



Mahatma Gandhi University
MEGHALAYA
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SYLLABUS MANUAL

INFORMATION TECHNOLOGY PROGRAMME

PROGRAMME CODE --- 210201

DIPLOMA IN COMPUTER APPLICATION (DCA)

YEAR I

CODE	SUBJECT	CREDIT
ITP11	Introduction to Information Technology	4
ITP12	Programming in C	4
ITP13	RDBMS	4
ITP14	Operating Systems	4
ITP27	Data Structure with C	4
ITP33	Practical-ITP 12	4
ITP34	Presentation/Seminar	10
TOTAL		34

Diploma in Computer Application (DCA)

The UG Degree consists of 7 Subjects in all. These comprise of Subjects: ITP-11 to ITP14 and ITP-27, ITP-33, ITP-34

Compulsory Subject: (ITP-27, ITP-33, ITP-34)

If any student wants to appear for semester system then follow the below mentioned subject's module:

Semester I: ITP11-ITP13, ITP33

Semester II: ITP14, ITP27 & ITP34

Detailed Syllabus

YEAR I

ITP11---INTRODUCTION TO INFORMATION TECHNOLOGY

UNIT I Computing Fundamentals

Brief history of development of computers, Computer system, concepts, Computer system Characteristics, Capabilities and limitations, Types of computers Generations of computers, Personal Computer (PCs) – evolution of PCs, configurations of PCs- Pentium and Newer, PCs Specifications and main characteristics- Basic components of a computer system - Control unit, ALU, Input/output functions and characteristics, memory - RAM, ROM, EPROM, PROM and Other types of memory

UNIT II Input/output Devices and types of Printers

Input/output & Storage Units:- Keyboard, Mouse, Trackball, Joystick, Digitizing tablet, Scanners, Digital Camera, MICR, OCR, OMR, Bar-code Reader, Voice Recognition, Light pen, Touch Screen, Monitors - characteristics and types of monitor -Digital, Analog, Size, Resolution, Refresh Rate, Interlaced / Non Interlaced, Dot Pitch, Video Standard - VGA, SVGA, XGA etc, Printers& types - Daisy wheel, Dot Matrix, Inkjet, Laser, Line Printer, Plotter, Sound Card and Speakers

UNIT III Software and its types, Operating System

Software and its Need, Types of Software - System software, Application software, System Software - Operating System, Utility Program, Programming languages, Assemblers, Compilers and Interpreter, Introduction to operating system for PCs-DOS Windows, Linux, File Allocation Table (FAT & FAT 32), files & directory structure and its naming rules, booting process details of DOS and Windows,

UNIT IV Languages

DOS system files Programming languages- Machine, Assembly, High Level, 4GL, their merits and demerits

UNIT V Use of communication and IT

Communication Process, Communication types- Simplex, Half Duplex, Full Duplex, Communication Protocols, Communication Channels - Twisted, Coaxial, Fiber Optic, Serial and Parallel Communication; Modem - Working and characteristics, Types of network Connections - Dialup, Leased Lines, ISDN, DSL, RF, Broad band ,Types of Network - LAN, WAN, MAN ,Internet, VPN etc., Topologies of LAN - Ring, Bus, Star, Mesh and Tree topologies, Components of LAN - Media, NIC, NOS, Bridges, HUB, Routers, Repeater and Gateways- Internet-Evolution, World Wide Web Internet Services, Convergence of technologies

UNIT VI MIS

Management information system - Introduction, Characteristics, Needs, Different views of MIS, Designing, Placement of MIS, Pitfalls in Designing an MIS, Computer based MIS – Advantages & Disadvantages

UNIT VII Computer Applications in Business

Need and Scope, Computer Applications in Project Management, Computer in Personnel Administration, Information System for Accounting-Cost and Budgetary Control, Marketing and Manufacturing, Computer Applications in Materials Management, Insurance and Stock-broking, Production planning and Control, Purchasing, Banking, Credit and Collection, Warehousing

UNIT VIII Ms Word

Introduction to Ms Word, Document Window, Application Window, Formatting in Ms Word, Mail Merge

Reference Books:

1. Fundamentals of Technology Project Management by Colleen Garton and Erika McCulloch

2. Fundamentals of Information Studies: Understanding Information and Its Environment, Second Edition by June Lester, Wallace C. and Jr. Koehler

3. The Basics of Information Security: Understanding the Fundamentals of InfoSec in Theory and Practice by Jason Andress

ITP12---Programming In C

Block 1: Introducing the Fundamentals of C Programming

Introduction, Exploring Data Types- The char Data Type, The int Data Type, The float Data Type, The double Data Type, The void Data Type. Introducing Constants, Introducing Variables- Declaring Variables, Initializing Variables. Introducing const and volatile Type Qualifiers- The const Type Qualifier, The volatile Type Qualifier. Explaining Data Type Modifiers, Exploring Backslash Constants, Exploring Symbolic Constant, Exploring Delimiters, Understanding Multiple Assignments.

