M.Sc.(AI).III/11.23.001 Reg.No. | | | | | | | | | |

A

**M.Sc COMPUTER SCIENCE DEGREE WITH SPECIALIZATION IN**

**ARTIFICIAL INTELLIGENCE**

**THIRD SEMESTER EXAMINATION, NOVEMBER 2023**

**21-344-0301 DEEP LEARNING**

**(Regular)**

**Time : 3 Hours** **Maximum Marks :50**

**Write any FIVE questions.**

**(Each question carries 10 Marks)**

| Qn No | | Questions | Marks | CO | BL | PI |
|---|---|---|---|---|---|---|
| 1 | a. | Write a perceptron learning algorithm for any binary classification problem. | 5 | CO1 | L3 | 2.5.2 |
| | b. | How to choose loss functions when training deep learning neural networks. | 5 | CO1 | L2 | 1.7.1 |
| | | **OR** | | | | |
| 2 | a. | Which of the following would you consider to be valid activation functions to train a neural net in practice? Explain it with reason.<br>(i) $f(x) = -\min(2, x)$<br>(ii) $f(x) = 0.9x + 1$<br>(iii) $f(x) = \begin{cases} \min(x, .1x) & \mid x >= 0 \\ \min(x, .1x) & \mid x < 0 \end{cases}$<br>(iv) $f(x) = \begin{cases} \max(x, .1x) & \mid x >= 0 \\ \min(x, .1x) & \mid x < 0 \end{cases}$ | 5 | CO1 | L3 | 2.5.2 |
| | b. | "A neural network get optimal weight and bias value", Justify this statement by explaining the mathematical concept behind it. | 5 | CO1 | L2 | 1.7..1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | a. | Consider the convolutional neural network defined by the layers in the left column below.<br>Fill in the shape of the output volume and the number of parameters at each layer. You can write the activation shapes in the format (H, W, C), where H, W, C are the height, width and channel dimensions, respectively. Unless specified, assume padding 1, stride 1 where appropriate.<br>Notation:<br>•CONVx- Ndenotes a convolutional layer with Nfilters with height and width equal to x.<br>•POOL- n denotes a n×n max-pooling layer with stride of nand 0 padding.<br>•FLATTEN flattens its inputs, identical to torch.nn.flatten /tf.layers.flatten<br>•FC-N denotes a fully-connected layer with N neurons | 7 | CO2 | L3 | 2.5. |
| | b. | What is the main purpose of using zero padding in a CNN? Illustrate with an example. | 3 | CO2 | L2 | 2.5.2 |

| Layer | Activation volume dimensions | Number of parameters |
|---|---|---|
| Input | 32 × 32 × 3 | 0 |
| CONV3-8 | | |
| Leaky ReLU | | |
| POOL-2 | | |
| BATCHNORM | | |
| CONV3-16 | | |
| Leaky ReLU | | |
| POOL-2 | | |
| FLATTEN | | |
| FC-10 | | |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 4. | a. | You have a dataset DI with 100 labeled training example. Design a DNN to classify D1. Use at least 4 hidden layersand ReLu activation in each layer. Design the model using facilities available in keras. | 6 | CO2 | L3 | 2.5.2 |
| | b. | Explain the concept of regularization technique in deep learning. | 4 | CO2 | L2 | 1.7. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | a. | What is 'gradient' when we are talking about RNN? State its drawback. | 3 | CO3 | L2 | 1.7.1 |
| | b. | How many dimensions must the input of a RNN layer have? What does each dimension represent? what about its output? | 3 | CO3 | L2 | 1.7.1 |
| | c. | What are the different types of RNN? State each of its application | 4 | CO3 | L2 | 1.7.1 |
| | | **OR** | | | | |
| 6. | a. | Explain how LSTM, and GRU work. Which is the best one to use and why? | 4 | CO3 | L2 | 2.5.2 |
| | b. | Implement a LSTM model for text classification. | 6 | CO3 | L3 | 2.5.2 |
| | | | | | | |
| 7. | a. | What is transfer learning? Why is it needed? Name commonly-used transfer learning models. | 5 | CO4 | L2 | 2.5.2 |
| | b. | Analyse and compare different pretrained models in deep convolutional neural network | 5 | CO4 | L3 | 1.7.1 |
| | | **OR** | | | | |
| 8. | | Explain architecture of RESNET in detail. Implement the model using Keras. | 10 | CO4 | L3 | 1.7.1 |
| | | | | | | |
| 9. | a. | List two actual case studies where autoencoders have been used. | 4 | CO5 | L3 | 1.7.1 |
| | b. | How to reverse max pooling layer in encoder to return the shape in decoder? | 4 | CO5 | L2 | 2.5.2 |
| | c. | Why do we use binary cross entropy loss on autoencoders? | 2 | CO5 | L2 | 2.5.2 |
| | | **OR** | | | | |
| 10. | a. | Implement GAN for increasing data in MNIST dataset. | 7 | CO5 | L3 | 2.5.2 |
| | b. | In the GAN objective function, why do we first find D(x) that maximizes the objective function and then maximizes the objective function w.r.t the generator? | 3 | CO5 | L2 | 2.5.3 |

