

BCA Program Structure

Year 1:

C Programming

Chapter 1: Algorithms and Flowcharts

Algorithms - Flowcharts - Solved Examples - Summary - Self assessment questions

Chapter 2: C Language Basics

Data Types in C - Constants in C - Variables - Constants/Literals - Operator - Control Structures - Loops - Summary - Self Assessment Questions

Chapter 3: Arrays

Introduction - One-dimensional arrays - Multidimensional arrays - Pros and cons of using arrays - Solved Examples - Summary - Self-Assessment Questions

Chapter 4: Functions in C

Introduction - Defining functions - Types of functions - Passing parameters - Recursion - Solved Examples - Summary - Self-Assessment Questions –

Chapter 5: Storage Classes and Standard Functions

Storage classes - Header files - Standard functions - Preprocessor Directives - Solved Examples - Summary - Self-Assessment Questions

Chapter 6: Introduction to Pointers in C

Introduction - Basic terminologies: Memory, Datatypes and their size requirement - The & and * Operators - A Pointer Variable - 'NULL' Pointer - Pointer to Pointer - Declaring Pointers of other datatypes - Pointers - A Detailed Look - Passing addresses to functions: Call by Reference - Functions Returning Pointers - Summary - Self-Assessment Questions –

Chapter 7: Handling Arrays using Pointers

Pointer Arithmetic - Pointer Comparison - Address of Array Elements - Relation between Arrays and Pointers - Pointer to an Array / Array Pointer - Pointer to Multidimensional Arrays - Summary - Self-Assessment Questions

Chapter 8: Pointers and Strings

What are Strings? - More about Strings? - Null ('\0') Character - Printing a String using printf() - Pointers and Strings - Standard Library String Functions - Two-Dimensional Array of Characters - Array of Pointers to Strings - Summary - Self-Assessment Questions

Chapter 9: Structures, Unions and Pointers

Introduction to structures - Why to use structures? - How to declare structures? - Declaring structure variables - Initializing structure variables - Pointer to the Structure. - Access structure elements - Array of Structures - Copy all elements of one structure to other - Nested Structures - Passing structures to functions - Pointers to the structures - Unions - Summary - Self-Assessment Questions

Chapter 10: File Handling

Introduction - File I/O operations - Handling Corner Cases - File Opening Modes - Copy contents of one file to other - Read/Write String from/to a File: fgets() and fputs() - Summary - Self-Assessment Questions

Discrete Mathematics

Chapter 1: Logic

Propositional Logic - Predicates and Quantifiers - Rules of Inference: Argument in propositional Logic

Chapter 2: Set Theory

Basic Set Theory - Union and Intersection of Sets - Set Difference, Set Complement and the Power Set - Relations and Functions - Equivalence Relation - Advanced topics in Set Theory and Relations - Families of Sets - More on Relations

Chapter 3: Recurrence Relation

Recurrence Relations: Introduction, Formation. - Linear Recurrence Relations with constant coefficients. - Homogeneous Solutions. - Particular Solutions

Chapter 4: Graph

Definitions - Walks, Trails, Paths, Circuits, Connectivity, Components - Graph Operations - Cuts - Labeled Graphs and Isomorphism

Chapter 5: Tree

Trees and Forests - (Fundamental) Circuits and (Fundamental) Cut Set

Chapter 6: Directed Graphs

Definition - Directed Trees - cyclic Directed Graphs

Chapter 7: Matrices and Vector Spaces of Graphs

Matrix Representation of Graphs - Cut Matrix - Circuit Matrix – An Application: Stationary Linear Networks - Matrices over GF(2) and Vector Spaces of Graphs

Chapter 8: Graph Algorithms

Computational Complexity of Algorithms - Reachability: Warshall's Algorithm - Depth-First and Breadth-First Searches - The Lightest Path: Dijkstra's Algorithm - The Lightest Path: Floyd's Algorithm - The Lightest Spanning Tree: Kruskal's and Prim's Algorithms - The Lightest Hamiltonian Circuit (Travelling Salesman's Problem): The Annealing Algorithm and the Karp–Held Heuristics - Maximum Matching in Bipartite Graphs: The Hungarian Algorithm - Maximum Flow in a Transport Network: The Ford–Fulkerson Algorithm

Modern Operating Environment and MS Office

Chapter 1 : Modern Operating Environment and MS Office

Introduction - What is a Computer? - History of Computers - Characteristics of Computers - Concepts of Hardware and Software - Types of Software - Evolution and Generation of Computers - Types of Computers - Limitations of Computers - Application Areas of computers

Chapter 2 : Structure and Working of Computer

Introduction - Functional Block Diagram of a Computer (Input Unit, Output Unit) - CPU (Central Processing Unit) (Components of CPU, Arithmetic Logic Unit (ALU), Control Unit (CU), Registers) - Bus Structure - [Keywords](#) - [Summary](#)

Chapter 3- Input/ Output Devices

Introduction - Input Devices - Output Devices - [Keywords](#) - [Summary](#)

Chapter 4: Computer Memory Structure

Introduction - What is Memory? - Primary (Semiconductor) Memory - Secondary Memory - Storage Devices - [Keywords](#) - [Summary](#)

Chapter 5: Computer Language and Software Structure

Introduction - Algorithm - Flowchart - Types of Programming Languages - Compilers and Interpreters - Characteristics of a Good Programming Language - Software - [Keyword](#) - [Summary](#)

Chapter 6-Operating System

Introduction to OS - Evolution of Operating System - Functions of Operating Systems - Types of Operating Systems - Windows Operating System - Components of the Windows O.S - Running Windows Applications - Switching between Applications - Windows Accessories - Difference between DOS and Windows Operating System - Linux O.S

Chapter 7-Networking

Introduction - Computer Network - Communication Modes - Data Transmission - Direction of Transmission Media - Network Structure - Network Topologies - Internet - [Keywords](#) – [Summary](#)

Chapter 8-MS Office

Introduction - Introduction to MS-Word 2007 - MS-Excel 2007 - MS-PowerPoint 2007 - MS-Access 2007

E-Commerce Concepts

Chapter 1 : Introduction to Electronic Commerce

Introduction - Main Activities of E-Commerce (Access control and security, Profiling and personalization, Search Management, Payment, Work flow management, Content and catalog management, Event notification) - Goals of E-Commerce - Technical Components of E-Commerce - Functions of E-commerce - Advantages of e-commerce - Disadvantages of e-commerce - Scope of E-Commerce - E-Commerce Applications - Electronic Business (Advantages of E-business, Limitations of E-business) - Difference between E-Commerce and E-Business - Categories of Ecommerce (Business-To-Consumer (B2C), Business-To Business (B2B), Consumer-To-Consumer (C2C), Consumer-To-Business

(C2B), Nonbusiness And Government, Organizational (Intra business)) - Models of E-commerce - Interdisciplinary nature of E-commerce - Limitations of E-Commerce - Summary - Keywords - Bibliography

Chapter 2: Building Own Website

Introduction - What does a Website do? - Reasons to Building a Websites - Benefits of Having a Website - Bandwidth Requirement - Cost of Building a Website - Time Consumed - Reach or Accessibility of Website - Register a Domain Name - Web Promotion - Banner Exchange - Shopping Bots - Target E-mails - Summary - Keywords - Bibliography

Chapter 3 : Internet and Extranet

Introduction – Internet (Tools and Services of Internet, Hardware and software of internet, Advantages and Disadvantages of Internet) - Intranet (Intranet Security, Planning and Creating an Intranet, Advantages and Disadvantages of Intranets, Features of Intranet, Components of Intranet Information Technology Structure) – Extranet (Application of Extranet, Advantages and Disadvantages of Extranet) - Internet versus Intranets - Extranet Versus Intranet - Development of Intranet - Role of Intranet in B2B Application - Summary - Keywords - Bibliography

Chapter 4: Electronic Payment System

Introduction - Requirements for Electronics Payment System - Characteristics of Electronics Payment System - Traditional Payment System - Process of Electronics Payment System (Authorization, Batching, Clearing, Funding) - Types of Electronics Payments Systems - E-Payments Tools – (E-Wallet, E-cash, E-checks, Intelligent Card) - Electronics Funds Transfer - Payment Cards (Credit cards, Debit cards, Charge cards, Smart cards) - Micropayment and Other Payment Systems - Electronic Bill or Paperless Bill Presentation and Payment - Need of E-payment - Payment Considerations - Using Payment Services Providers - Value Exchange System - Modern/Mobile payment of Cash - Secure electronic transfer

Chapter 5: Technology Solution

Introduction - Protecting Internet Communication – Encryption (Importance of encryption, Encryption vs. Decryption) - Symmetric Key Encryption - Public key Encryption - Public key Encryption Using Digital Signatures - Digital Envelopes - Digital Certificates (Certificate Authorities, How to check certificate is valid or not valid?) - Limitation to Encryption Solutions (Disadvantages of Encryption, Disadvantages of Digital Signatures) - Summary - Keywords - Bibliography

Chapter 6 : E-Com Security

Introduction - E-Commerce security Environment - Security Threats in Ecommerce environment (Malicious Code, Computer Viruses, Computer Worm, Trojan Horse, Logic Bomb, Trap Roots, Unwanted Programs, Spyware, Adware, Password Crackers, Dialers, Phishing and Identity Theft, Phishing Techniques, Anti phishing, How to avoid phishing, Hacking and Cyber, Vandalism, Credit Card Fraud/Theft, Spoofing, Difference between spoofing and phishing, Denial of services(DOS), Distributed Denial of Service Attack(DDoS), Prevention of DoS and DDoS attacks)

Computer Networks

Chapter 1 : Basics of Computer Networks

Introduction (Definition, Goals, Applications, Structure, Components) – Topology (Bus, Ring, Star, Mesh, Tree, Hybrid) - Types of networks (LAN, MAN, WAN, Internet, Broadcast & Point-to-Point Networks) -

Communication Types (Serial, Parallel) - Modes of Communication (Simplex, Half Duplex, Full Duplex) - Protocols and Standards - Summary - Self Assessment Questions

Chapter 2 : Network Models

Introduction - Design Issues of the layer - Protocol Hierarchy - ISO-OSI Reference Model (Layers in the OSI Model, Functions of each layer) - Terminology (SAP, Connectionless services, Connection Oriented services, Peer Entities) - Internet Model (TCP/IP) - Comparison of ISO-OSI & TCP/IP Model - Addressing (Physical Addresses, Logical Addresses, Port Addresses) - IP Addressing (Classful Addressing, Classless Addressing) - Summary - Self Assessment Questions

Chapter 3 : Transmission Media

Structure – Introduction - Classification of Transmission Media (Guided Media (Wired), Coaxial Cable: Physical Structure, Characteristics, Connector, Applications, Twisted Pair: Physical Structure, UTP vs STP, Connector, Applications, Fiber Optics Cable: Physical Structure, Propagation Modes (Single Mode & Multimode), Connectors, Applications, Unguided Media (Wireless), Electromagnetic Spectrum for Wireless Communication, Propagation Methods: Ground Propagation, Sky Propagation, Line-of-Sight Propagation, Wireless Transmission: Radio Waves, Infra-Red, Micro-Wave) - Summary - Self Assessment Questions

