Mahatma Gandhi University
MEGHALAYA
www.mgu.edu.in

SYLLABUS MANUAL

INFORMATION TECHNOLOGY PROGRAMME
PROGRAMME CODE --- 210202

ADVANCE DIPLOMA IN COMPUTER APPLICATIONS (ADCA)

**YEAR I**

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<th>CODE</th>
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**YEAR II**

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<td><strong>TOTAL</strong></td>
<td><strong>32</strong></td>
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Advance Diploma in Computer Application (ADCA)
Year I: ITP-11 to ITP14 and ITP-27, ITP-33, ITP-34
Year II: ITP-15 to ITP-21 and ITP-28

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
**Semester III:** ITP15-ITP18
**Semester IV:** ITP19-ITP21 & ITP28
Detailed Syllabus

YEAR 1

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 &
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

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, Comparing Strings. Using String Handling Functions- strlen(), strcmp(), strncmp(), strcat(), strncat(), strcpy(), strncpy(), strchr(), 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. Boyce-Codd’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


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


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**


**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,

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, O notation, 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
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: Traversals (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 (Insert 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
3. Data structures & Program Design in C Robert Kruse, C.L.Tondo, Bruce Leung
ITP33---Practical-ITP 12

ITP34---Presentation/Seminar

YEAR II

ITP15---Web Technology

Unit 1: Exploring Web Technologies

Unit 2: Exploring HTML

Unit 3: Descriptive Markups
The META Element, Semantic Tags, The Dublin Core and RDF.

Unit 4: Working with Style Sheets
Internal Style Sheet, Inline Style Sheet, External Style Sheet.

Unit 5: Client Side Programming

Unit 6: Server Side Programming
Introduction to Server-Side Web Technologies, Programming Languages for Server-Side Scripting, Configuring Server to Support CGI Applications, Working with Forms and I/O Operations

Unit 7: Miscellaneous Web Technologies

ITP16---UNIX with Shell Programming

Block 1: Introducing Unix Operating System
Introduction, Hardware configuration for Unix, Features of Unix, Architecture of Unix, Unix Commands, PATH, man, echo, Printf, script, passwd, who, date, sty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip, Unix Utilities, System calls.

Block 2: Exploring File System in Unix


Block 3: File System Commands

File System Commands.

Block 4: Unlink

Du, df, mount, umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin, Compressing and Decompressing files.

Block 5: Using advanced Commands in Unix

Introduction, tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm., cmp, diff, tr, awk, cpio.

Block 6: Using Vi Editor

Introduction, Modes, Command Mode, Insert Mode, Basic Navigation, Adding, Deleting and Changing text in vi editor, Saving and reading Files in vi editor.

Block 7: UNIX Shell Programming

Introduction, The Shell’s Interpretive cycle, Describing types of Shells in Unix, C Shell, TC shell, Korn Shell, Bash Shell, Redirection, Pipes, Tee command, Shell Variables, Job Control.

Block 8: Quoting

Quoting, Quoting with Backslashes, Using Single Quotes, Using Double Quotes.

Block 9: Substitution


Block 10: Exploring Filters

Introduction, Filter command, Concatenating File, Display Beginning and End of Files, Paginating File, Cut a File, Pasting Files, Sorting a File.

Block 11: Translating Characters

Translating Characters, Searching Duplicate Lines, Counting Characters, Comparing Files, Deleting Lines.

Block 12: Filtering with Awk
Introduction, Variables and Expressions, The comparison operators, Variables, Storing awk programs in a file.

Block 13: Arrays

Arrays, Functions, String Functions, Mathematical Functions, User-Defined Functions, Splitting Lines into Fields, Comparing sed and awk, Using grep.

Block 14: Programming in C shell

Introduction, Environment variables, Adding Environment variables, Setting Environment variables.

Block 15: Using Scripts

Startup and Shutdown scripts, Command Execution scripts.

Block 16: Expressions

Using Expressions, Commands Execution in Shell syntax.

ITP17—Communication Skills

UNIT I: Concord & Forms of Verbs Rule of Concord or Agreement.

UNIT II: Forms of Verbs: Present Tense, Past Tense, Future Tense, Tenses with Since.