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M.Sc.(AI).III/11.23.003 Reg.No. | | | | | | | | |

C

**M.Sc. COMPUTER SCIENCE WITH SPECIALIZATION IN ARTIFICIAL INTELLIGENCE**
**THIRD SEMESTER EXAMINATION NOVEMBER 2023**

**21-344-0317 NATURAL LANGUAGE PROCESSING**

**(Regular)**

**Time: 3 Hours** **Maximum Marks :50**

**Each question carries 10 Marks**

| No | | QUESTIONS | MARKS | CO | BL | PI |
|---|---|---|---|---|---|---|
| 1 | a. | You have a corpus of text documents and want to calculate the probabilities of bi-grams. After counting, you find that the bi-gram "*the cat*" appears 10 times, and the bigram "*the dog*" appears 5 times. However, the unigram "*the*" occurs 200 times, and "*cat*" and "*dog*" occur 50 times each. Apply *Laplace smoothing* to compute the smoothed probabilities of "*the cat*" and "*the dog*" bigrams. | 4 | CO1 | L3 | 1.2.1 |
| | b. | Given two strings, "*kitten*" and "*sitting*," calculate the Minimum Edit Distance (MED) using dynamic programming. Use the following costs:<br>Insertion cost: 1<br>Deletion cost: 1<br>Substitution cost: 2 | 6 | CO1 | L3 | 1.2.1 |
| | | **OR** | | | | |
| 2 | a. | Create a Python function that takes a *text input* and an *integer* specifying the *n*-gram size and then generates the *n-grams* for that text? | 5 | CO1 | L3 | 1.7.1 |
| | b. | Suppose a simple *bi-gram language model* has been trained on a dataset containing the following sentences:<br>"The cat sits on the mat"<br>"The dog barks loudly "<br>"The sun shines brightly"<br>"The dog ate fish and slept on the mat"<br>To calculate the perplexity of this *bi-gram model* on a test set with the sentence:<br>"The cat ate fish" | 5 | CO1 | L3 | 1.2.1 |

<table>
<tr><td>3</td><td>a.</td><td>You have a corpus of five documents and want to calculate the TF-IDF scores for a specific term "apple" in each document. The term "apple" appears as follows in each document:<br><br>Document 1: 3 times<br><br>Document 2: 2 times<br><br>Document 3: 0 times<br><br>Document 4: 5 times<br><br>Document 5: 1 time<br><br>The total number of terms in each document is as follows:<br><br>Document 1: 400 words<br><br>Document 2: 350 words<br><br>Document 3: 500 words<br><br>Document 4: 600 words<br><br>Document 5: 450 words<br><br>Calculate the TF-IDF score for "apple" in each document using the standard formula.</td><td>4</td><td>CO2</td><td>L3</td><td>1.2.1</td></tr>
<tr><td></td><td>b.</td><td>Design and explain a Python function named get_window(sentence, window_size) that implements the Continuous Bag of Words (CBOW) approach. This function should take a sentence as input along with a specified window size and should output the surrounding words within the window and the target word for each window position. Provide the code implementation and describe the underlying logic of CBOW in your explanation.</td><td>6</td><td>CO2</td><td>L3</td><td>1.7.1</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>4</td><td>a.</td><td>Given the sentence "Exploring the world of Natural Language Processing unveils the hidden language of data" as a corpus, and using the Continuous Bag of Words (CBOW) approach to transform the words into vectors:<br><br>Prepare Table 1 detailing the word vectors obtained through CBOW (window size = 2) for words in the sentence.<br><br>Table 1: Training set for CBOW model<br><table><tr><th>Context words</th><th>Context word vectors</th><th>Center word</th><th>Center word vector</th></tr><tr><td>.....</td><td>.....</td><td>.....</td><td>.....</td></tr></table></td><td>7</td><td>CO2</td><td>L3</td><td>1.2.1</td></tr>
<tr><td></td><td>b.</td><td>Derive the loss function equations and elucidate the utilization of gradient descent within the skip-gram model through mathematical formulations</td><td>3</td><td>CO2</td><td>L2</td><td>1.2.1</td></tr>
</table>