Block 2: Managing Input and Output

Introduction, Input/output Functions, The printf() Function, The printf() Place holders- Type-identifiers, Type Prefixes, Field-width, Precision, Flags. Escape Sequence, The scanf() Function- Rules, Program. The scanf() place holders- Type Indicators, Use of *, Field-width. The getchar() Function, The gets() Function, The putchar() Function, The puts() Function.

Block 3: Working with Operators and Expressions in C

Introduction, Working with Operator- The Unary Operators, The Assignment Operators, The Arithmetic Operators, The Increment and Decrement Operators, The Relational Operators, The Logical Operators, The Bitwise Operators, The Conditional Operators, The Special Operators, The Shorthand Assignment Operators. Operator Precedence in C, Type Casting in C, Implementing Mixed Mode Operation, Using Mathematical Functions in C, Using the Header Files and Preprocessor Directives.

Block 4: Control Structures-I

Introduction, Exploring the Syntax of a Control Structure, Working with Conditional Statements- Using the if Statement, Using the if-else Statement, Creating the Nested if Statements, Using the if-else Ladder, Using the switch Statement, Creating Nested switch Statements. Working with Iterative Statements- Using the while Loop, Using the do-while Loop, Using the Loop. Working with Jump Statements- Using the break Statement, Using the continue Statement, Using the go to Statement.

Block 5: Arrays

Introduction, Introducing Arrays, Types of Arrays- One-Dimensional Arrays, Two-Dimensional Arrays, and Limitations of Arrays.

Block 6: Working with Functions

Introduction, Overview of Functions- Function Definition, Function Invocation, Types of Functions- Built-in Functions, User-defined Functions, Parameter Passing Mechanisms, Passing Arrays in Function, Recursive Functions, Functions and Variables- Local and Global Variables, Static and Register Variables.

Block 7: String Handling in C-I

Introduction, Understanding Strings in C, Declaring and Initializing a String, Reading and Displaying the Strings- Using the scanf () and printf () Functions, Using the puts() and gets() Functions, Using the getchar() and putchar() Functions. Creating an Array of Strings.

Block 8: String Handling in C-II

Performing String Operations- Concatenating Strings, Calculating the Length of a String, and Comparing Strings- Using String Handling Functions- strlen(), strcmp(), strncmp(), strcat(), strncat(), strcpy(), strncpy(), strchr(), strlwr(),strupr(), strrev().

Block 9: Structures and Unions

Introduction, Structures- Defining a Structure, Declaring Structure Variables, Initializing Structure Variables, Nested Structures, Arrays of Structures, The type def Statement. Unions- Defining a Union, Declaring Union Variables, Initializing Union Variables.

Block 10: Pointers

Introduction, Understanding Pointers, Declaring a Pointer Variable, Using the address of (&) Operator, Initializing a Pointer Variable, Dereferencing a Pointer, Performing Operations on Pointers- Assignment, Arithmetic, Comparison, Working with Functions and Pointers- Call By Value, Call by Reference. Working with Arrays and Pointers- Pointers to One-dimensional Arrays, Pointers to String. Allocating Memory at Runtime- malloc(), calloc(), free(),realloc().

Block 11: Working with Preprocessor Directives

Introduction, Using the File Inclusion Directives, Using the Macro Substitution Directives- Defining a Simple Macro, Defining Macro with Arguments, Defining Nested Macros. Using the Compiler Control Directives- The #ifdef Directive, The #ifndef Directive, The #if Directive, The #ifelse Directive, The #ifdef Directive.

Block 12: Data File Processing in C

Introduction, Exploring Data Files, Opening and Closing Files- Reading from Files, Writing to Files, Accessing Data Files Randomly- The fseek() Function, The ftell() Function, The fread() Function, The fwrite() Function.

ITP13---RDBMS

Block 1: Understanding Database Management System

Introduction to Databases- Data versus Information, File Oriented Approach, Database Oriented Approach, Characteristics of Database. Database Management System- Characteristics of DBMS, DBMS Architecture, Advantages and Disadvantages of DBMS, Types of Database Systems. Types of Database Models- Record-Based Model, Relational Model, Network Model, Hierarchical Model, E-R Model, Object-Oriented Model.