UNIT III: The Future Tense in Adverbial Clauses, Tense in Sentences of Condition.

UNIT IV: Idiomatic use of Prepositions and Conjunctions.

UNIT V: What is an Idiom, Idiomatic Use of Prepositions.

UNIT VI: Words Followed by prepositions.

UNIT VII: Structural Use of Infinitive, Gerund and Participles.

UNIT VIII: The Participle, the Infinitive, Gerunds.

UNIT IX: Common Errors in English Adjectives and Adverbs (Confused).


UNIT XI: Vocabulary Building in English Language Useful Words for Expressing Ideas. Derivations: Root Words.

UNIT XII: Prefixes and Suffixes, Antonyms and Synonyms, Nationality Words: Names of Countries and People.

Reference Books:-

**ITP18---Basic Mathematics**

**Block 1: Introduction to Sets**

Objectives, Introduction, Types of Sets, Subsets, Equal Sets, Null Sets, Universal Sets, Finite and Infinite Sets, Open and Closed Sets Operations on Sets, Union of Sets, Intersection of Sets, Complement of Set, Partition of Sets, Cartesian Product of Sets, Cardinality of Sets, Venn-Diagrams, Applications of Sets.

**Block 2: Relations and Functions**


**Block 3: Introduction to Progressions**

Objectives, Introduction, Arithmetic Progression, nth Term of an Arithmetic Progression, Sum of n Terms of an Arithmetic Progression, Arithmetic Mean, Applications of Arithmetic Progression, Geometric Progression, nth Term of a Geometric Progression Sum of n Terms of a Geometric Progression, Geometric Mean, Applications of Geometric Progression.

**Block 4: Harmonic Progression**

Harmonic Mean, Relation between Arithmetic Mean, Geometric Mean and Harmonic Mean.

**Block 5: Determinants**

Objectives, Introduction, Minors and Cofactors, Properties of Determinants, Rank of a Matrix, Inverse of a Matrix, CRAMER’S RULE.

**Block 6: Matrices**

Types of Matrices, Operations on Matrices, Addition of Matrices, Subtraction of Matrices, Vector and Scalar Multiplication of Matrices, Inverse of a Matrix, Eigen Vectors of a Matrix, Caley-Hamilton Theorem.

**Block 7: Differential Calculus**


**Block 8: Differential Calculus Series**

Taylor’s Series, Maclaurin’s Series, Indeterminate Form, Leibnitz Theorem, Curve Tracing.
Block 9: Integral Calculus

Objectives, Introduction, Integral as Limit of Sum, Fundamental Theorem of Integral Calculus, Indefinite Integrals, Method of Integration, Substitution Method of Integration, By Parts Method of Integration, Partial Fraction Method of Integration, Integration of Algebraic and Transcendental Function, Gamma and Beta Function.

Block 10: Multiple Integration


Block 11: Functions of Several Variables

Objective, Introduction, Limits and Continuity, Partial Differentiation, Chain Rule, Euler’s Theorem, Maxima and Minima, Lagrange’s Method of Undetermined Multipliers, Taylor’s Formula.

Block 12: Plane Curves and Polar Coordinates


Block 13: Correlation and Regression

Correlation, Types of Correlation, Karl Pearson’s Coefficient of Correlation, Rank Correlation Method, Spearman’s Rank Correlation Coefficient, Regression, Regression Lines, Application of Regression Lines for Forecasting Sales, Coefficient of Regression.

Block 14: Probability and Probability Distribution


Block 15: Logarithms and Progression

Introduction, Logarithms, Laws Of Operations, Compound Interest, Arithmetic Progression, Geometric progression, Annuities.

Block 16: Statistics in Business


ITP19---Principles of Management

UNIT I: Conceptual Framework of Management Management Defined, Components of...

UNIT II: Evolution and Foundations of Management Theories

UNIT III: Management Planning Process


UNIT V: Types of Authority Introduction, Sources of Authority, Decentralisation of Authority, Distinction Between Delegation and Decentralisation, Factors Determining the Extent of Decentralisation, Advantages of Decentralisation, Limitations of Decentralisation, The Technique of Decentralisation, Organisation Charts.