Chapter 4 : Wired and Wireless LANs

Introduction - IEEE Standards - Standard Ethernet (MAC Sublayer, Physical Layer) - Changes in Standard Ethernet (Fast Ethernet, MAC Sublayer, Physical Layer) - Giga Ethernet (MAC Sublayer, Physical Layer) - Network Interface Cards (NIC) (Components of NIC, Functions of NIC, Types of NIC) - Wireless LAN (IEEE 802.11 Architecture, Bluetooth Technology) - Summary - Self Assessment Questions

Chapter 5 : Network Connectivity Devices

Categories of Connectivity Devices (Passive and Active Hubs, Repeaters, Bridges, Transparent Bridge (Loop Problem, Spanning Tree), Source Routing Bridge, Switches, Router, Gateways) -Network Security Device (Firewalls, Packet-Filter firewall, Proxy firewall) - Summary - Self Assessment Questions

Chapter 6 : Internet Basics

Concept of Internet and Extranet (Intranet, Extranet) - Internet Information Server (IIS) - Web Server, WWW (World Wide Web) - Search Engines (Architecture, Web Documents: static, dynamic and active documents) - Internet Service Providers (ISP) – HTTP (HTTP Transaction, Persistent and non-persistent connection) - Summary - Self Assessment Questions

Data Structure Using C

Chapter 1: Basic Concept and Introduction to Data Structure

Pointers and Dynamic Memory Allocation (Pointer Introduction, Dynamic Memory Allocation) - Algorithm Analysis (Algorithm Definition and Characteristics, Performance Analysis, Space Complexity, Time Complexity, Asymptotic Notation) - Introduction to Data Structure - Abstract Data Type/ADT - Introduction to Arrays - Polynomials - Introduction to Structures - typedef - Summary - Keywords - Self- Assessment Questions

Chapter 2 : Searching and Sorting Techniques

Introduction to Searching (Linear Search, Binary Search) - Sorting (Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Heap Sort, Merge Sort, Comparison of Sorting Methods) - Summary - Keywords - Self-Assessment Questions

Chapter 3 : Linked List

Concept of Linked Organization (Introduction, Definition, Advantages of Linked List, Difference between Linked List and Array) - Implementation of Linked List (Static Representation, Dynamic Representation) - Types of Linked List (Singly Linked List, Operations on a Singly Linked List, Doubly Linked List, Circular Linked List) - Summary - Keywords - Self Assessment Questions

Chapter 4 : Stack and Queue

Definition of a Stack - Implementation of stack (Static, Dynamic Representation) - Primitive Operations on Stack - Application of Stack - Definition of a Queue - Implementation of Queue (Static, Dynamic Representation) - Primitive Operations on Queue - Types of Queue - Priority Queue - Double Ended Queue(DEQUE) - Application of Queues - Summary - Keywords - Self Assessment Questions

Chapter 5 : Trees

Introduction - Tree Terminology - Binary Trees Types - Representation on Binary Trees - Operations on Binary Tree - Traversing a Binary Tree - AVL Trees - Summary - Keywords - Self Assessment Questions

Chapter 6 : Graphs

Basic Concepts of Graphs (Type of Graphs, Properties of Graph, Terminology in Graphs, Representation of GRAPH) -Shortest Path Problem - Traversal of Graphs (Depth First Search (DFS), Breadth First Search (BFS)) - Applications of Graphs (Spanning Tree) - Summary - Keywords - Questions

Environmental Science

Chapter 1 : The Multidisciplinary Nature of Environmental Studies

Definition, Scope and Importance - Need For Public Awareness – Summary - Key words - Self Assessment Questions

Chapter 2 : Natural Resources

Introduction - Renewable And Non-Renewable Resources - Role Of An Individual In Conservation Of Natural Resources - Equitable Use Of Resources For Sustainable Lifestyles – Summary - Key words - Self Assessment Questions

Chapter 3 : Ecosystems

Introduction - Ecosystem types - Ecosystem components (Producers, Consumers, Decomposers, Abiotic components, Trophic levels) - Ecological pyramids (Pyramid of numbers, Pyramid of Biomass, Pyramid of Energy) - Different aspects of ecosystem study (Trophic structure, Biochemical structure, Species structure, Productivity concept) - Significance of ecosystem study - Biogeochemical cycles (Carbon cycle, Oxygen cycle, Nitrogen cycle, Phosphorus cycle, Sulphur cycle) - Diversity of ecosystem (Aquatic ecosystem, Terrestrial ecosystem) – Summary, Key words, Self Assessment Questions

Chapter 4 : Biodiversity and Its Conservation

Introduction - Hotspots of Biodiversity - Levels of Biodiversity organization - Factors of Biodiversity loss - Conservation of biodiversity - Obstacles in Biodiversity conservation - Convention and Articles on Biodiversity conservation - International institutes involved in Biodiversity conservation - Sustainable management of Biodiversity – Summary - Self Assessment Questions

Chapter 5 : Environmental Pollution

Origin of pollution – Pollutants - Types of pollution (Air Pollution, Water Pollution, Land Pollution, Noise Pollution, Thermal Pollution, Radioactive Pollution) – Summary - Key words - Self Assessment Questions

Chapter 6 : Social Issues and The Environment

Introduction - From unsustainable to sustainable development - Urban problems related to energy - Water conservation (Watershed management, Rainwater harvesting) - Resettlement and rehabilitation of people: its problems and concerns - Environmental ethics: issues and possible solution (Code of ethics) - Climate change, global warming, Acid rain, ozone layer depletion, nuclear accidents and Holocaust (Ozone layer depletion, Acid rain, nuclear accidents and Holocaust) - Consumerism and waste products - Environment protection act - Issues involved in enforcement of environment legislation (Environment impact assessment) - Public awareness – Summary - Key words - Self Assessment Questions

Chapter 7 : Human Population and The Environment

Introduction – Demography - Population Growth, Variation Among Nations (Global Population Growth) - Population Explosion: Family Welfare Program (Methods Of Sterilization, Urbanization) - Environment And Human Health (Climate And Health, Infectious Diseases, Water – Related Diseases, Risks Due To Chemicals In Food, Cancer And the Environment) - Human Rights - Value Education - HIV/AIDS - Woman

And Child Welfare - Role Of Information Technology (It) In Environment And Human Health – Summary -
Key words - Self Assessment Questions

Year 2:

Object Oriented Programming with C++

Chapter 1: Principle of OOP's

Software crisis - Software Evaluation - POP (Procedure Oriented Programming) - OOP(Object Oriented Programming) - Basic concepts of OOP - Benefits of OOP - Object Oriented Language - Application of OOP

Chapter 2: Basics of C++

ABrief History of C and C++ - Difference between C and C++ - Features of C++ - Advantages and Disadvantages of C++ - Applications of C++ - Writing and Executing a C++ Program - Program Structure and Rules - Sample C++ Program - Comments - Return Type of MAIN()

Chapter 3: Expression

Introduction C++ Tokens - Understand different Data types in C++ - Understand Declaration of Variables - How to Initialization of Variables in C++ - Understand Reference Variables - Know the Operators and use of the Operators in C++ - Type Cast Operator in C++ - Understand Memory Management operators and use of the same - Mentioning of Expression - Understand Statement - Understand Symbolic Constant - Type Compatibility with C++ - Summary - SelfAssessment Questions

Chapter 4: Functions in C++

Introduction to Function, - Passing Information-Parameters, - Default Arguments, - Constant Arguments, - Function Overloading, - Inline Functions, - Recursive Functions - Summary - Self Assessment Questions

Chapter 5: Classes and Objects

Introduction of a Class, - Member Functions, - Making an Outside Function Inline, - Nesting Of Member Functions, - Private Member Function, - Arrays within a Class, - MemoryAllocation for Objects, - Arrays of Objects, - Objects as FunctionArguments, - Returning Objects, - Const Member Function, - Static Class Members - Pointer to Members, - Local classes, - Friend Functions, - Unions and classes, - Object Composition and Delegation - Summery - SelfAssessment Questions

Chapter 6: Constructor and Destructor

Introduction to Constructor - Constructor Definition, - Multiple Constructors in a class - Constructor with Default Arguments - Dynamic Initialization of Objects - Const Object, Destructor - Summary - Self Assessment Questions

Chapter 7: Operator Overloading and Type Conversion

Introduction, - Overloading Unary Operators, - Overloading Binary Operators, - Limitations of Operator Overloading, - This pointer, - Overloading<<and>>Operators, - Manipulation of String, - Types Conversion - Summary - SelfAssessment Questions

Chapter 8: Inheritance

Introduction OOPs – Inheritance - Single Inheritance, - Multiple Inheritance, - Multilevel Inheritance, - Hierarchical inheritance, - Hybrid Inheritance, - Container Classes, - Virtual Base Classes, - Construction in Derived classes, - Virtual Function, - Pure Virtual Functions, - Abstract Classes - Summary - Self Assessment Questions

Chapter 9: The C++ I/O System Basics

Introduction - C++ streams - C++ streams classes - Unformatted I/O Operations - Formatted console I/O Operations - Managing output with manipulators - Design Our Own Manipulators - Summary – Self Assessment Questions

Chapter 10: Working with Files

Introduction Creating a Stream, - Opening a File, - Closing a File, - Checking For Failure with File Commands, - Detecting the End-of-file, - File Pointers and their Manipulation, - Reading/Writing a character From a File, - Write()and read() Functions, - .Buffers and Synchronization, - Other Functions, - RandomAccess File Processing, - Updating a File :RandomAccess, - Command LineArguments. - Summary. – Self Assessment Questions

Chapter 11: Template

Introduction - Class templates - Multiple parameters in class templates - Function templates - Multiple parameters in function templates - Overloading of template functions - Member function templates - Non-type template arguments - Summary - 0SelfAssessment Questions

Chapter 12: Exception Handling

Introduction - Principles of Exception handling - Exception handling mechanism - Throwing mechanism - Catching mechanism - Re-throwing an Exception - Specifying Exception - Summary - SelfAssessment Questions

Chapter 13: Introduction to Standard Template library

Introduction - The C++ Standard Template Library (STL) - .Algorithms - C++: Containers in STL - C++: Iterators in STL - Use and Application of STL - Classification of Containers in STL - Using Container Library in STL - 0Standard Exceptions in C++ - 1Dynamic MemoryAllocation in C++ - 2Summary. - 3SelfAssessment Questions

Chapter 14: Namespace

Introduction - Creating a Namespace - Rules to create Namespaces - Using a Namespace in C++ - Discontinuous Namespaces - Nested Namespaces - Summary. – Self-Assessment Questions

Chapter 15: New Style Caste and RTRI

Introduction - New-Style Casts, - Static_cast, - Dynamic_cast, - Const_cast,Reinterpret_cast, - Run-Time Type Information(RTTI), - ASimpleApplication of Run-Time Type ID, - Typied can be applied to Templates classes

Software Engineering

Chapter 1: Overview of System Analysis and Design

Introduction to System Concepts - Mapping Software with system definition - Categories of Information System - Concepts of Engineering - Software development Life Cycle (SDLC) - Different Approaches and

