UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Online End Semester Examination, May 2021

Course: Machine Learning   Semester: VI
Program: B. Tech. (ECE)   Time 03 hrs.
Course Code: ECEG4016   Max. Marks: 100
Instructions: Attempt all the questions

SECTION A		(6 X 5 = 30 Marks)

S. No.		Marks	CO
Q 1	(a) Type of learning in which there is no idea about the class or label of a particular data (i) Supervised learning (ii) Unsupervised learning (iii) Semi-supervised learning (iv) Reinforcement learning (b) In which regression algorithm the dependent variable has binary values? (i) Linear regression (ii) Polynomial regression (iii) Logistic regression (iv) None of These (c) The range of coefficient of determination is (i) 5 to 10 (ii) 0 to 1 (iii) -5 to 5 (iv) 0 to 100 (d) When new predictor (X) are added to the multiple linear regression model, how does R^2 behaves (i) Decreasing (ii) Increasing or decreasing (iii) Increasing and Decreasing (iv) Remains Constant (e) Which algorithm is an iterative approach to find the optimum value of slope and intercept? (i) Ordinary Least Square (ii) Gradient descent (iii) Recursive Least Square (iv) None of these	5 M	CO1
Q 2	(a) A neuron is able to_____ information in the form of chemical and electrical signals. (i) receive (ii) process (iii) transmit (iv) All of these (b) The inputs of the McCulloch-Pits neuron could be (i) either -1 or 1 (ii) either 0 or 1 (iii) either 0 or -1 (iv) None of These (c) Deep neural networks generally have more than _____ hidden layers. (i) 1 (ii) 2 (iii) 3 (iv) None of these (d) To handle intense computation of deep learning _____ is needed. (i) Parallel computing (ii) CPU based computing (iii) GPU computing (iv) None of these (e) Recurrent networks (i) are similar to MLFFN (ii) may have self-loops (iii) have feedback loops (iv) All of these	5 M	CO2
Q 3	(a) _____ in terms of SVM means that an SVM is inflexible in classification (i) Hard Margin (ii) Soft Margin (iii) Linear Margin (iv) Non-linear classifier	5 M	CO3

	(b) Which of the following are the supervised classification algorithms? (i) Decision Trees (ii) Random Forest (iii) SVM (iv) All of these (c) In a classification problem if actual values is [0,1,1,0,1,0,1,1] and the predicted values is [1,0,1,1,0,0,1,0]. Jaccard Index is? (i) 0.6 (ii) 0.23 (iii) 0.8 (iv) 0.42 (d) Which algorithm is also known as ensemble classifier? (i) Decision Tree (ii) Random Forest (iii) SVM (iv) kNN (e) Which of the following is true about SVM (i) It is useful only in high-dimensional space (ii) It always gives an approximate value (iii) It is accurate (iv) Also known as ensemble classifier		
Q 4	(a) k-means clustering algorithm is an example of which type of clustering method? (i) Hierarchical (ii) Partitioning (iii) Density-based (iv) None of these (b) Which of the following statement describes the difference between agglomerative and divisive clustering? (i) Agglomerative is a bottom-up and divisive is top-down technique (ii) Agglomerative is a top-down and divisive is bottom-up technique (iii) Agglomerative technique can start with a single cluster (iv) Divisive technique can end with a single cluster (c) Which clustering technique may filter out outliers (i) Hierarchical (ii) k-means (iii) Density-based (iv) None of these (d) Examples of unsupervised machine learning algorithms is? (i) Customer segmentation (ii) Anomaly detection (iii) Data mining (iv) All of these (e) Which clustering algorithm adopts distance based approach to refine clusters? (i) Hierarchical (ii) k-means (iii) Density-based (iv) None of these	**5 M**	**CO4**
Q 5	Differentiate multi-layer neural network and radial basis function neural network.	**5 M**	**CO2**
Q 6	List the differences between k-means and density based clustering algorithm.	**5 M**	**CO4**
SECTION B		**(5 X 10 = 50 Marks)**	
Q 7	How unsupervised learning is different from supervised learning? Explain with a suitable example. What is clustering in unsupervised learning? Briefly explain any two clustering techniques.	**10 M**	**CO4**
Q 8	Explain the basic structure of a multi-layer perceptron and prove how it can solve the XOR problem.	**10 M**	**CO2**
Q 9	Explain the following evaluation parameters of supervised machine learning algorithm: (i) Coefficient of determination (ii) RMSE (iii) Confusion matrix (iv) Jaccard Index (v) F1-score	**10 M**	**CO3**
Q 10	Differentiate the following: (a) Logistic regression and Polynomial regression (b) Hold-out method and K-fold cross validation method	**10 M**	**CO1**
Q 11	Describe the structure of an artificial neuron. Derive the expression of weight change in a multi-layer neural network using back-propagation algorithm.	**10 M**	**CO2**

	SECTION C			(1 X 20 = 20 Marks)	

Q 12	(a) What is classification in a supervised learning algorithm? Briefly explain the classification learning steps with a flow chart. Discuss the kNN and SVM classification model with its strength, weakness and applications. (b) A leading software company INFOSYS is coming in UPES for hiring B. Tech. students. This company last year selected the students based on certain criteria and is given in table 1. It is to be evaluated using decision tree algorithm that Aditya, a student of UPES, wants to find out if he may be offered a job in INFOSYS. His CGPA is low, Communication is Bad, Aptitude-High, Programming skills-Bad.	20 M	CO3

CGPA	Communication	Aptitude	Programming Skills	Job Offered?
High	Good	High	Good	Yes
Medium	Good	High	Good	Yes
Low	Bad	Low	Good	No
Low	Good	Low	Bad	No
High	Good	High	Bad	Yes
High	Good	High	Good	Yes
Medium	Bad	Low	Bad	No
Medium	Bad	Low	Good	No
High	Bad	High	Good	Yes
Medium	Good	High	Good	Yes
Low	Bad	High	Bad	No
Low	Bad	High	Bad	No
Medium	Good	High	Bad	Yes
Low	Good	Low	Good	No
High	Bad	Low	Bad	No
Medium	Bad	High	Good	No
High	Bad	Low	Bad	No
Medium	Good	High	Bad	Yes

Table 1