| | | | | | | |
|---|---|---|---|---|---|---|
| **5** | **a.** | You have a simple HMM for part-of-speech tagging with three states (Noun, Verb, Adjective) and an observation sequence "*the cat runs fast.*" Calculate the most likely state sequence using the Viterbi algorithm, given the following probabilities:<br><br>*Initial state probabilities:* P(Noun) = 0.4, P(Verb) = 0.3, P(Adjective) = 0.3<br><br>*Transition Probabilities:*<br><br>P(Noun \| Noun) = 0.2<br><br>P(Noun \| Verb) = 0.4<br><br>P(Noun \| Adjective) = 0.3<br><br>P(Verb \| Noun) = 0.25<br><br>P(Verb \| Verb) = 0.2<br><br>P(Verb \| Adjective) = 0.1<br><br>P(Adjective \| Noun) = 0.15<br><br>P(Adjective \| Verb) = 0.1<br><br>P(Adjective \| Adjective) = 0.2<br><br>*Emission Probabilities:*<br><br>P(the \| Noun) = 0.4<br><br>P(cat \| Noun) = 0.5<br><br>P(runs \| Verb) = 0.6<br><br>P(fast \| Adjective) = 0.7 | **10** | **CO3** | **L3** | **1.7.1** |
| | | **OR** | | | | |
| **6** | **a.** | You have an HMM-based Named Entity Recognition (NER) system with three states (*Person*, *Organization*, *Location*) and a sequence of five words: "***John, works, at, Google, US.***" Given the following probabilities, find the most likely sequence of named entity tags for this sentence:<br><br>*Initial state probabilities:* P(*Person*) = 0.4, P(*Organization*) = 0.3, P(*Location*) = 0.3<br><br>*Transition Probabilities:*<br><br>P(*Person* \| *Person*) = 0.2<br><br>P(*Organization* \| *Person*) = 0.3<br><br>P(*Location* \| *Person*) = 0.1<br><br>P(*Person* \| *Organization*) = 0.2 | **10** | **CO3** | **L3** | **1.7.1** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | P(*Organization* \| *Organization*) = 0.4<br>P(*Location* \| *Organization*) = 0.2<br>P(*Person* \| *Location*) = 0.1<br>P(*Organization* \| *Location*) = 0.2<br>P(*Location* \| *Location*) = 0.3<br><u>*Emission Probabilities:*</u><br>P(***John*** \| *Person*) = 0.7<br>P(***works*** \| *Person*) = 0.1<br>P(***at*** \| *Organization*) = 0.3<br>P(***Google*** \| *Organization*) = 0.8<br>P(***US*** \| *Location*) = 0.4 | | | | |
| **7** | **a.** | Suppose we have a dataset of animals with various characteristics. If an animal has the following characteristics - it gives birth, cannot fly, live in water, and has no legs - what is the predicted class (mammals or non-mammals) according to the Naive Bayes algorithm? | **10** | **CO4** | **L3** | **1.7.1** |

| Name | Give Birth | Can Fly | Live in Water | Have Legs | Class |
|---|---|---|---|---|---|
| human | yes | no | no | yes | mammals |
| python | no | no | no | no | non-mammals |
| salmon | no | no | yes | no | non-mammals |
| whale | yes | no | yes | no | mammals |
| frog | no | no | sometimes | yes | non-mammals |
| komodo | no | no | no | yes | non-mammals |
| bat | yes | yes | no | yes | mammals |
| pigeon | no | yes | no | yes | non-mammals |
| cat | yes | no | no | yes | mammals |
| leopard shark | yes | no | yes | no | non-mammals |
| turtle | no | no | sometimes | yes | non-mammals |
| penguin | no | no | sometimes | yes | non-mammals |
| porcupine | yes | no | no | yes | mammals |
| eel | no | no | yes | no | non-mammals |
| salamander | no | no | sometimes | yes | non-mammals |
| gila monster | no | no | no | yes | non-mammals |
| platypus | yes | no | no | yes | mammals |
| owl | no | yes | no | yes | non-mammals |
| dolphin | yes | no | yes | no | mammals |
| eagle | no | yes | no | yes | non-mammals |

