BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

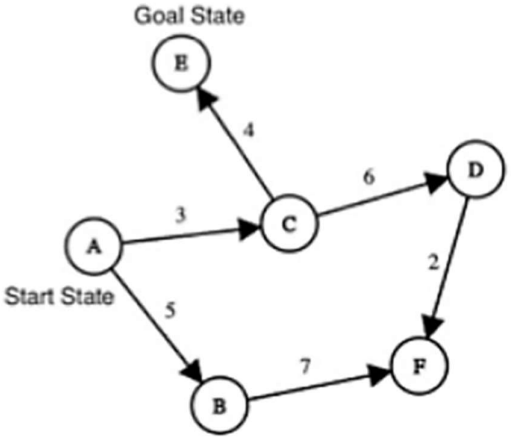
CLASS: B. TECH | **SEMESTER : IV**
BRANCH: AI & ML | **SESSION : SP/2025**

SUBJECT: AI205 INTRODUCTION TO ARTIFICIAL INTELLIGENCE

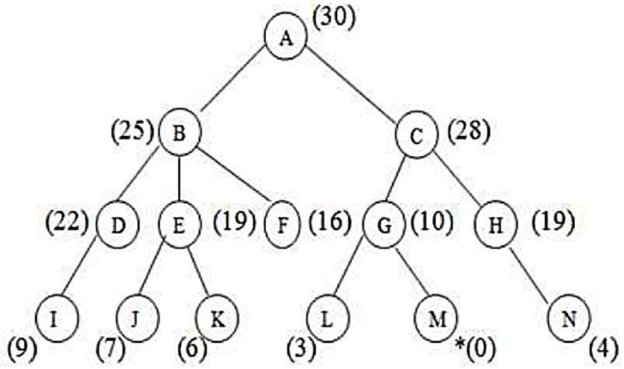
TIME: 3 HOURS | **FULL MARKS: 50**

INSTRUCTIONS:
1. **The question paper contains 5 questions each of 10 marks and total 50 marks.**
2. **Attempt all questions.**
3. **The missing data, if any, may be assumed suitably.**
4. **Before attempting the question paper, be sure that you have got the correct question paper.**
5. **Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.**

			CO	BL
Q.1(a)	Explain with an example a distributed learning agent and horn Clauses. Write the CNF of: P OR Q → R AND (R →P)	[6]	1, 2	K3
Q.1(b)	Formalize the following statements in FOPL 1. There is an animal that eats (some) grain-eating animals. 2. Every animal eats plants or plant-eating animals which are much smaller than itself.	[4]	1, 2	K3
Q.2(a)	Explain why DFS is not suitable for solving the 8 Puzzle problem. Find the order of nodes visited by Iterative-deepening depth-first search?	[5]	3	K4

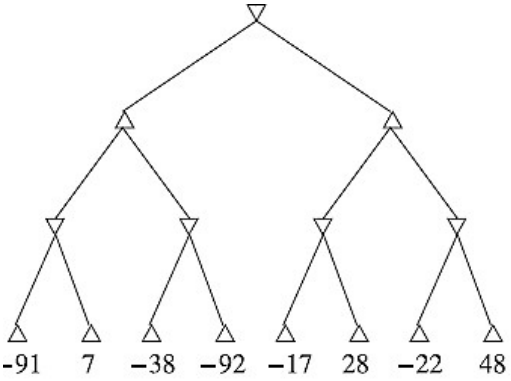


Q.2(b)	Using this example and the start state to be 'A' and the goal state to be 'M', Compute the Best First Search for path A to M. Compare the complexity with Breadth first search.	[5]	3	K5

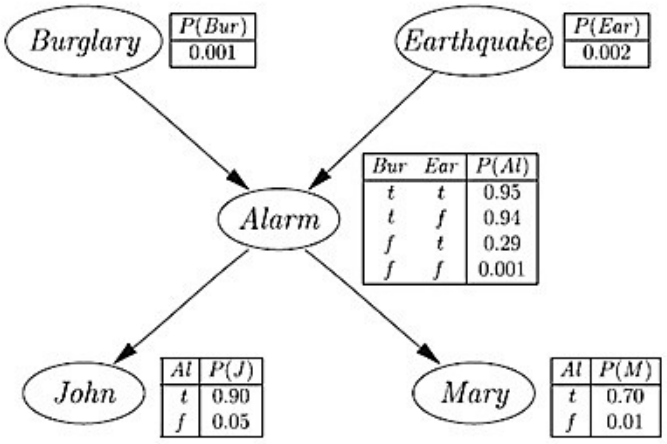


PTO

Q3 (a)	Draw the complete game tree by marking each node with the backed up MINIMAX Value. Explain the Alpha beta pruning with the final pruned tree. Note: Upward triangles are the Max function and downward triangles are Min functions.	[5]	3	K5, K6



Q.3(b)	Write the features of A* and AO* algorithm. Also explain the meaning of admissible heuristics.	[5]	3	K6
Q.4(a)	1. Discuss the principle of entropy. 2. Consider the following scenario: On an airport all passengers are checked carefully. Let T with t ∈ {0, 1} be the random variable indicating whether somebody is a terrorist (t = 1) or not (t = 0). Let A with a ∈ {0, 1} be the variable indicating arrest. A terrorist shall be arrested with probability P(A= 1|T = 1) = 0.98, a non-terrorist with probability P(A= 1|T = 0) = 0.001. One in a lakh passengers is a terrorist, P(T = 1) = 0.00001. What is the probability that an arrested person actually is a terrorist?	[5]	4	K5,6
Q.4(b)	For the given BBN Find P(A'B) *and* P(AE). What is the probability that john calls when there is neither an earthquake nor burglary but the Alarm rings.	[5]	4	K6



Q.5(a)	What is bellman equation? describe it. What is the role of the discount factor γ?	[5]	5	K4
Q.5(b)	Explain exploration vs. exploitation trade-off. Find the Q Learning and TD Learning Update value for the given values: r=2; alpha=0.1; gamma=.8 max Q(s,a)=5; V(s)=3;V'(s)=5; and Q(s,a)=4.	[2+1.5+1.5]	5	K3, K4

::::::30/04/2025::::::M