CUMMINS COLLEGE OF ENGINEERING FOR WOMEN
(An Autonomous Institute affiliated to Savitribai Phule Pune University)
Fourth Year Computer
DEEP LEARNING (PECE4201D)

Duration : 02:00 Hours   Max Marks : 50

Instructions :

1. All questions are compulsory.
2. Use of scientific calculator is allowed.
3. Draw diagrams wherever necessary.
4. Assume suitable data wherever necessary.
5. Handwriting must be readable.
6. Write precise answers.
7. While submitting Photo copy of answer sheets, check that the photo image of your paper is readable and not tilted.

Unit-1

Q No 1 a)   (5)

Total Population 400	True Condition			
		Tuna	Sharks	dolphins	seahorse
Predicted Condition	Tuna	70	10	15	5
	Sharks	8	67	20	5
	dolphins	0	11	88	1
	seahorse	4	10	14	72

Calculate True positive, True Negative, False Positive, False Negative and accuracy for Shark.

Unit-2

Q No 2 a) Compare Deep Learning and machine learning. Suggest suitable application where these models are used.   (5)
Points to consider: definition, features, applications
(01+02+02 Marks)

Unit-3

Q No 3 a) There are two models, both the models are two class classifier neural networks namely model 1 and model 2. For both the models, Predicted Output ^y and desired output y is as given below. (5)

 A) Calculate loss using **cross-entropy** and **B)** Explain what is loss? Give your analysis on which model is better.

Model 1: (Y, ^Y) := Input 1: (Y= 1, ^Y=0.8); Input 2: (Y= 0 , ^Y=0.2);
Model 2: (Y, ^Y) := Input 1: (Y= 1, ^Y=0.8); Input 2: (Y= 0 , ^Y=0.2);

A) 02 Marks
B) 03 Marks

Unit-4

Q No 4 a) Consider the image given below. (5)

Compare Semantic segmentation and Instance Segmentation with respect to the image given in the figure. Choose suitable Deep learning model useful to perform these tasks.
(04 + 01 Marks)

Unit-5

Q No 5 a) Give one example of time series data. What is anomaly detections with respect to time series data? Identify input and output for the example you explained. (5)

Unit-6

Q No 6 a) "There are no bugs in the software"
"The software is not user-friendly"
"Can't say anything about the quality of that software"
Perform Sentiment analysis as "positive, negative or neutral" on given statements. Suggest suitable Deep neural network model for this application area. Justify your answer in short. (03+02 Marks) (5)
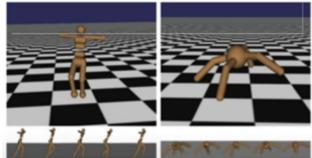
Unit-7

Q No 7 a) Consider text classification problem where contents are classified as spam or non-spam. Identify suitable input $x^{(t)}$ and output $o^{(t)}$ for a given application. Draw suitable RNN architecture for this type of text classification. Explain various parameters in the architectural diagram used to calculate output $o^{(t)}$ for given $x^{(t)}$. (5)

Unit-8

Q No 8 a) Consider 227x227 image data with 1000 classes. Explain Convolution operation at first layer in VGGNet by applying suitable kernel size, stride and padding for a given image size. (5)

Q No 9 a)   (5)

Consider Robot locomotion problem as shown in the figure. Objective of this problem is to move robot forward. Identify state, action and reword and explain how Deep reinforcement learning selects next action to achieve the objective.

Q No 10 a) Suggest suitable Deep Learning model for Query Search in Natural Language Translation.   (5)

Explain with example what could be input and output.

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Unit-1

Q No 1 a)   (5)

Total Population 400		True Condition			
		Tuna	Sharks	dolphins	seahorse
Predicted Condition	Tuna	70	10	15	5
	Sharks	8	67	20	5
	dolphins	0	11	88	1
	seahorse	4	10	14	72

Calculate True positive, True Negative, False Positive, False Negative and accuracy for Shark.

