SET 2 - Sem

Total No. of Questions – [3] Total No. of Printed Pages: 3

G.R. No.	

PAPER CODE	

May 2022 (ENDSEM) EXAM

T.Y. (SEMESTER - II)

COURSE NAME: **Machine Learning (Elective III)**

COURSE CODE: **ETUA32182A**

(PATTERN 2018)

Time: [1Hr] [Max. Marks: 30]

(*) Instructions to candidates:

1) **Figures to the right indicate full marks.**
2) **Use of scientific calculator is allowed**
3) **Use suitable data where ever required**

Question No.		Question Description	Marks	CO mapped	Blooms Taxonomy Level
Q.1)	**a)**	In a certain PCA based application, the data is arranged in 2x2 matrix and is as follows $A=\begin{bmatrix}4 & 1\\ 1 & 4\end{bmatrix}$ Calculate the co-variance matrix. Steps : **2marks** Correct answer: $\begin{bmatrix}4.5 & -4.5\\ -4.5 & 4.5\end{bmatrix}$ **2 marks**	**(4)**	CO4	Apply
	b)	What is Principal Component Analysis (PCA)? Through detailed procedure describe how PCA is used for Dimensionality reduction. PCA introduction: **2 marks** Procedure : **3 marks** Dimensionality reduction : **1 mark**	**(6)**	CO4	Understand
		OR			
	b)	Explain step by step expectation and maximization algorithm used for estimation of parameters in Gaussian Mixture models.	**(6)**	CO4	Understand

		Expectation steps : **4 marks** Maximization steps: **2 marks**			
Q.2)	**a)**	In a certain perceptron training, the value of the weight is 0.6 , learning rate is 0.1 and the gradient of error with respect to weight is 0.0020. If simple gradient descent optimization is used, then calculate the updated value of the weight. Ans : **0.4998** Formula **1 mark** and correct calculation **3 marks**	**(4)**	CO5	Apply
	b)	Activations functions used in multilayer perceptron must be continuous, differentiable and easy to compute. Justify the appropriateness of the above statement. Justification : **every point for 2 marks each**	**(6)**	CO5	Understand+Apply
		OR			
	b)	You are training a multilayer perceptron for certain classification application. What will be the effect on training if use 1) Stochastic gradient 2) Batch gradient and 3) Mini batch gradient. **2 marks each**	**(6)**	CO5	Understand
Q.3)	**a)**	Five convolutional filter of size 7x7 with zero padding and stride of 1 are used in the first layer of convolutional neural network. If input image of resolution 224x224x3 is applied to this layer, what are the dimensions of data next layer will receive? Formula : **2 marks** **218x218x5 : 2 marks**	**(4)**	CO6	Apply
	b)	Consider the following Convolutional neural network where all the convolution filters are of size 3 x 3. For all the convolution layers, the stride S = 1 and padding P = 1: • CONV1: convolutional layer which takes an image of size 28 x 28 x 1 as input, and produces 64 outputs (64 filters of size 3 x 3 x 1) The number of parameters in layer are calculated as filter size x number of filters. For example in CONV1 layer number of parameters will be 3x3x64=576 • POOL1: 2 x 2 max-pooling layer	**(6)**	CO6	Apply

		• CONV2: convolutional layer with 64 inputs, 128 outputs (128 filters of size 3 x 3 x 64) • POOL2: 2 x2 max-pooling layer • CONV3: convolutional layer with 128 inputs, 256 outputs • CONV4: convolutional layer with 256 inputs, 256 outputs • POOL3: 2 x 2 max-pooling layer • FC1: fully connected layer with 1024 outputs In the above example, calculate the size of the output after POOL1 layer . Formula **2 marks** calculation **2 marks** **14x14x64 : 2 marks**			
		OR			
	b)	What is convolution? **1 mark** Explain 2D convolution process with suitable example? **4 marks** How 2D convolution is used in 3D filtering in Convolutional Neural networks? 1 mark	**(6)**	CO6	Unders tand