

MATS School of Engineering & Technology

**MATS University
Raipur**



**Syllabus Scheme
(5th Semester)
For
Bachelor of Engineering
In
Computer Science & Engineering**

Subject Code For School of Engineering & Tech. Deptt.

5th Semester (Computer Science)

S.No.	Subject Code	Subject Name
1	BE520	Operating System
2	BE521	Analysis and Design of Algorithms
3	BE522	Database Management System
4	BE523	Principles of Communication System
5	BE524	Introduction to Java
6	BE525	Computer Graphics
7	BE526	Database Management System Lab
8	BE527	Principles of Communication Lab
9	BE528	Java Programming Lab
10	BE529	Computer Graphics Lab



MATS School of Engineering & Technology
MATS University, Raipur
Scheme of Teaching & Examination
Vth Semester
Computer Science & Engineering



S. No.	Course code	SUBJECT	Periods per week		Evaluation Scheme		Total Marks
			L	P	IM	ESE	
THEORY							
1	BE520	Operating System	5	0	30	70	100
2	BE521	Analysis and Design of Algorithms	5	0	30	70	100
3	BE522	Database Management System	5	0	30	70	100
4	BE523	Principles of Communication System	5	0	30	70	100
5	BE524	Introduction to Java	5	0	30	70	100
6	BE525	Computer Graphics	5	0	30	70	100
PRACTICAL							
7	BE526	Database Management System Lab	0	3	20	30	50
8	BE527	Principles of Communication Lab	0	3	20	30	50
9	BE528	Java Programming Lab	0	3	20	30	50
10	BE529	Computer Graphics Lab	0	3	20	30	50

L-Lecturer, P-Practical, ESE- End Semester Examination, IM-Internal Marks

OPERATING SYSTEM

BE520

UNIT I

INTRODUCTION

Operation System objective and function, The Evolution of operating Systems, Batch, interactive, Time Sharing and Real time systems, Protection, Operating System Structure, System Components, Operating system services, System structure. Distributed Computing, Key Architecture Trends, Parallel Computation, Input-Output Trends.

UNIT II

CONCURRENT PROCESSES

Process concept: Introduction, Definitions of “Process”, Process States, Process State Transitions, Process Control Block, Operations on Processes, Suspend and Resume, Interrupt Processing.

Mutual Exclusion, Producer / Consumer Problem, Critical section problem, Semaphores, Classical problems in concurrency, Inter process communication. Asynchronous Concurrent Process: Introduction, Parallel Processing, Control Structure for indicating Parallelism, CPU scheduling: Concepts, Performance criteria, and scheduling Algorithms, Algorithm evaluation, Multiprocessor Scheduling.

UNIT III

DEAD LOCKS

System model, Deadlock characterization, Prevention, Avoidance and Detection, Recovery from deadlock, Combined approach.

UNIT IV

MEMORY MANAGEMENT

Base Machine, Resident Monitor, Multiprogramming with fixed partition, Multiprogramming with variable partitions, Paging, Segmentation, Paged - Segmentation, Virtual Memory Concepts, Demand paging, Performance, Page Replacement algorithms, Allocation of frames, Thrashing, Cache memory organization impact on performance.

UNIT V

I/O MANAGEMENT & DISK SCHEDULING

I/O Device and the organization of the I/O function, I/O Buffering, Disk I/O, Operating system Design issues. File system: Concepts of File, File organization and Access mechanism, File Directories, File sharing, Implementation issues. Case studies: Unix system, A virtual machine operating systems.

Text Books:

1. Operating System concepts, Silberschatz A and Peterson, J.L, PE- LPE.
2. Operating System Design & Implementation, Tanenbaum, A.S., PHI.
3. Operating system concepts Galvin, Silberschatz John Wiley & Sons
4. Operating systems H.M.Deital Pearson Education

Reference Books:

1. Operating System Concept & Design, Milenkovic M, McGraw Hill.
2. Operation System, Stalling William, Maxwell Mc Millan International Editions.

ANALYSIS AND DESIGN OF ALGORITHMS

BE521

UNIT I

Concepts of algorithm, Asymptotic complexity, Examples of Analysis use of Recurrence relation in analysis of algorithms, Removal of Recursion, Heap and heap sort, Disjoint set structure.

