BTS–V(R/S)–01–23–1399 Reg. No. | | | | | | | | |

A

B.Tech. Degree V Semester Regular/Supplementary Examination January 2023

CS 19-202-0507 MACHINE LEARNING

(2019 Scheme)

Time: 3 Hours Maximum Marks: 60

Course Outcome
On successful completion of the course, the students will be able to:

CO1: Explain various learning approaches and concepts of supervised learning.
CO2: Compare the different dimensionality reduction techniques.
CO3: Make use of theoretical foundations of decision trees to identify best split and Bayesian classifier.
CO4: Make use of clustering algorithms.
CO5: Identification of classifier models for typical machine learning applications.
CO6: Combine algorithms and analyze different algorithms.
Bloom's Taxonomy Levels (BL): L1 – Remember, L2 – Understand, L3 – Apply, L4 –Analyze, L5 – Evaluate, L6 – Create
PO – Programme Outcome

PART A

(Answer *ALL* questions)

			(8 × 3 = 24) Marks	BL	CO	PO
I.	(a)	Define Vapnik-Chervonenkis (VC) dimension. Show that VC dimension of a line hypothesis is three.	3	L3	1	1, 2
	(b)	Compute the Maximum Likelihood estimate for the parameter λ in the Poisson distribution whose probability function is $f(x)=\frac{e^{-\lambda}\lambda^{x}}{x^{!}} x=0,1,2,.....n$	3	L3	1	1, 2
	(c)	Describe the basic concepts of Expectation Maximization Algorithm.	3	L1	2	1, 2
	(d)	Justify the statement "clustering in unsupervised learing"	3	L2	5	1,2
	(e)	What is meant by k-fold cross validation. Given a data set with 1200 instances, how k-fold cross validation is done with k = 1200.	3	L4	6	1, 2
	(f)	Briefly explain Kernel Trick in the context of Support Vector Machine.	3	L2	1	1, 2
	(g)	Compare and contrast the Model based learning and Temporal difference learning.	3	L3	5	1, 2
	(h)	Distinguish between Bagging and Boosting.	3	L2	2	1, 2

PART B

(4 × 12 = 48)

II.	(a)	Explain the concept of PAC learning. Derive an expression for PAC learning in such a way that the selected function will have low generalized error.	7	L2	1	1, 2
	(b)	Is regression a supervised learning technique? Justify your answer. Compare regression with classification using suitable examples.	5	L2	1	1, 2
		OR				
III.	(a)	Explain Bayesian decision theory and discuss the two- category classification.	9	L2	1, 3, 1	1, 2
	(b)	Distinguish between Bias and Variance.	3	L4	1	1, 2

(P.T.O.)

			Marks	BL	CO	PO
IV.	(a)	Illustrate the idea of Principal Components Analysis for a two-dimensional data using suitable diagrams.	6	L3	2	1, 2
	(b)	Explain in detail the algorithm of (DIANA) **DI**visive **ANA**lysis of hierarchical clustering technique.	6	L2	2	1, 2
		OR				
V.		What are the basic steps of K-means clustering? Explain in detail how the optimal value of "K" in the K-means algorithm is determined.	12	L2	4	1, 2
VI.	(a)	Describe the significance of soft margin hyperplane and optimal separating hyperplane and explain how they are computed.	7	L1	5	1, 2
	(b)	State the mathematical formulation of the SVM problem. Give an outline of the method for solving the problem..	5	L1	5	1, 2
		OR				
VII.		Why do we require pruning in Decision Trees? Explain in detail any one method used for deriving a decision tree.	12	L3, L2	3	1, 2
VIII.		What do you understand by graphical models in machine learning? Explain any two graphical model in detail with suitable diagram.	12	L2	6	1, 2
		OR				
IX.		Explain the Multilayer Perceptron Network with a neat sketch	12	L2	6	1, 2

Blooms's Taxonomy Levels
L1 - 14.28%, L2 - 52.38%, L3 - 23.80%, L4 - 9.52%.

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