3. Write a Java program to perform encryption and decryption using the following algorithms
  - a) Ceaser Cipher
  - b) Substitution Cipher
  - c) Hill Cipher
4. Write a C/Java program to implement the 8 bits simplified DES algorithm logic
5. Write a C/Java program to implement the Blowfish algorithm logic.
6. Write the RC4 logic in Java.
7. Implement the Euclid Algorithm to generate the GCD of an array of 10 integers in 'C'.
8. Implement Rabin-Miller Primality Testing Algorithm.
9. Write a Java program to implement RSA algorithm.
10. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.
11. Write a Java program to calculate the message digest of a text using the SHA-1 algorithm.
12. Calculate the message digest of a text using the MD5 algorithm in JAVA.
13. Create a digital certificate of your own by using the Java keytool.
14. Write Java program to hide of confidential information within Image using Steganography technique.
15. Configure a firewall to block the following for 5 minutes and verify the correctness of this system using the configured parameters:
  - a) Two neighborhood IP addresses on your LAN.
  - b) All ICMP requests.
  - c) All TCP SYN Packets.



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#### ADVANCED DBMS LAB (MTCSE227)

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



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- 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.



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#### 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 Joining. 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



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**DISTRIBUTED COMPUTING (MTCSE2340)**

**Course Objective:**

To learn the concepts of Distributed Computing.

1. To study resource management in distributed system.
2. To study about communication in distributed environment.
3. To study IPC and RPC mechanisms in distributed systems.

**UNIT – I COMMUNICATION IN DISTRIBUTED ENVIRONMENT**

Introduction, Various Paradigms in Distributed Applications, Remote Procedure Call, Remote Object Invocation, and Message Oriented Communication, Unicasting, Multicasting and Broadcasting, Group Communication.

**UNIT – II DISTRIBUTED OPERATING SYSTEMS**

Issues in Distributed Operating System, Threads in Distributed Systems, Clock Synchronization, Causal Ordering, Global States, Election Algorithms, Distributed Mutual Exclusion, Distributed Transactions, Distributed Deadlock, Agreement Protocols.

**UNIT – III DISTRIBUTED RESOURCE MANAGEMENT**

Distributed Shared Memory, Data-Centric Consistency Models, Client-Centric Consistency Models, Ivy – Munin – Distributed Scheduling, Distributed File Systems, Sun NFS.

**UNIT – IV FAULT TOLERANCE AND CONSENSUS**

Introduction to Fault Tolerance, Distributed Commit Protocols, Byzantine Fault Tolerance, Impossibilities in Fault Tolerance.

**UNIT – V CASE STUDIES**

Distributed Object-Based System, CORBA, COM+, Distributed Coordination-Based System, JINI.

**Text/ Reference Books:**

1. Distributed Systems Concepts and Design, George Coulouris, Jean Dollimore, Tim Kindberg, Third Edition, Pearson Education Asia, 2002.
2. Distributed Computing: Fundamentals, Simulations and Advanced Topics, Hagit Attiya and Jennifer Welch, Wiley, 2004.
3. Advanced Concepts In Operating Systems, Mukesh Singhal, McGrawHill Series in Computer Science, 1994.
4. Distributed Systems, A.S.Tanenbaum, M.Van Steen, Pearson Education, 2004.
5. Distributed Computing Principles and Applications, M.L.Liu, Pearson Addison Wesley, 2004.

**Course Outcome:**

After completion of the course study, students will be to

1. Explain the concept of Distributed Computing.
2. Design and build application programs on distributed systems.
3. Improve the performance and reliability of distributed programs.



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#### SOFT COMPUTING (MTCSE2341)

##### Course Objective:

1. To introduce basics of soft computing (neural networks, fuzzy system).
2. To give idea of genetic algorithm and its applications.

##### UNIT – I INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS

Evolution of Computing, Soft Computing Constituents, From Conventional AI to Computational Intelligence, Machine Learning Basics.

##### UNIT – II GENETIC ALGORITHMS

Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning, Machine Learning Approach to Knowledge Acquisition. Chromosome representation, encoding, decoding, Genetic operators: Selection, Crossover, Mutation, Elitism, Schema Theorem, EGA, Convergence theorem, real-coded GA, Ordered GA, Steady-state GA, Multi-objective evolutionary algorithms, applications in search and optimization. Recent advances in Evolutionary Computing (Particle Swarm Optimization, Ant Colony Optimization).

##### UNIT – III NEURAL NETWORKS

Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks, Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks.

##### UNIT – IV FUZZY LOGIC

Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions, Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making.

