Artificial Intelligence
Class XI

Theory – 70
Syllabus , Marks Distribution
and Question Pattern

1. Computer Fundamentals [17 Marks]		
1A	History of computer, Basic Computer hardware, input and output devices, Basic computer architecture, input output devices, memory and CPU, networking of machines (overview of LAN, MAN, WAN, Internet, Wifi etc), types of computer (workstation, desktop, Smartphone, embedded system, etc.), 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).	5
1B	Bit, Byte and Word, Number System (Base, Binary, Decimal, Octal, Hexadecimal), Conversion of number systems, Boolean logic (Boolean Gates), Boolean operators (OR, AND and NOT), ASCII code, Concept of Algorithm and Flowchart.	7
1C	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)).	5

2. Introduction to Python Programming [15 Marks]		
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.	7
2B	Overview of linear and nonlinear 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 operations: Push, Pop, peek, size), queue (concept of FIFO, basic operations: Enqueue, Dequeue, peek, size), useof 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.), binarytree (definition and schematic view only) .	5
2C	Linear search and binary search algorithm, sorting algorithm (bubble sort only)	3

3. Foundation for AI [10 Marks]		
3A	History of AI: Alan Turing and cracking enigma, mark 1 machines, 1956-the birth of the term AI,AI winter of 70's, expert systems of 1980s, skipped journey of present day AI. Distinction between terms AI, Pattern recognition and Machine Learning Note: should be taught as a story more than flow of information World war 2, Enigma and Alan Turing, the birth of modem computers	3
3B	Introduction to linear algebra and statistics for AI : • Basic matrix operations like matrix addition, subtraction, multiplication, transpose of matrix, identity matrix • A brief introduction to vectors, unit vector, normal vector, Euclidean space - Probability distribution, frequency, mean, median and mode, variance and standard deviation, Gaussian distribution • Correlation , Regression, Introduction to Graphs - (Basic idea)- • Distance function, Euclidean norm, distance between two points in 2D and 3D andextension of idea to n dimensions	7

4. Search As Optimization (basic principles and example based understanding) [10 Marks]		
4A	Search as optimization: how to search for the best answer to a question? playing tic-tac-toe - State Space Search, different states as different solutions of a problem • Mathematical equation for optimizing a result, example tic-tac-toe, the states of the board and equation to calculate score of the board with respect to a player • Expanding possible states from a state and choosing the best state • Uninformed search a) Breadth first search b) Depth first search Informed search a) Heuristic search strategy with tic tac toe example b) Greedy best-first search c) A* search - basic idea only(without proof) d) Hill climbing (only basic idea with a simple example)	7
4B	Evolution and Darwin's theory, inspiration of evolutionary algorithms, crossover and mutation, Russian roulette for random selection, optimization using genetic algorithm, one use of GA (to be chosen) practical: mention libraries and problem. • Natural evolution theory, survival of the fittest • Expressing a solution vector as gene, example of binary strings » Crossover and mutation, its equivalent over binary strings • Random selection of genes from pool and random mutation • Fitness function Practical example by finding the root of an univariate equation.	3

5. Knowledge representation and reasoning [12 Marks]		
5	Logic in computer science, propositional logic, logic as expressions, truth table, conjunction, disjunction, syllogism, tautology, de morgan's theorem. Use of logic to derive conclusions with practical examples [NO LAB COMPONENT] • Statements as logical propositions • Atomic and compound propositions • Negation, conjunction and disjunction as NOT, AND and OR • Implication and Biconditional statements • Truth table as a way of proving propositions • Commutativity and associativity and distributive rules • De Morgan's theorem • Practical examples to infer meanings from statements • Simple concept of Unification (without details of MGU) • Simple concept of clause • Basic concept of Inference • Example of Answer Extraction system • A brief introduction to fuzzy logic	12

6. Uncertainty management [3 Marks]		
6	• Handling Uncertain Knowledge • Uncertainty and Rational decision • Probabilistic Reasoning • Bayes Rule • Conditional Probability • Probabilistic inference using Bayes' Rule – General method(simple cases)	3
7. Preliminary concepts of Chatbots [3 marks]		
7	• What is Chatbot? • Examples of different Chatbots • The flowchart describing basic working principle of Chatbots.	3

QUESTION PATTERN OF ARTIFICIAL INTELLIGENCE

Question Pattern

Class XI

Sl.no.	Unit	MCQ (21 Nos.) (1 mark)	SA (14 Nos.) (1 mark)	Descriptive [7marks- 4+3/5+2/3+2+2/4+2+1/3+3+1]	TOTAL
1.	Computer Fundamentals	5Qx1M=5	5Qx1M=5	1QX7M=7	17
2.	Introduction to Python Programming	5x1=5	3Qx1M=3	1X7=7	15
3.	Foundation for AI	2x1=2	1X1=1	1X7=7	10
4.	Search as optimization	2x1=2	1X1=1	1X7=7	10
5.	Knowledge representation and Reasoning	3x1=3	2x1=2	1X7=7	12
6.	Uncertainty Management	2x1=2	1X=1	-	03
7.	Preliminary Concept of Chatbot	2x1=2	1X=1	-	03
SUMMARY		**21 marks (21Questions)**	**14 marks (14Questions)**	**35 marks**	**Total – 70 marks**