Models for System including RAD and Spiral and - prototyping model - The Role and Task of System Analyst, Skills required for a Good Software Analyst

Chapter 2: Software Requirement Specification Technique

Introduction To Requirement Engineering - Requirement Anticipation - Requirement Investigation - Requirement Specification, - Solved Cases Study with IEEE standards for SRS document

Chapter 3: Information Requirement Analysis

Introduction to Decision Analysis - What is Functional Decomposition? - Process modeling with Data Flow Diagram - Entity Relationship Diagram - Normalization - Data Dictionary - Decision Tree - Decision Table

Chapter 4: Designing of Input, Output and Program

Introduction To System Design - Human Computer Interface and software design - Design of Input and Control - Design of Output - User Interface Design - Solved Case Study

Chapter 5: Software Maintenance

Introduction - Why We Need Software maintenance - Types of Maintenance - Maintenance Cost
Introduction to Legacy - Reverse Engineering - Documentation

Chapter 6: Case Tools

Introduction to Case Tools - Types of CASE Tools used in various SDLC phases with example - Advantages and Disadvantages of Case Tools - Case Studies

Chapter 7: Current Trends in Software Engineering

Introduction - Software Engineering for Projects and Products - Scrum methodology - Web Engineering - Agile Process - CPM and PERT - Gantt Charts - SQA - SEI-CMM
Introduction to Software Security

CHAPTER 1: RECURSIVE FUNCTION

Structure: Concept of Recursion - Program using Recursion

CHAPTER 2: ARRAY-I

Structure: Concept of array - Types of Arrays – One , Two and Multidimensional array - Array Operations - declaration, initialization, accessing array elements - Memory representation of two-dimensional array (row major and column major) - Passing arrays to function - Application of Array

CHAPTER 3: ARRAY -II

Structure: One Dimensional Array program - One Dimensional Array program using function - Two-Dimensional Array program

CHAPTER 4: POINTER-I

Structure: Introduction to pointer - Declaration, Definition, Initialization and Dereferencing - Pointer Arithmetic - Relationship between array and pointer

Unit-2

CHAPTER 5: POINTER-II

Structure: Multiple Induction (Pointer to Pointer) - Function and Pointer - Dangling Pointer - Types of Pointer - Array and Pointer

CHAPTER 6: DYNAMIC MEMORY MANAGEMENT

Structure: Dynamic Memory Allocation - malloc() - calloc() - realloc() - free()

CHAPTER 7: STRING-I

Structure: Introduction - String Literals - Syntax and Predefined String Function

CHAPTER 8: STRING-II

Structure: Array of String - String and Pointer - String program without using predefined string function

Unit-3

CHAPTER 9: STRUCTURE

Structure: Introduction - Concept of Structure - Accessing Structure Members - Nested Structure - Array of Structure - Structure and Function - Pointer and Structure

CHAPTER 10: STRUCTURE PROGRAM

Structure: Accept and display Student Information - Accept and display Book Information - To calculate Electricity Bill - To calculate Employee Salary - To Display result of Student - Trace the Output

CHAPTER 11: UNION

Structure: Concept of Union - Definition of Union - Initialization of Union - Accessing Union Members - Difference Between Structure and Union - Union Program

CHAPTER 12: FILE HANDLING -I

Structure: Concept - Introduction to Stream - Operation on file - Types of Files - Operation of Text files and Binary Files - Standard Library input / Output Function - Random access to file

Unit-4

CHAPTER 13: FILE HANDLING- II

Structure: File Handling Program - Trace the Output

CHAPTER 14: COMMAND LINE ARGUMENTS

Structure: Concepts - Program of command Line Arguments

SUBJECT: JAVA PROGRAMMING

Chapter 1: Introduction to Object Oriented Programming: Early Age: Procedural Oriented Programming, Disadvantages of Procedural Oriented Programming, Need for Real-life solutions: Birth of Object-Oriented

Programming (OOP), Advantages of Object-Oriented Programming (OOP), Features of Java, Java Virtual Machine (JVM), Summary, Self-Assessment Questions

Chapter 2: Java Basic Constructs: Comments, Primitive Data Types, Literals, Keywords, Identifiers, Variables, Arrays, Type Conversions, Flow Controls, Operators, Operator Precedence, Summary, Self-Assessment Questions

Chapter 3: Classes and Objects in Java: Classes, Objects, Accessing, Members of Object, Object Reference Variables, Variable Scopes, Packages and Access Modifiers, Key OOP Concepts in Java, Constructors, and this keyword, Wrapper Classes, The Object Class, Summary, Self-Assessment Questions.

Chapter 4: Inheritance: Introduction to Inheritance, Terms used in Inheritance, Types of Inheritance, An abstract Class, An interface, The Super Keyword, Polymorphism, The final Keyword, Summary, Self-Assessment Questions.

Chapter 5: Strings: Introduction to String, Read data from the command line, String Processing, Regular expressions, Solved Examples, Summary, Self-Assessment Questions

Chapter 6: Exception Handling: Define the purpose of Java exceptions, Catching and handling the exceptions, Auto close resources with a try-with-resources statement, Throwing exception, User-defined exceptions, Summary, Self-Assessment Questions

Chapter 7: Java Applets: Introduction, Important Methods, Applet's Execution Environment, Life Cycle of an Applet, Developing an Applet, Abstract Window Toolkit (AWT), Solved Examples, Summary, Self-Assessment Questions

Chapter 8: Threads: Processes and Threads, Define and create a thread, Manage threads, Synchronization of threads, Inter thread communication, Solved Examples, Summary, Self-Assessment Questions

Chapter 9: JDBC: Introduction to database, Introduction to JDBC, Solved Examples, Summary, Self-Assessment Questions

RDBMS (Oracle)

Chapter 1 : Introduction to RDBMS

Introduction (Components of RDBMS, Advantages of RDBMS, Disadvantages of RDBMS) - Introduction to popular RDBMS products and their features - Difference between DBMS and RDBMS - Relationship among application programs and RDBMS (Responsibilities of client machines, Responsibilities of server machines, Advantages of client server architecture, Disadvantages of client server architecture)

Chapter 2 : PL/SQL

Overview of PL/SQL (PLSQL Execution Environment, Advantages of PLSQL) - Data Types (Built-in Data Types, User Defined Data Types, Large Object Types) - PL/SQL Block - PL/SQL Control Structures (Conditional Control, Iterative Control, Sequential Control) - Exception Handling (Predefined Exception, User Defined Exception) - Function (Execution of Function, Dropping a function) - Procedures (Execution of Procedure, Dropping a Procedure) - Cursor (Types of Cursor, Implicit Cursor, Explicit Cursor) -

Database Triggers (Types of Triggers, Dropping a Trigger) - Oracle Packages - Summary - Keyword - Bibliography

Chapter 3 : Transaction Management

Introduction - Transaction Concept - Transaction Properties (Atomicity, Consistency, Isolation, Durability) - Transaction States - Concurrent Execution - (Concurrent Transaction, Advantages of concurrent transaction, Problems associated with concurrent transaction, Schedule) - Serializability (Types of serializability: Conflict Serializability, View Serializability, Precedence Graph) - Recoverability - Summary - Keywords - Bibliography

Chapter 4 : Concurrency Control

Introduction - Concurrency Control - Lock based Protocols (Binary Lock, Shared Lock, Exclusive Lock, Two phase Locking) - Time Stamp Based Protocols (Thomas' Write Rule) - Validation Based Protocols - Deadlock Handling - Deadlock Prevention Algorithm (Wait –Die Scheme, Wound –Wait Scheme, Timeout Based Schemes) - Deadlock Detection (Wait –For Graph) - Recovery from deadlock (Selection of the victim, Rollback, Starvation) - Solved Examples - Summary - Keywords - Bibliography

Chapter 5 : Recovery System

Introduction - Failure Classification (Minor failure/ non-catastrophic failure: System Crash, Transaction Failure due to concurrency control, Major failure/ catastrophic failure (Disk Failure, Physical Problem) -Storage Structure (Volatile storage, Non- volatile storage) - Recovery and Atomicity (System log, Commit, Check Points, DO,UNDO,REDO Operations, Database Recovery Algorithm: Deferred Update, Immediate Update, Shadow paging) - Recovery with concurrent transaction (Rollback, Check Point, Commit) - Remote backup system - Solved Examples - Summary - Keywords - Bibliography

Software Deployment

Unit-1

Chapter 1: Introduction of Software and software development Lifecycle (SDLC)

Structure: What is Software?-What is Software Development lifecycle (SDLC)?-Models of Software Development Life Cycle.

Chapter 2: Introduction of Software Deployment

Structure: What is Software Deployment?-History of Software deployment.-Deployment Activities-Software Deployment Principles

Chapter 3: Software Deployment methods and Strategies

Structure: Why is Software deployment Important?-Software Deployment Vs Software Release.-Software Deployment and Development Methodologies.-Software deployment Strategies.-What is software deployment Process?

Chapter 4: Understanding Software Deployment

Structure: Advantages of Software Deployment-Useful Software Deployment Tools for software delivery-What comes after deployment?

Unit-2

Chapter 5: Fundamentals of Software deployment

Structure: The software Delivering Problems-Software Configuration Management-Continuous Integration Process-Implementation of Testing Strategy

Chapter 6: Anatomy of the Software Deployment

Structure: Study of the deployment pipeline process-Building and deployment -The commit stage

Chapter 7: Types of Test

Structure: Introduction-Automated acceptance testing

Chapter 8: The Deploying and releasing of Application

Structure: Introduction-Release Strategy-Release plan-Releasing product-Deploying application

Unit-3

Chapter 9: Infrastructure and other Management

Structure: Introduction-Needs of Operations -Managing and modeling Infrastructure

Chapter 10: Data Management

Structure: Introduction-Managing data-Managing test data

Chapter 11: Management of Components

Structure: Introduction-Managing Components

Chapter 12: Management of dependencies

Structure: Introduction-Dependency management

Unit-4

Chapter 13: Advanced Version

Structure: Introduction-History of Revision Control-Concurrent version system-Commercial version control system-Distributed version Control system-Stream Based version Control System

Chapter 14: Continuous Delivery Management

Structure: Introduction-Continuous Delivery Management

FULL STACK DEVELOPMENT

Unit-1

Chapter 1: Introduction to Hyper-Text Mark Up Language (HTML 5)

Structure: HTML Basics -Browsers and HTML -Editors Offline and Online -Tags Attribute and Elements - Doctype element -Comments -Heading - Paragraphs -Formatting Text -Lists -Links -Images -Tables

Chapter 2: Introduction to Cascading Style Sheet (CSS)

Structure: How to use CSS -Applying CSS to HTML -Selectors properties and values -CSS Colors - Backgrounds -CSS Box Model -CSS Margins Padding Borders -CSS Text and Font Properties -CSS General Topics

Chapter 3: Introduction to Bootstrap

Structure: Bootstrap Basics -Bootstrap Grids -Bootstrap Themes -Bootstrap CSS -Bootstrap JS

