Model Question Paper for 2021(CBCS Scheme)

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Seventh Semester B.E. Degree Examination
21AI71
ADVANCED AI&ML

TIME: 03 Hours   **Max. Marks: 100**

Note: Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

		Module -1	*Bloom's Taxonomy Level	COs	Marks
Q.01	a	What is Artificial Intelligence ?, Discuss the branches of AI.	L1	CO1	10
	b	What is state space ? Explain the concept of state space representation using the water Jug Problems.	L2	CO1	10
		OR			
Q.02	a	Explain any two AI techniques for solving tie-tar-toe problems.	L2	CO2	10
	b	Write the algorithm for breadth first search and depth-first . Enlist the advantage of each.	L3	CO1	10
		Module-2			
Q. 03	a	Explain the properties of good knowledge representation systems.	L2	CO2	10
	b	Define the following terms 1. Concept learning ii. Consistent hypothesis iii. Version space	L4	CO2	10
		OR			
Q.04	a	Define uncertainty, explain the effects of practical ignorance.	L2	CO2	10
	b	Explain inference using full joint distribution	L1	CO2	10
		Module-3			
Q. 05	a	Design the perceptron that implement AND functions. Why is that a single layer perceptron can not be used to represent XOR function.	L4	CO3	10
	b	Derive an equation for gradient discrete rule to minimize the error.	L2	CO3	10
		OR			
Q. 06	a	Write a short note on Scrum and Crystal.	L3	CO3	10
	b	Explain the core principles and practices of software engineering	L2	CO3	10
		Module-4			
Q. 07	a	Define maximum likelihood hypothesis derive an equation for ML hypothesis using Bayes theorem	L4	CO4	10
	b	Given a user-item interaction matrix with 5 users and 4 items, how many latent factors would you need if you're using Singular Value Decomposition (SVD) for matrix factorization? Assume you choose 3 latent factors.	L1	CO4	10
		OR			

Q. 08	a	If a user has interacted with 3 items with ratings 4, 3, and 5 respectively, and the model predicts ratings of 4.2, 2.9, and 4.8, calculate the Mean Squared Error (MSE) between the predicted and actual ratings.	L2	CO4	10
	b	Describe a hybrid recommender system that combines collaborative filtering and content-based filtering. How can these two approaches be combined, and what are the potential challenges, such as data sparsity and scalability?	L3	CO4	10
Q-09	a.	You have a user-item rating matrix where User A has rated Items 1, 2, and 3 with values of 5, 3, and 4, respectively. User B has rated Items 1, 3, and 4 with values of 2, 5, and 4, respectively. Using cosine similarity, calculate the similarity score between User A and User B.	L5	CO5	10
	b.	consider a small dataset with 6 data points and two clusters: consider a small dataset with 6 data points and two clusters: **Data points:** • $P_1(1, 2)$, $P_2(2, 2)$, $P_3(3, 3)$ (Cluster 1) • $P_4(7, 8)$, $P_5(8, 8)$, $P_6(9, 7)$ (Cluster 2) Calculate the silhouette score for one point from each cluster (say P1 from Cluster 1 and P4 from Cluster 2).	L6	CO6	10
		OR			
Q-10	a.	How does the choice of distance metric impact the performance of clustering algorithms in unsupervised learning?	L5	CO5	10
	b.	What is the "curse of dimensionality," and how does it affect clustering algorithms, particularly in high-dimensional spaces?	L6	CO6	10

		Module-5			
Q. 09	a	Define software quality and explain place of software quality in project management.	L2	CO5	10
	b	Explain Capability Maturity Model and CMM key areas.	L2	CO5	10
		OR			
Q. 10	a	Explain Product v/s Process quality management.	L2	CO5	10
	b	Explain in detail about Empirical Estimation Model	L1	CO5	10

*Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to beattained by every bit of questions.