**OR**

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | a. | Consider the dataset provided below and the specified hypothesis: {"Age":'<=30', "Income":"medium", "Student":'yes', "Credit_Rating":'fair'}. | 10 | CO4 | L3 | 1.7.1 |

| Age | Income | Student | Credit_Rating | Buys_Computer |
|---|---|---|---|---|
| <=30 | high | no | fair | no |
| <=30 | high | no | excellent | no |
| 31-40 | high | no | fair | yes |
| >40 | medium | no | fair | yes |
| >40 | low | yes | fair | yes |
| >40 | low | yes | excellent | no |
| 31-40 | low | yes | excellent | yes |
| <=30 | medium | no | fair | no |
| <=30 | low | yes | fair | yes |
| >40 | medium | yes | fair | yes |
| <=30 | medium | yes | excellent | yes |
| 31-40 | medium | no | excellent | yes |
| 31-40 | high | yes | fair | yes |
| >40 | medium | no | excellent | no |

Using the Naive Bayes algorithm:

a. Calculate the probability that a person with these characteristics will buy a computer.

b. Calculate the probability that an person with these characteristics will not buy a computer.

c. Calculate the predicted class (buy or not buy).

Explain the steps involved in the calculation and provide the numerical values for the probabilities.

| | | | | | | |
|---|---|---|---|---|---|---|
| 9 | a. | Sketch the architectural representation of a single-cell RNN, GRU, and LSTM. Additionally, provide the mathematical equations governing the operations within each cell, illustrating the internal computations and transformations performed by these architectures. | 7 | CO5 | L2 | |
| | b. | Suggest three solutions for the vanishing and exploding gradient problem in RNN | 3 | CO5 | L2 | |

| | | OR | | | | |
|---|---|---|---|---|---|---|
| 10 | a. | Given an organization's task of building a Recurrent Neural Network (RNN) for classifying healthcare application reviews collected from 50,000 users, with annotations by five expert annotators, create a Python code to construct the RNN model with specific functionalities:<br>1. Map each word in the reviews to an integer vector of the same size.<br>2. Generate real-valued embeddings for each word.<br>3. Develop a prediction model utilizing the vectors obtained from steps (1) and (2).<br>Provide a Python code snippet that implements these functionalities to facilitate the organization's classification task. Ensure the model is trained and tested using a dataset comprising 25,000 samples for both positive and negative reviews. | 10 | CO5 | L3 | 1.7.1 |

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M.Sc.(AI).III/11.23.002 Reg.No. | | | | | | | | |

