P P SAVANI UNIVERSITY

Fifth Semester of B. Tech. AIML Examination

November 2022

SECE3041 Artificial Intelligence & Machine Learning

29.11.2022, Tuesday **Time: 10:00 a.m. To 12:30 p.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1	**Answer the Following:**	**[05]**	**CO**	**BTL**
(i)	Who coined the term AI?		1	1
(ii)	As the number of training examples grows toward infinity, the probability that logistic regression will overfit the training data goes to zero. (T/F)		3	3
(iii)	Which data structure is used to implement BFS?		2	1
(iv)	Why hill-climbing search always lead to a local maximum?		2	2
(v)	Most semantic networks are not cognitive based. (T/F)		3	3
Q - 2 (a)	What is the state space in case of 8, 5, 3 water jug problem for an initial state 8, 0, 0.	**[05]**	2	5
Q - 2 (b)	Consider the following sentences: - John likes all kinds of food - Apples are food - Anything anyone eats and isn't killed by is food - Bill eats peanuts and is still alive - Sue eats everything Bill eats i) Translate all the sentences into formulas in predicate logic. ii) Convert formulas from previous step into clause form. iii) Prove that John likes Peanuts using resolution.	**[05]**	3	6
	OR			
Q - 2 (a)	Consider the following set of well-formed formulas in predicate logic 1. Man(Marcus) 2. Pompeian(Marcus) 3. ∀x: Pompeian(x) → Roman(x) 4. Ruler(Caesar) 5. ∀x: Roman(x) → loyalto(X. Caesar) V hate(x, Caesar) 6. ∀x: →y: loyalto(x,y) 7. ∀x: ∀ y: man(x) ∧ ruler(y) ∧ tryassassinate (x,y) → loyalto (x,y) 8. tryassassinate (Marcus, Caesar) Convert these into clause form and prove that hate (Marcus, Caesar) using resolution proof.	**[05]**	3	6
Q - 2 (b)	Describe the issues of Knowledge Representation.	**[05]**	3	4
Q - 3 (a)	Write an algorithm for the Back Propagation algorithm which uses the stochastic gradient descent method.	**[05]**	6	1

Q - 3 (b)	Explain the representations of neural network.	[05]	6	1

OR

Q - 3 (a)	State and explain the algorithm for Best First Search Algorithm with an example.	[05]	2	1
Q - 3 (b)	Explain the effect of overestimation and underestimation on A* algorithm.	[05]	2	1
Q - 4	Attempt anyone.	[05]		
(i)	What are the heuristics and what are their importance? Also, justify the statement: "Heuristics are not sure to lead to a solution yet the field of AI is full of them."		2	3
(ii)	Define with suitable examples: (a) intelligence, (b)artificial intelligence, (c) agent, (d) rationality, (e) logical reasoning.		1	1

SECTION –II

Q - 1	**Answer the Following:**	[05]		
(i)	Define Unsupervised Learning.		5	1
(ii)	How to choose the number of clusters or K in the k-means algorithm?		5	3
(iii)	State down Bayes Theorem.		4	1
(iv)	What is the difference between logistic regression and SVM?		5	1
(v)	Why to use Artificial Neural Networks?		6	1
Q - 2	State down and explain Gibbs Algorithm in detail.	[05]	4	3

OR

Q - 2	List down different types of Naïve Bayes Classifiers and explain any two in detail.	[05]	4	1

Q - 3 Consider the following table – it consists of the height, age and weight (target) value for 10 people. As you can see, the weight value of ID11 is missing. We need to predict the weight of this person based on their height and age using KNN. [10] 5 3

ID	Height	Age	Weight
1	5	45	77
2	5.11	26	47
3	5.6	30	55
4	5.9	34	59
5	4.8	40	72
6	5.8	36	60
7	5.3	19	40
8	5.8	28	60
9	5.5	23	45
10	5.6	32	58
11	5.5	38	?

Q - 4 Suppose we have the following dataset that has various transactions, and from this dataset, we need to find the frequent itemset and generate the association rules using the Apriori algorithm: [10] 5 3

TID	ITEMSETS
T1	A, B
T2	B, D
T3	B, C
T4	A, B, D
T5	A, C
T6	B, C
T7	A, C
T8	A, B, C, E
T9	A, B, C

Given: Minimum Support= 2, Minimum Confidence= 50%

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CO: Course Outcome Number BTL: Blooms Taxonomy Level

Level of Bloom's Revised Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create