Chapter 4: Introduction to JavaScript -JavaScript Scope -JavaScript Events -JavaScript Strings - JavaScript Numbers -JavaScript Math -JavaScript Arrays -JavaScript Boolean -JavaScript Comparisons -JavaScript Conditions -JavaScript Switch -JavaScript Loops -JavaScript Type Conversion -JavaScript RegExp -JavaScript Errors -JavaScript Debugging -JavaScript Hoisting -JavaScript Strict Mode - JavaScript Functions -JavaScript Objects -JavaScript Forms -JavaScript HTML DOM -JavaScript BOM

Unit-2

Chapter 5: Introduction to JQuery

Structure: JQuery Syntax -jQuery Syntax -jQuery Selectors -jQuery Events -jQuery Effects -jQuery HTML -jQuery Traversing -jQuery AJAX & Mis

Chapter 6: Introduction to JQuery-Mobile

Structure: jQuery Mobile Pages - jQuery Mobile Transitions - jQuery Mobile Buttons - jQuery Mobile Icons - jQuery Mobile Popups - jQuery Mobile Toolbars - jQuery Mobile Navbars - jQuery Mobile Panels - jQuery Mobile Collapsibles - jQuery Mobile Tables - jQuery Mobile Grids - jQuery Mobile Lists - jQuery Mobile Forms - jQuery Mobile Themes - jQuery Mobile Events

Chapter 7: Introduction to React JS

Structure: Templating using JSX -Components -State and Props -Lifecycle of Components -Rendering List -Portals -Error Handling -Routers -Redux -Immutable.js -Redux-Saga -Service side rendering -Unit testing -Webpack

Chapter 8: Introduction to Mongo DB

Structure: MongoDB Environment -MongoDB Create Database -MongoDB Drop Database -MongoDB Create Collection -MongoDB Drop Collection -MongoDB Read Operations -MongoDB Write Operations -MongoDB Data Modelling -MongoDB Administration -MongoDB Security -MongoDB Aggregation -MongoDB Indexes -MongoDB Storage -MongoDB Replication

Unit-3

Chapter 9: Introduction To SQL

Structure: Rational Databases -SQL Querying -Your First Queries -Filtering Your Results -Consolidating Your Data -Grouping Your Data -Joining Tables -Subqueries -Manipulating Your Data -Transaction Control -Creating Database Objects And Adding Business Logic

Chapter 10: Introduction to Express Frame Work

Structure: Introduction to Node JS -What is Nodejs -Getting Started with Express -Your first Express App -Express Routing Implementing MVC in Express -Middleware -Using Template Engines -Error Handling -API Handling -Debugging Developing Template Engines -Using Process Managers Security & Deployment

Chapter 11: Introduction to Angular JS

Structure: Preparing for TypeScript -Angular-4 new features -Building with A4 Components -Bootstrap Scaffolding -Angular 4 Binding and Events -Dependency Injection and services -Directives -Pipes -Forms -HTTP, Promises, and Observables -Testing

Chapter 12: Introduction to Node.JS

Structure: Node.JS - basics and Setup -Node js - basics and setup -3. Node js console -4. Node js command utilities -5. Node js modules -6. Node js concepts -7. Node js events -8. Node js with express js -9. Node js database access

Unit-4

Chapter 13: Introduction to HTTP and Web Sockets

Structure: HTTP Parameters -HTTP Parameters -HTTP Messages -HTTP Request -HTTP Response - HTTP Methods -HTTP Status Code -HTTP Header Fields -Registration -HTTP Authentication WEB SOCKETS -Introduction to Web sockets -Web socket URIs -Web socket APIs -Opening Handshake -Data Framing -Sending and Receiving Data -Closing the Connections -Error Handling - Web socket Security -Deployment Considerations

Chapter 14: Introduction to Linux

Structure: Installing Linux -Getting To Know The Command Line -It's All About The Files -Working With Command Line -More Advanced Command Line And Concepts

HTML, CSS and JAVASCRIPT

Unit-1	
Chapter 1:	Introduction to Web Development & Related Terms
Contents in the chapter:	Overview of Web Concept of Internet, Intranet and Extranet Requirement of Internet Application areas of Internet. Key difference between Web and Internet Client-Server computing
Chapter 2:	Introduction to Website Development
Contents in the chapter:	Meaning of web page, Website, basic types of websites Types of websites development , 1)Client Side web development 2)Server Side web development 3) Full stack web development
Chapter 3:	HyperText Markup Language -I
Contents in the chapter:	Introduction to Hypertext Markup Language. Uses of HTML,

	<p>Limitations of HTML, Concept of Tag, Attributes, denotation of tags Basic structure of HTML Program Text formatting tags</p>
Chapter 4:	HyperText Markup Language -II
Contents in the chapter:	<p>List Tag & its attributes :- 1)ordered List 2)Unordered List 3) Definition List Adding Image in a Webpage with its all attributes</p>
Unit-2	
Chapter 5:	HyperText Markup Language -III
Contents in the chapter:	<p>ImageMap, Table Tag & its attributes</p>
Chapter 6:	HyperText Markup Language -IV
Contents in the chapter:	<p>Linking of document using Anchor Tag Types of Linking 1)Internal Linking 2)External Linking :- A)Text as hyperlink B)Image as Hyperlink Form Tag & its attributes Controls of form GET & POST Method Dividing a screen into multiple Sections /frames using Frameset Tag Targeted frame</p>
Chapter 7:	HTML -5
Contents in the chapter:	<p>Key features of HTML-5 Tags-Section, Article, aside, header, foot figure etc. • Events in HTML5, • Input tag in HTML5- (Type, Auto focus, placeholder, required etc.</p>

	<p>attributes.)</p> <ul style="list-style-type: none"> • Graphics in HTML5 <p>Media tags in HTML5</p>
Chapter 8:	Cascading Style Sheet (CSS)
Contents in the chapter:	<p>Introduction to CSS</p> <ul style="list-style-type: none"> • Use of CSS • Types of CSS, Selectors, Properties, Values. <p>CSS Properties- Background, Text, Fonts, Link, List, Table, Box Model, Border, Margin, Padding, Display, Positioning,</p>
Unit-3	
Chapter 9:	Java Script -I
Contents in the chapter:	<p>Introduction to JavaScript</p> <ul style="list-style-type: none"> • JavaScript Variables, Data types, Operators, Built in functions in JavaScript
Chapter 10:	Java Script -II
Contents in the chapter:	<p>Control structure in JavaScript:-</p> <p style="padding-left: 40px;">If ,If...else,</p> <p style="padding-left: 40px;">Do...while ,for loops</p> <p style="padding-left: 40px;">Switch case</p>
Chapter 11:	Java Script -III
Contents in the chapter:	<p>DOM, Math, Array, History, Navigator, Location, Windows, String, Date,</p> <p>Document objects,</p>
Chapter 12:	Java Script -IV
Contents in the chapter:	<p>Functions in Javascript .</p> <p>types of functions :-</p> <p style="padding-left: 40px;">Built in Functions</p> <p style="padding-left: 40px;">user defined function,</p> <ul style="list-style-type: none"> • Validation in JavaScript

Unit-4	
Chapter 13:	Java Script -V
Contents in the chapter:	Events in JavaScript, event handling in JavaScript.
Chapter 14:	Steps to create a website
Contents in the chapter:	Requirement for any website creation Steps to create a website

Web Services, REST API, NodeJS Development

Unit-1	
Chapter 1:	Web Services
Contents in the chapter:	<ul style="list-style-type: none"> ● Introduction To Web Services ● Need For Web Services ● Characteristics ● The architecture of Web Services ● Components ● Security ● Standards ● Summary
Chapter 2:	Web Services Resources
Contents in the chapter:	<ul style="list-style-type: none"> ● How Does Web Services Work? ● Why Web Services? ● Services Transport ● Examples of Web Services
Chapter 3:	SOAP Web Services
Contents in the chapter:	<ul style="list-style-type: none"> ● Advantages Of SOAP Web Services ● Disadvantages Of SOAP Web Services <ul style="list-style-type: none"> ❖ RESTful Web Services ❖ SOAP VS REST ❖ SOA
Chapter 4:	JAVA Web Services
Contents in the chapter:	<ul style="list-style-type: none"> ● JAS Web Services ● RPC Web Services ● JAX Web Services Ex RPC ● JAX Web Services Ex Document ● Summary

Unit-2	
Chapter 5:	REST API
Contents in the chapter:	<ul style="list-style-type: none"> ● Introduction ● The Need For Rest ● REST API- Restful Web ● Comparison Of APIs ● An Intuition Understanding of REST ● REST Constraints ● Concept of Serialization ● Concept of Deserialization ● Richardson Maturity Model ● REST API- Tools
Chapter 6:	Request & Response
Contents in the chapter:	<ul style="list-style-type: none"> ● Understanding HTTP Request ● HTTP Request Method ● Analyze HTTP Response ● Designing REST URLs
Chapter 7:	RESTful Services
Contents in the chapter:	<ul style="list-style-type: none"> ● Controllers and Action ● Creating Routing Templates ● Understanding Routing Attributes ● Using Parameters in Request ● Model Variation
Chapter 8:	Database
Contents in the chapter:	<ul style="list-style-type: none"> ● REST API - Creating Domain Models ● Scaffolding- REST API ● Controllers - REST API ● Database Seeding - REST API ● Migration - REST API ● Using DTOs ● Implementing Paging ● CORS AND Enabling CROS ● Deferral Execution
Unit-3	
Chapter 9:	Caching
Contents in the chapter:	<ul style="list-style-type: none"> ● introduction to Caching ● REST API Expiration Model ● Validation Model - REST API ● Cache-Control - REST API ● Concurrency in REST API

	<ul style="list-style-type: none"> ● JSON - REST API ● Cache Model
Chapter 10:	REST API - Advanced Concepts
Contents in the chapter:	<ul style="list-style-type: none"> ● Understanding HATEOAS ● Approaches to Reterening Hypermedia Data ● HAL and Collection + JSON ● Versioning REST rAPIs
Chapter 11:	Introduction to Node Js
Contents in the chapter:	<ul style="list-style-type: none"> ● What is Node.Js? ● Features of Node Js ● Who uses Node.Js? ● Where to use Node.Js?
Chapter 12:	Node JS
Contents in the chapter:	<ul style="list-style-type: none"> ● Setting Up Node.Js Environment ● Node.Js Console ● Node.Js RPEL ● Node.Js NPM ● Node.js CL Options ● Node.js Globals ● Node.js OS ● Node.js Errors ● Node.js DNS ● Node.js Net ● Node.js Crypto ● Node.js TLS/SSL ● Node.js Debugger ● Node.js Process ● Node.js Child Process ● Node.js Buffers ● Node.js Streams ● Node.js File System ● Node.js Path ● Node.js StringDecoder ● Node.js Query String ● Node.js ZLIB ● Node.js Assertion ● Node.js V8 ● Node.js Callbacks ● Node.js Events ● Node.js Punycode ● Node.js TTY ● Node.js Web Modules

Unit-4	
Chapter 13:	Node.js MySQL
Contents in the chapter:	<ul style="list-style-type: none"> ● MySQL Create Connection ● MySQL Create Database ● MySQL Create Table ● MySQL Insert Record ● MySQL Update Record ● MySQL Delete Record ● MySQL Select Record ● MySQL Select Unique ● MySQL Drop Table
Chapter 14:	Node.js MongoDB
Contents in the chapter:	<ul style="list-style-type: none"> ● Create Connection ● Create Database ● Create Collection ● MongoDB Insert ● MongoDB Select ● MongoDB Query ● MongoDB Sorting ● MongoDB Remove

