ENCLOSURE-I

➢ **Detailed Syllabus**

Total Marks: 2000		Total Credits: 73	
Course No	**Course Title**	**Evaluation Pattern**	**Credit**
SEMESTER - I			
IT-01	Fundamentals of Computers	Objectives:40%, Descriptive: 60%	3
IT-02	Introduction to Programming	Objectives:30%, Descriptive: 40%, Practical:30%	4
IT-03	Digital Logic	Objectives:40%, Descriptive: 60%	3
IT-05	Communication Skills & Technical Writing	Objectives:40%, Descriptive: 60%	2
IT-11	Mathematical Foundations of Computer Science	Objectives:40%, Descriptive: 60%	3
SEMESTER - II			
IT-07	Database Management System	Objectives:30%, Descriptive: 40%, Practical:30%	4
IT-12	Data Structure and Algorithm	Objectives:30%, Descriptive: 40%, Practical:30%	4
IT-13	Computer Organization & Architecture	Objectives:40%, Descriptive: 60%	4
IT-27	Web Technologies	Objectives:30%, Descriptive: 40%, Practical:30%	4
IT-10	Management and Accounting	Objectives:40%, Descriptive: 60%	3
SEMESTER - III			
IT-14	Operating System	Objectives:30%, Descriptive: 40%, Practical:30%	4
IT-17	Data Communication & Computer Network	Objectives:40%, Descriptive: 60%	4
IT-16	Objected Oriented Programming	Objectives:30%, Descriptive: 40%,	4

	using JAVA	Practical:30%	
IT-21	Software Engineering	Objectives:40%, Descriptive: 60%	4
IT-28	Advanced Web Technologies	Objectives:30%, Descriptive: 40%, Practical:30%	4
SEMESTER - IV			
IT-22	Computer Graphics & Multimedia	Objectives:40%, Descriptive: 60%	4
IT-23	Application Software Development	Objectives:40%, Descriptive: 60%	4
IT-29	E Commerce	Objectives:40%, Descriptive: 60%	3
IT-30	Project	200 Marks	8

SEMESTER – I
IT-01: FUNDAMENTALS OF COMPUTERS

Introduction

Brief history of development of computers, computer system concepts, capabilities and limitations, types of computers: Analog, Digital, Hybrid, general, special purpose, Micro, mini, mainframe super computers, generations of computers, personal computers, types of personal computers – Laptop, Palmtop etc.

Computer software

Need of software, types of software, System software – Operating system and its types, loader, linker etc.; Application software --word processing, spread sheet, presentation graphics, database management software; Programming languages - machine, assembly, high level, 4GL, their merits and demerits, Computer Viruses.

Components of Computer System

Basic components of computer system, Input devices, output devices, Control Unit, storage devices., maintaining the Computer System.

PC Hardware and Maintenance

Introduction and Identification of different hardware component of a PC , Installation of Operating System, Hard Disk Partitioning ,Troubleshooting.

IT-02: INTRODUCTION TO PROGRAMMING

Introduction to C:
Steps for Problem Solving ,Algorithm, Analysis of Algorithm Efficiency, Flowchart , Pseudo code, Program , Programming Languages , Translators

History of C , Features of C, Structure of a C Program, Writing a C Program, Compiling and Run a C Program, Syntax and Semantic Errors, Linker Errors, Logical and Runtime Errors, Execution Process

Variables and Constants:
Character Set, Identifiers and Keywords, Rules for Forming Identifiers , Data Types and Storage Classes in C, Variables , Declaring Variables, Initializing Variables, Constants, Types of constants

Expressions and Operators:
Assignment Statements, Unary and Binary Operators , Arithmetic Operators, Relational Operators , Logical Operators, Comma and Conditional Operators, Type Cast Operator, Size of Operator, Precedence of Operators

Control Statements, Decision Control Statements:: The if Statement , The switch Statement, Loop Control Statements:: The while Loop , The do-while Loop ,The for Loop, The Nested Loop, The Goto Statement, The Break Statement, The Continue Statement

