								1	22	No
med	med .	4	no	yes						
		4	no	no				2	25	Yes
			no	no						

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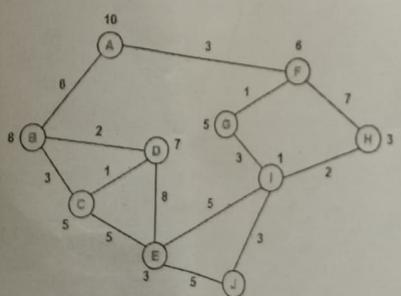Bengaluru - 560059, Karnataka, India

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Academic year 2024-2025 (Odd Sem)

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Date	08-01-2025	Maximum Marks	10+50
Course Code	IS353IA	Duration	2 hours
Sem	V	CIE -II	
UG/PG	UG	Faculty: AS/VH/VG/JS/SHRS/ARA/MEM	

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
(Common to CSE/ISE/CD/CY)

Q.N	QUIZ	M	BT	CO
1	The process of removing details from a representation is called _____.	1	1	4
2	The depth of a tree is given by "d". While using Iterative deepening search, the children of root are generated _____ times.	1	3	2
3	Suggest a method to characterize the quality of a heuristic	1	1	5
4	The k-NN algorithm is sensitive to the choice of K. Recommend a way to reduce it	1	2	1
5	The Naïve Bayes classifier is robust to irrelevant attributes. Give reason	2	3	4
6	Suggest 4 different ways to evaluate the performance of an algorithm	2	3	5
7	A node in a tree is represented by 4 components . Which are they ?	2	2	4

Q. N	TEST	M	BT	CO
1	Apply BFS and DFS to the following graph and compare the results . Show all the necessary steps during the traversal and reasons. Also discuss the pros and cons of BFS and DFS	10 (6+4)	3	1

2	Find the most cost-effective path to reach from start state A to final state J using A* Algorithm for the graph in Figure :1	10	4	2

Figure 1

3	Consider the statements given below . State whether you agree or disagree with the statements . Give valid reasons for each a. Depth-first search always expands at least as many nodes as A* search with an admissible heuristic. b. $h(n) = 0$ is an admissible heuristic for the 8-puzzle. c. A* is of no use in robotics because percepts, states, and actions are continuous. d. Breadth-first search is complete even if zero step costs are allowed.	10	3	5

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4	e. Assume that a rook can move on a chessboard any number of squares in a straight line, vertically or horizontally, but cannot jump over other pieces. Manhattan distance is an admissible heuristic for the problem of moving the rook from square A to square B in the smallest number of moves.	10	4	2

Consider the data given in Table 1

Instance	A	B	C	Class
1	0	0	0	+
2	0	0	1	−
3	0	1	1	−
4	0	1	1	−
5	0	0	1	+
6	1	0	1	+
7	1	0	1	−
8	1	0	1	−
9	1	1	1	+
10	1	0	1	+

From the data given,
(a) Estimate the conditional probabilities for $P(A|+)$, $P(B|+)$, $P(C|+)$, $P(A|-)$, $P(B|-)$, and $P(C|-)$.
(b) Use the estimate of conditional probabilities given in the previous question to predict the class label for a test sample $(A = 0, B = 1, C = 0)$ using the Naïve Bayes approach.
(c) Estimate the conditional probabilities using the m-estimate approach, with $p = 1/2$ and $m = 4$.
(d) Repeat part (b) using the conditional probabilities given in part (c).

5	Consider the dataset given below, Using K-NN Algorithm, classify the unknown instance : brightness =20 and saturation =25 to appropriate class . Assume k=5	5+5	3	5

Brightness	Saturation	Class
40	20	Red
50	50	Blue
60	90	Blue
10	25	Red
70	70	Blue
60	10	Red
25	80	Blue

Also give any 5 characteristics of K-NN algorithm

Course Outcomes: After completing the course, the students will be able to:-	
CO 1	Explain and apply AI and ML algorithms to address various requirements of real-world problems.
CO 2	Design and develop AI and ML solutions to benefit society, science, and industry.
CO 3	Use modern tools to create AI and ML solutions.
CO 4	Demonstrate effective communication through team presentations and reports to analyze the impact of AI and ML solutions on society and nature.
CO5	Conduct performance evaluation, modeling, and validation of AI and ML solutions benefiting lifelong learning.

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

Particulars	CO1	CO2	CO3	CO4	CO5	L1	L2	L3	L4	L5	L6
Marks Distribution	11	21	-	5	23	21	3	35	20	-	-