USER INTERFACE, EXPERIENCE, DESIGN

Unit-1 The User Interface—An Introduction and Overview	
Chapter 1:	Introduction of the User Interface
Contents in the chapter:	<ul style="list-style-type: none"> ● Defining the User Interface ● The Importance of Good Design ● The Benefits of Good Design ● A Brief History of the Human-Computer Interface ● A Brief History of Screen Design
Chapter 2:	The Graphical User Interface
Contents in the chapter:	<ul style="list-style-type: none"> ● Introduction to Graphical User Interface ● The Popularity of Graphics ● The Concept of Direct Manipulation ● Graphical Systems: Advantages and Disadvantages ● Characteristics of the Graphical User Interface

Chapter 3:	The Web User Interface
Contents in the chapter:	<ul style="list-style-type: none"> • Introduction to Web User Interface • Characteristics of a Web Interface • The Merging of Graphical Business Systems and the Web <ul style="list-style-type: none"> ○ Characteristics of an Intranet versus the Internet ○ Extranets
Chapter 4:	Principles of User Interface Design
Contents in the chapter:	<ul style="list-style-type: none"> • Principles of User Interface Design • Principles for the Xerox STAR • General Principles
UNIT- II The User Interface Design Process	
Chapter 5: [Step- I & II]	Know Your User or Client and Understand the Business Function
Contents in the chapter:	<ul style="list-style-type: none"> • Understanding How People Interact with Computers • Responses to Poor Design • Important Human Characteristics in Design • Human Considerations in Design • Human Interaction Speeds • Methods for Gaining an Understanding of Users • Business Definition and Requirements Analysis • Determining Basic Business Functions • Design Standards or Style Guides • SYSTEM Training and Documentation Needs
Chapter 6: [Step- III]	Understand the Principles of Good Screen Design
Contents in the chapter:	<ul style="list-style-type: none"> • Human Considerations in Screen Design • Technological Considerations in Interface Design • Examples of screen

Chapter 7: [Step- IV]	Develop System Menus and Navigation Schemes
Contents in the chapter:	<ul style="list-style-type: none"> • Structures of Menu • Functions of Menu • Formatting of Menu • Phrasing the Menu • Selecting Menu Choices
Chapter 8: [Step- V]	Select the Proper Kinds of Windows
Contents in the chapter:	<ul style="list-style-type: none"> • Window Characteristics • Components of a Window • Window Presentation Styles • Types of Windows • Window Management • Organizing Window Functions • Window Organization • Window Operations
Chapter 9: [Step- VI & VII]	Choose the Proper Kinds of Device and Screen based controls
Contents in the chapter:	<ul style="list-style-type: none"> • Characteristics of Device-Based Controls • Selecting the Proper Device-Based Controls • Guidelines for Selecting the Proper Device-Based Control • Operable Controls • Text Entry/Read-Only Controls • Selection Controls • Palettes • Combination Entry/Selection Controls • Other Operable Controls • Presentation Controls

Chapter 10: [Step- VIII & IX]	Write Clear Text and Messages & Provide Effective Feedback and Guidance and Assistance
Contents in the chapter:	<ul style="list-style-type: none"> • Words, Sentences, Messages, and Text • Text for Web Pages • Providing the Proper Feedback • Guidance and Assistance
Chapter 11: [Step- X]	Provide Effective Internationalization and Accessibility
Contents in the chapter:	<ul style="list-style-type: none"> • International Considerations • Accessibility
Chapter 12: [Step- XI & XII]	Create Meaningful Graphics, Icons and Images & Choosing the Proper Colors
Contents in the chapter:	<ul style="list-style-type: none"> • Icon • Multimedia • Color Uses • Possible Problems with Color • Color and Human Vision • Choosing Colors
Chapter 13: [Step- XIII]	Organize and Layout Windows and Pages
Contents in the chapter:	<ul style="list-style-type: none"> • Organizing and Laying Out Screens • Screen Examples
Chapter 14: [Step- XIV]	Test, Test, and Retest
Contents in the chapter:	<ul style="list-style-type: none"> • The Purpose of Usability Testing • The Importance of Usability Testing • Scope of Testing

	<ul style="list-style-type: none"> • Prototypes • Kinds of Test • Developing and Conducting the Test • Analyze, Modify, and Retest
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Dot Net Programming

Chapter 1 : Introduction to .Net Framework

Introduction (Introduction to .Net, .Net Platform, What is .Net) - Integrated Development Environment - Event Driven Programming - .Net Framework - Architecture of .Net - Developing Application - Features of .Net Framework - Advantages of .Net - Develop Simple .Net Application - Summary - Keywords - Self-Assessment Questions

Chapter 2 : Introduction to VB .NET

Introduction (Features of VB.Net) - Basic of VB.Net (Datatypes, Variables, Datatype Conversion, Constants, Keywords, Operators, Statements) - Control Structures (Decision Making Statements, Loops, Loop Control Statements) - Build Console Application (Methods) - Build Windows Application (Controls, Menus and Popup Menus, Dialog Controls, Dialog Box) - Summary - Keywords - Self-Assessment Questions

Chapter 3 : Object Oriented Programming in VB .NET

Introduction - Class and Object (Classes, Objects, Fields) - Properties (Types of Properties) - Methods - Events - Constructors and Destructors (Constructors, Types of Constructors, Destructors) - Method Overloading – Inheritance (Types of Inheritance, Inheritance Modifiers, MyBase Keyword, MyClass Keyword) - Access Modifiers - Method Overriding - Interfaces - Polymorphism - Exception Handling - Summary - Keywords - Self-Assessment Questions

Chapter 4 : Architecture of ADO.NET

Introduction (Architecture of ADO.NET, Data Set, Data Provider) – Databases (Creation of SQL Database and Table, Connections, Command, DataAdapter, DataSet, DataReader, DataTable, Accessing and Manipulating Data) - Connections to Database with Server Explorer - Multiple Table Connection - Data Binding - Navigating Data Source - DataGridView Control - DataForm Wizard - Data Validation - Summary - Keywords - Self-Assessment Questions

Chapter 5 : Crystal Report

Introduction - Connecting to the Database (Table, Queries, Building Report, Modifying Report) - Field Explorer (Parameter Fields, Special Fields) - Working with Multiple Tables - Summary - Keywords - Self-Assessment Questions

Advanced Java

Chapter 1 : JDBC

Introduction (Role of JDBC, Features of JDBC, JDBC Architecture, Common JDBC Components) - Design of JDBC (JDBC Versions, JDBC Configuration) - Basic JDBC Program Concept - Drivers (Types of Drivers, Standard JDBC Drivers, JDBC packages) - Making the Connection - Executing SQL Commands (Executing SQL Statements, Result Set (Scrollable and Updatable), Metadata) - Executing Queries - Transactions (Commit, Rollback, Save points)

Chapter 2 : Networking

Introduction - Networking Basics (Protocol, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Addressing, Domain Name Service (DNS), Uniform Resource Locator (URL), Socket, Socket Networking, Client-Server Networking, Ports) - The java.Net Package (The InetAddress Class, URL, URLConnection Class) - Socket and Socket Server Class (Connectionless Transmission- Datagram Socket Class, Connection Oriented Transmission- Stream Socket Class, Socket Class, ServerSocket Class) - Creating a Socket to the remote host on a port (Creating TCP Client, Creating TCP Server) - Simple Socket Program Example

Chapter 3 : Servlet and JSP

Introduction (Overview of Servlet, Advantages of Servlet, Tasks of Servlet, How Servlet works?, Types of servlet, Servlet Hierarchy) - Servlet Life Cycle - Creating Servlet - Tomcat Configuration - Handling GET and POST Requests (javax.servlet Package, javax.servlet.http Package, servlet Interface, ServletConfig Interface, ServletRequest Interface, ServletResponse Interface) - Reading Servlet Parameters - Servlet-JDBC - Session Tracking (User Authorization, URL Rewriting, Hidden form fields, Cookies, HttpSession) - Cookie Class - JSP Introduction (JSP Architecture, JSP Processing, Accessing Model of JSP, Advantages of JSP) - Life Cycle of JSP - Components of JSP (Scripting Elements of JSP, Declarations, Expressions, Scriptlets, Comments, JSP Directives, Page Directive, Include Directive, Taglib Directive) - JSP Implicit Objects - Mixing Scriptlets and HTML - JSP with Database - Simple JSP Program - Summary - Keywords - Bibliography

Chapter 4 : Multithreading

Introduction - Threading Basics (Benefits of Multithreaded Programming, Disadvantages of Multithreading) - Thread Life Cycle - Creating a Thread (Using a Thread class, Main Thread) - Thread Priority - Thread Synchronization - Inter-Thread communication - Implementation of Thread with Applet - The Runnable Interface - Sample Programs of Thread - Summary - Bibliography

Chapter 5 : Java Beans and RMI

Introduction (What is Bean?, Features of Bean, Advantages of Java Beans, Disadvantages of Java Beans) - Using Bean Development kit(BDK) - Introduction to jar and manifest files - Java beans API - Remote Method Invocation - RMI architecture - Stubs and skeleton - Registry - Setting up RMI - Using RMI with applet - Summary - Keywords - Bibliography

Year 3:

Introduction to Artificial Intelligence

Unit-1	
Chapter 1:	Introduction to Artificial Intelligence
Contents in the chapter:	<ul style="list-style-type: none">• What is Artificial Intelligence?• AI related branches & fields.• AI techniques and applications
Chapter 2:	The History Of AI
Contents in the chapter:	<ul style="list-style-type: none">• The beginnings of AI 1950-1974• Re-birth 1980-1987• The modern era 1997-2005• Deep learning & the future 2012-to present
Chapter 3:	Problems, Problem Spaces and Search
Contents in the chapter:	<ul style="list-style-type: none">• Defining AI problems as a State Space Search: example• Production Systems
Chapter 4:	Search and Control Strategies
Contents in the chapter:	<ul style="list-style-type: none">• Search and Control Strategies• Problem Characteristics• Issues in Design of Search Programs• Additional Problem
Unit-2	
Chapter 5:	Heuristic Search Techniques-I
Contents in the chapter:	<ul style="list-style-type: none">• Generate-and-test• Hill Climbing• Best First Search
Chapter 6:	Heuristic Search Techniques-II

Contents in the chapter:	<ul style="list-style-type: none"> • Problem Reduction • Constraint Satisfaction • Mean-Ends Analysis
Chapter 7:	Knowledge Representation
Contents in the chapter:	<ul style="list-style-type: none"> • Representations and Mappings • Approaches to Knowledge Representation
Chapter 8:	Knowledge representation method
Contents in the chapter:	<ul style="list-style-type: none"> • Propositional Logic • Predicate logic • Representing Simple facts in Logic • Representing Instances and Isa relationships • Computable Functions and Predicates • Resolution • Forward and backward chaining
Unit-3	
Chapter 9:	Slot and Filler Structures -Weak Structures
Contents in the chapter:	<ul style="list-style-type: none"> • Semantic Networks • Frames
Chapter 10:	Slot and Filler Structures - Strong Structures
Contents in the chapter:	<ul style="list-style-type: none"> • Conceptual Dependencies • Scripts
Chapter 11:	Game Playing-I
Contents in the chapter:	<ul style="list-style-type: none"> • Minimax Search Procedures • Adding alpha-beta cutoffs
Chapter 12:	Game Playing-II
Contents in the chapter:	<ul style="list-style-type: none"> • Uncertainty Reasoning • Basic Probability Axioms • Bayes' Rule • Bayesian Classification • Certainty Factor Theory

Unit-4	
Chapter 13:	Learning
Contents in the chapter:	<ul style="list-style-type: none"> • What is learning? • Rote Learning • Learning by taking advice • Learning in problem solving • Learning from examples • Explanation based learning
Chapter 14:	Reinforcement Learning
Contents in the chapter:	<ul style="list-style-type: none"> • Agent – environment interaction, key Features • Markov system • Markov decision processes • Agents Learning tasks.