Arrays:

Definition , Syntax of Array Declaration and Initialization, Subscript, Processing the Arrays , Multi-Dimensional Arrays, Declaration and Initialization of Two-Dimensional Array, Processing of Two Dimensional Arrays, Representation of Matrix using Two Dimensional Array

Strings:

Character Arrays, Declaration and Initialization of Strings, Array of Strings,Library String Functions: strlen , strcpy , strncpy , strcmp , strncmp , strcmpi , strnicmp , strcat , strncat , strlwr , strupr , strrev , strdup, strchr , strset , strnset , strstr

Functions:
Definition , Structure of a Function , Function Declaration , Function Definition , Formal parameter , Actual parameter ,The Return Statement , Function Prototypes , Recursive Function, Function Calling: Call by value and Call by address
Structures and Unions:

Declaration and Initialization of Structures, Accessing the Members of a Structure , Structures as Function Arguments , Structures and Arrays , Unions , Initializing an Union, Accessing the Members of an Union

Pointers:

What is Pointer , Address and Indirection Operators , Pointer Type Declaration and Assignment, Pointer to a Pointer , Null Pointer Assignment , Pointer Arithmetic, Passing Pointers to Functions , Arrays and Pointers , Array of Pointers , Pointers and Strings

The C Preprocessor and Command Line Arguments:

Definition, Macros in C, #define, #include, #ifdef, Other Preprocessor Commands, Predefined Names Defined by Preprocessor

Command Line Arguments in C, Structure of Programs that use Command-Line Arguments, Accessing Command-Line Arguments

Files:

Definition, File Handling in C Using File Pointers, fopen( ) , fclose( ) , Input and Output using file pointers , Character Input and Output in Files, String Input / Output Functions , Formatted Input / Output Functions , Block Input / Output Functions, Sequential Files, Random Access Files , Positioning the File Pointer

IT-03: DIGITAL LOGIC
Binary Systems

Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, Complements, Binary Codes, Binary Storage and Registers, Binary Logic, Integrated Circuits

Boolean Algebra and Logic Gates

Basic Definitions, Boolean Algebra: Theorems and Properties, Boolean Functions, Canonical and Standard Forms and Other Logic Operations. Digital Logic Gates and its different types.

Simplification of Boolean Functions

Map Method: Two, Three and Four variable maps. Product of Sums Simplification, NAND and NOR implementation, Don't Care Conditions, Tabulation Method.

Combinational Logic and Sequential Logic

Adders: Half Adder, Full Adder and Binary Parallel Adder. Decoder, Encoder, Multiplexer, Demultiplexer.

Flip-Flops and its different types, Registers, Shift Registers, Counters.

Processor and Control Logic Design

Arithmetic Logic Unit and its design, Status Register. Hard-Wired Control, Microprogram Control.

SEMESTER – II

IT-12: DATA STRUCTURE AND ALGORITHM

Introduction to Data structure, Primitive and composite data types, Abstract Data Type Time and space complexity of algorithms, Concept of Θ, Big-O, Small-o and Big-Omega notations.

Linear List , Arrays, Stacks, Queue, Circular Queue, Priority Queue

Singly Linked List, Doubly Linked List and Circular Linked List

Introduction to Trees, Properties of Trees, Binary Trees, Extended binary trees, Complete binary trees, Binary search trees, Weight balanced and Height balanced trees, AVL trees, Threaded Binary trees , B-Trees , Heap .

Introduction to Graph, Properties of Graphs, Connected graph, Sequential representation of Graphs : Adjacency Matrix, Path matrix, Warshall's algorithm, Linked Representation of Graphs : Adjacency list, Graph Traversal: Depth-first and Breadth-first

Spanning trees, Minimum Spanning tree, Prim's and Kruskal's algorithms
Selection sort, Insertion sort, Bubble sort , Radix sort , Quick sort , Heap sort, Merge sort
Searching techniques: Binary search, Linear search, Hashing.

