Graphic Era HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

End Term (Even) Semester Examination May-June 2025

Roll no.....

Name of the Program and semester: B.Tech CSE -AI/ML, IV Semester
Name of the Course: Deep Learning
Course Code: TCS 464

Time: 3 hour

Maximum Marks: 100

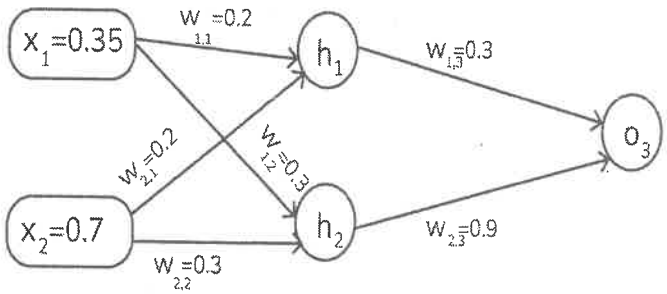
Note:

(i) All the questions are compulsory.
(ii) Answer any two sub questions from a, b and c in each main question.
(iii) Total marks for each question is 20 (twenty).
(iv) Each sub-question carries 10 marks.

Q1. (2X10=20 Marks)

a. Discuss components of deep learning. Elaborate each component with architecture diagram. CO1

b. Calculate the total error in the following neural network considering target value $T_1 = 0.67$ CO2



c. Differentiate between loss function and cost function. Discuss squared error loss and absolute error loss with their equation. Also discuss their advantages and disadvantages. CO2

Q2. (2X10=20 Marks)

a. What do you mean by padding in convolutional neural network. Discuss advantages of padding technique. Apply padding concept on following image to perform convolutional operation with 3x3 horizontal filter CO4

1	1	1	1	1	1
1	1	1	1	1	1
1	1	1	1	1	1
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

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b. Differentiate between sigmoid and SoftMax activation function with their equation/graph. Discuss both with by taking suitable example of neural network. CO3

c.How overfitting problem in deep neural network can be solved. Justify your answer by taking an example of training of deep neural network where hidden layers are = 4 CO5

Q3. (2X10=20 Marks)

a. Discuss the concept of data augmentation. Write down the python script to implement data augmentation on a single image with 5 different transformations and explain the output achieved. CO3

b. Let us consider a Convolutional Neural Network having three different convolutional layers in its architecture as – CO5

Layer-1: Filter Size – 3 X 3, Number of Filters – 10, Stride – 1, Padding – 0
Layer-2: Filter Size – 5 X 5, Number of Filters – 20, Stride – 2, Padding – 0
Layer-3: Filter Size – 5 X5, Number of Filters – 40, Stride – 2, Padding – 0

If we give the input a 3-D image to the network of dimension 39 X 39, then determine the dimension of the vector after passing through a fully connected layer in the architecture.

c. Draw the LSTM architecture. Explain all components of LSTM model. Discuss the usefulness of LSTM model for natural language processing applications. CO6

Q4. (2X10=20 Marks)

a. Draw the encoder and decoder architecture for language translation application. What is the disadvantage of encoder decoder architecture. How you can measure the performance of encoder and decoder. CO4

b. Elaborate the preprocessing steps in Natural Language Processing applications. Apply TF-IDF method on following sentences: CO3

Sentence 1: He is a good boy.
Sentence 2: She is a good girl.
Sentence 3: Boy and girl are good.

c. Elaborate the concept of mini-batch stochastic gradient descent optimizer. What kind of problem does this optimizer suffer from. How can we overcome that problem. CO2

Q5. (2X10=20 Marks)

a. Draw and explain the architecture of Generative Adversarial Network. How you can calculate the cost function for Generative Adversarial Network. Also, explain the drawbacks of Generative Adversarial Network. CO6

b. What do you mean by vanishing gradient problem. What is the main cause of this problem. How we can overcome this problem in deep neural network. CO3

c. Describe activation function ReLU, Leaky ReLU and Exponentially Linear unit function. Write equation for each case with their derivative function curves. CO2

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Note For the question paper setters:

- Question paper should cover all the COs of the course.
- Please specify COs against each question.