Basics of R Programming

Chapter 1 Introduction R programming

Structure - 1.1 Introduction - 1.2 R-Environment - 1.3 R-Packages - 1.4 Name spaces - 1.5 Statistics with R - 1.6 R-Studio - 1.7 Analytics with R - 1.8 Business analytics with R - 1.9 Data visualization - 1.10 Import Data into R system - 1.11 Data Manipulations - 1.12 Data Science & Machine Learning with R - 1.13 Installation steps – Windows platform - 1.14 Basic operations - 1.15 Companies using R - 1.16 Self-Assessment Questions - 1.17 Summary

CHAPTER2: Analytics Environment on MS Azure Machine

Structure - 2.1 Introduction - 2.2 Machine Learning Algorithms - 2.3 Azure Machine Learning - 2.4 Azure Machine Learning on Cloud Environment - 2.5 Machine Learning Process - 2.6 Azure Management - 2.7 Azure ML Components - 2.8 Azure Analytical Services - 2.9 Linear Regression using R - 2.10 Summary - 2.11 Self-Assessment Questions

Chapter 3: Basic R Constructs

Structure - - 3.1 Introduction - 3.2 R- Variables - 3.3 Types of Operators - 3.4 Control Structures - 3.5 String operations - 3.6 Vectors - 3.7 Missing values - 3.8 Summary - 3.9 Self-Assessment Questions

Chapter 4: Data Management Techniques in R

Structure - 4.1 Introduction - 4.2 Variable management - 4.3 Built-in functions - 4.4. Vectors - 4.5 Matrix operations - 4.6 Data frame management - 4.7 List Management - 4.8 Arrays - 4.9 Factors - 4.10 Function management in R - 4.11 Summary - 4.12 Self-Assessment Questions - 4.13 References

CHAPTER 5: Data Preparing Techniques

Structure - 5.1 Introduction - 5.2 Raw data extractions - 5.3 Combining datasets - 5.4 Data cleaning - 5.5 Sorting, Ranking and Ordering - 5.6 Data Binning - 5.7 Type conversions - 5.8 Summary - 5.9 Self-Assessment Questions

Chapter 6: Statistical Techniques

Structure - 6.1 Introduction - 6.2 Types of data - 6.3 Measures of Central Tendency - 6.4 Measures of Dispersion - 6.5 Statistical tests - 6.6 Predictive modeling – Linear Regression - 6.7 Summary - 6.8 Self-Assessment Questions

Maths For Machine Learning Algorithms

Unit-1	
Chapter 1:	Introduction
Contents in the chapter:	<ul style="list-style-type: none">• Definition of learning systems.• What is Machine Learning.• Applications of machine learning.
Chapter 2:	Basic Statistic required for Data Science
Contents in the chapter:	<ul style="list-style-type: none">• Probability• Probability Distribution• Measure Of central tendency• Random Variables• hypothesis testing• variance• Percentiles• Descriptive Statistics• Quantitative Analysis• Qualitative Analysis
Chapter 3:	Required Tools
Contents in the chapter:	<ul style="list-style-type: none">• Core Python• NumPy• Pandas• Matplotlib• R intro
Unit-2	
Chapter 4:	Data Collection

Contents in the chapter:	<ul style="list-style-type: none"> • Understanding Business Requirement • Significance of pandas library • Data Structures in pandas • Importing & Exporting Data • Essential Functionality of Series & DataFrame • Data Collection • Data Collection Process • Sources of data in organizations • Instruments for collecting data • Significance of clean data • Data Cleaning & Preprocessing techniques • Data Reduction
Chapter 5:	Data Cleaning
Contents in the chapter:	<ul style="list-style-type: none"> • Significance of clean data • Data Cleaning & Preprocessing techniques • Data Reduction • Support Vector Machines • Model Evaluation • Naive Bayes Theorem • Random Tree Classification
Chapter 6:	Visualizing Data
Contents in the chapter:	<ul style="list-style-type: none"> • Why Data Visualization? • The Matplotlib library • Types of plots & charts • Line plot • Bar plot • Histogram • Pie chart • Scatter plot • Boxplot • Customizing Visualizations • Grid & Subplots
Chapter 7:	Sampling and Estimation
Contents in the chapter:	<ul style="list-style-type: none"> • Sample versus population • Sample techniques (simple, stratified, clustered, random) • Sampling Distributions • Parameter Estimation • Unbalanced data treatment
Unit-3	

Chapter 8:	Linear Regression
Contents in the chapter:	<ul style="list-style-type: none"> • Linear Regression • Least Square Method • Linear Algebra solution to least square method • Examples • Problem and solution set
Chapter 9:	Linear Discriminant Analysis
Contents in the chapter:	<ul style="list-style-type: none"> • Classification • Linear Discriminant Analysis • The Posterior Probability Functions • Modelling the Posterior Probability Functions • Linear Discriminant Functions • Estimating the Linear Discriminant Functions • Classifying Data Points Using Linear Discriminant Functions • Examples • Problem and solution set
Chapter 10:	Logistics Regression
Contents in the chapter:	<ul style="list-style-type: none"> • Logistic Regression • Logistic Regression Model of the Posterior Probability Function • Estimating the Posterior Probability Function • The Multivariate Newton-Raphson Method • Maximizing the Log-Likelihood Function • Examples • Problem and solution set
Chapter 11:	Artificial Neural Network
Contents in the chapter:	<ul style="list-style-type: none"> • Artificial Neural Network • Neural Network Model of the Output Functions • Forward Propagation • Choosing Activation Functions • Estimating the Output Functions • Error Function for Regression • Error Function for Binary Classification • Error Function for Multi-class Classification • Minimizing the Error Function using Gradient Descent • Back propagation Equations • Examples • Problem and solution set
Chapter 12:	Maximal Margin Classifier
Contents in the chapter:	<ul style="list-style-type: none"> • Maximal Margin Classifier • Definitions of Separating Hyperplane and Margin • Maximizing the Margin

	<ul style="list-style-type: none"> • Definition of Maximal Margin Classifier • Reformulating the Optimization Problem • Solving the Convex Optimization Problem • KKT Conditions • Primal and Dual Problems • Solving the Dual Problem • The Coefficients for the Maximal Margin Hyperplane • The Support Vectors • Classifying Test Points • Examples • Problem and solution set
Unit-4	
Chapter 13:	Support Vector Classifier
Contents in the chapter:	<ul style="list-style-type: none"> • Support Vector Classifier • Slack Variables: Points on Correct Side of Hyperplane • Slack Variables: Points on Wrong Side of Hyperplane • Formulating the Optimization Problem • Definition of Support Vector Classifier • A Convex Optimization Problem • Solving the Convex Optimization Problem (Soft Margin) • The Coefficients for the Soft Margin Hyperplane • The Support Vectors (Soft Margin) • Classifying Test Points (Soft Margin) • Examples • Problem and solution set
Chapter 14:	Support Vector Machine Classifier
Contents in the chapter:	<ul style="list-style-type: none"> • Support Vector Machine Classifier • Enlarging the Feature Space • The Kernel Trick

Python Programming

Unit-1	
Chapter 1:	Introduction to the python scripting world
Contents in the chapter:	<ul style="list-style-type: none"> • Why Python? • Applications of Python. • Basics of Python
Chapter 2:	Python Datatype
Contents in the chapter:	<ul style="list-style-type: none"> • Command Line Arguments • Standard Data Types-basic,none,Boolean

	<ul style="list-style-type: none"> ● Python strings
Chapter 3:	Python Operators
Contents in the chapter:	<ul style="list-style-type: none"> ● Arithmetic, comparison, assignment, bitwise logical ● Python identity operators (is & is not) ● Python membership operators (in & not in) ● Operator Precedence
Chapter 4:	Decision and Control Statements
Contents in the chapter:	<ul style="list-style-type: none"> ● If statement ● If else statement ● While,for loop ● Break and continue statement ● Iterating by
Unit-2	
Chapter 5:	Python Strings
Contents in the chapter:	<ul style="list-style-type: none"> ● Escape Characters,Special Operations. ● String formatting Operator ● Single quotes, Double quotes, Triple quotes ● Raw String, Unicode strings, Built-in String methods.
Chapter 6:	Python List
Contents in the chapter:	<ul style="list-style-type: none"> ● Updating and deleting List,Basic List Operations,Reverse. ● Built in functions ● Functional programming tools - filter(), map(), and reduce() ● Using Lists as stacks and Queues ● List comprehensions
Chapter 7:	Python tuples and sets
Contents in the chapter:	<ul style="list-style-type: none"> ● Creating tuples,deleting tuples and accessing values in a tuple. ● Updating and deleting tuple elements. ● Indexing,slicing and matrices. ● Tuple functions ● Sets-operations
Chapter 8:	Python Dictionary
Contents in the chapter:	<ul style="list-style-type: none"> ● Creating and accessing values ● Update and delete values

	<ul style="list-style-type: none"> ● Built in dictionary methods and functions ● Properties of dictionary keys.
Unit-3	
Chapter 9:	Functions
Contents in the chapter:	<ul style="list-style-type: none"> ● Call by value and Call by Reference ● Variable number of arguments ● Anonymous function ● Recursion ● Lambda functions
Chapter 10:	Files and Directories
Contents in the chapter:	<ul style="list-style-type: none"> ● Operations on files and file types ● Copying and renaming files ● Creating and moving to Directories ● Traversing Directory Trees ● Word count and copying a file.
Chapter 11:	Python Classes/Objects
Contents in the chapter:	<ul style="list-style-type: none"> ● Object Oriented Programming ● Classes in Python ● Data Hiding ● Overloading methods and operators. ● Recursive call to methods.
Chapter 12:	Garbage Collection
Contents in the chapter:	<ul style="list-style-type: none"> ● The constructor
Unit-4	
Chapter 13:	Inheritance and Class
Contents in the chapter:	<ul style="list-style-type: none"> ● Implementing subclass, overriding methods ● Class variables, class methods, and static methods
Chapter 14:	Python Exceptions
Contents in the chapter:	<ul style="list-style-type: none"> ● Assert Statement ● Multiple Exceptions ● Try and finally