IT-07: DATABASE MANAGEMENT SYSTEM

The Basic Concepts

The file based system, limitations of file based system, the Database Approach, Advantages of DBMS.

DBMS Architecture
Three level architecture of Database System, Mappings, Data Independence.
Components and Functions of DBMS, Database Administrator and its roles.

Entity, Attributes and Associations

Definition of Entity, attribute, association among entity and attributes, Generalizations and Aggregation.

Data Models

Relational Model, Hierarchical Model, Network Model

The Relational Model

The Relational Model, Domains, Attributes, Tuples, Relations and Views. Primary Key, Foreign Key, Candidate Key, Alternate Key, Super Key, Relational Constraints.

The E-R Model, Weak Entity and Strong Entity.

Relational Algebra

Basic operations – Union, Intersection, Difference and Product. Additional operations – Select, Project, Join and Divide.

Database Integrity and Normalization

Referential Integrity, Entity Integrity. Functional Dependencies, Concept of Normalization, First Normal Form, Second Normal Form, Third Normal Form, Boyce Codd Normal Form.

Structured Query Language

What is SQL? Data Definition Languages, Data Manipulation Languages, Data Control Languages.

Database Recovery and Security

What is Recovery? Kinds of failures, Failure controlling methods, Database errors, Recovery Techniques, Security & Integrity, Relationship between Security and Integrity.

IT-11: MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Sets and Relations: Definition of sets, subsets, complement of a set, universal set, intersection and union of sets, De-Morgan's laws, Cartesian products, Equivalent sets, Countable and

uncountable sets, minset, Partitions of sets, Relations: Basic definitions, graphs of relations, properties of relations

Algebra of logic, Propositions, Connectives, Tautologies and contradiction, Equivalence and implication, Principle of Mathematical induction, quantifiers.

Introduction of a Matrix, its different kinds, matrix addition and scalar multiplication, multiplication of matrices, transpose etc. Square matrices, inverse and rank of a square matrix, solving simultaneous equations using Gauss elimination, Gauss Jordan Methods, Matrix Inversion method.

A general introduction, simple and multipgrpahs, directed and undirected graphs, Eulerian and Hamiltonian Graphs, Shortest path algorithms, Chromatic number, Bipartite graph, graph coloring.

IT-10: MANAGEMENT & ACCOUNTING

Accounting: Principles, concepts and conventions, double entry system of accounting, introduction to basis books of accounts of sole proprietary concern, closing of books of accounts and preparation of trial balance.

Final Accounts: Trading, Profit and Loss accounts and Balance sheet of sole proprietary concern (without adjustment)

Financial Management: Meaning, scope and role, a brief study of functional areas of financial management. Introduction to various FM tools: Ration Analysis, Fund Flow statement and cash flow statement (without adjustments)

Costing: nature, importance and basic principles. Marginal costing: Nature scope and importance, Break even analysis, its uses and limitations, construction of break even chart, Standard costing: Nature, scope and variances (only introduction)

Computerized accounting: Meaning and advantages, Computer Programs for accounting, Balancing accounts, Trial balance and final accounts in computerized, Accounting, control, and Audit, Sub- Modules of computerized accounting systems.

IT-16: OBJECT ORIENTED PROGRAMMING USING JAVA

Object Oriented Methodology

Paradigms of Programming Languages, Evolution of OO Methodology, Basic Concepts of OO Approach, Comparison of Object Oriented and Procedure Oriented Approaches, Benefits of OOPs, Introduction to Common OO Language, Applications of OOPs

Classes and Objects, Abstraction and Encapsulation, Inheritance, Method Overriding and Polymorphism.

Java Language Basics

Basic Features, Java Virtual Machine Concepts, Primitive Data Type And Variables, Java Keywords, Java Operators.

Expressions, Statements, Control Statements, Selection Statements, Iterative Statements, Jump Statements, Arrays.