UNIT II

Divide and conquer technique, Analysis and Design of algorithms base on this technique for binary search, Merge sort, Quick sort and Selection problem matrix multiplication.

UNIT III

Study of greedy strategy, Solutions based on greedy strategy for knap sack problem, Minimum spanning trees, Scheduling problem, Shortest paths optimal merge patterns. Concept of dynamic programming and Problems based on this approach such as O/I Knapsack problem, Multi-stage graphs, Shortest paths, Traveling sales person problem, Reliability design problem.

UNIT IV

Depth-first search, Breadth search, bi-connected components, Backtracking concept and its example like 8-queen's problem, Hamiltonian cycle problem, Introduction to branch and its examples like 8-puzzle problem traveling sales person problem.

UNIT V

Binary search trees, height balanced trees, AVL trees, 2-3 trees, B-trees hashing. Introduction to lower-bound theory introduction to NP-Complete and NP Hard problems, Examples of NP complete problem like Hamiltonian path and circuits, Eulerian paths and Circuits etc.

Reference Books:

1. Computer algorithms by Horowitz n shani.
2. The design and analysis of computer algorithms Alfred V. Aho, John E. Hopcroft, Jeffrey D. *Ullman*
3. Introduction to algorithms by Cormen and Rivest

DATABASE MANAGEMENT SYSTEM

BE522

UNIT I

INTRODUCTION TO DATA BASE

Advantages of DBMS, Type of Data Models, Schema and instances, DBMS Architecture and Data Independence, Entity- Relationship Model, Attributes and Keys, Relationship Types, Weak Entity set, Strong Entity Set, Enhanced E-R Modeling, Specialization and Generalization, Record Storage and Primary File Organizations: Introduction, Secondary Storage Devices, Buffering of Blocks, Structure of Files: Types of Single Level ordered indexes, Multilevel indexes, Dynamics Multilevel indexes using B-trees and B+- Trees.

UNIT II

THE RELATIONAL DATA MODEL

Relational data model concepts, Constraints, Relational Algebra, Relational Calculus, Tuple relational calculus in SQL: DDL,DML, DCL, Types of Constraints, Defining different constraints on a table, Defining & Dropping integrity constraints in the alter table command, View, Index.

UNIT III

DATABASE DESIGN

Functional Dependencies and Normalization for Relational Databases: Informal design guidelines for relation schemes, Functional dependencies, Normal forms based on Primary keys, General definitions of second and third normal forms, Boyce- Codd normal form, Problem related with normal forms & solutions, Multi valued & Join Dependencies, 4th & 5th Normalization.

UNIT IV

QUERY & TRANSACTION PROCESSING

Query Processing: Query processing stages, Query interpretation, Query execution plan, Table scans, Fill factor, Multiple index access, Methods for join tables scans, Structure of a query optimizer. Transaction Processing: Types of failures, ACID property, schedules and recoverability, Serializability of schedules, Levels of transaction consistency, Deadlocks, Nested transaction, Transaction benchmarking.

UNIT V

CRASH RECOVERY

Failure classification, Different type of Recovery techniques & their comparative analysis, Deferred update, Immediate update, Shadow paging, Check points, On-line backup during Database updates, Concurrency Control: Different type of concurrency control techniques & their comparative analysis, Locking techniques, Time- stamp ordering, Multi-version techniques, Optimistic techniques, Multiple granularity. Integrity, Security, Non-procedural and procedural integrity constraints, Integrity constraints specifications in SQL.

Text Books:

1. Database system concept, Korth & Sudarshan, MH.
2. Database Design Fundamentals, Rische, PHI.

Reference Books:

1. Principles of Database Systems”, 2nd Edn., Ullman, J.O, Galgotia Publications.
2. Introduction to Database Systems , C.J.Date, Pearson Education.
3. Fundamentals of Database Systems , Elmasri & Navathe, Pearson Education.

PRINCIPLES OF COMMUNICATION SYSTEM

BE523

UNIT I

AMPLITUDE MODULATION SYSTEM

Need for Modulation, Amplitude Modulation, Amplitude Modulation Index, Modulation Index for Sinusoidal AM, Frequency spectrum for Sinusoidal AM, Average power for Sinusoidal AM, Effective voltage and current for sinusoidal AM, Balanced Modulator, The Square law Demodulator, Non-sinusoidal modulation, DSBSC Modulation, SSB modulation and generation, VSB, FDM.