	<ul style="list-style-type: none"> • User-defined Exceptions
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SQL FOR DATA ANALYTICS

UNIT-1	
CHAPTER 1:	INTRODUCTION TO SQL
CONTENTS IN THE CHAPTER:	<ul style="list-style-type: none"> • INTRODUCTION • DEFINITION OF DATA • DATA TYPES • RELATIONAL DATABASE AND SQL • TYPES OF SQL STATEMENT • DDL, DML, DQL, DCL, CONSTRAINTS
CHAPTER 2:	MANAGING TABLES
CONTENTS IN THE CHAPTER:	<ul style="list-style-type: none"> • CREATING TABLES • CREATING TABLES USING SELECT STATEMENT • ADDING AND REMOVING COLUMNS • REMOVING TABLE • ADDING,UPDATING AND DELETING DATA
CHAPTER 3:	SQL BASICS FOR ANALYTICS
CONTENTS IN THE CHAPTER:	<ul style="list-style-type: none"> • SELECT STATEMENT • WHERE CLAUSE, • USING AND ,OR,IN,NOT IN,LIKE,WILDCARDS
CHAPTER 4:	SUBQUERRIES
CONTENTS IN THE CHAPTER:	<ul style="list-style-type: none"> • INTRODUCTION • SINGLE ROW SUBQUERY • MULTIPLE ROW SUBQUERY
UNIT-2	
CHAPTER 5:	AGGREGATE FUNCTIONS
CONTENTS IN THE CHAPTER:	<ul style="list-style-type: none"> • SUM,COUNT, AVG, MIN, MAX, VARIENCE • GROUP BY • HAVING CLAUSE
CHAPTER 6:	FUNCTIONS
CONTENTS IN THE CHAPTER:	<ul style="list-style-type: none"> • STRING • NUMERIC • DATE • CASE
CHAPTER 7:	JOINS
CONTENTS IN THE CHAPTER:	<ul style="list-style-type: none"> • <i>INTRODUCTION</i> • TYPESOFJOINS(EQUI,INNER,OUTER,LEFT, RIGHT) • UNIONS

CHAPTER 8:	VIEWS AND INDEXING
CONTENTS IN THE CHAPTER:	<ul style="list-style-type: none"> • CONCEPT • CREATING VIEW FROM SINGLE,MULTIPLE TABLES • INDEX:CONCEPT AND ADVANTAGES
UNIT-3	
CHAPTER 9:	DATA CLEANING
CONTENTS IN THE CHAPTER:	<ul style="list-style-type: none"> • INTRODUCTION • CLEAN UP WITH SQL
CHAPTER 10:	WINDOWS FUNCTIONS
CONTENTS IN THE CHAPTER:	<ul style="list-style-type: none"> • INTRODUCTION • WINDOW KEYWORD • WINDOW FUNCTIONS
CHAPTER 11:	ANALYTICS USING COMPLEX DATA TYPES
CONTENTS IN THE CHAPTER:	<ul style="list-style-type: none"> • INTRODUCTION • DATE AND TIME DATATYPES FOR ANALYSIS
CHAPTER 12:	IMPORTING EXPORTING DATA
CONTENTS IN THE CHAPTER:	<ul style="list-style-type: none"> • INTRODUCTION • THE COPY COMMAND
UNIT-4	
CHAPTER 13:	FUNCTIONS AND TRIGGERS
CONTENTS IN THE CHAPTER:	<ul style="list-style-type: none"> • FUNCTIONS WITH AND WITHOUT ARGUMENT • CREATING TRIGGERS
CHAPTER 14:	PERFORMANT SQL
CONTENTS IN THE CHAPTER:	<ul style="list-style-type: none"> • DATABASE SCANNING METHOD • QUERRY PLANNING • INDEX SCANNING

Machine Learning in Python

Chapter 1: Machine Learning and Classification Algorithms

Structure:

- 1.1 Building intelligent machines to transform data into knowledge
- 1.2 Types of machine learning
- 1.3 An introduction to the basic terminology and notations
- 1.4 A roadmap for building machine learning systems
- 1.5 Using Python for machine learning

- 1.6 Artificial neurons – a brief glimpse into the early history of machine learning
- 1.7 Implementing a perceptron learning algorithm in Python
- 1.8 Adaptive linear neurons and the convergence of learning
- 1.9 Summary
- 1.10 Self Assessment Questions

Chapter 2: A Tour of Machine Learning Classifiers Using Scikit-learn and Data Preprocessing

Structure:

- 2.1 Choosing a classification algorithm
- 2.2 Modeling class probabilities via logistic regression
- 2.3 Maximum margin classification with support vector machines
- 2.4 Solving nonlinear problems using a kernel SVM
- 2.5 Decision tree learning
- 2.6 K-nearest neighbors – a lazy learning algorithm
- 2.7 Building Good Training Sets – Data Preprocessing
- 2.8 Handling categorical data
- 2.9 Partitioning a dataset in training and test sets
- 2.10 Bringing features onto the same scale
- 2.11 Selecting meaningful features
- 2.12 Summary
- 2.13 Self Assessment Questions

Chapter 3: Compressing Data via Dimensionality Reduction

Structure:

- 3.1 Unsupervised dimensionality reduction via principal component analysis
- 3.2 Principal component analysis in scikit-learn
- 3.3 Supervised data compression via linear discriminant analysis
- 3.4 Using kernel principal component analysis for nonlinear mappings
- 3.5 Kernel principal component analysis in scikit-learn
- 3.6 Summary
- 3.7 Self Assessment Questions

Chapter 4: Combining Different Models for Ensemble Learning

Structure:

- 4.1 Learning with ensembles
- 4.2 Implementing a simple majority vote classifier

- 4.3 Combining different algorithms for classification with majority vote
- 4.4 Evaluating and tuning the ensemble classifier
- 4.5 Bagging – building an ensemble of classifiers from
- 4.6 Leveraging weak learners via adaptive boosting
- 4.7 Summary
- 48 Self Assessment Questions

Chapter 5: Applying Machine Learning to Sentiment Analysis

Structure:

- 5.1 Obtaining the IMDb movie review dataset
- 5.2 Introducing the bag-of-words model
- 5.3 Assessing word relevancy via term frequency-inverse
- 5.4 Cleaning text data
- 5.5 Processing documents into tokens
- 5.6 Training a logistic regression model for document classification
- 5.7 Working with bigger data – online algorithms and out-of-core learning
- 5.8 Summary
- 5.9 Self Assessment Questions

Chapter 6: Predicting Continuous Target Variables with Regression Analysis

Structure:

- 6.1 Introducing a simple linear regression model
- 6.2 Exploring the Housing Dataset
- 6.3 Visualizing the important characteristics of a dataset
- 6.4 Implementing an ordinary least squares linear regression model
- 6.5 Estimating the coefficient of a regression model via scikit-learn
- 6.6 Evaluating the performance of linear regression models
- 6.7 Turning a linear regression model into a curve – polynomial regression
- 6.8 Modeling nonlinear relationships in the Housing Dataset
- 6.9 Dealing with nonlinear relationships using random forests
- 6.10 Summary
- 6.11 Self Assessment Questions

Chapter 7: Working with Unlabeled Data – Clustering Analysis

Structure:

- 7.1 Grouping objects by similarity using k-means
- 7.2 K-means++
- 7.3 Hard versus soft clustering
- 7.4 Using the elbow method to find the optimal number of clusters
- 7.5 Quantifying the quality of clustering via silhouette plots
- 7.6 Organizing clusters as a hierarchical tree
- 7.7 Applying agglomerative clustering via scikit-learn
- 7.8 Summary
- 7.9 Self Assessment Questions

Business Application of Machine Learning**Chapter 1 Introduction to Artificial Intelligence & Machine Learning****Structure:**

- 1.1 Artificial Intelligence: Basic Concepts
- 1.2 AI, Big Data, Data Science, Machine Learning: Relationship
- 1.3 Beyond the AI Hype
- 1.4 Summary
- 1.5 Self-Assessment Questions

Chapter 2 Machine Learning Application in Customer Service**Structure:**

- 2.1 Customer Experience
- 2.2 Chatbots
- 2.3 Call Center Automation
- 2.4 Summary
- 2.5 Self-Assessment Questions

Chapter 3 Machine Learning Application in Hospitality**Structure:**

- 3.1 Best Fit / Dynamic Pricing

- 3.2 Demand Forecasting
- 3.3 Summary
- 3.4 Self-Assessment Questions

Chapter 4 Machine Learning Application in Banking & Financial Services

Structure:

- 4.1 Robo-Advisers based Portfolio Management
- 4.2 Loan & Insurance Underwriting
- 4.3 Summary
- 4.4 Self-Assessment Questions

Chapter 5 Machine Learning Application in Retail

Structure:

- 5.1 Online Recommendation
- 5.2 Inventory Optimization
- 5.3 Summary
- 5.4 Self-Assessment Questions

Chapter 6 Future Potential of Machine Learning

Structure:

- 6.1 Technological Advances in Machine Learning
- 6.2 Future Possibilities Unlimited
- 6.3 Summary
- 6.4 Self-Assessment Questions

Chapter 7 Summary

Structure:

- 7.1 Machine Learning Application Recap
- 7.2 Self Assessment Questions

Object Oriented Software Engineering

Chapter 1 : Object Oriented and Principles

What is Object Orientation - Object Oriented System Development - Identifying the Elements of an Object Model - Identifying Classes and Object - Specifying The Attributes (With Visibility) - Defining Operations - Finalizing the Object Definition - Summary - Self-Assessment Questions

Chapter 2 : Introduction to UML

Introduction - Concept of UML (What is UML?, What is UML not?, Advantage of UML, [A] Things, Structural elements: Class, Interface, Collaboration, Use Case, Component, Behavioral Elements, Interaction, Grouping Elements: Package, Annotational Things, Relationships in UML: Dependency, Association, Generalization, Realization) - Summary - Self-assessment questions

Chapter 3 : Basic Structural Modeling

Object and Classes (Object diagrams, Object, What is Class?) – Relationships (Dependency, **Generalization, Association, Aggregation, Realization**) - Common Mechanisms (Specifications, Adornments, Common Divisions, Extensibility Mechanisms) - Class Diagram - Summary - Self -Assessment Question

Chapter 4 : Advanced Structural Modeling

Advanced Classes - Advanced Relationship - Interface - Package Diagram - Object Diagram - Summary - Self-assessment Questions

Chapter 5 : Basic Behavioral Structure

Interaction: Terms and Concepts - Use cases and Use Case Diagram - Interaction Diagram (Sequence Diagram) - State Chart Diagram - Activity Diagram - Summary - Self-Assessment Questions

Chapter 6 : Object Oriented Analysis

Iterative Development and the Rational Unified Process - Benefits of Iterative development - Inception - Understanding Requirements - Use Case Model from Inception to Elaboration - Elaboration - Construction - Transition - Summary - Self-Assessment

Chapter 7 : Object Oriented Design

Software Development Methodologies - Object Oriented Design Model - System Design process - Object Design Process - Summary - Self-Assessment Questions