**B**

**M.SC. COMPUTER SCIENCE WITH SPECIALIZATION IN ARTIFICIAL INTELLIGENCE**

THIRD SEMESTER EXAMINATION NOVEMBER 2023

**21-344-0313 COMPUTER VISION**

**(Regular)**

**Time: 3 Hours** **Maximum Marks :50**

**Each question carries 10 Marks**

| No | | QUESTIONS | MARKS | CO | BL | PL |
|---|---|---|---|---|---|---|
| 1 | a. | With a neat diagram explain different stages in Photometric Image Formation. | 5 | CO1 | L2 | 1.7.1 |
| | b. | Explain different types of Image Enhancement techniques. | 5 | | | |
| | | **OR** | | | | |
| 2 | a. | Describe about image restoration techniques. | 5 | CO1 | L2 | 1.7.1 |
| | b. | Explain different types of Computer Vision techniques. | 5 | | | |
| | | | | | | |
| 3 | | Elucidate the steps involved in Harris Corner Detection. | 10 | CO2 | L2 | 1.7.1 |
| | | **OR** | | | | |
| 4 | | Explain any two image edge detection operators. | 10 | CO2 | L2 | 1.7.1 |
| | | | | | | |
| 5 | | What is Image Stitching? Write RANSAC algorithm and explain. | 10 | CO3 | L2 | 1.2.1 |
| | | **OR** | | | | |
| 6 | | Describe about graph cut and mean shift segmentation techniques. | 10 | CO3 | L2 | 1.7.1 |
| | | | | | | |
| 7 | | What is meant by optical flow?, and how is it related to the motion field? | 10 | CO4 | L2 | 1.2.1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | **OR** | | | | |
| **8** | **a.** | List and explain the steps used in orthographic structure from motion. | 7 | **CO4** | **L2** | **1.7.1** |
| | **b.** | Describe in detail about Depth Estimation Techniques. | 3 | | | |
| | | | | | | |
| **9** | | A computer vision expert wishes to use a fast and reliable face detection algorithm for his computer vision application. What would be your suggestion?, and explain the algorithm with justification. | **10** | **CO5** | **L2** | **1.2.1** |
| | | **OR** | | | | |
| **10** | | What is Disparity? Explain in detail about the different approaches used to measure the disparity. | **10** | **CO5** | **L2** | **1.7.1** |

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M.Sc.(AI).III/11.23.004 Reg.No. | | | | | | | | |

A

**M.SC. COMPUTER SCIENCE WITH SPECIALIZATION IN ARTIFICIAL INTELLIGENCE**
**THIRD SEMESTER EXAMINATION NOVEMBER 2023**

**22-344-0314 COMPUTER FORENSICS**
**(Regular)**

**Time: 3 Hours** **Maximum Marks :50**

**Each question carries 10 Marks**

| Sl.NO | | Questions | Marks | CO | BL | PI |
|---|---|---|---|---|---|---|
| 1. | a | The following are some recent cyber-attacks. Identify the type of attacks and write short note on each.<br><br>1) Sarah, who regularly receives promotional emails from Amazon. One day, she receives an email that appears to be from this legitimate website, offering her a special discount on her next purchase. The email looks convincing, complete with the company's logo and branding. Excited about the discount, Sarah clicks on the provided link within the email. However, the link doesn't take her to the official website; instead, it redirects her to a fraudulent website that mimics the real one.<br><br>2) Ryan S. Lin hacked into a Massachusetts woman's online accounts, stole personal information, and used it to harass and intimidate her.<br><br>3) An individual who gains unauthorized access to a person's private collection of explicit or sensitive content, then distributes this material without the owner's consent through various means, such as public websites, sending it directly to the victim's contacts. | 8 | CO1 | L3 | 4.4.1 |
| | b | Differentiate identity theft and identity fraud | 2 | CO1 | L2 | 2.7.1 |
| | | OR | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2. | a | Explain any 3 methods that a criminal can use to steal the personal information. | 4 | CO1 | L2 | 2.7.1 |
| | b | List different classes of Computer crime with one example for each | 4 | CO1 | L2 | 2.7.1 |
| | c | Identify the role of computers in given cyber-attacks.<br>i) A hacker used a computer to create a virus program for gaining personal information of others.<br>ii) The attacker denies the use of a legitimate machine through virus attack and makes that machine inoperable. | 2 | CO1 | L2 | 4.4.1 |
| | | | | | | |
| 3. | a | Identify the type of evidence<br>i) Chat logs from messaging applications contain conversations discussing illegal activities or plans.<br>ii) GPS data from a suspect's device , which show their movements, potentially placing them at the scene of a crime.<br>iii) Network traffic logs show unusual patterns or communication with known malicious IP addresses.<br>iv) The employment contract digitally signed by an employer.<br>v) A screenshot of a conversation obtained from an anonymous forum. | 5 | CO2 | L2 | 4.4.1 |
| | b | Briefly explain the general procedure for evidence collection . | 5 | CO2 | L2 | 2.7.1 |
| | | OR | | | | |
| 4. | | Explain the systematic procedure for cyber forensic investigation. | 10 | CO2 | L2 | 2.7.1 |
| | | | | | | |
| 5. | a | What is an incident? Give Examples for CIA related incidents. | 4 | CO3 | L2 | 2.7.1 |
| | b | Explain different steps in Incident Response Methodology. | 6 | CO3 | L2 | 2.7.1 |
| | | OR | | | | |
| 6. | | Explain different steps in Hackers Methodology. | 10 | CO3 | L2 | 2.7.1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7 | a | Is it possible to recover deleted (accidentally or purposefully) data on a disk ? Is there any scenario in which it is not possible to recover the deleted information? Justify your answers | 5 | CO4 | L2 | 2.7.1 |
| | b | Explain steps to create forensically sound duplicates using DD command. | 5 | C04 | L2 | 2.7.1 |
| | | OR | | | | |
| 8. | a | What are different file formats supported by FTK Imager ? Explain steps for creating an image using STK | 5 | CO3 | L2 | 2.7.1 |
| | b | Explain digital evidence preservation and List 5 rules of evidence. | 5 | CO4 | L2 | 2.7.1 |
| | | | | | | |
| 9. | a | Name two platforms that can be used to check whether a received email link is malicious or not. | 2 | CO5 | L2 | 2.7.1 |
| | b | Explain procedure for email forensics with supporting tools. | 8 | C05 | L2 | 2.7.1 |
| | | OR | | | | |
| 10. | | Explain any 5 commands supporting forensic process improvements | 10 | CO5 | L2 | 2.7.1 |