Class and Objects

Class Fundamentals, Creating objects, Assigning object reference variables, Introducing Methods, Static methods, Constructors, Overloading constructors, This Keyword, Using Objects as Parameters, Argument passing, Returning objects, Method Overloading, Garbage Collection, The Finalize ( ) Method

Inheritance and Polymorphism

Inheritance Basics, Access Control, Multilevel Inheritance, Method Overriding, Abstract Classes, Polymorphism, Final Keyword

Packages and Interfaces
Package, Defining Package, CLASSPATH, Package naming, Accessibility of Packages, Using Package Members, Interfaces, Implementing Interfaces, Interface and Abstract Classes, Extends and Implements Together

I/O in Java
I/O Basics, Streams and Stream Classes, Byte Stream Class, Character Stream Classes, Predefined Streams, Reading from, and Writing to, Console, Reading and Writing Files, The Transient and Volatile Modifiers, Using Instance of Native Methods

Strings and Characters

Fundamentals of Characters and Strings, The String Class, String Operations, Data Conversion using Value of ( ) Methods, String Buffer Class and Methods

Exploring Java I/O

Java I/O Classes and Interfaces, I/O Stream Class, Input and Output Stream, Input Stream and Output Stream, Hierarchy,Text Streams, Stream Tokenizer, Serialization, Buffered Stream, Print Stream, Random Access File

IT-14: OPERATING SYSTEM

Introduction to Operating System

What is an operating system, history of operating systems. Operating system concepts – processes, files and shells.

Operating system classification – Single user, multi user, simple batch processing, multiprogramming, multitasking, parallel systems, distributed system, real time system.

Process Management

Process - Process Model, Process Hierarchies, Process States, Threads - What is thread and its use, design issues of thread.
Procss Scheduling:- Basic Concepts. Preemptive and non-preemptive scheduling. Types of scheduling:- batch, interactive and real-time. Scheduling Algorithms:- First Come First Server, Shortest Job First & Round Robin Scheduling.

What is Interprocess Communication, Race conditions, Critical-Sections, Mutual exclusion. Solution to race condition: - Disabling Interrupt, Peterson's solution, Sleep & Wake Up(The Producer Consumer Problem) and Semaphores.

Input/Ouput Management & Deadlocks

Basic principles I/O Hardware, I/O Devices, Device controllers, DMA. Principles of I/O Software, its goals, Interrupt Handlers, Device Drivers, Device Independent I/O Software(its functions)

What is Deadlock. Principles of Deadlock (Deadlock conditions & Modelling). Deadlock Detection, Recovery & Prevention. Deadlock Avoidance(Banker's algorithm).

Memory Management

Monoprogramming and Multiprogramming. Swapping and its basic concepts. Virtual Memory – Basic Concepts, Paging, Page Tables. Page replacement algorithms: - Optimal, Not Recently Used, First In First Out, Least Recently Used.

File System

What is file, file naming, file types(directory, regular, device), sequential access and random access files, file attributes, operations on file, hierarchical directory structure, path name(relative and absolute), operation on directories. File System Implementation Techniques.

System Calls

What is System Calls. System Calls:- Process Management(fork, getpid, getppid, wait, waitpid, exit, execve), Signaling(kill, sigaction, sigreturn, pause), File & Files System Management(creat, open, close, read, write, lseek, stat, fstat, dup, rename).

IT-28: ADVANCED WEB TECHNOLOGIES

Overview

History of Internet, Internet services: telnet, e-mail, ftp, WWW. Equipments required for an Internet Connection, Opening an e-mail account, Reading and Writing e-mail., ftp, www

URL, Surfing the Internet., Search Engine, uploading and downloading.

Web Browsers*:*

functions and working principle of web browsers; plug-ins & helper applications; conceptual architecture of typical web browsers (like Mozilla).

Introduction to Client/Server Computing:

client-server computing basics; types of Client/Server systems; middleware; N-tired systems: 2-tier/3-tier/4-tier systems; Fat Clients versus Fat Servers.

Web Servers:

Web services and web server functionality; web server composition; registration; HTTP, IP address, DNS & ports; conceptual architecture of a typical web server (like Apache).