Chapter 8 : Architectural Modeling

Introduction - Components - Component Diagrams - Deployment - Deployment Diagrams - Common Uses of Deployment Diagrams - Collaborations - Organizing Collaborations - Examples of Collaboration Diagrams

Chapter 9 : Object Oriented Testing

Introduction - Object Oriented Testing Strategies - Test Case Design of Object-Oriented Software (Overview of test case, Test-case Design for OO software, Object oriented testing Methods) - Inter Class Test Case Design - Summary - Self-Assessment Question

Deep Learning

Unit-1	
Chapter 1:	Introduction to Deep Learning
Contents in the chapter:	<ul style="list-style-type: none">• <i>Artificial Intelligence</i>• <i>Machine Learning</i>• Introduction to Deep Learning• Why Deep Learning?• Example of Deep Learning• Architecture
Chapter 2:	Introduction to Machine Learning
Contents in the chapter:	<ul style="list-style-type: none">• Introduction• Statistical Techniques• Categories of Machine Learning• Supervised Learning• Regression• Classification• Unsupervised Learning• Reinforcement Learning• Deep Learning• Deep Reinforcement Learning
Chapter 3:	Introduction to Artificial Intelligence
Contents in the chapter:	<ul style="list-style-type: none">• <i>Introduction</i>• <i>What is AI Technique?</i>• <i>Applications of AI</i>• <i>What is Intelligence Composed of?</i>• <i>Difference between Human and Machine Intelligence</i>• <i>Research Areas</i>• <i>Speech and Voice Recognition</i>
Chapter 4:	Neural Networks

Contents in the chapter:	<ul style="list-style-type: none"> • Introduction • Motivation behind Neural Network • Importance of Neural Network • Artificial Neural Networks • Convolutional Neural Network • Recurrent Neural Network
Unit-2	
Chapter 5:	Deep Neural Network
Contents in the chapter:	<ul style="list-style-type: none"> • <i>Introduction</i> • <i>Types of Deep Learning Networks</i> • <i>Deep learning applications</i> • <i>Limitations of Deep learning applications</i> • <i>Advantages of Deep learning applications</i> • <i>Disadvantages of Deep learning applications</i>
Chapter 6:	Artificial Neural Networks
Contents in the chapter:	<ul style="list-style-type: none"> • Introduction • Working of Artificial Neural Networks • Architecture of Artificial Neural Networks • Backpropagation • Advantages Artificial Neural Networks • Disadvantages of Artificial Neural Networks
Chapter 7:	Convolutional Neural Network
Contents in the chapter:	<ul style="list-style-type: none"> • <i>Introduction</i> • Working of Convolutional Neural Network • CNN Use Case
Chapter 8:	Recurrent Neural Network
Contents in the chapter:	<ul style="list-style-type: none"> • Introduction • Application • Types of Recurrent Neural Network • Training Recurrent Neural Networks • <i>Advantages of Recurrent Neural Network</i> • <i>Disadvantages of Recurrent Neural Network</i> • CNN Vs. RNN
Unit-3	

Chapter 9:	Deep Learning with PyTorch
Contents in the chapter:	<ul style="list-style-type: none"> • What is PyTorch • History of PyTorch • PyTorch Basics • <i>Tensors Operations</i>
Chapter 10:	Deep Learning with TensorFlow
Contents in the chapter:	<ul style="list-style-type: none"> • What is TensorFlow? • <i>History of TensorFlow</i> • <i>Applications of TensorFlow</i> • Advantage of TensorFlow • Disadvantage of TensorFlow
Chapter 11:	Deep Learning with Keras
Contents in the chapter:	<ul style="list-style-type: none"> • <i>Introduction</i> • <i>Characteristics of Keras</i> • <i>Keras user experience</i> • <i>Advantages of Keras</i> • <i>Disadvantages of Keras</i>
Chapter 12:	Machine Learning –Deep Learning
Contents in the chapter:	<ul style="list-style-type: none"> • <i>Applications</i> • <i>Untapped Opportunities of Deep Learning</i> • <i>What is required for Achieving More Using Deep Learning?</i> • Deep Learning -Disadvantages
Unit-4	
Chapter 13:	Python Deep Learning
Contents in the chapter:	<ul style="list-style-type: none"> • Introduction • Python Deep Learning Environment • fundamentals of Python Deep Learning • Python Deep Basic Machine Learning • Deep Learning and Traditional Machine Learning
Chapter 14:	Deep Learning applications
Contents in the chapter:	<ul style="list-style-type: none"> • <i>Image Processing</i> • <i>Natural Language Processing</i> • <i>Speech Recognition</i> • <i>Video Analytics</i>

Image Processing

Unit-1	
Chapter 1:	Introduction
Contents in the chapter:	<ul style="list-style-type: none">• What is Digital Image Processing?• The origins of Digital Image Processing• Examples of Fields that use Digital Image Processing• Fundamental Steps in Digital Image Processing• Components/ Elements of Digital Image Processing
Chapter 2:	Digital Image Fundamentals
Contents in the chapter:	<ul style="list-style-type: none">• Introduction• Elements of Visual Perception• Light and Electromagnetic Spectrum• Image Sensing and Acquisition• Image Sampling and Quantization• Some Basic Relationship between Pixels
Chapter 3:	Image Enhancement in the Spatial Domain
Contents in the chapter:	<ul style="list-style-type: none">• Introduction• Some Basic Gray Level Transformations• Histogram Processing• Basics of Spatial Filtering
Chapter 4:	Image Enhancement in the Frequency Domain
Contents in the chapter:	<ul style="list-style-type: none">• Introduction to the Fourier Transform and the Frequency Domain• One dimensional Fourier transform• 2-D Discrete Fourier Transform(DFT) and its Inverse• Filtering in the Frequency Domain• Smoothing Frequency-Domain Filters• Sharpening Frequency Domain Filter• Implementation

Unit-2	
Chapter 5:	Image Restoration
Contents in the chapter:	<ul style="list-style-type: none"> • Introduction • Noise Models • Periodic Noise • Restoration in the presence of noise only spatial filtering • Periodic noise reduction by frequency domain filtering • Estimating the degradation function • Geometric Mean filter • Inverse Filtering • Minimum Mean square Error (Wiener) Filtering • Geometric Transformation
Chapter 6:	Colour Image Processing
Contents in the chapter:	<ul style="list-style-type: none"> • Introduction • Colour Fundamentals • Colour Models • Pseudo Colour Image Processing • Basic of Full-colour Image Processing
Chapter 7:	Colour Transformations
Contents in the chapter:	<ul style="list-style-type: none"> • Colour Transformations • Smoothing and Sharpening
Chapter 8:	Colour Segmentation
Contents in the chapter:	<ul style="list-style-type: none"> • Colour Segmentation • Colour Edge detection • Noise in Colour Images
Unit-3	
Chapter 9:	Image Enhancement

Contents in the chapter:	<ul style="list-style-type: none"> • Introduction • Frequency domain techniques • Spatial domain techniques • Spatial Operations • Noise Smoothing • Edge detection
Chapter 10:	Morphological Image Processing
Contents in the chapter:	<ul style="list-style-type: none"> • Introduction • Some basic concepts from set theory • Reflection and Translation • Logic Operations Involving Binary Images • Erosion and Dilation • Opening and Closing • The Hit-or-Miss Transformation
Chapter 11:	Image Segmentation
Contents in the chapter:	<ul style="list-style-type: none"> • Image Segmentation Fundamentals • Detection of Discontinuities • Thresholding • Region-based Segmentation
Chapter 12:	Thresholding
Contents in the chapter:	<ul style="list-style-type: none"> • Intensity Thresholding • The Role of Illumination • Basic adaptive Thresholding • Optimal Global and Adaptive Thresholding
Unit-4	
Chapter 13:	Representation
Contents in the chapter:	<ul style="list-style-type: none"> • Introduction • Representation

Chapter 14:	Description
Contents in the chapter:	<ul style="list-style-type: none"> • Simple Boundary descriptors • Simple Regional Descriptors • Use of Principal Components for Description • Relational Descriptors

Data Visualization with Python

Unit-1	
Chapter 1:	Introduction to Data Visualization
Contents in the chapter:	<ul style="list-style-type: none"> • What is Data Visualization? • Why need of Data Visualization? • Benefits of data visualization • Importance of data visualization
Chapter 2:	Matplotlib
Contents in the chapter:	<ul style="list-style-type: none"> • Introduction to Matplotlib • Matplotlib Architecture • General Concept of Matplotlib • Install Matplotlib with pip • Basic Plotting with Matplotlib
Chapter 3:	Numpy
Contents in the chapter:	<ul style="list-style-type: none"> • What is numpy? • Need of numpy? • Installation of numpy
Chapter 4:	Pandas
Contents in the chapter:	<ul style="list-style-type: none"> • What is a panda? • Key features of pandas • Benefits of Pandas • Pandas – Data Structure with example
Unit-2	
Chapter 5:	Data Visualization tools

Contents in the chapter:	<ul style="list-style-type: none"> • Bar chart • Histogram • Pie Chart
Chapter 6:	More Data Visualization tools
Contents in the chapter:	<ul style="list-style-type: none"> • Scatter Plot • Area Plot • STACKED Area Plot • Box Plot
Chapter 7:	Advanced Data Visualization tools
Contents in the chapter:	<ul style="list-style-type: none"> • Waffle Chart • Word Cloud • HEAT MAP
Chapter 8:	Specialized Data Visualization tools (Part-I)
Contents in the chapter:	<ul style="list-style-type: none"> • Bubble charts • Contour plots • Quiver Plot
Unit-3	
Chapter 9:	Specialized Data Visualization tools (Part-II)
Contents in the chapter:	<p>Three-Dimensional Plotting in Matplotlib</p> <ul style="list-style-type: none"> • 3D Line Plot • 3D Scatter Plot • 3D Contour Plot • 3D Wireframe Plot • 3D Surface Plot
Chapter 10:	Seaborn
Contents in the chapter:	<ul style="list-style-type: none"> • Introduction to seaborn • Seaborn Functionalities • Installing seaborn
Chapter 11:	Data Visualization Seaborn Functions
Contents in the chapter:	<ul style="list-style-type: none"> • Data Visualization Seaborn Functions
Chapter 12:	Python seaborn for statistical analysis

Contents in the chapter:	<ul style="list-style-type: none"> • <u>seaborn.scatterplot()</u> • <u>seaborn.lineplot()</u> • <u>Categorical Scatter Plot-</u> • 1. <u>seaborn.catplot()</u> • 2. <u>seaborn.stripplot()</u> • 3. <u>seaborn.swarmplot()</u>
Unit-4	
Chapter 13:	<u>Categorical Distribution Plots</u>
Contents in the chapter:	<ul style="list-style-type: none"> • 1. <u>seaborn.violinplot()</u> • 2. <u>seaborn.boxplot()</u> • 3. <u>seaborn.boxenplot()</u>
Chapter 14:	<u>Categorical estimate plots</u>
Contents in the chapter:	<ul style="list-style-type: none"> • 1. <u>seaborn.countplot()</u> • 2. <u>seaborn.barplot()</u> • 3. <u>seaborn.pointplot()</u>

Project Work