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POST GRADUATE DIPLOMA IN COMPUTER APPLICATION – PART ONE

Syllabus:-

Sr. No.	Module Code	Name of Module	Credits	Total Marks
1	PDCA111	Fundamental of Computer & C Language	4	100
2	PDCA112	Basic of Internet	3	100
3	PDCA113	Paradigms of Programming	4	100
4	PDCA114	Computer Organization	4	100
5	PDCA115	Principle of Management	4	100
6	PDCA116	System Analysis & Design	3	

Module Name: FUNDAMENTAL OF COMPUTER & C LANGUAGE

Unit-I

1. **Introduction to computer system:** Introduction, Characteristics of computer, Drawbacks of computers, Generations of Computers
2. **Computer Organization:** Architecture of Computer System
3. **Number System:** Introduction, Commonly Used Number System, Decimal, Binary, Octal, Hexadecimal, Converting from one number system to another
4. **Binary Arithmetic:** Introduction, Binary Addition, Subtraction, Multiplication, Division, Representations of characters, BCD Code, EBCDIC, ASCII, Fixed Point Representation, Floating Point Representation
5. **Algorithms and Flowchart:** Algorithms, Characteristics of algorithms, Flowchart, Different Symbols used in Flowcharts.
6. **Computer Languages:** Machine Language, Advantages of Machine Language, Disadvantages of Machine Language, High Level Language, Assembly Language, Software, Type of Software, System Software, Application Software
7. **Input-output Devices:** Introduction, Offline Input Devices, Online Input Devices, Punched Cards, Keyboards, Mouse, Touch Pad, Light Pen, Scanner

8. **Storage Devices:** Introduction, Primary Memory, RAM, DRAM, ROM, PROM, EPROM, Cache Memory, Secondary Memory, Magnetic Tape, floppy, Hard Disk, CD-ROM

9. **Operating System:** Introduction, Type of Operating System, Batch Processing Operating System, Single-user Operating System, Multi-User Operating System, Multi-Processing Operating System, Real Time Operating System, DOS, Functions of DOS

10. **Viruses:** Introduction, Types of Viruses, Antivirus

Unit-II

1. **An introduction to C:** History of C, Feature of C, Structure of a C program, Variables and Data Types, Arithmetic Expressions

2. **Components of C Language:** Character Set, C token, Data Type in C, Operators, Type Casting, Data Conversion

3. **Input / Output Functions:** Formatted Input / Output functions, The print function, The scanf Function, Unformatted Input / Output Function, Character Input / Output Function, String Input / Output Functions

4. **Conditional Statement:** Introduction, If-else statement, Nesting If-else Statement, The switch Statement

5. **Looping:** Introduction, While Loop, Do While Loop, Nesting Loop, The Break Statement, The Continuous Statement

6. **Arrays in C:** Array, Two Dimensional Arrays, Passing Array as Parameters, String, Some Library Function for String Handling

7. **Function:** Modular Programming, Top-Down Approach, Structured Programming, function with no Argument and no Return Value, Function Prototype, Storage class in C, Declaring Variables of Specified Storage Classes, Local and Global Variables.

8. **Pointer in C:** Pointer, Passing Pointers as Parameters, Dynamic Memory Allocation, Pointer to Pointer, Pointer to Function.

9. **Structure and Union:** Structure, Array of Structure, Pointer to Structure, Nested Structure, Structure and Function, Difference between Structure and Union.

10. **File Handling in C:** Introduction, Difference between Text and Binary File, Basic File Handling Functions, File Input / Output.

11. **Preprocessor:** Introduction, Functions of a C Preprocessor.

Module Name: BASICS OF INTERNET

Unit-I

Internet Technology

1. **Evolution & Protocols**: Internet Evolution, Protocols, Interface Concept, Internet V.s. Internet growth of internet ISP, Connectivity - dial up, leased line, VSAT etc. URLs. Domain names, Portals, Application E-mail File Transfer Protocol, Telnet, Chatting, Data Transmission Protocol, Client/Server, architecture and its characteristics, FTP and its Usages. Telnet Concepts, remote logging, protocols, terminal emulation, message board, Internet Chatting, Voice chat, Text chat.
2. **Web Concept**: World Wide Web, Web Publishing, HTML, Design tools, HTML edition, Image edition, Issue in website creation & maintenance FTP s/w for uploading Use of frames and forms in web pages.

Unit-II

E-Commerce

Introduction to E-Commerce: Introduction, Concept technology in E-Commerce, Internet business, Advantage of E-Commerce, Application, Feasibility and constrain.