UNIT II

ANGLE MODULATION SYSTEM

Phase and Frequency modulation and their relationship, Frequency deviation, Spectrum of FM Signal, BW of FM Signal, Effect of modulation on BW, Constant BW, FM phasor diagram, Narrow band F.M. Armstrong and Parameter variation methods of FM generation and FM Demodulators.

UNIT III

DIGITAL COMMUNICATION

Sampling theorem, Pulse Modulation: PAM, PPM, PWM. Quantization of Signals, Quantization error, Pulse Code Modulation (PCM) and the system, Time division multiplexing (TDM), DPCM, DM, ADM, PSK FSK and DEPSK.

UNIT IV

ELEMENTS OF INFORMATION THEORY

Average Information, Entropy, Information Rate, Communication Channel, Discrete And Continuous channel, Shannon-Hartley Theorem and its Implications, Channel capacity, Gaussian channel, Bandwidth S/N trade off.

UNIT V

ADVANCED COMMUNICATION TECHNIQUES

Satellite Communication: Components and Block diagram of Satellite communication system, Transponders, Up-link and Down-link budget calculations, Fiber Optics Communication: Principles of light propagation in optical fiber, Losses in fibers, Dispersion, Connectors and splices, Fiber optic communication link.

Text Books:

1. Electronic Communications by Roddy & Coolen, PHI.
2. Electronic Communication System by Kenedy & Davis, TMH

Reference Books:

1. Principles of Communication system by H.Taub and K.L. Shiling.
2. An Introduction to the Principle of Communication Theory by J.C. Hancock, Mc Graw Hill.
3. Signal Processing, Modulation and Noise-by Betts, English University Press, London.
4. Communication System-by A.B. Carlson, Mc-Graw Hill.

INTRODUCTION TO JAVA

BE524

UNIT I

INTRODUCTION & FUNDAMENTALS

Features of Java, Newly added features in Java2, Introduction to OOPS, Data types, Variables, Literals, expressions, Operators, Arrays and programming constructs, Garbage Collection, Comparison with C++, Java Virtual Machines, Java Class Libraries, JIT, Overview of Java Technologies: Applets, Beans, RMI, Servlets, JSP, JSF, CORBA .

UNIT II

CLASSES AND OBJECTS

Classes and Objects, Objects and References, Method: Defining method, Calling method, Passing Arguments to method, This keyword, Overloading method, Static, Access Specifiers: Public, Default, Private & Protected, Command line Arguments, Constructors and Finalizers, Overloading Constructors, Inner Classes. Introduction to inheritance: Definition and Advantages, overriding, Super, final and abstract classes, Interface, Package.

UNIT III

EXCEPTIONS, STRING AND VECTOR

Basics of exception Handling, Default Exception Handling, Try and Catch, Multiple Catch Statements, Try-Catch- finally, Uses of throw and throws, Strings: String Constructor, String arithmetic, String methods, String buffer and methods, Introduction and programming using Vector, Iterator and Enumeration.

UNIT IV

MULTITHREADING

Thread Concepts, Thread lifecycle, Runnable Vs Thread Class, Thread Priority, Thread Methods, Thread Synchronization: Concept of Monitor, Synchronized methods & Synchronized blocks.

UNIT V

INTERNET PROGRAMMING WITH JAVA

AWT, Applets and its Application, User interfacing components, Events and Event Handling, Overview of Swing Components, Java Database Connectivity: JDBC, ODBC, executing DDL, DML commands, Statement, Prepared statement and Callable statement, Java Stored Procedures.

Text Books:

1. Java complete reference – Herbert Schildt (TMH)
2. Java how to program – Dietel and Dietel

Reference Books:

1. Programming with Java :- Schaum's series
2. Java 2 Black book – Steven Holzner
3. Java Examples in a nutshell – O' Reilly
4. Core Java – Cay S. Horstman, Gary Cornell

COMPUTER GRAPHICS

BE525

UNIT I

OVERVIEW OF GRAPHICS SYSTEM

Video display devices, Input devices, Raster scan & Random scan system, Line-Circle-Ellipse generating algorithm, Filled area primitives, 2-D & 3-D transformation, Clipping: 2-D Cyrus Beck clipping, Liang Barsky 2-D & 3-D clipping: Cohen Sutherland, Polygon clipping: Sutherland Hodgeman & Weiler-Atherton polygon clipping.