Unit-2

Q No 2 a) Compare Autoencoders and RBM. Suggest suitable application where   (5)
these models are used.
Points to consider: diagram, features, applications
(01+02+02 Marks)

Unit-3

Q No 3 a) There are two models, both the models are two class classifier neural networks namely model 1 and model 2. For both the models, Predicted Output ^y and desired output y is as given below. (5)
A) Calculate loss using **cross-entropy** and **B)** Explain what is loss? Give your analysis on which model is better.
Model 1: (Y, ^Y) := Input 1: (Y= 1, ^Y=0.8); Input 2: (Y= 0 , ^Y=0.2);
Model 2: (Y, ^Y) := Input 1: (Y= 1, ^Y=0.8); Input 2: (Y= 0 , ^Y=0.2);

A) 02 Marks
B) 03 Marks

<div align="center">Unit-4</div>

Q No 4 a) Consider the image given below. (5)

Compare Semantic segmentation and Object Detection with respect to the image given in the figure. Choose suitable Deep learning model useful to perform these tasks.
(04 + 01 Marks)

<div align="center">Unit-5</div>

Q No 5 a) Give one example of time series data. What is anomaly detections with respect to time series data? Identify input and output for the example you explained. (5)

<div align="center">Unit-6</div>

Q No 6 a) "All products in that shop are at low price" (5)
"All products in that shop are of low quality"
"Can't say about the quality of products in that shop"
Perform Sentiment *analysis as "positive, negative or neutral" on given statements. Suggest suitable Deep neural network model for this application area. Justify your answer in short.*
(03+02 Marks)

<div align="center">Unit-7</div>

Q No 7 a) Consider text classification problem where contents are classified as spam or non-spam. Identify suitable input $x^{(t)}$ and output $o^{(t)}$ for a given application. Draw suitable RNN architecture for this type of text classification. Explain various parameters in the architectural diagram used to calculate output $o^{(t)}$ for given $x^{(t)}$. (5)

<div align="center">Unit-8</div>

Q No 8 a) Consider 227x227 image data with 1000 classes. Explain Max pooling (5)
operation at initial layer in VGGNet by applying suitable kernel size, stride
and padding for a given image size.

Unit-9

Q No 9 a) Make use of Generator and Discriminator in Generative Adversarial (5)
Network to explain how to generate handwritten English characters.

Unit-10

Q No 10 a) Suggest suitable Deep Learning model for Object detection in Computer (5)
Vision. Explain with example what could be input and output

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Unit-1

Q No 1 a)   (5)

Total Population 400	True Condition			
		Tuna	Sharks	dolphins	seahorse
Predicted Condition	Tuna	70	10	15	5
	Sharks	8	67	20	5
	dolphins	0	11	88	1
	seahorse	4	10	14	72

Calculate True positive, True Negative, False Positive, False Negative and accuracy for Dolphins.

Unit-2

Q No 2 a) Compare Perceptron and Sigmoid neurons. Suggest suitable application   (5)
where these models are used.
Points to consider: diagram, features, applications
(01+02+02 Marks)

Unit-3

Q No 3 a) There are two models, both the models are two class classifier neural networks namely model 1 and model 2. For both the models, Predicted Output ^y and desired output y is as given below. **A)** Calculate loss using **Hinge loss** and **B)** Explain what is loss? Give your analysis on which model is better. (5)

Model 1: (Y, ^Y) := Input 1: (Y= 1, ^Y=0.8); Input 2: (Y= 0 , ^Y=0.2);
Model 2: (Y, ^Y) := Input 1: (Y= 1, ^Y=0.8); Input 2: (Y= 0 , ^Y=0.2);

A) 02 Marks
B) 03 Marks

Unit-4

Q No 4 a) Consider the image given below. (5)

Compare Semantic segmentation and Instance Segmentation with respect to the image given in the figure. Choose suitable Deep learning model useful to perform these tasks.
(04 + 01 Marks)

Unit-5

Q No 5 a) What is machine translation? Identify input and output for this application. Explain with example. What type of task is this? (one to one/one to many/many to one/many to many) (5)

