Mahatma Gandhi University
MEGHALAYA
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SYLLABUS MANUAL

INFORMATION TECHNOLOGY
PROGRAMME
PROGRAMME CODE --- 210201

DIPLOMA IN COMPUTER APPLICATION (DCA)

YEAR I

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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

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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
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

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

Block 3: Working with Operators and Expressions in C

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 for 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(), strcmpi(), strcat(), strncat(), strcpy(), strncpy(), strrchr(), strlwr(),strupr(), strrev().

Block 9: Structures and Unions


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


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


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


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


Block 6: Using Triggers


Block 7: Understanding Transaction, Locking, and Error Handling

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**


**Block 3: Process Management and CPU Scheduling**


**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**


**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**

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**


**Block 13: Security**


**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: Travelsals (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 (Inset 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

ITP33---Practical-ITP12

ITP34---Presentation/Seminar