UNIT VI: Delegation of Authority

UNIT VII: Communication

UNIT VIII: Motivation

UNIT IX: Staffing, Staffing Defined, Job Analysis, Manpower Planning, Recruitment, Transfers and Promotions, Appraisals, Manpower Development, Job Rotation, Training, Rewards and Recognition.

UNIT X: Co-ordination

UNIT XI: Decision-making
Decision-making Defined, Characteristics of Decision-making, Elements of


Reference Books:

1. Total Quality Management in Education by Sallis Edward (Associate Principal Brunel College of Technology Bristol) and Edward Sallis (Paperback - May 1, 2002)
2. What Every Principal Should Know About Operational Leadership (v. 6) by Jeffrey Glanz (Paperback - Nov 28, 2005)

ITP20---Operations Research

Block 1: Introducing UNIX Operating System

Introduction, Hardware configuration for Unix, Features of Unix, Architecture of Unix, Unix Commands, PATH, man, echo, Printf, script, passwd, who, date, sty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip, Unix Utilities, System calls.

Block 2: Exploring File System in UNIX


Block 3: File System Commands

File System Commands.

Block 4: Unlink

Du, df, mount, umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin, Compressing and Decompressing files.

Block 5: Using advanced Commands in UNIX

Introduction, tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm., cmp, diff, tr, awk, cpio.

Block 6: Using Vi Editor

Introduction, Modes, Command Mode, Insert Mode, Basic Navigation, Adding, Deleting and Changing text in vi editor, Saving and reading Files in vi editor.

Block 7: UNIX Shell Programming
Introduction, The Shell’s Interpretive cycle, Describing types of Shells in Unix, C Shell, TC shell, Korn Shell, Bash Shell, Redirection, Pipes, Tee command, Shell Variables, Job Control.

**Block 8: Quoting**

Quoting, Quoting with Backslashes, Using Single Quotes, and Using Double Quotes.

**Block 9: Substitution**

Substitution, File Substitution, Variable Substitution, Command Substitution, Arithmetic Substitution

**Block 10: Exploring Filters**

Introduction, Filter command, Concatenating File, Display Beginning and End of Files, Paginating File, Cut a File, Pasting Files, Sorting a File.

**Block 11: Translating Characters**

Translating Characters, Searching Duplicate Lines, Counting Characters, Comparing Files, Deleting Lines

**Block 12: Filtering with Awk**

Introduction, Variables and Expressions, The comparison operators, Variables, Storing awk programs in a file.

**Block 13: Arrays**

Arrays, Functions, String Functions, Mathematical Functions, User-Defined Functions, Splitting Lines into Fields, Comparing sed and awk, Using grep.

**Block 14: Programming in C shell**

Introduction, Environment variables, Adding Environment variables, Setting Environment variables.

**Block 15: Using Scripts**

Startup and Shutdown scripts, Command Execution scripts.

**Block 16: Expressions**

Using Expressions, Commands Execution in Shell syntax.

**ITP21—Enterprise Resource Planning (ERP)**

**Block 1: Introduction of Management Information System**


**Block 2: Management Information System (MIS)**

Block 3: Strategic Role of MIS

Objectives, Introduction, Strategic MIS, Competitive Advantages with MIS, Customer Relationship Management (CRM), Supply Chain Management (SCM), Enterprise Resource Planning (ERP), Business Process Re-Engineering (BPR), Total Quality Management (TQM)

Block 4: Management of Data Resources

Objectives, Introduction, Concept of Data, Types of Data, Methods of Data Collection, Data Warehousing, Data Mining

Block 5: Designing Database

Hierarchical Data Model, Network Data Model, Relational Data Model, Resource Requirement and Procurement.

Block 6: Decision Support Systems

Objectives, Introduction, Understanding DSS, Problem Solving and Decision Making, Simon’s model of decision making, Types of Decisions, Components of Decision Support System

Block 7: Types of Decision Support Systems

Types of Decision Support Systems, Tools and Technologies used in DSS, DSS and Outsourcing.

Block 8: Introduction to ERP

Objectives, Introduction, Need for ERP Systems, Basic Concepts of ERP, ERP Model and Modules

Block 9: Implementation of ERP

Advantages and Disadvantages of ERP, Comparison between EMS and MIS.

