QP Code: RN21BTECH579 | Reg. No | | | | | | | | | | | AR 21

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

B. Tech (Seventh Semester - Regular) Examinations, November – 2024

21BCSOE47011 – Data Analytics

(CSE)

Time: 3 hrs | Maximum: 70 Marks

Answer ALL questions

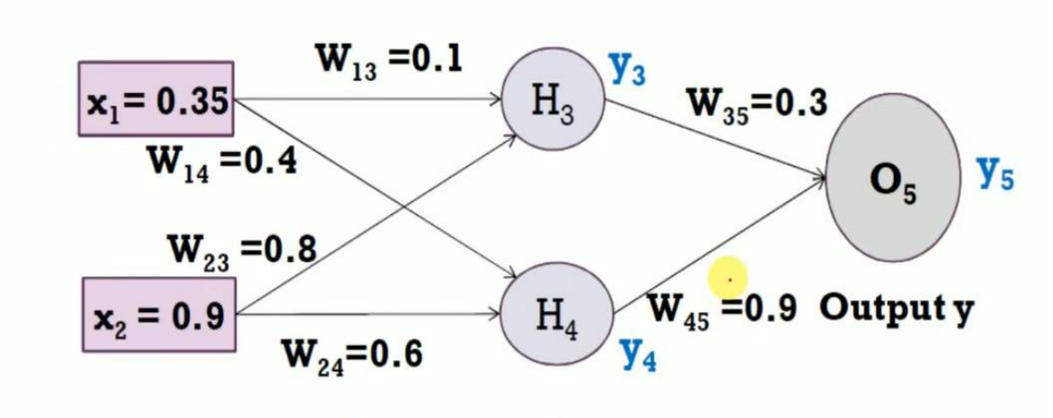
(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

	Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a.	Describe the main difference between ridge regression and lasso regression.	CO3	K3
b.	What is overfitting in neural networks, and how can it be mitigated?	CO3	K4
c.	What are principal components, and why are they important in data analysis?	CO2	K3
d.	Describe one application of prescriptive analytics in business.	CO5	K3
e.	Explain the goal of Linear Discriminant Analysis.	CO4	K3

PART – B **(15 x 4 = 60 Marks)**

	Answer ***All*** the questions	Marks	CO #	Blooms Level
2. a.	Assume that the neurons have a sigmoid functions perform a forward pass. Assume that the actual output of y =0.5 and learning rate=1.	8	CO3	K4



b.	Perform the backward Propagation for the above diagram (2.a)	7	CO3	K4
	(OR)			
c.	Describe the role of K-Nearest Neighbour (K-NN) in image scene classification. Explain how K-NN can be applied in this domain, including the distance metric used and the limitations of K-NN for image classification tasks.	8	CO4	K5
d.	Describe the significance of regularization in regression models. Discuss how regularization helps prevent overfitting, and compare the types of regularization penalties applied in ridge regression and lasso regression.	7	CO5	K4
3.a.	Assume SVM algorithm ,find the hyperplane with maximum margin for the following data: N=3, X1(mean)=(2,2), X2(mean)=(4,5), X3(7,4) , y1=-1 , y2=+1 , y3=+1.	8	CO4	K6
b.	Explain Support Vector Machines (SVM) for classification. Describe the concept of margin maximization, the importance of support vectors, and how the kernel trick enables SVMs to perform classification in higher-dimensional feature spaces.	7	CO4	K4
	(OR)			

c.	Describe the significance of regularization in regression models. Discuss how regularization helps prevent overfitting, and compare the types of regularization penalties applied in ridge regression and lasso regression.	8	CO5	K4
d.	Explain multiple regression with multiple outputs. How does handling multiple output variables differ from single-output regression, and what additional considerations are necessary for model evaluation?	7	CO5	K6
4.a.	Discuss the Perceptron Learning Algorithm. Provide a detailed explanation of how it updates weights and converges to a solution. Include limitations, especially with non-linearly separable data, and mention how it can be adapted to solve classification problems.	8	CO4	K4
b.	Explain Linear Discriminant Analysis (LDA) and its assumptions. Describe the goal of LDA in classification and outline the steps for applying it to a dataset. How does it differ from Quadratic Discriminant Analysis (QDA)?	7	CO5	K4

(OR)

c.	Differentiate between R-Squared and Adjusted R-Squared? Find the R-Squared value for following information, where intercept is 2.2 & coefficient value is 0.6.	8	CO4	K5

X	1	2	3	4	5
Y	2	4	5	4	5

d.	Define cross-validation and its types with applications. Explain the main types with visualizations for each type to illustrate the process.	7	CO6	K4
5.a.	Compare and contrast ridge regression and lasso regression. Explain how each method addresses multicollinearity and overfitting, and describe scenarios in which one might be preferred over the other.	8	CO3	K4
b.	Describe the process of linear regression using least squares. Explain how the model parameters are estimated, and discuss how least squares minimizes the residuals. Include a brief discussion on the assumptions of linear regression.	7	CO2	K2

(OR)

c.	Assume SVM algorithm ,find the hyperplane with maximum margin for the following data: N=3, X1(mean)=(2,2), X2(mean)=(4,5), X3(7,4) , y1=-1 , y2=+1 , y3=+1.	8	CO3	K5
d.	Find linear regression of the data of week (1,2,3,4) and product sales (1,3,4,8) (in thousands). Use linear regression in matrix form predict the 5th week sales.	7	CO2	K4

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