

SHRI.G.S. INSTITUTE OF TECHNOLOGY & SCIENCE
Department Of Information Technology
MCA II year III Sem

Subject Code: CT20003

Subject Nomenclature: DAA

Session: 2023-2024

Lecture No	Topic Covered (Unit No)
1.	UNIT-I: Review of Elementary Data Structures: Stacks, Queues
2.	Lists, Trees
3.	Hash, Graph
4.	Internal representation of Data Structures
5.	Introduction to Algorithms
6.	Algorithm Specifications.
7.	UNIT -II: Performance Analysis of Algorithms: Time and Space Complexity
8.	Time space trade-off, Various bounds on complexity
9.	Asymptotic notations: O-notation, Ω -notation, Θ -notation
10.	Recurrences and Recurrences solving techniques
11.	Recursion-tree method
12.	Master method, Substitution method
13.	Average time analysis methods: Probabilistic methods
14.	Unit III: Divide and Conquer Method: Structure of Divide and Conquer Algorithms
15.	Binary Search, Quick Sort
16.	Strassen Matrix Multiplication
17.	Greedy Method: Overview of Greedy Method
18.	Example Problems like: Minimum Cost Spanning Tree
19.	Knapsack Problem
20.	Unit IV: Dynamic Programming: Overview
21.	Matrix Multiplication
22.	Travelling Salesman Problem
23.	All Pairs Shortest Path and other problems
24.	Backtracking: Overview, 8-Queens Problem
25.	Knapsack Problem
26.	Branch and Bound: The Method, Example Problems
27.	Unit V: NP-hard Definition, Properties and Examples
28.	NP-complete problems Definition, Properties and Examples
29.	Introduction to Parallel Algorithms
30.	Randomized Algorithms

Internet and Web Technology

Lecture No.	Unit 1: Introduction to Internet
1	Evolution of Internet & WWW, Internet Working Concept
2	Review of TCP/IP Architecture
3	Basic Tools of Internet Access, Browsing, and Search Technologies
4	DNS, Internet Service Providers
5	Internet Connectivity: Wired – Dial-up, Leased Lines, ISDN Lines
6	Wireless Connectivity: Radio Link, VSAT
7	Review and Discussion on Connectivity Technologies
8	Introduction to practical sessions and assignments

Lecture No.	Unit 2: Web Site Planning & Designing
9	Introduction to HTML, Basic Rules
10	Introduction to JavaScript
11	Server-side Programming Language: PHP Orientation
12	Basic Rules of PHP Programs, Functions
13	Storing Information with Database
14	Web Management: Fault, Configuration, and Performance Management
15	Web Sites Maintenance, Troubleshooting
16	Case Studies and Examples
17	Practical: Developing a Simple HTML Page with JavaScript and PHP

Lecture No.	Unit 3: Web Site Hosting
18	WWW Servers, Multiple Sites on a Single Server
19	HTTP, URLs, Domain Registration
20	How to Register a Web Site on Search Engine, Mail Hosting Facilities
21	Web Browsers: Principle, Types, Examples
22	Web Searching: Principle of Search Engines, Types, Examples
23	Search Mechanisms, SEO Basics
24	Discussion on Hosting and Browsers
25	Practical: Setting Up a Local Server and Hosting a Simple Site

Lecture No.	Unit 4: Important Web Protocols
26	File Transfer Protocol: Types of FTP Servers, TFTP
27	SMTP, Email Protocols (X-400, SMTP, UUCP)
28	Telnet: Protocol, Server Domain, Telnet Client, Terminal Emulation
29	Usenet and Internet Relay Chat
30	Web Applications: E-mail Networks
31	E-mail Headers, Contents, and Encoding
32	E-mail Routing, E-mail Client, POP-3, IMAP-4
33	Overview of SOA, Web Services & Their Architecture
34	Practical: Using FTP, Telnet, and Setting Up an Email Client

Lecture No.	Unit 5: Advanced Topics
35	Introduction to Service-Oriented Architecture (SOA)
36	Web Services & Their Architecture, Service Registry/Brokers
37	WSDL Interfaces
38	Introduction to Semantic Web, Technologies, and Applications
39	E-mail: Advanced Client Configuration and Management
40	Review and Advanced Discussion on SOA and Semantic Web
41	Preparing for Projects and Assignments
42	Recap and Q&A Session, Preparation for Examinations