Introduction to HTML

Hypertext Markup Language (HTML), Writing a web page in HTML, Tags, hyperlinks, URLs, tables, text formatting in web pages, Using graphics and multimedia in web pages; image maps., Use of frames and forms.

Introduction to JavaScript:

Constants, variables, operators, expressions, statements. Use of user-defined and built-in functions, Client-side Form validation using JavaScript, Using properties and methods of built-in objects.

SEMESTER – IV

IT-22: COMPUTER GRAPHICS & MULTIMEDIA

Graphics Hardware: The Functional Characteristics Of The Systems Are Emphasized. Input Device: Keyboard Touch Panel, Light Pens, Graphic Tablets, Joysticks, Trackball, Data Glove, Digitizer, Image Scanner, Mouse, Voice Systems.

Hard Copy Devices: Impact And Non Impact Printers, Such As Line Printers, Dot Matrix Printers, Laser, Ink- Jet, Electrostatic, Flatbed And Drum Plotters. Video Display Devices: Refresh Cathode–Ray Tube, Raster Scan Display, Random Scan Displays, Color CRT-Monitors, Direct View Storage Tube, Flat Panel Displays, 3-D Viewing Devices, Raster Scan Systems, Random Scan Systems, Graphic Monitors And Workstation.

Scan Conversation Algorithm Line, Circle And Ellipse, Breshenham's Algorithm, Area Filling Techniques, Character Generation. 2-Dimensional Graphics: Cartesian And Homogenous Co-Ordinate Systems, Geometrical Transformation (Translation, Scaling, Rotation, Reflection, Shearing), Two Dimensional Viewing Transformation And Clipping (Line, Polygon And Text)

3-Dimensional Graphics: Geometrical Transformation (Translation, Scaling, Rotation, Reflection, Shearing), Mathematics And Projections (Parallel And Perspective). 3-D Viewing transformation And Clipping.

Hidden Line Surface Removal Algorithms, Z-Buffer, Scan Line, Sub Division Shading: Modeling Light Intensities: Diffuse Reflection, Refracted Light, Half toning. Surface Shading Methods: Constant Intensity Method, Gouraud Shading, Phong Shading.

Introduction to Multi-media Technology, Audio System, Image Compression, Data Compression, Digital Motion Video, Authoring tools, Multimedia Applications, Multimedia DBMS.

IT-23: APPLICATION SOFTWARE DEVELOPMENT

Introduction to .NET

.NET: Introduction, Advantages, DNA Architecture, Study of .NET Framework, Languages under .NET.

Introduction to VB.NET
Basic Programming Rules, Creating a Project, Exploring & Coding a Project, Building a Project, Debugging.

Variables, Constants, Operators and Expressions and Control Statements, Arrays, Structures, Enumerators, Functions.

Class, Object, Inheritance, Events, String Handling, Exception Handling, File Handling, Multi-Threading, Memory Management Issues.

GUI Programming with VB.NET

Introduction to GUI Application and Their Components. Elements of GUI Programming: Controls, Properties, Methods, Events.

Form Control: Interacting with Controls, Dialog Controls, Creating and Using MDI Applications, Creating Custom Controls.

Database Programming

Connecting to Databases, Retrieving Data, Inserting Data, Updating Data etc.

IT-29: WEB TECHNOLOGY

Review of HTML & JavaScript:

Various HTML Tags, properties & use; Cascading Style Sheet (CSS). Creating interactive and dynamic web pages with JavaScript.

Markup language basics:

Standard Generalized Markup Language (SGML)- structures, elements, Content models, DTD, attributes, entities. Extensible Markup Language (XML)- Introduction: using user-defined tags in web pages; displaying XML contents using HTML and JavaScript; XML Document Type Definitions;

Extensible Stylesheet Language (XSL) and its use to display XML contents; XSL and basic database queries; brief introduction to other markup languages: VML, MathML, VRML, RELML, HRMML, VoxML, etc.

Server-side scripting:

Overview of CGI, ASP, and JSP. Server side scripting using PHP- constants, variables, operators, expressions & statements; user-defined & built-in functions; form processing scripts; using properties and methods of built-in objects. Web database connectivity-introduction to ODBC; PHP with database connectivity.

