

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

**CLASS: B. TECH
MECHANICAL, CHEMICAL,
BRANCH: ELECTRICAL AND ELECTRONICS,
ELECTRONICS AND COMMUNICATION)**

**SEMESTER: VII
SESSION: MO/2022**

SUBJECT: IT420 ARTIFICIAL INTELLIGENCE

TIME: 2 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 25.
2. Candidates attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.
5. Tables/Data handbook/Graph paper etc. to be supplied to the candidates in the examination hall.

Q1 (a) Define in your own words: [0.5x
4=2] CO
CO1 BL
BL1
 -Rational agent
 -Bounded rationality.
 -Turing Test
 -Omniscience

Q1 (b) For each of the following activities, give a PEAS description of the task environment and characterize it in terms of the properties: [1.5+
1.5=3
] CO1 BL1,
BL2
 (a) Shopping for AI books on the Internet.
 (b) Part picking robot.

Q2 (a) Write down the task environment of the followings: [2] CO1,
CO5 BL1,
BL2,
BL3

Task Environment	Fully / Partially / overserved env.	Single/ Multiagent Env.	Deterministic / Stochastic/ Strategic	Episodic/ Sequential	Discrete/ Continuous
Chess with a clock					
Medical diagnosis					

Q2 (b) Describe how agent architectures are modified from simple reflex agent to model-based agent to goal-based and finally, to utility-based agent in partially observed environment (take vacuum agent / automated taxi driving as an example). [3] CO1 BL2

Q3 (a) The 8-puzzle consists of a 3x3 board with 8-PUZZLE eight numbered tiles and a blank space. A tile adjacent to the blank space can slide into the space. The object is to reach a specified goal state, such as the one shown on the right of the figure: [2] CO2,
CO5 BL2,
BL3

2	8	3
1	6	4
7		5

Initial State

1	2	3
8		4
7	6	5

Final State

By using left, right, up, and down action sequences show the one solution using DFS.

Q3 (b) Consider 'Water Jug Problem' and describe the followings- [3] CO2,
CO5 BL2,
BL3,
BL4
 a. The problem statement (problem definition as a state space search).
 b. The production rules for moving within the search space.
 c. The starting, goal state(s) and at least two solutions to the problem.
 d. How BFS (Breadth first search) works in this example.

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|--------|---|-----|-----|---------------------|
| Q4 (a) | In general, iterative deepening is the preferred uninformed search method when the search space is large, and the depth of the solution is not known-explain? | [2] | CO2 | BL2 |
| Q4 (b) | Differentiate Breadth First Search and Iterative deepening depth-first search with the help of algorithms and evaluate time complexity (TC) and space complexity (SC) . Both the cases time complexities are same, but space complexities are different, if $b=10$ and $d=5$, find out the numbers of nodes, TC and SC. (consider, 1 million nodes can be generated per second and that a node requires 1000 bytes of storage.) | [3] | CO2 | BL4,
BL5,
BL6 |
| Q5 | Define the terms NLP, NLU and NLG. Explain briefly - Morphology analysis, syntactic processing, Semantic analysis, and Pragmatic analysis of NLP. | [5] | CO4 | BL1,
BL2 |

:::::: 30/09/2022 ::::::::M