Time: 3 hours **Max. Marks: 80**

N.B.: (1) Question No. 1 is **Compulsory**.

(2) Attempt any **three** questions out of the remaining **five**.

(3) Each question carries 20 marks and sub-question carry equal marks.

(4) Assume suitable data if required.

1. Solve **ANY FOUR** sub-questions from the following (20)

(a) Define Intelligent Agent. What are the characteristics of Intelligent Agent? (5)

(b) Give State space representation for 8 puzzle Problem. What are possible Heuristic functions for it? (5)

(c) What is FOPL? Represent the following sentences using FOPL (5)
i) John has at least two friends
ii) If two people are friends then they are not enemies.

(d) Differentiate between forward and backward chaining. (5)

(e) Define Artificial Intelligence with example. (5)

2. (a) Draw and Describe the Architecture of Utility based agent. How is it different fromModel based agent? (10)

(b) Explain A* Algorithm with example. (10)

3. (a) Explain Resolution by Refutation with suitable example (10)

(b) Give the partial order plan for the following blocks-world-problem (10)

4. (a) Apply Heuristic Search Technique to 8-puzzle problem. (10)

(b) Explain different Inference Rules for First Order Predicate Logic. (10)

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5	(a)	Define the terms chromosome, fitness function, crossover and mutation as used in Genetic algorithms. Explain how Genetic algorithms work.	(10)
	(b)	What are steps involved in natural language processing (NLP) of an English sentence? Explain with an example sentence.	(10)
6.		Write short note on **ANY TWO** of the following.	(20)
	(a)	Expert System Architecture and Applications	(10)
	(b)	Depth First Search Algorithm	(10)
	(c)	Decision Tree learning	(10)

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