Advanced web technologies:

brief introduction to COM, DCOM, CORBA, ISAPI, SOAP, UDDI, WSDL, .NET, etc. Introduction to AJAX and its implementations.

Web Security:

Firewalls- definition and uses, network layer firewalls and application layer firewalls; Proxy servers.

IT 29: E – Commerce
Electronic commerce fundamentals:

History and basic idea of EDI and electronic messaging, definition of e-commerce; administration, business, and consumer models of e-commerce; e-commerce enablers- cost reduction, trust issues, products, processes, and markets.

E-commerce Internet applications: overview of e-commerce standardization activities and standards

Electronic payment systems: digital cash- Ecash, ECheque, Credit card based payment systems, Micropayments and Macropayments.

Social impacts of e-commerce: changes in administration & business; electronic shopping; electronic forms; global e-commerce and future trends.

IT-30: PROJECT

Enclosure: II (Academic Planner)

ACADEMIC CALENDAR
Gauhati University Institute of Distance and Open Learning
Guwahati- 781014, Assam

ADMISSION			
SEMESTER (TRADITIONAL PROGRAMME)			
A	1	Fresh	July-September
	2	Continuation	July-September
SEMESTER (IT PROGRAMMES)			
B	1	Fresh	July-September
	2	Continuation	Odd Semester (July-September)
			Even Semester (January-February)
ADMISSION TEST FOR M.Sc. IT PROGRAMME			
C		August	
ANNUAL PROGRAMMES			
D	1	Fresh	July-September
	2	Continuation	July- September
DISTRIBUTION OF SLM			
SEMESTER/ANNUAL (TRADITIONAL PROGRAMMES)			
A	1	Fresh	July-October
	2	Continuation	July-October
SEMESTER (IT PROGRAMMES)			
B	1	Odd Semester	July-October
	2	Even Semester	Jan-March
CONTACT CLASSES			
SEMESTER (TRADITIONAL PROGRAMMES)			
A	1	Odd Semester	September-December
	2	Even Semester	March-June
SEMESTER (IT PROGRAMMES)			
B	1	Odd Semester	September-December
	2	Even Semester	March-June
ANNUAL PRAGRAMME			
C	1	Previous	December-May
	2	Final	December-May
EXAMINATION : TERM END			
SEMESTER (TRADITIONAL/IT)			
A	1	Previous	July-August (All Sundays)
	2	Final	July-August (All Sundays)
ANNUAL			
August-September (All Sundays)			
B	*Schedule may change as per directive of the controller of Examination, GU/Govt. of Assam*		

EXAMINATION: Sessional (OMR based Internal Examination)			
A	**SEMESTER (TRADITIOAN/IT)**		
	1	Odd Semester	November
	2	Even Semester	May
ANNUAL			
January			
DECLARATION OF RESULT (Term End)			
SEMESTER (TRADITIONAL/IT)			
A	1	Odd Semester	May-June
	2	Even Semester	November-December
B	**ANNUAL**		
	Januray		

ENCLOSURE-III

SLM covering syllabus

Sl No.	Semester	Course No.	Course Name
1	I	IT 01	Fundamentals of Computers
2		IT 02	Introduction to Programming
3		IT 03	Digital Logic
4		IT 05	Communication Skills & Technical Writing
5		IT 11	Mathematical Foundations of Computer Science
6	II	IT 07	Database Management System
7		IT 12	Data Structure and Algorithm
8		IT 13	Computer Organization & Architecture
9		IT 27	Web Technologies
10		IT 10	Management and Accounting
11	III	IT 14	Operating System
12		IT 17	Data Communication & Computer Network
13		IT 16	Objected Oriented Programming using JAVA
14		IT 21	Software Engineering
15		IT 28	Advanced Web Technology
16	IV	IT 22	Computer Graphics & Multimedia
17		IT 23	Application Software Development
18		IT 29	E Commerce