BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP2024)

CLASS: BTECH **SEMESTER : IV**
BRANCH: AI/ML **SESSION : SP2025**

SUBJECT: AI205 INTRODUCTION TO ARTIFICIAL INTELLIGENCE

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	What is an agent? On what factors do rationality in agents depend?	[2]	1	1,2
Q.1(b)	Give examples to illustrate different between: 1. Static and dynamic environments 2. Completely and partially observable environments 3. Deterministic and stochastic environments	[3]	1	1,2
Q.2(a)	Define the parameters on which uninformed algorithms are evaluated	[2]	3	2
Q.2(b)	Consider the Water Jug problem: Given two jugs, a 4-gallon and 3-gallon having no measuring markers on them. There is a pump that can be used to fill the jugs with water. How can you get exactly 2 gallons of water into 4-gallon jug. Which algorithm would be best suited for finding the solution. Justify your choice.	[3]	3	3
Q.3(a)	Write down the predicate logic representations for the following and answer whether: 1. Brothers are siblings. 2. Everyone dislikes medicine	[2]	2	1,2
Q.3(b)	Write the following statements in propositional logic 1. If the criminal had an accomplice, then he came in a car. 2. The criminal had no accomplice and did not have the key, or he had the key and an accomplice. 3. The criminal had the key. Answer the following question by backward chaining: "Did the criminal come in a car or not?"	[3]	2	3,5
Q.4(a)	For given algorithms A1 and A2, explain the keywords 'entails'; 'proves'; 'sound' and 'complete'.	[2]	1,2	2,3
Q4 (b)	Use resolution to prove Q is true $Q \equiv \neg((A \Leftrightarrow \neg B) \wedge (B \Leftrightarrow \neg C) \wedge (C \Leftrightarrow \neg A))$	[3]	2	3,5,6
Q.5(a)	Using Automated mars rover example, explain the concept of environment, state, world and variables.	[2]	2	3,4,5
Q5 (b)	Obtain a prenex normal form and perform Skolemization for the Formula $\neg(\forall x P(x) \vee \forall x Q(x))$ c) $\exists x P(x) \rightarrow \exists x Q(x)$	[3]	3	3,4,5

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