Module Name: PARADIGMS OF PROGRAMMING

1. Algorithm.
2. Growth of Function.
3. Analyzing Algorithm Control Structure.
4. Recurrences.
5. Quick Sort.
6. Curriculum of Social Studies.
7. Amortized Analysis.
8. Heap.
9. Sorting in Linear Time.
10. Median and Order Statistics.
11. Backtracking.

Module Name: COMPUTER ORGANIZATION

Unit-I

The Von Neumann Architecture & ALU Organization

1. Details of Von Neumann Architecture
2. Simple ALU Organization, Arithmetic Processor.

Unit-II

Control Unit & Memory Organization

1. **Control Unit :** Hardwired and Micro programmed Control
2. **Memory Organization:** Primary Memory, Secondary Memory, High Speed memory, Virtual Memory.

Unit-III

I/O Transfer, Peripherals & Assembly language Programming

1. **I/O Transfer :** Program Controlled, interrupt Controlled and DMA
2. **Peripherals & Assembly Language:** Introduction to Computer buses, Peripherals, performance bench marking and current trends in architecture / Assembly language programming.

Module Name: PRINCIPLE OF MANAGEMENT

1. **Definitions of Management:** Its Nature and Purpose, Management as a Science and art, the Elements of Science, Patterns of Management Analysis-Systems Approach to Operational Management. Function of Managers. Management and Society - Social Responsibility and Ethics with Reference to India and EN India. Operating in a pluralistic Society, Social Responsibility of Managers, ethic s in Managing. A Broad Overview of the Different Forms of Business Enterprises in India.
2. **Nature and Purpose of Planning:** Types of Plans; Steps in Planning Process - A Rational Approach to Goal Achievement. Objectives - The Nature of Objectives, Evolving Concepts in Management by Objectives (MBO), the Process of MBO, Setting Objective, Benefits and Weakness of MBO. The Nature and Purpose of strategies Planning Process , The TOWS Matrix, The Portfolio Matrix , Major Kinds of Strategies and policies, The Three Generic Competitive Strategies by Porter, Effective Implementation of Strategies , Premising and forecasting. Decision Making - The Importance and Limitations of Rational Decision Making, Evaluation of Alternatives, Selecting a Alternative, Programmed and Non-Programmed Decision , Decision Making Under Certainty , Uncertainty and risk, Modern Approaches to Decision Making under Uncertainty, Evaluating the Important for a Decision , Other Actor in Decision Making, Decision Support System , Systems Approach and Decision Making.
3. **Nature and Purpose of Organizing:** Formal and Informal Organization, Organizational Division - The Department, Organization Levels and the span of management, factors Determining an Effective span, organization Environment for Entrepreneur and Entrepreneur, The Structure and process of Reorganizing.

   Department by Simple Members, By time, by Enterprise function, by Territory or Geography , by Customer ,By Process or Equipment, and by Product. Matrix Organization, Strategic Business Units, Choosing the Pattern of Departmentation. Authority and Power, Line and staff concepts, Functional Authority, Benefits and Limitations of staff, Decentralization and Delegation of Authority, art of Delegation, Balance as a key to Decentralization.

Unit-II

Functional Methodology

1. **Human Resource Management and Selection :** Definition of Staffing, Defining the managerial job, Systems Approach to HRM- an Overview the Staffing function, Situational Factors Affecting Staffing , Selecting - Matching the Person with the job, Systems Approach , Position Requirements and job Design, Skills and Personal Characteristics Required by Managers, matching Qualifications with position Requirements, Selection-Process, Techniques and Instruments, Orienting and Socializing New Employees. Performance Appraisal -- Purposes and user of appraisal, Problem of Management Appraisal choosing The Appraisal Criteria, Traditional Trait Appraisals, Apprising Managers against Verifiable Objectives, Appraising Managers As Managers, Rewards and Stress of Managing, Formulating the Career Strategy. Manager Development Process and Training, Approaches to Managers Development, On -The- Job training and internal and external Training, Managing Changes, Organizational Conflict, Organizational Development.
2. **Controlling The Basis Control Process:** Critical Control points and Standards, Control as a Feedback System, real-time Information and control Feed Forward Control, requirements for Effective Controls. Budget- Traditional non-budgetary Control Devices, Time-even Network analysis, information technology, use of Computers in handling information, Challenges created by information technology. Control of Overall Performance, budget Summaries and report, Profit and loss Control, Control through return on investment, Direct Control v/s Preventive Control, Developing Excellent Mangers.

