Register No.:   ....   Name: ....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIFTH SEMESTER B.TECH DEGREE EXAMINATION (R), DECEMBER 2023
COMPUTER SCIENCE AND ENGINEERING
(2020 SCHEME)

Course Code :   20CST393

Course Name: Neural Networks and Deep Learning

Max. Marks :   100   **Duration: 3 Hours**

PART A
(Answer all questions. Each question carries 3 marks)

1. Distinguish between classification and prediction with an example.
2. List any three applications of supervised learning.
3. Demonstrate perceptron learning with an example.
4. Compare ReLU and Softmax activation function.
5. How batch gradient descent differs from stochastic gradient descent?
6. List any three hyper parameter tuning methods and its relavence.
7. What happens when convolution and pooling operation are applied repeatedly on input data in CNN?
8. What is the significance of strides in CNN?
9. List any three applications of RNN.
10. Differentiate between RNN and LSTM.

PART B
(Answer one full question from each module, each question carries 14 marks)

MODULE I

11.   a)   Differentiate between Unsupervised and Reinforcement Learning.   (4)

     b)   Consider a confusion matrix made for a classifier that classifies people based on whether they speak Malayalam or Hindi.

(10)

	Malayalam Speaker	Hindi Speaker
Malayalam Speaker	84	14
Hindi Speaker	12	77

From the given diagram, True Positives (TP) = 84, True Negatives (TN) = 77, False Positives (FP) = 14, False Negatives (FN) = 12. Find the accuracy, precision, recall, sensitivity, specificity of the model.

OR

12. a) Explain linear regression modeling with an example. Compare linear regression and logistic regression.   (7)

    b) How bias and variance are related to under-fitting and over-fitting?   (7)

MODULE II

13. a) The following figure shows a multilayer feed-forward neural network. The initial weight and bias values of the network is given in the table below. The activation function used is the sigmoid function. Let the learning rate be 0.92.

X_1	X_2	X_3	W_{14}	W_{15}	W_{24}	W_{25}	W_{34}	W_{35}	W_{46}	W_{56}	b_4	b_5	b_6
0	1	1	0.1	0.3	-0	0.2	0.6	-0	0.2	0.2	0.3	0.1	0.1

Calculate weight and bias updation with the first training sample (X_1, X_2, X_3) with class label 1, using backpropagation algorithm

  (9)
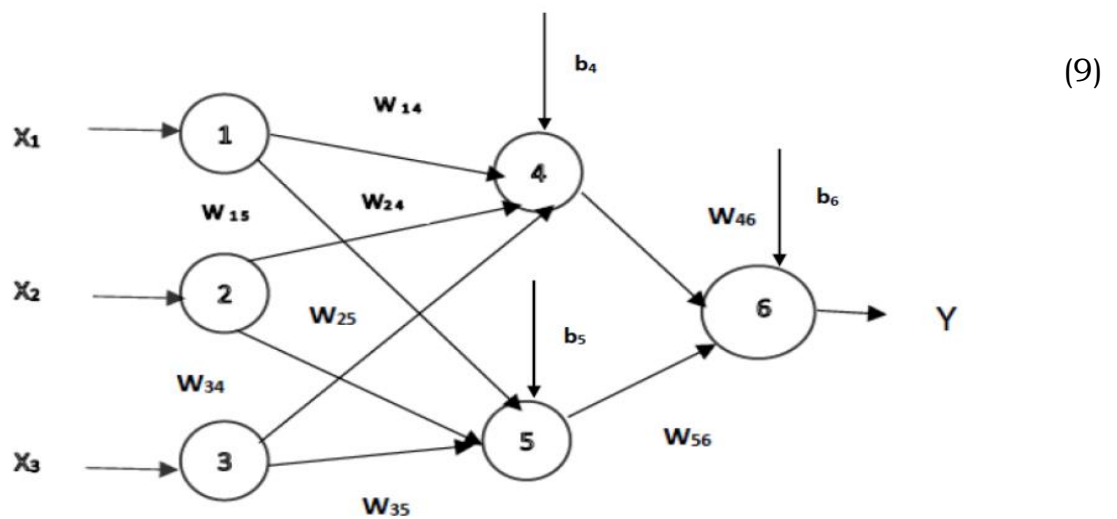
    b) Explain the significance of loss function in a machine learning algorithm.   (5)

OR

14. a) List and explain the practical issues of neural network training.   (7)

    b) Explain the back propagation algorithm for neural network training with an example.   (7)

MODULE III

15. a) What is gradient descent problem?   (5)

    b) How adaptive learning rate is used in gradient descent?   (9)

OR

16. a) Differentiate between the regularization techniques, lasso regression and ridge regression. (6)

b) Explain different ensemble methods. (8)

MODULE IV

17. a) Draw and explain the architecture of a convolutional neural network model AlexNet with handwritten digit dataset MNIST. (9)

b) Explain the role of filter, padding, and strides in a convolution layer of a CNN with an example. (5)

OR

18. a) How does a Convolutional Neural Network work? Explain with a neat diagram. (9)

b) Determine the shape of output matrix of an image of size 15 x 15 that uses a padding size of 2, stride size 2, and a 5 x 5 filter. (5)

MODULE V

19. a) Describe any one problem on Natural language Processing domain which provide a solution using LSTM. (7)

b) Explain the architecture of LSTM. (7)

OR

20. a) Explain the architecture of RNN with a neat diagram. (10)

b) What are the limitations of RNN? (4)

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