Register Number:……..

KUMARAGURU college of technology
character is life

B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Fifth Semester

INFORMATION TECHNOLOGY

U18ITE0001: Artificial Intelligence

COURSE OUTCOMES

CO1: Demonstrate the awareness of intelligent agents and problem solving using different search algorithms
CO2: Interpret the use of different knowledge representation methods.
CO3: Make use of uncertain knowledge for planning and reasoning in AI applications.
CO4: Explain the basics of decision making.
CO5: Apply the knowledge of machine learning methods in AI applications.

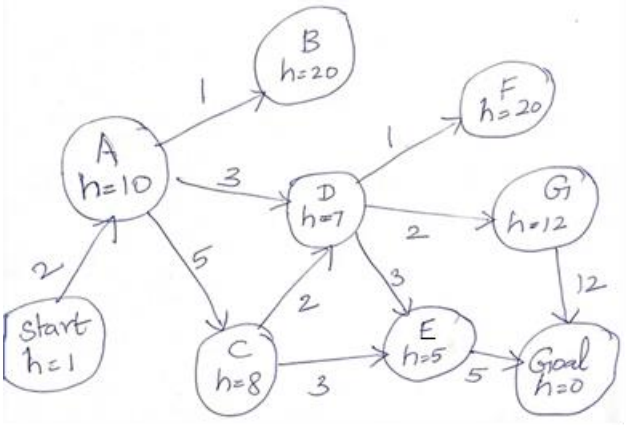
Time: Three Hours **Maximum Marks: 100**

Answer all the Questions
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

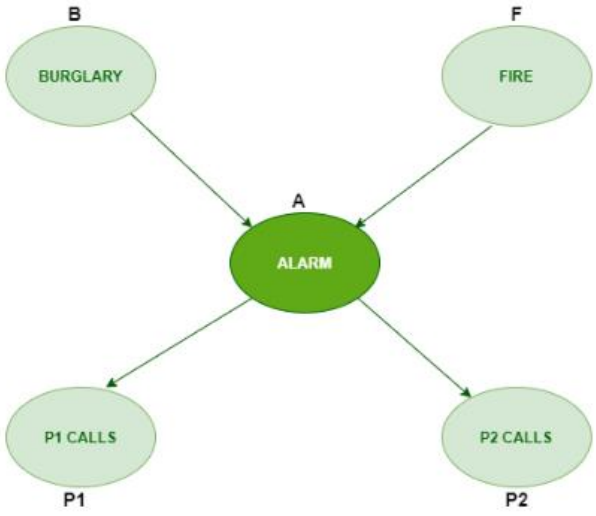
1.	Illustrate the significance of using heuristic function in search algorithms.	CO1	[K_2]
2.	Outline the characteristics of artificial intelligence.	CO1	[K_2]
3.	Give the elements of a search-based problem-solving with their meaning.	CO2	[K_2]
4.	Compare predicate logic with proportional logics.	CO2	[K_2]
5.	Identify the purpose of conditional independence in Bayesian networks?	CO3	[K_3]
6.	Define partial order planning.	CO3	[K_2]
7.	What is utility theory?	CO4	[K_2]
8.	What is a Nash equilibrium, and how is it used in game theory?	CO4	[K_2]
9.	How does overfitting occur in decision trees.	CO5	[K_2]
10.	Discuss the role of the exploration-exploitation tradeoff in Q-learning?	CO5	[K_2]

Answer any FIVE Questions
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	Consider the given graph. Trace the path for Greedy best search and A* algorithm. Find which one is optimal. Also write the algorithm for A* search.	8	CO1	[K_3]



	b)	Compare breadth first and depth first search algorithm. Consider a water jug problem. You are given 2 jugs: a 4-gallon jug and 3-gallon jugs. Neither has any measuring mark in it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2-gallon of water into 4-gallon jug? Write any one solution using depth first search.	8	CO1	[K3]
12.	a)	Explain the concept of unification and its role in logical inference.	8	CO2	[K2]
	b)	Describe the concept of class hierarchies with example and how they are represented in description logics.	8	CO2	[K2]
13.	a)	How does forward state-space search differ from backward state-space search in planning?	8	CO3	[K2]
	b)	What is Bayesian Network? Explain the steps to construct Bayesian network. Consider the given example and find the probability that 'P1' is true, 'P2' is true when the alarm 'A' rang, but no burglary 'B' and fire 'F' has occurred.	8	CO3	[K3]



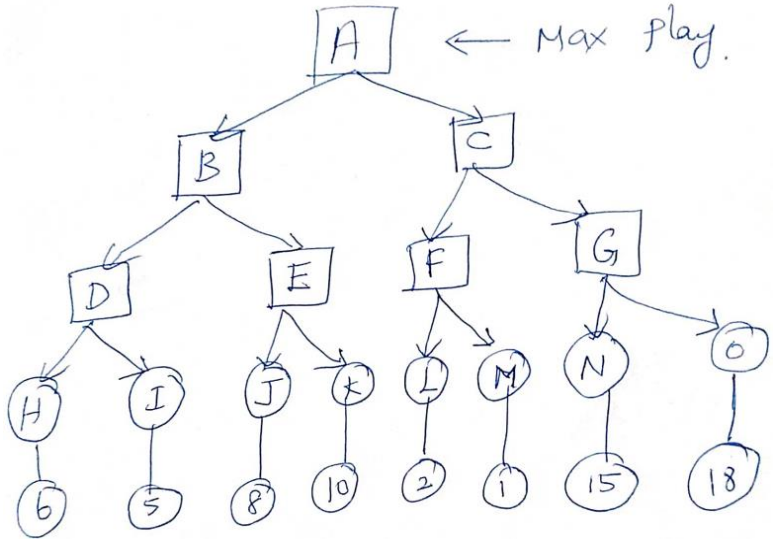
14.	a)	What is risk-neutral, risk-averse, and risk-seeking behaviors in decision theory? Explain it.	8	CO4	[K2]
	b)	Explain how Markov Decision Processes are used to model sequential decision problems.	8	CO4	[K2]

15. a) The following dataset contains loan information and can be used to predict whether a borrower will default. The last column is the classification. Use the naive Bayes method to determine whether a loan X= (Home Owner = No, Marital Status=Married, Income=High) should be classified as a "Defaulted or not". 8 CO5 [K_3]

Tid	Home Owner	Marital Status	Annual Income	Defaulted Borrower
1	Yes	Single	High	No
2	No	Married	High	No
3	No	Single	Low	No
4	Yes	Married	High	No
5	No	Divorced	Low	Yes
6	No	Married	Low	No
7	Yes	Divorced	High	No
8	No	Single	Low	Yes
9	No	Married	Low	No
10	No	Single	Low	Yes

b) What is Q-learning, and how does it help in learning optimal action policies in reinforcement learning? 8 CO5 [K_2]

16. a) Explain MIN-MAX algorithm. Consider the following game tree in which static tree are all from the first players point of view. Apply MIN-MAX algorithm to decide which move to be chosen (First player is the maximizing player). Also perform pruning using alpha beta pruning. 8 CO1 [K_3]



b) Explain how the k-nearest neighbor (k-NN) algorithm works. 8 CO5 [K_2]

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