UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2021

Course: Deep Learning **Semester: V**
Program: B. Tech. (AI-Minor Specialization) **Duration: 03 hrs.**
Course Code: MRAI0203 **Max. Marks: 100**
Instructions: Attempt all the questions

	SECTION A	**(5 X 4= 20 Marks)**	
S. No.		**Marks**	**CO**
Q 1	(a) How the deep learning network is different from ANN? (i) Advance computing power (ii) Automatic feature extraction (iii) Complex structure (iv) All of these (b) Which of the following libraries is used for importing deep learning algorithms in python? (i) scikit learn (ii) TensorFlow (iii) Numpy (iv) Pandas (c) Which neural network has only one hidden layer between the input and output? (i) Shallow neural network (ii) Deep neural network (iii) Recurrent neural network (iv) Feedforward neural network (d) Which of the following is not a type of deep neural network? (i) Convolutional neural network (ii) Autoencoders and RBM (iii) Recurrent neural network (iv) None of these	**4 M**	**CO1**
Q 2	(a) Which of the following is true about principal component analysis? (i) Simplify a dataset (ii) Reduces dimension (iii) Finds strongest correlation in the dataset (iv) All of these (b) The covariance between one dimension and itself is the variance (i) True (ii) False (c) Which of the following are the applications of PCA? (i) Face recognition (ii) Speech recognition (iii) Noise filtering (iv) All of these (d) PCA reduces the dimension by finding a few_____ linear combinations. (i) Hexagonal (ii) Orthogonal (iii) Octagonal (iv) Pentagonal	**4 M**	**CO2**
Q 3	(a) Which of the following network is well suited for image recognition problem. (i) feedforward neural network (ii) recurrent neural network (iii) convolutional neural network (iv) none of these (b) Which of the following problems can be solved using recurrent neural network. (i) Sentiment analysis (ii) Speech recognition (iii) Video activity recognition (iv) All of these (c) In recurrent neural network machine translation is which type of problem? (i) one to one (ii) many to one (iii) one to many (iv) many to many (d) In convolutional neural network which layer reduces the dimension of feature map while preserving the important information. (i)Pooling layer (ii)Convolutional layer (iii)Fully connected layer (iv) None of these	**4 M**	**CO3**

Q 4	Write the python code/ algorithm for classifying numbers from 0-9 using multi-layer neural network.	4 M	CO4
Q 5	List out the limitations of conventional neural network that are overcome in convolutional and recurrent neural network.	4 M	CO3
SECTION B		**(10 X 4 = 40 Marks)**	
Q 6	(a) What do you understand by perceptron? Explain how it can be used to implement logical operations. (b) Differentiate the following: (i) Learning rate and Epochs (ii) Sigmoid function and ReLU function	10 M	CO1
Q 7	Explain how data compression is performed in artificial neural network? Briefly explain all the steps that are involved in principal component analysis with a suitable example.	10 M	CO2
Q 8	Differentiate convolutional neural network and recurrent neural network? Explain the architecture of CNN with a suitable diagram.	10 M	CO3
Q 9	What do you understand by Triplet loss function? Explain how face recognition and face verification can be implemented using convolutional neural network with a suitable flow chart.	10 M	CO4
SECTION C		**(20X2=40 Marks)**	
Q 10 (a) Q 10 (b)	Design the artificial neural network to solve the XOR problem. Explain and derive how synaptic weights are optimized in multi-layer neural network using backpropagation algorithm with a suitable diagram.	20 M	CO1
Q 11 (a) Q 11 (b)	With reference to recurrent neural network explain the following: (i) Vanishing gradient problem (ii) Exploding gradient problem What are LSTM networks? Elucidate its structure and working principle. Write a python code/algorithm for any one deep learning application using LSTM network.	20 M	CO3