Unit-6

Q No 6 a) "All products in that shop are at low price"
"All products in that shop are of low quality"
"Can't say about the quality of products in that shop"
Perform Sentiment *analysis as "positive, negative or neutral" on given statements. Suggest suitable Deep neural network model for this application area. Justify your answer in short.*
(03+02 Marks) (5)

Unit-7

Q No 7 a) Consider text classification problem where contents are classified as spam or non-spam. Identify suitable input $x^{(t)}$ and output $o^{(t)}$ for a given application. Draw suitable RNN architecture for this type of text classification. Explain various parameters in the architectural diagram used to calculate output $o^{(t)}$ for given $x^{(t)}$. (5)

Unit-8

Q No 8 a) Consider 227x227 image data with 1000 classes. Explain Max pooling (5)
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Q No 9 a) Make use of Generator and Discriminator in Generative Adversarial (5)
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Unit-1

Q No 1 a) Consider feed forward neural network with 2 input neuron, four hidden neuron and one output neuron.

Input Layer   Hidden Layer   Output Layer

w11   H1
x1   V1
H2   V2
w21   V3
H3   V4
w14
x2
w24   H4
Y

Using following weights, biases and thresholds draw correct network diagram and show all values in the diagram that are given below.
(02 Marks)

Implement the network using perceptron rule.
Find h1, h2, h3, h4 and y output at each neuron.
(10 Marks)

Examine and give your analysis for what type of gate is implemented using given specifications:
(01 Mark)

Input: (x1, x2) =: {(0, 0), (0, 1); (1, 0); (1,1)}
Bias at every hidden neuron H1, H2, H3, H4 are b1= b3= b3= 3 and b4 = 2, Bias at Y output neuron =0;
Waits from Input to Hidden neurons are:
 w11= -1, w12=-1, w13= 1, w14=1; w21= -1, w22=1, w23= -1, w24=1;
Waits from Hidden Neuron to Output Neuron are v1 =1, v2= 0. v3 = 0 v4 = 2
consider activation function as follows for every neuron
f(x)= 1 if x>threshold;
    = 0 otherwise
Consider threshold as 2 for H1, and 3 for H2, H3, H4 and threshold as 0 for output neuron Y
Prepare following table:

x1	x2	H1	H2	H3	H4	h1	h2	h3	h4	Y	y

Q No 2 a) Identify Role of Parameter Sharing in CNN. Explain with the help of 5 neurons in two layers. (6)

Q No 3 a) Perform convolution and pooling for following example. (6)

Input image matrix is:

10	10	50	50	50
10	10	50	50	50
10	10	50	50	50
10	10	50	50	50
10	10	50	50	50

Kernel for Convolution is

1	1
1	-1

Consider stride as 1 for convolution.

Consider stride as 2 and filter size as 2 for max pooling.

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Unit-1

Q No 1 a) Consider feed forward neural network with 2 input neuron, four hidden neuron and one output neuron.

Using following weights, biases and thresholds draw correct network diagram and show all values in the diagram that are given below.
(02 Marks)

Implement the network using perceptron rule.
Find h1, h2, h3, h4 and y output at each neuron.
(10 Marks)

Examine and give your analysis for what type of gate is implemented using given specifications:
(01 Mark)

Input: (x1, x2) =: {(0, 0), (0, 1); (1, 0); (1,1)}
Bias at every hidden neuron H1, H2, H3, H4 are b1= b3= b3= 3 and b4 = 2, Bias at Y output neuron =0;
Waits from Input to Hidden neurons are:
 w11= -1, w12=-1, w13= 1, w14=1; w21= -1, w22=1, w23= -1, w24=1;
Waits from Hidden Neuron to Output Neuron are v1 =1, v2= 0. v3 = 0 v4 = 2
consider activation function as follows for every neuron
f(x)= 1 if x>threshold;
     = 0 otherwise
Consider threshold as 2 for H1, and 3 for H2, H3, H4 and threshold as 0 for output neuron Y
Prepare following table:

x1	x2	H1	H2	H3	H4	h1	h2	h3	h4	Y	y

Q No 2 a) Identify Role of the receptive field of the units in the deeper layers. (6)
Explain with the help of 3 layers.

