


Name: Enrolment No:			
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES End Semester Examination, May 2022			
Course: Machine Learning Program: B. Tech. (Electronics & Communication Engineering) Course Code: ECEG4016 Instructions: Attempt all the questions		Semester: VI Time: 03 hrs. Max. Marks: 100	
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	(a) Type of learning in which there is an idea about the class or label of a particular data (i) Supervised learning (ii) Unsupervised learning (iii) Semi-supervised learning (iv) Reinforcement learning (b) Which machine learning algorithm estimates whether the email is spam or non-spam? (i) Linear regression (ii) Polynomial regression (iii) Logistic regression (iv) None of These (c) Which machine learning algorithm falls under the category of lazy learner? (i) kNN (ii) SVM (iii) Decision Trees (iv) Random Forest (d) _____ machine learning algorithm performs probabilistic prediction? (i) KNN (ii) SVM (iii) Naive Bayes Classifier (iv) Random Forest	4M	CO1
Q 2	(a) 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 (b) Deep neural networks generally have more than _____ hidden layers. (i) 1 (ii) 2 (iii) 3 (iv) None of these (c) To handle intense computation of deep learning _____ is needed. (i) Parallel computing (ii) CPU based computing (iii) GPU computing (iv) None of these (d) Recurrent networks (i) are similar to MLFFN (ii) may have self-loops (iii) have feedback loops (iv) All of these	4M	CO2
Q 3	(a) The distance between hyperplane and data points is called as (i) Hyper Plane (ii) Margin (iii) Error (iv) Support Vectors (b) Which of the following is not a supervised classification algorithm? (i) Density based algorithm (ii) Random Forest (iii) SVM (iv) Decision Trees (c) In a classification problem if actual values is [1,1,1,0,1,0,1,1] and the predicted values is [1,0,1,1,0,0,1,0]. Jaccard Index is? (i) 0.6 (ii) 0.23 (iii) 0.33 (iv) 0.42	4M	CO3

	(d) Which of the following is a performance measure for regression problem? (i) R^2 (ii) Precision (iii) Recall (iv) Confusion matrix		
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	4M	CO4
Q 5	Elucidate the following: (a) Memory based Learning (b) Competitive Learning	4M	CO2
SECTION B (4Qx10M= 40 Marks)			
Q 6	Explain the following performance parameters of machine learning algorithm: (a) Coefficient of determination (b) Confusion matrix (c) Recall (d) Jaccard Index (e) Relative Square Error	10M	CO1
Q 7	(a) Explain how artificial neural network is inspired from biological neural network? With pictorial representation describe the structure of neuron and explain the significance of weights and biases in neural network. (b) Explain the following neural network architecture: (i) Single-layer feed-forward network (ii) Multi-layer feed-forward network (iii) Recurrent neural network	10M	CO2
Q 8	Differentiate the following supervised machine learning algorithms? (i) Support Vector machines and K-Nearest Neighbour algorithm (ii) Decision Trees and Random Forest OR Differentiate the following supervised machine learning algorithms? (i) Logistic regression and Polynomial regression (ii) SVM and Naive Bayes Classifier	10M	CO3

Q 9	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.	10M	CO4
SECTION C (2Qx20M=40 Marks)			
Q 10	<p>(a) Design a neural network to analyze the following situation using McCulloch-Pitts model. The situations are as follows: Situation 1: It is not raining nor it is sunny Situation 2: It is not raining but it is sunny Situation 3: It is raining and it is not sunny Situation 4: It is raining and it is sunny Based on McCulloch-Pitts model decide when John will carry the umbrella.</p> <p>(b) What are the advantages of multi-layer neural network over single layer neural network? Derive the expression of weight change in a multi-layer neural network using back-propagation algorithm.</p> <p style="text-align: center;">OR</p> <p>(a) What is unconstrained optimization technique in neural network? Differentiate how weights of neural network are optimized using Newton's method and Gauss newton method.</p> <p>(b) What is the significance of activation function in neural network? Explain with suitable diagram any four activation function which are widely used in designing neural network.</p>	20M	CO2

Q 11

Explain Naive Bayes Classifier and Bayes theorem. Table 1 shows the arrival of airplanes in the routes from any airport to New Delhi under certain conditions. Using Naive Bayes Classifier find most likely classification for the following unseen instance:

Saturday	Summer	Normal	None	???
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Days	Season	Fog	Rain	Class
Weekday	Spring	None	None	On Time
Weekday	Winter	None	Slight	On Time
Weekday	Winter	None	None	On Time
Holiday	Winter	High	Slight	Late
Saturday	Summer	Normal	None	On Time
Weekday	Autumn	Normal	None	Very Late
Holiday	Summer	High	Slight	On Time
Sunday	Summer	Normal	None	On Time
Weekday	Winter	High	Heavy	Very Late
Weekday	Summer	None	Slight	On Time
Saturday	Spring	High	Heavy	Cancelled
Weekday	Summer	High	Slight	On Time
Weekday	Winter	Normal	None	Late
Weekday	Summer	High	None	On Time
Weekday	Winter	Normal	Heavy	Very Late
Saturday	Autumn	High	Slight	On Time
Weekday	Autumn	None	Heavy	On Time
Holiday	Spring	Normal	Slight	On Time
Weekday	Spring	Normal	None	On Time
Weekday	Spring	Normal	Heavy	On Time

20M

CO3