Block 2: Introducing Relational Database Management System

Introduction. Relational Database Management System- Characteristics of RDBMS, Exploring Tables in Databases, ER Diagrams. Explaining Data Integrity- Entity Integrity, Domain Integrity, Referential Integrity, User-Defined Integrity. Exploring Keys- Primary Key, Foreign Key, Composite key, Candidate Key. Rules of

Normalization- First Normal Form, Second Normal Form, Third Normal Form, Fourth Normal Form, Fifth Normal Form. BoyceCodd's 12 Rules

Block 3: Performing Basic SQL Operations

Introduction. Opening the Query Editor Window. Working with SQL Data Statements- Retrieving Data Using the SELECT Statement, Inserting Data Using the INSERT Statement, Modifying Data Using the UPDATE Statement, Deleting Data, Using the DELETE Statement. Working with Operators- Arithmetic Operators, Logical Operators, Comparison Operators, Assignment Operator, Bitwise Operators, String Concatenation Operators, Unary Operators, Compound Assignment Operator. Working with Aggregate Functions.

Block 4: Performing Transact-SQL Operations

Introduction. Data Types- Exact Numerics, Approximate Numerics, Date and Time, Character Strings, nicode Character Strings, Binary Strings, Other Data Types. Control Flow Statements- The BEGIN...END Statement, The GOTO Statement, The IF...ELSE Statement, The WHILE Statement. Database Operations- Creating a Database, Dropping the Database. Table Operations- Creating a Table, Altering the Table, runcating the Table, Dropping the Table. Constraints- The PRIMARY KEY Constraint, The UNIQUE Constraint, The FOREIGN KEY Constraint, The CHECK Constraint. Joins- Performing a Cross Join, Performing an Inner Join, Performing an Outer Join, Performing a Self-Join.

Block 5: Working with Stored Procedures and User-Defined Functions

Introduction. Benefits of Stored Procedures. Types of Stored Procedures- System Stored Procedures, User-Defined Stored Procedures. Creating a Stored Procedure. Altering a Stored Procedure. Using Parameters in a Stored Procedure-Using Input Parameters, Using Output Parameters. Types of User-defined Functions- Scalar Functions, Table-Valued Functions. Creating a User-Defined Function.

Block 6: Using Triggers

Introduction. Introducing Triggers. Triggers Vs Constraints. DML Triggers- Creating DML Triggers, Using DML Trigger. DDL Triggers- Creating DDL Triggers, Using DDL Triggers. DML Triggers Vs DDL Triggers.

Block 7: Understanding Transaction, Locking, and Error Handling

Introduction. Introducing ACID Properties. Classifying Transactions-Explaining Explicit Transactions, Defining Autocommit Transactions. Creating Transactions. Saving Transactions. Understanding Locking. Discussing Concurrency- Describing Optimistic Concurrency, Describing Pessimistic Concurrency, Discussing Concurrency Problems. Outlining Isolation Levels. Locking in SQL Server 2008 R2- Categorizing the Different Lock Modes, Managing Deadlock. Implementing Error Handling- Using the @@ERROR Function, Using the RAISERROR Statement, Using the TRY...CATCH Statement.

ITP14---operating system

Block 1: Overview of Operating Systems

Computer and System Software, Objectives and History of Operating Systems, Categories of OS, Job Scheduling, Virtual Storage.

Block 2: Memory Management

Device Management, Buffering, Spooling, Windows Operating Systems, Features of Windows OS, Linux OS, Features of Linux OS, Linux Distributions.

Block 3: Process Management and CPU Scheduling

Process Concept, Process Management, The Process Management Model, Creation and Termination of Processes, States of Process, Process Control Block, Process and Process Scheduling Algorithms, Process Behavior and CPU I/O Burst Cycle, First-Come-First-Served, Shortest-Job-First, Priority Scheduling, Pre-emptive Algorithms, Round-Robin, Multilevel Queues.

Block 4: Concurrency and Process Synchronization

Need for Concurrent Process Synchronization, Cooperating Processes, The Bounded Buffer Producers and Consumers Problem, Critical Section Problem, Inter- Process Communication, Semaphores, Monitors.

Block 5: Threads

Overview of Threads, User and Kernel Threads, Multithreading Models, Thread Libraries, Design Issues in Threads, Other Threading Issues

Block 6: Deadlock and Starvation

Overview of Deadlock Situation, Simple Resource Deadlock, River Crossing Problem, Conditions for Deadlock, Resource Allocation Graph.