##### UNIT – V NEURO-FUZZY MODELING

Adaptive Neuro-Fuzzy Inference Systems, Coactive Neuro-Fuzzy Modeling, Classification and Regression Trees, Data Clustering Algorithms, Rule base Structure Identification, Neuro-Fuzzy Control, Case studies.

##### Text Books:

1. Neuro-Fuzzy and Soft Computing, Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, Prentice-Hall of India, 2003.
2. Fuzzy Sets and Fuzzy Logic-Theory and Applications, George J. Klir and Bo Yuan, Prentice Hall, 1995.
3. Neural Networks Algorithms, Applications, and Programming Techniques, James A. Freeman and David M. Skapura, Pearson Edn., 2003.

##### Reference Books:

1. An Introduction to Genetic Algorithm, Mitchell Melanie, Prentice Hall, 1998.
2. Genetic Algorithms in Search, Optimization and Machine Learning, David E. Goldberg, Addison Wesley, 1997.
3. Introduction to Fuzzy Logic using MATLAB, S. N. Sivanandam, S. Sumathi and S. N. Deepa, Springer, 2007.
4. Introduction to Genetic Algorithms, S.N.Sivanandam · S.N.Deepa, Springer, 2007.
5. Introduction to Artificial Neural Systems, Jacek M. Zurada, PWS Publishers, 1992.

##### Course Outcome:

After completion of the course study, students will be to

1. Explain the concept of Soft Computing, Neural Networks, Genetic Algorithms.
2. Design and build application s of Neuro Fuzzy Models.
3. Improve the performance and reliability of Fuzzy Logic.



# Department of Computer Science & Engineering

## MATS University

Aarang, Raipur (C.G.)

### Syllabus Scheme of M. Tech. in Computer Science & Engineering



#### MULTIMEDIA SYSTEMS (MECSE2342)

##### Course Objective:

1. To study the fundamental concept of multimedia.
2. To study issues and problems in the representation, manipulation, and delivery of multimedia content.
3. To understand the concepts of Operating System, File System, Networks in Multimedia Components.
4. To study the communication and synchronization concepts for Multimedia.

##### UNIT – I INTRODUCTION AND QOS

Introduction, QoS Requirements and Constraints, Concepts, Resources, Establishment Phase, Run Time Phase, Management Architectures.

##### UNIT – II OPERATING SYSTEMS

Real Time Processing, Scheduling, Inter-process Communication, Memory and Management, Server Architecture, Disk Management.

##### UNIT – III FILE SYSTEMS AND NETWORKS

Traditional and Multimedia File Systems, Caching Policy, Batching-Piggy backing, Ethernet, Gigabit Ethernet, Token Ring, 100VG Any LAN, Fiber Distributed Data Interface (FDDI), ATM Networks, MAN, WAN.

##### UNIT –IV COMMUNICATION

Transport Subsystem, Protocol Support for QoS, Transport of Multimedia, Computer Supported Cooperative Work, Architecture, Session Management, M Bone Applications.

##### UNIT – V SYNCHRONIZATION

Synchronization in Multimedia Systems, Presentation, Synchronization Types, Multimedia Synchronization Methods, Case Studies, MHEG, MODE, ACME.

##### Text Book:

1. Multimedia Systems, Ralf Steinmetz and Klara Nahrstedt, Springer, I Edition 2004.

##### Reference Books:

1. Media Coding and Content Processing, Ralf Steinmetz and Klara Nahrstedt, Prentice hall, 2002.
2. Multimedia, Vaughan T, Tata McGraw Hill, 1999.
3. Multimedia Applications Development using DVI Technology, Mark J.B., Sandra K.M., McGraw Hill, 1992.
4. Multimedia Communication Systems: Techniques, Standards, and Networks, K. R. Rao, Zoran S. Bojkovic, Dragorad A. Milovacovic, D. A. Milovacovic, Prentice Hall, 1<sup>st</sup> Edition, 2002
5. Fundamentals of Multimedia, Ze-Nian Li and Mark S. Drew, Pearson, 2004

##### Course Outcome:

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

1. Explain concepts of multimedia.
2. Explain issues and problems in the representation, manipulation, and delivery of multimedia content.
3. Implement concepts of Operating System, File System, and Networks in Multimedia Components.
4. Implement communication and synchronization concepts for Multimedia.



# Department of Computer Science & Engineering

## MATs University

Aarang, Raipur (C.G.)

### Syllabus Scheme of M. Tech. in Computer Science & Engineering



#### NATURAL LANGUAGE PROCESSING (MTCSE2343)

##### Course Objective:

1. To introduce the concept of Natural Language Processing.
2. To study various phases of Natural Language Processing.
3. To learn the linguistic implementation.
4. To learn the concept of speech recognition.