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M.Sc.(AI).III EL/11.23.005 Reg.No. | | | | | | | | |

**B**

**M.SC. COMPUTER SCIENCE WITH SPECIALIZATION IN ARTIFICIAL INTELLIGENCE**
**THIRD SEMESTER EXAMINATION NOVEMBER 2023**

**21-344-0301 Deep learning ( Inter Disciplinary Elective)**

**Time: 3 Hours** **Maximum Marks :50**

**Each question carries 10 Marks**

| Qn No | | Questions | Marks | CO | BL | PI |
|---|---|---|---|---|---|---|
| 1 | | Write a perceptron learning algorithm which is trained to recognize spam email by learning the characteristics of what constitutes spam vs non-spam email and state the importance of perceptron learning algorithm | 10 | CO1 | L2 | 1.7.1 |
| | | **OR** | | | | |
| 2 | | Gradient descent is an iterative optimization algorithm for finding the local minimum of a function. Justify this argument by explaining mathematical concepts involved in the process. Also write an algorithm to implement this optimization approach. Which technique is used to avoid over fitting and how is it implemented. | 10 | CO1 | L2 | 2.5.2 |
| | | | | | | |
| 3 | a | How feature extraction is carried out using CNN? | 3 | CO2 | L2 | 1.6.1 |
| | b | What's the difference between batch normalization and dropout layers in a CNN? | 3 | CO2 | L2 | 2.5.2 |
| | c | What will be the values of pixel in the convoluted image if the following input image of size 6*6 and kernel of size 3*3 is given<br><br>input image<br>10 10 10 0 0 0<br>10 10 10 0 0 0<br>10 10 10 0 0 0<br>10 10 10 0 0 0<br>10 10 10 0 0 0<br>10 10 10 0 0 0<br><br>kernel<br>1 0 -1<br>1 0 -1<br>1 0 -1 | 4 | CO2 | L3 | 2.5.3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | **OR** | | | | |
| 4 | | What is the reason for doing optimization and regularization in deep neural network? Explain the steps involved in optimization and regularization. | 10 | CO2 | L2 | 2.5.2 |
| | | **OR** | | | | |
| 5 | | "Recurrent Neural Network are used for processing time series data" Justify your answer with an example. | 10 | CO3 | L2 | 1.7.1 |
| | | **OR** | | | | |
| 6 | | Why LSTM? Explain its architecture in detail, How LSTM is implemented. | 10 | CO3 | L2 | 1.7.1 |
| | | **OR** | | | | |
| 7 | | Suppose you have a small number of images in your dataset and to apply deep learning methodology, which is the efficient strategy you will apply to classify? Explain its architecture and implement code from the scratch of that particular model. | 10 | CO4 | L3 | 2.5.2 |
| | | **OR** | | | | |
| 8 | | Implement image classifier using any of the pre trained model. | 10 | CO4 | L3 | 1.7.1 |
| | | **OR** | | | | |
| 9 | | Describe how auto encoders can be used as a generate model with the help of an example. | 10 | CO5 | L2 | 1.7.1 |
| | | **OR** | | | | |
| 10 | | By considering real life scenario explain the architecture of GAN. | 10 | CO5 | L2 | 2.5.3 |

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