Block 7: Deadlock Handling

Deadlock Prevention, Mutual Exclusion Condition, Hold and Wait Condition, No Preemption, Circular Wait, Deadlock Avoidance, Dijkstra's Banker's Algorithm, Deadlock Detection and Recovery.

Block 8: Main Memory and Virtual Memory Management

Storage Organization, Memory allocation to programs, Partitioning of Memory, Free Space Management, Buddy System Memory Allocator, Memory Protection Hardware in Multiprogramming Systems, Overlay Structured Programs, Paging, Page Replacement Algorithms, Segmentation

Block 9: File System Management and Implementation

File System Overview, File Access Methods, Structure of Directory, File Sharing, File Protection, File System Implementation, Directory Implementation

Block 10: Allocation Methods

File Allocation Methods, Free space management techniques, File System Recovery.

Block 11: Distributed System

Overview of Distributed Systems, Distributed Computing System Models, Design Issues of the DOS.

Block 12: Topologies

Network Topologies, Types of Computer Networks, Network Technologies, Communication Protocols, Fault Tolerance.

Block 13: Security

Security Goals, Security Mechanisms and Principles, Malicious Attacks, Mechanisms for Domain Protection.

Block 14: Authentication

User Authentication, Biometrics, Program Threats, Cryptography, Denial of Service Attacks.

Block 15: Introducing Linux

Introducing Linux, Exploring Linux Distributions, Exploring Fedora Linux, Exploring the Features of Fedora Linux, Deploying Fedora Linux

ITP27---DATA STRUCTURE WITH C

UNIT I: Sorting and Searching Techniques

Bubble, Selection, Insertion, Shell sorts and Sequential, Binary, Indexed Sequential Searches, Interpolation, Binary Search Tree Sort, Heap sort, Radix sort, Analysis of Algorithms, Algorithm, Pseudo code for expressing algorithms, time complexity and space complexity, Onotation, Omega notation and theta notation.

UNIT II: Hashing Techniques

Hash function, Address calculation techniques, Common hashing functions , Collision resolution , Linear probing, Quadratic, Double hashing, Bucket hashing, Deletion and rehashing .

UNIT III: Stacks

LIFO structure, creates, POP, PUSH.

UNIT IV: Queues

FIFO structure Priority Queues.

UNIT V: Linear List Concept.

UNIT VI: List v/s Array; Internal pointer & External pointer head, tail of a list, Null list, length of a list.

UNIT VII: Linked Lists: Nodes, Linked List Data Structure.

UNIT VIII: Linked Lists algorithms

Create List, Insert Node (empty list, beginning, Middle, end), Delete node(First, general case), Search list, Retrieve Node, add node, Remove node, Print List, Append Linked List, array of Linked; Complex Linked List structures: Header nodes, Circularly-Linked List, Doubly Linked List: Insertion, Deletion; Multilinked Lists: Insertion, Deletion.

UNIT IX: Introduction to Trees

Binary Trees: Travesals (breadth-first, depth-first); Expression Trees: (Infix, Prefix, Postfix Traversals); General Trees; Search Trees; Binary Search Trees .

UNIT X: Heap

Structure; Basic algorithms – ReheapUp, ReheapDown, Build heap, Insert, Delete .

UNIT XI: Multiway Trees

M-way search trees; B-Trees: Insertion (Inseet node, Search node, Split node, Insert entry), Deletion (Node delete, Delete entry, Delete mid, ReFlow, Balance, Combine), Traverse B-Tree; B-Tree Search.

UNIT XII: Graphs

Terminology; Operations (Add vertex, Delete Vertex, Add Edge, Delete Edge, Find Vertex); Traverse Graph (Depth-First, Breadth-First); Graph Storage Structures (Adjacency Matrix, Adjacency List); Networks: Minimum Spanning Tree, Shortest Path Algorithm, (Dijkstra’s algorithm, Kruskal’s algorithm, Prim’s algorithm, Warshall’s algorithm).

Reference Books

1. **Data structure – A Pseudocode Approach with C** – Richard F Gilberg Behrouz .
2. **Schaum’s Outlines Data structure** Seymour Lipschutz Tata McGraw Hill 2nd Edition .
3. **Data structures & Program Design** in C Robert Kruse, C.L.Tondo, Bruce Leung Pearson .
4. **“Data structure using C”** AM Tanenbaum, Y Langsam & MJ Augustein, Prentice Hall India.

ITP33---Practical-ITP12

ITP34---Presentation/Seminar