##### UNIT – I INTRODUCTION

Introduction: NLP, Challenges of NLP, NLP Applications, Processing of Indian Languages.

Words and Word Forms: Morphology fundamentals; Morphological Diversity of Indian Languages; Morphology Paradigms; Finite State Machine Based Morphology; Automatic Morphology Learning; Shallow Parsing; Named Entities; Maximum Entropy Models; Random Fields, Scope Ambiguity and Attachment Ambiguity resolution.

##### UNIT – II PARSING IN NLP

Structures: Theories of Parsing, Parsing Algorithms; Robust and Scalable Parsing on Noisy Text as in Web documents; Hybrid of Rule Based and Probabilistic Parsing; Scope Ambiguity and Attachment Ambiguity resolution.

##### UNIT – III MACHINE TRANSLATION

Machine Translation: Need of MT, Problems of Machine Translation, MT Approaches, Direct Machine Translations, Rule-Based Machine Translation, Knowledge Based MT System, Statistical Machine Translation, UNL Based Machine Translation, Translation involving Indian Languages.

##### UNIT – IV LINGUISTICS

Meaning: Lexical Knowledge Networks, WorldNet Theory; Indian Language Word Nets and Multilingual Dictionaries; Semantic Roles; Word Sense Disambiguation; WSD and Multilinguality, Metaphors.

##### UNIT – IV SPEECH RECOGNITION

Speech Recognition: Signal processing and analysis method, Articulation and acoustics, Phonology and phonetic transcription, Word Boundary Detection; Argmax based computations; HMM and Speech Recognition.

##### Text/Reference Books:

1. Natural Language Understanding, Allen J., Benjamin/Cunnings, (1987).
2. Natural Language Processing and Information Retrieval, Siddiqui and Tiwary U.S., Oxford University Press (2008).
3. Natural Language Processing: The PLNLP Approach, Jensen K., Heidorn G.E., Richardson S.D., Springer (2013).
4. Phonetics, Roach P., Oxford University Press (2012).
5. Speech and Language Processing, Jurafsky, Dab and Martin, James, Second Edition, Prentice Hall, 2008.

##### Course Outcome:

After completion of the course study, students will be to

1. Explain the concept of Natural Language Processing.
2. Implement various phases of Natural Language Processing.
3. Do linguistic implementation and develop the various speech recognition applications.





# Department of Computer Science & Engineering

## MATS University

Aarang, Raipur (C.G.)

### Syllabus Scheme of M. Tech. in Computer Science & Engineering



#### SYSTEM SIMULATION (MTCSE2344)

##### Course Objective:

1. Introduce computer simulation technologies and techniques, provides the foundations for the student to understand computer simulation needs, and to implement and test a variety of simulation and data analysis libraries and programs. This course focusses what is needed to build simulation software environments, and not just building simulations using preexisting packages.
2. Introduce concepts of modeling layers of society's critical infrastructure networks.
3. Build tools to view and control simulations and their results.

##### UNIT – I SIMULATION BASICS

Handling Stepped and Event-based Time in Simulations, Discrete versus Continuous Modelling , Numerical Techniques,

Sources and Propagation of Error.

##### UNIT – II DYNAMICAL, FINITE STATE, AND COMPLEX MODEL SIMULATIONS

Graph or Network Transitions Based Simulations, Actor Based Simulations, Mesh Based Simulations, Hybrid Simulations.

##### UNIT – III CONVERTING TO PARALLEL AND DISTRIBUTED SIMULATIONS

Partitioning the Data, Partitioning the Algorithms, Handling Inter-partition Dependencies.

##### UNIT – IV PROBABILITY AND STATISTICS FOR SIMULATIONS AND ANALYSIS

Introduction to Queues and Random Noise ,Random Variates Generation, Sensitivity Analysis.

##### UNIT – V SIMULATIONS RESULTS ANALYSIS AND VIEWING TOOLS

Display Forms: Tables, Graphs, and Multidimensional Visualization, Terminals, X and MS Windows, and Web Interfaces,

Validation of Model Results

##### Text/Reference Books:

1. Real-Time Simulation Technologies: Principles, Methodologies, and Applications by Katalin Popovici, Pieter J. Mosterman.
2. Guide to Modeling and Simulation of Systems of Systems by Bernard P. Zeigler, Hessam S. Sarjoughian.

##### Course Outcome:

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

1. Understand Basic Model Forms.
2. Understand Basic Simulation Approaches.
3. Understand Handling Stepped and Event-based Time in Simulations.
4. Understand Discrete versus Continuous Modelling.
5. Understand Numerical Techniques.
6. Understand Sources and Propagation of Error.