Q No 3 a) Perform convolution and pooling for following example. (6)
Input image matrix is:

10	10	50	50	50
10	10	50	50	50
10	10	50	50	50
10	10	50	50	50
10	10	50	50	50

Kernel for Convolution is

-1	0
0	1

Consider stride as 1 for convolution.
Consider stride as 2 and filter size as 2 for average pooling.
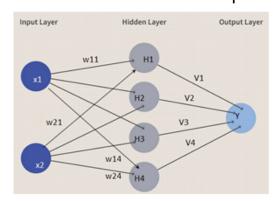
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Unit-1

Q No 1 a) Consider feed forward neural network with 2 input neuron, four hidden neuron and one output neuron.

Using following weights, biases and thresholds draw correct network diagram and show all values in the diagram that are given below.
(02 Marks)

Implement the network using perceptron rule.
Find h1, h2, h3, h4 and y output at each neuron.
(10 Marks)

Examine and give your analysis for what type of gate is implemented using given specifications:
(01 Mark)

Input: (x1, x2) =: {(0, 0), (0, 1); (1, 0); (1,1)}
Bias at every hidden neuron H1, H2, H3, H4 are b1= b3= b3= 3 and b4 = 2, Bias at Y output neuron =0;
Waits from Input to Hidden neurons are:
 w11= -1, w12=-1, w13= 1, w14=1; w21= -1, w22=1, w23= -1, w24=1;
Waits from Hidden Neuron to Output Neuron are v1 =1, v2= 0. v3 = 0 v4 = 2
consider activation function as follows for every neuron
f(x)= 1 if x>threshold;
     = 0 otherwise
Consider threshold as 2 for H1, and 3 for H2, H3, H4 and threshold as 0 for output neuron Y
Prepare following table:

x1	x2	H1	H2	H3	H4	h1	h2	h3	h4	Y	y

Q No 2 a) Identify Role of Invariance to translation in CNN. Explain with the help (6)
of 2 layers 2 layers and 4 neurons.

Q No 3 a) Perform convolution and pooling for following example. (6)
Input image matrix is:

10	10	50	50	50
10	10	50	50	50
10	10	50	50	50
10	10	50	50	50
10	10	50	50	50

Kernel for Convolution is

1	1
1	-1

Consider stride as 1 for convolution.

Consider stride as 2 and filter size as 2 for max pooling.
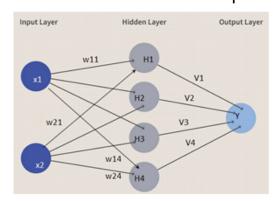
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Unit-1

Q No 1 a) Consider feed forward neural network with 2 input neuron, four hidden neuron and one output neuron. (13)

Using following weights, biases and thresholds draw correct network diagram and show all values in the diagram that are given below.
(02 Marks)

Implement the network using perceptron rule.
Find h1, h2, h3, h4 and y output at each neuron.
(10 Marks)

Examine and give your analysis for what type of gate is implemented using given specifications:
(01 Mark)

Input: (x1, x2) =: {(0, 0), (0, 1); (1, 0); (1,1)}
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consider activation function as follows for every neuron
f(x)= 1 if x>threshold;
     = 0 otherwise
Consider threshold as 2 for H1, and 3 for H2, H3, H4 and threshold as 0 for output neuron Y
Prepare following table:

x1	x2	H1	H2	H3	H4	h1	h2	h3	h4	Y	y

Q No 2 a) Identify Role of Invariance to translation in CNN. Explain with the help of 2 layers 2 layers and 4 neurons. (6)

Q No 3 a) Perform convolution and pooling for following example. (6)
Input image matrix is:

10	10	50	50	50
10	10	50	50	50
10	10	50	50	50
10	10	50	50	50
10	10	50	50	50

Kernel for Convolution is

1	1
1	-1

Consider stride as 1 for convolution.

Consider stride as 2 and filter size as 2 for max pooling.