UNIT II

CURVES & SURFACES

Conics-Parametric forms for circle, Ellipse, Parabola, Bezier Curves-Need for cubic parametric curves c_0 , c_1 , c_2 continuity, Generation through Bernstein polynomials, Condition for smooth joining of 2 segments, Convex Hull property, B-Spline Curves: Knot vectors-uniform and open uniform curves, Uniform, Periodic B-splines, Open, Uniform B-splines, Non-uniform, rational B-splines, Beta splines, Subdividing curves, Drawing curves using forward differences.

UNIT III

PROJECTIONS & HIDDEN SURFACE REMOVAL

3-D Transformation for right handed co-ordinate system (Z-axis towards viewer), Parallel projection on xy-plane (including oblique view), Perspective projection-1, 2 and 3 Vanishing points, Handling points at infinity, Reconstruction of 3-D images. Hidden Surface Removal: Back face removal, Floating Horizon method for curved objects, Z-Buffer or depth buffer algorithm, Painter's algorithm (Depth sorting method), Binary space partitioning trees, Scanline algorithm, Warnock's algorithm.

UNIT IV

SHADING & COLOR ISSUES

Illumination model for Diffused & Specular reflection, Computing reflection vector, Gouraud and Phong Tracing, Band Illusion, Lateral inhibition, Texture mapping & their characteristics, Parametric Texture mapping, 2D Texture mapping and Bump mapping, Handling shadows, Radiosity: Lambert's Law, Basic element, Recapitulation, Modeling transparency, Visualization of data sets, Volume rendering, Color issues: Additive, Subtractive primaries, Wavelength spectrum, JCM color. .

UNIT V

FRACTALS & ANIMATION

Fractals: Self similar fractals-fractal dimension, Generation of Terrain-random midpoint displacement, Grammar based models, Self-squaring fractals. Solid Modeling: Generation through sweep techniques, Constructive solid geometry, B representations, Octrees, Ray Tracing & their Theory, Animation: In-between using rotation and translation, Procedural animation, Image Transformation: Translation and rotation, Morphing, Motion Control (Key framing), Spline Driven animation, Arc length parameterization, Velocity curves, Euler angles and use of quaternion.

Text Books:

1. Computer graphics, Hearn and Baker, PHI
2. Computer Graphics, Foley, PE-LPE,

Reference Books:

1. Procedural Elements of Computer graphics, Rogers, McGraw Hill
2. Computer graphics, Harringtons S., McGraw Hill.
3. Computer Graphics, Schaum Series.

DATABASE MANAGEMENT SYSTEM LAB

BE526

List of Experiments

Schema for table creation
Employee (person name, street, city)
Works (person Name, company name, salary)
Company (company name, city)
Manages (person name, Manager name)

1. Creating tables, Renaming tables.
2. Data constraints (Primary key, Foreign key, Not Null), Data insertion into a table.
3. Viewing data from tables.
4. Filtering table data.
5. Creating table from another table.
6. Inserting data into a table from another table.
7. Delete, alter, and update operations.
8. Grouping data, aggregate functions
9. Oracle functions (mathematical, character functions)
10. Subqueries
11. Set operations.
12. Joins.
13. PL/SQL (Anonymous block, control structure)
14. PL/SQL (Procedures)
15. Triggers
16. Cursors

Text Books:

1. SQL & PL/SQL, Ivan Bayross, SPD.
2. Database Design Fundamentals, Rishe, PHI.

Reference Books:

1. Principles of Database Systems”, 2nd Edn., Ullman, J.O, Galgotia Publications.
2. Introduction to Database Systems , C.J.Date, Pearson Education.
3. Fundamentals of Database Systems , Elmasri & Navathe, Pearson Education.