Module Name: SYSTEM ANALYSIS & DESIGN

1. **Data and Information:** Types of information: operational, tactical, strategic and statutory – why do we need. Information systems – management structure – requirements of information at different levels of management – functional allocation of management – requirements of information for various functions – qualities of information – small case study.
2. **Systems Analysis and Design Life Cycle:** Requirements determination – requirements specifications – feasibility analysis – final specifications – hardware and software study – system design – system implementation – system evaluation – system modification. Role of systems analyst – attributes of a systems analyst – tools used in system analysis.
3. **Information Gathering:** Strategies – methods – case study – documenting study – system requirements specification – from narratives of requirements to classification of requirements as strategic, tactical, operational and statutory. Example case study.
4. **Feasibility Analysis:** Deciding project goals – examining alternative solutions – cost – benefit analysis – quantifications of costs and benefits – payback period – system proposal preparation for managements – parts and documentation of a proposal – tools for prototype creation

5. **Tools for Systems Analysts:** Data flow diagrams – case study for use of DFD, good conventions – leveling of DFDs – leveling rules – logical and physical DFDs – software tools to create DFDs.

6. **Structured Systems Analysis and Design:** Procedure specifications in structured English – examples and cases – decision tables for complex logical specifications – specification oriented design vs procedure oriented design.

7. **Data Oriented Systems Design**: Entity relationship model – E-R diagrams – relationships cardinality and participation – normalizing relations – various normal forms and their need – some examples of relational data base design.

8. **Data Input Methods:** Coding techniques – requirements of coding schemes – error detection of codes – validating input data – input data controls interactive data input.

9. **Designing Outputs:** Output devices – designing output reports – screen design – graphical user interfaces – interactive I/O on terminals.

10. **Object Oriented Systems Modeling:** What are objects? – Why objects? – Objects and their properties – classes – inheritance – polymorphism – how to identify objects in an application – how to model systems using objects – some cases of object oriented system modeling.

11. **Control – Audit and Security of Information Systems:** Audit and security of information systems – why controls are needed – objectives of control – techniques used in control – auditing information systems – auditing around, through and with the computer – testing information systems – types of tests – how to generate tests – security of information systems – disaster recovery – business process continuity.

12. **Systems Analysis and Design in the Era of Electronic Commerce:** B2B, B2C and C2C e-commerce – advantages and disadvantages of e-commerce. Ecommerce system architecture – physical networks, logical network, World Wide Web, web-services – html, XML.

13. Electronic data interchange: EDI standards – virtual private networks – XML and EDI.

14. **Security of E-Commerce Transactions, Firewalls:** Encryption methods – symmetric and asymmetric encryption – digital signature – certifying authorities for signatures – legal status of e-commerce transactions

15. Payment systems in e-commerce: Cheque payment, credit card payments, e-cash payments.

Complete System Analysis and Design Case Studies: A system for journal acquisition in libraries – walk through the entire life cycle.

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POST GRADUATE DIPLOMA IN COMPUTER APPLICATION – PART TWO

Syllabus:-

Sr. No.	Module Code	Name of Module	Credits	Total Marks
1	PDCA121	Data Structure	5	100
2	PDCA122	Object Oriented Programming Using C++	5	100
3	PDCA123	Operating System	5	100
4	PDCA124	Database Management System	4	100
5	PDCA125	Minor Project Work	3	100

Subject Name: DATA STRUCTURES

Unit-I

Basic Concepts

1. **Fundamental:** Data Structures, Algorithms and various types of applications.
2. **Basic Data Types**: Stack, Lists a7 recursion.

Unit-II

Trees & Sets

1. **Trees:** Definition and implementation of binary tree, tree traversal, postfix, prefix notations, heap.
2. **Sets:** Definition and Implementation of hash table, priority queues.

Unit-III

Algorithms & File Structure

1. **Sorting Algorithms :** Quick sort, insertion sort, Bubble sort, merge sort
2. **Searching Algorithms:** Linear search, Binary search, depth first search and Breadth first search techniques.
3. **File Structure:** Sequential, Index Sequential file Structure.

Subject Name: OBJECT ORIENTED PROGRAMMING USING C++

1. OOP paradigm , Advantages of OOP , Comparison between Functional Programming and OOP approach, characteristics of Object oriented Language objects, Class, Inheritance, Polymorphism, and abstraction, encapsulation, Dynamic Binding, Message passing.

2. Introduction to C++, Identifier and keywords, constants, C++ Operators, Type Conversion, variable declaration, Statement, expressions, User defined data types, Conditional expression (For, While, Do-while) loop statement , breaking control statement (Break, Continue).
3. Defining a function, type of functions, Inline functions, Call by value and Call by reference, Preprocessor, Header files and standard functions, Structures, Pointers and structures, Unions, Enumeration. **Classe**s, Member functions, Objects, Array of objects, Nested classes, Constructors, Copy Constructors, Destructors, Inline member functions, Static class member, friend functions, Dynamic memory allocation.
4. Inheritance: Single inheritance, Multi-level inheritance, hierarchical, Virtual base class, Abstracts classes, Constructors in Derived classes, nesting of classes.
5. Function overloading , Operator overloading, polymorphism, Early binding, Polymorphism with pointers, Virtual functions, Late binding , Pure virtual functions, Opening and closing of files, Stream member function , Binary file operations, Structure and file operations, classes and file operations, Random access file processing.