Object Oriented Programming Using Java

Lecture No.	Unit 1: Introduction
1	Overview of Object-Oriented Programming and Java
2	Inherent Complexity of Software, Attributes of Complex Systems
3	Elements of the Object Model: Minor and Major Elements
4	Review of Object-Oriented Concepts and Terminology
5	Java Development Kit and Integrated Development Environment Setup
6	Basic Java Syntax and Program Structure
7	Variables, Data Types, and Expressions
8	Control Structures: Selections and Loops
9	Practical: Writing and Running Simple Java Programs

Lecture No.	Unit 2: Object Oriented Concepts
10	Problem Solving using Object-Oriented Approach
11	Understanding Objects and Classes
12	Attributes and Methods, Data Abstraction and Encapsulation
13	Data Hiding, Constructors, and Object Lifecycle
14	Static and Instance Members of a Class
15	Inheritance: Basics and Types
16	Overloading Methods and Constructors
17	Practical: Designing Classes and Creating Objects
18	Review and Discussion on OOP Concepts

Lecture No.	Unit 3: Object Oriented Fundamentals
19	Basic Language Elements, Primitive and Non-Primitive Data Types
20	Unicode Character Set, Variable Defaults, and Initial Values
21	Operators and Assignments, Access Modifiers
22	Methods: Declaration, Calling, and Parameters
23	String Handling and Immutable Strings
24	Arrays: Declaration, Instantiation, and Use
25	Introduction to Error Handling with Exceptions
26	Practical: Programming with Arrays and Strings
27	Mid-Term Review and Practice Exercises

Lecture No.	Unit 4: Advanced Object Oriented Programming
28	Control Structures: Advanced Concepts and Usage
29	Packages and Access Control
30	Interfaces and Abstract Classes
31	Deep Dive into Inheritance and Polymorphism
32	Compile-Time and Run-Time Polymorphism
33	Wrapper Classes and Autoboxing
34	Exception Handling: Try, Catch, Finally, Throw, and Throws
35	Multithreaded Programming: Basics and Synchronization
36	Practical: Handling Exceptions and Multithreading

Lecture No.	Unit 5: Object Oriented Analysis and Design
37	Introduction to Analysis and Design Concepts
38	Understanding Design Concepts and Principles
39	Use Cases and Identifying Requirements
40	Class Diagrams: Structure and Relationships
41	State Transition and Object Diagrams
42	Designing a Small System: Putting it All Together
43	Advanced Features and Best Practices in OOP
44	Practical: Designing and Implementing a Small Project
45	Recap, Q&A Session, and Preparation for Examinations

Elective I

Machine Learning

Lecture No.	Unit 1: Introduction
1	Overview of machine learning, different forms of learning
2-3	Gaussian and maximum likelihood estimation
4	Bayesian estimation, bias and variance of estimators
5-6	Missing and noisy features, nonparametric density estimation
7-8	Applications and software tools

Lecture No.	Unit 2: Classification Methods
9-10	Nearest neighbour, decision trees
11-12	Linear Discriminant Analysis, logistic regression
13-14	Perceptrons, large margin classification
15-16	Kernel methods, Support Vector Machines
17-18	Classification and Regression Trees, graphical models

Lecture No.	Unit 3: Clustering Methods
19-21	Partitioned-based Clustering: K-means, K-medoids
22-24	Hierarchical Clustering: Agglomerative-Divisive, measures
25-27	Density-based Clustering: DBScan, Spectral clustering

Lecture No.	Unit 4: Neural Networks
28-30	Perceptron algorithm, multilayer perceptrons, backpropagation
31-32	Nonlinear regression, multiclass discrimination
33-34	Training procedures, localized network structure
35-36	Dimensionality reduction, interpretation

Lecture No.	Unit 5: Reinforcement Learning
37-39	Single State Case, K-Armed Bandit, reinforcement learning
40-42	Model-Based Learning, Value Iteration, Policy Iteration
43-45	Temporal Difference Learning, Exploration Strategies