Block 10: ERP and E-Commerce


Block 11: ERP and Applications of E-Commerce

ERP and Challenges of E-Commerce

Block 12: ERP and Related Technologies

Introduction, ERP Related Technologies, Online Analytical Processing, Data Mining

Block 13: Business Intelligence
Integration of ERP and Related Technologies

Block 14: Emerging Trends in ERP
Introduction, Emerging Technologies, ERP Deployment Models, Future of ERP

Block 15: Ethical Aspects and Security of Information
Introduction, Ethics in Information Technology, Ethical Challenges of IT

Block 16: Security of Information
Security Management and Control, Requirement of Regulatory System, Security Policy, Legal Requirement

ITP28---C# with .NET

Unit I


Overview of C#: Namespaces, Adding comments, Main returning a value, Using aliases for Namespace classes, Passing String objects to Write Line method, Command line arguments, Main with a Class, Providing interactive input, Using mathematical functions, multiple main methods, compile time errors, program structure, program coding style.

Literals, Variables & Data Types: Literals, variables, data types, value types, reference types, declaration of variables, initialization of variables, default values, constant variables, boxing & unboxing.

Operators and Expressions: Introduction; Arithmetic Operators; Relational Operators; Logical Operators; Assignment Operators; Increment and Decrement Operators; Conditional Operator; Bitwise Operators; Special Operators; Arithmetic Expressions; Evaluation of Expressions; Precedence of Arithmetic Operators; Type Conversions; Operator Precedence and Associativity; Mathematical Functions.

Decision Making and Branching: Introduction; Decision Making with if Statement; Simple if Statement; The if...else Statement; Nesting of if ......Else Statements; The else if Ladder; The Switch Statement; The? : Operator.

Decision Making and Looping: Introduction; The while Statement; The do Statement; the for Statement; the for each Statement; Jumps in Loops.

Unit II

Methods in C#: Introduction; Declaring Methods; The Main Method; Invoking Methods; Nesting of Methods; Method Parameters; Pass by Value; Pass by Reference; The Output Parameters; Variable Argument Lists; Methods Overloading.

Handling Arrays: Introduction; One-Dimensional Arrays; Creating an Array; Two-Dimensional Arrays; Variable-Size Arrays; the System. Array Class; Array List Class.
Manipulating Strings: Introduction; Creating Strings; String Methods; Inserting Strings Using System; Comparing Strings; Finding Substrings; Mutable Strings; Arrays of Strings; Regular Expressions.

Structures and Enumerations: Introduction; Structures; Structs with Methods; Nested Structs; Difference between Classes and Structs; Enumerations; Enumerator Initialization; Enumerator Base Types; Enumerator Type Conversion.

Unit III

Classes and Objects: Introduction; Basic Principles of OOP; Defining a Class; Adding Variables; Adding Methods; Member Access Modifiers; Creating Objects; Accessing Class Members; Constructors; Overloaded Constructors; Static Members; Static Constructors; Private Constructors; Copy Constructors; Destructors; Member Initialization; The this Reference; Nesting of Classes; Constant Members; Read-only Members; Properties; Indexers.

Inheritance and Polymorphism: Introduction; Classical Inheritance; Containment Inheritance; Defining a Subclass; Visibility Control; Defining Subclass Constructors; Multilevel Inheritance; Hierarchical Inheritance; Overriding Methods; Hiding Methods; Abstract Classes; Abstract Methods; Sealed Classes: Preventing Inheritance; Sealed Methods; Polymorphism.

INTERFACES:

Multiple Inheritances: introduction; Defining an Interface; Extending an Interface; Implementing Interfaces; Interfaces and Inheritance; Explicit Interface Implementation; Abstract Class and Interfaces.

Operator Overloading: Introduction; Overloadable Operators; Need for Operator Overloading; Defining Operator Overloading; Overloading Unary Operators; Overloading Binary Operators; Overloading Comparison Operators.

Managing Errors and Exceptions: Introduction; Types of Errors; Exceptions; Syntax of Exception Handling Code; Multiple Catch Statements; The Exception Hierarchy; General Catch Handler; Using finally Statement; Nested Try Blocks; Throwing Our Own Exceptions; Checked and Unchecked Exceptions; Using Exceptions For Debugging.