Subject Name: - OPERATING SYSTEMS

1. **Operating System Overview:** Introduction, Objectives and functions, Basic Elements, Evolution of Operating System, Instruction Execution, Interrupts, Memory, Memory Hierarchy, System Components, Operating system Services, System Calls, Virtual Machines, System Design and Implementation.
2. **Process Concepts:** Introduction, Process States, Process Control Block (PCB), Process Scheduling, Co-operating Processes, Threads, Inter Process Communications (IPC).
3. **CPU Scheduling:** Scheduling Criteria, Types of Scheduling, Scheduling Algorithms, Multiple-processor Scheduling, Real-time Scheduling, Disk-Scheduling Policies.
4. **Memory Management:** Introduction, Memory –management Requirements, Logical and Physical Address Space, Swapping, Loading Programs into main memory, Paging, Page Replacement Algorithms, Allocation Of Frames, Translation Look Aside Buffer (TLB), Simple Segmentation with Paging, page Size, Thrashing.
5. **File System:** Introduction, File Organization and Access Methods, Directory Structure, Protection, Security Threats, Intruders, Viruses, File-System Structure, File Allocation Methods, Free-Space Management, Directory Management, Efficiency and Performance of Secondary Storage.
6. **Deadlocks:** Introduction, Principles, Principles Of Deadlocks, System Model, Deadlock Characterization, Resource- allocation Graphs, Methods For Handling Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection on, Recovery from Deadlock.
7. **Process Management and Synchronization:** Introduction, Critical Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions, Monitors, Message Passing.

Subject Name: DATABASE MANAGEMENT SYSTEM

1. **Basic - Concepts of Database Systems:** Database Schema, Instance and Database state, The Three-Schema Architecture, Data Independence, DBMS Languages, People Deal with Databases.
2. **Entry - Relationship Model:** The E- R Model, Entity Relationship Diagram, Composite versus Atomic Attributes, Role Names Recursive Relationships, Constraints on Relationship Types.
3. **Data Models and Its Implementation:** The Hierarchical Data Model, the Network Data Model, Network Modeling Concepts, the Relational Model.
4. **Introduction to Relational Model:** CODD'S 12 Rules for a fully relational DBMS, Basic Concepts of Relational Model, Referential Integrity Constraints, Enforcing Integrity Constraints.
5. **Oracle: A Relational Database Management System** Oracle System Structure,. Oracle Server, Oracle Database Structure, Oracle Schema Objects, Oracle Data Dictionary.
6. **Structured Query Language: SQL:** Three Parts of SQL, Sub-Queries, Referential Integrity, Some Other SQL Command.

7. **Procedural Language/ Structured Query Language:** PL/SQL Runtime Architecture (PL/SQL Engine), Procedure, Parameters, Packages, Cursors, Triggers.
8. **Relational Algebra and Relational Calculus:** Relational- Oriented Operation, Set-Oriented Operations and Union Compatibility, Aggregate Function and Grouping, Tuple Relation Calculus.
9. **Normalizing Database:** Benefits of Normalization, Function Dependency, The Domain Key Normal Form.
10. **Database Design and Tuning:** The Database Design Process, Requirements and Analysis, Choice of DBMS, Logical Database Design, Database Implementation and Tuning.
11. **Transaction Processing:** Concurrency Control, Recoverability.
12. **Query Processing and Query Optimization:** Query Processing, Query Optimization, Heuristics Rules in Query Optimization, Information used in Cost Function.
13. **Database Recovery Techniques:** Classification of Transaction Failures, Recovery Techniques Base on Deferred Update, Recovery Techniques Base on Immediate Update, Buffer Management.
14. **Concurrency Control Techniques:** The Acid Test for Transaction Management, Binary Locks, Serializability by Two-Phase Locking, Deadlock Problem.
15. **Data Warehousing:** Data Warehouse Definition, Data Form Legacy Systems, Decision- Support and Executive Information Systems.
16. **Data Mining and Web Mining:** Data Mining Techniques, Future Direction of Data Mining, Data Mining Techniques for Web Searching.
17. **Object- Oriented Database:** History Of OODBMS, Need for Abstract Data Types, O-O Features in SQL3, Hypertext Databases.
18. **Distributed Database:** Structure of Distributed Database, Design of Distributed Database, Advantage of Distributed Database, DDBMS Prototypes.