PRINCIPLE OF COMMUNICATION LAB

BE527

List of Experiments to be performed

1. To study Amplitude Modulation on trainer kit.
2. To study Demodulation on Trainer kit.
3. To study Frequency Modulation and to trace the frequency modulated waveform on CRO using Trainer Kits.
4. To study Frequency Demodulation using Trainer Kits.
5. To generate SSB-SC signal and to study its characteristics.
6. To generate DSB-SC signal using Balanced Modulator and to study its characteristics.
7. To design a square Law modulator using FET and to study its characteristics.
8. To design a ring modulator and to study its characteristics.
9. To design a square Law detector using diode and to study its V-I characteristics.
10. To perform Experiment with data modulation techniques and to study the waveforms.
11. To perform experiment with adaptive Delta modulation techniques and to study the waveforms.
12. To study Signal sampling and reconstruction techniques.
13. To study the TDM pulse Amplitudes Modulation/Demodulation and to draw their waveforms.
14. To study ASK Modulation and demodulation.
15. To study FSK Modulation and Demodulation.

(Along with the above experiments, Simulators may be used to give idea about various communication techniques.)

List of Equipments/Machine Required:

Discrete components, Function Generator, Power supply, CRO, Communication trainer kits, Modulated Signal Generator, Transmission Line, COMMSIM Software.

Recommended Books:

1. Radio Communication by G.K. Mithal, Khanna Publishers.

JAVA PROGRAMMING LAB

BE528

List of Programs

1. Write a program to perform multiplication of two matrices.
2. Write a program to find the volume of a box having its side w,h,d means width ,height and depth. Its volume is $v=w*h*d$ and also find the surface area given by the formula $s=2(w*h+h*d+d*w)$. Use appropriate constructors for the above.
3. Develop a program to illustrate a copy constructor so that a string may be duplicated into another variable either by assignment or copying.
4. Create a base class called shape. Apart from Constructors, It contains two methods getxy value() and showxy value() for accepting co-ordinates and to display the same. Create the subclass Called Rectangle which contains a method to display the length and breadth of the rectangle called showxy value().Illustrate the concepts of Overriding and Constructor call sequence.
5. Write a program that creates an abstract class called dimension, cre ates two subclasses, rectangle and triangle. Include appropriate methods for both the subclass that calculate and display the area of the rectangle and triangle.
6. Write a program, which throws Arithmetic Exception. Write another class (in a different file) that handles the Exception.
7. Write a program to sort a stream of Strings.
8. Create a user defined Exception class which throws Exception when the user inputs the marks greater than 100 Catch it and again rethrow it.
9. Write a program in which a Mythread class is created by extending the Thread class. In another class, create objects of the Mythread class and run them. In the run method print “MATS” 10 times. Identify each thread by setting the name.
10. Write a program to illustrate various thread methods.
11. Write a Program to implement Bank Account Class which illustrates the concept of Synchronization.
12. Write Program to illustrate the use of Vector Class and Iterator Interface.
13. Write a program, which illustrates capturing of Mouse Events. Use Applet class for this.
14. Write a program using swing components which simulates simple calculator.
15. Write a JDBC program for Student Mark List Processing.
16. Write a Japplet to simulate OnLineTest that uses JDBC and Vector.
17. Design a text editor, which is having some of the features of notepad.

Reference Books:

1. Java2 complete reference - Herbert schildt (TMH)
2. Java programming – E Balagurusamy
3. Java 2 Black book – Steven Holzner
4. Java Examples in a nutshell – O’ Reilly

COMPUTER GRAPHICS LAB

BE529

LIST OF PROGRAMS

1. Write a program to draw the line using DDA algorithm.
2. Write a program to draw the line using Bresenham's algorithm.
3. Write a program to draw circle using Bresenham's algorithm.
4. Write a program to draw circle using mid-point algorithm.
5. Write a program to demonstrate draw ellipse using midpoint algorithm.
6. Write a program Rotation of Triangle.
7. Write a program Translation of Line.
8. Write a program to perform scaling of line.
9. Write a program shearing of Rectangle.
10. Write a program to implement boundary –fill algorithm.
11. Write a program to implement flood –fill algorithm.
12. Write a program to implement Bezier curve using four control points.
13. Write a program to implement Cohen Sutherland line clipping algorithm.
14. Write a program to implement Liang Barsky line clipping algorithm.
15. Write a program to implement face of a cartoon.

Reference Books:

1. Computer Graphics & Multimedia- G. S. Baluja -Dhanpat Rai & CO.
2. Computer Graphics Donald Hearn & M Pauline Baker-Pearson Pvt. Ltd.