Model Question Paper-1/2 with effect from 2021(CBCS Scheme)

USN | | | | | | | | | | |

Sixth Semester B.E. Degree Examination

Subject Title: Machine Learning

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

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

02. Assume PlayTennis as the Datasset, wherever required

		Module -1	*Bloom's Taxonomy Level	COs	Marks
Q.01	a	Explain the different types of Machine Learning.	L2	CO1	6
	b	Apply the Find-S algorithm to the following dataset to determine the most specific hypothesis.	L3	CO1	7
	c	What is inductive bias, and why is it important in Machine Learning?	L2		7
		OR			
Q.02	a	Describe the main challenges faced in Machine Learning.	L2	CO1	6
	b	Using the Candidate Elimination algorithm, demonstrate how to find the Version Space given the following set of hypotheses and examples.	L3	CO1	8
	c	Explain the concept of Version Spaces in Machine Learning.	L2		6
		Module-2			
Q. 03	a	Explain the importance of visualizing data before preparing it for a machine learning model.	L2	CO2	5
	b	Given a dataset of handwritten digits, outline the steps to preprocess the data, train a binary classifier to distinguish between the digits '0' and '1', and evaluate its performance.	L3	CO2	10
	c	What is the significance of the MNIST dataset in machine learning?	L2	CO2	5
		OR			
Q.04	a	Describe the steps involved in preparing data for a machine learning model.	L2	CO2	5
	b	Design and implement a machine learning pipeline to perform multiclass classification using the MNIST dataset, including steps for data preparation, model selection, training, and fine-tuning.	L3	CO2	10
	c	What is error analysis, and why is it crucial in the process of training a machine learning model?	L2	CO2	5
		Module-3			
Q. 05	a	Explain the concept of gradient descent and its role in training linear regression models.	L2	CO4	6
	b	You are given a dataset with a nonlinear relationship between the features and the target variable. Design a model using polynomial regression to fit this dataset. Outline the steps involved and evaluate the model's performance. CO3	L3	CO4	8
	c	What are regularized linear models, and why are they important in preventing overfitting?	L2	CO4	6

		OR			
Q. 06	a	Describe the differences between linear and polynomial regression.	L2	CO4	6
	b	Implement a Support Vector Machine (SVM) model to classify a dataset with multiple classes. Explain the steps taken to preprocess the data, train the model, and optimize its performance. Include the methods used for hyperparameter tuning and evaluation of the final model.	L3	CO4	8
	c	What are the main differences between linear and nonlinear Support Vector Machines	L2	CO4	6
		Module-4			
Q. 07	a	Explain the concept of GINI impurity and how it is used in decision tree algorithms.	L2	CO3	5
	b	Evaluate the performance of each bagging and boosting as well as their combination. Discuss the results in terms of accuracy, robustness, and computational cost.	L3	CO3	10
	c	What is the role of regularization hyperparameters in decision tree algorithms?	L2	CO3	5
		OR			
Q. 08	a	Describe the difference between Bagging and Pasting in ensemble learning.	L2	CO3	5
	b	Apply the CART algorithm to a regression problem, evaluate the model's performance using appropriate regression metrics.	L3	CO3	10
	c	What are the main differences between boosting and stacking in ensemble learning?	L2	CO3	5
		Module-5			
Q. 09	a	Explain the Maximum Likelihood Estimation (MLE) method and its significance in parameter estimation.	L2	CO5	6
	b	What is the Minimum Description Length (MDL) Principle and how is it applied in model selection?	L2	CO5	6
	c	Describe the Bayes Optimal Classifier and its theoretical importance in classification problems.	L2	CO5	8
		OR			
Q. 10	a	What is the Gibbs Algorithm and how does it differ from the Bayes Optimal Classifier?	L2	CO5	6
	b	Explain the working of the Naïve Bayes Classifier and provide an example of its application.	L2	CO5	6
	c	What is a Bayesian Belief Network, and how does it represent probabilistic relationships between variables?	L2	CO5	8