CLASS – XI : SEMESTER – I

SUBJECT: ARTIFICIAL INTELLIGENCE AND DATA SCIENCE (AIDS)-THEORY

FULL MARKS: 35   **CONTACT HOURS: 60 Hours**

UNIT NO.	SUB UNIT	TOPICS	CONTACT HOURS	MARKS
Unit-1 Computer Fundamentals (16)	1A	History of computer, generation of computers, classification of computers, block diagram of a basic Computer system-a visual representation of its fundamental components (CPU unit, input unit, output unit, memory unit input) and their functions, various input and output devices, Basic computer architecture, Storage Devices -primary and secondary storage devices	5	3
	1B	Bit, Byte and Word, Number System (Base, Binary, Decimal, Octal, Hexadecimal), Conversion of number systems, Boolean logic, Logic Gates, canonical form, combinational circuit design(with simple examples), ASCII code. **Basic computer architecture**-data flow between CPU, Memory and I/O device, Interconnection of computer units via system buses, Registers- various important registers within CPU, Control unit-how it instructs ALU and registers, and I/O devices, Simple examples showing how ALU works. Basic instruction format, basic steps of instruction cycle and their brief description.	10	5
	1C	Concept of Algorithm and Flowchart(with simple examples), Basics of Computer Programming (three levels: high level language, assembly language, machine language, definition and block diagrams), Overview of Compiler and Interpreter (definition and mention name of major compiled (e.g., C, C++) and interpreted languages (e.g., Python), Overview of procedural and object oriented programming (key features and just the basic differences, mention names of some popular procedural (e.g., BASIC, FORTRAN, C) and object oriented programming languages (e.g., C++, Java, Python).	8	5

	1D	Overview of Software (system software and application software with examples (mention names only), Definition of Operating System and functions (mention names of some popular operating systems like Windows, Linux, Android, etc.). Networking of machines (overview of LAN, MAN, WAN, Internet, Wifi etc), types of computer (workstation, desktop, Smartphone, embedded system, etc.),	**5**	**3**
Unit -2 **Introduction to Python Programming (14)**	2a	Basics of Python programming (with a simple 'hello world' program, process of writing a program, running it, and print statement), Concept of class and object, Data-types (integer, float, string), Notion of a variable, Operators (assignment, logical, arithmetic etc.), accepting input from console, conditional statements (If else and Nested If else), Collections (List, Tuple, Sets and Dictionary), Loops (For Loop, While Loop & Nested Loops), Iterator, String and fundamental string operations (compare, concatenation, sub-string etc.), Function, Recursion.	10	5
	2B	Overview of linear and non-linear data structure (definition, schematic view and difference), array (1D, 2D and its relation with matrix, basic operations: access elements using index, insert, delete, search), stack-concept of LIFO, basic stack operations and their implementations using basic python code (use user-defined functions for stack operations), queue-concept of FIFO, basic queue operations and their implementations using basic python code(use user-defined functions for queue operations), use of List methods in python for basic operations on array, stack and queue, overview of NumPy library and basic array operations (arrange(), shape(), ndim(), dtype() etc.), binary tree (definition and schematic view only) .	10	6
	2C	**Time complexity -** Big-oh and Big-omega notation only**,** Linear search and binary search algorithm, sorting algorithm (bubble sort only)	4	3
Unit- 3 Introduction to Linear Algebra and Vector Algebra	3	Basic matrix operations like matrix addition, subtraction, multiplication, transpose of matrix, identity matrix. Distance function, Euclidean norm, distance between two points in 2D and 3D and extension of idea to n dimensions. A brief introduction to vectors, unit vector, normal vector, Euclidean space, real n-dimensional space, dot product of vectors	8	5