2-Som

Total No. of Questions – [06] Total No. of Printed Pages: 3

G.R. No.	

MAY 2022- END-SEM

B. TECH. (Electronics and Telecommunications)

(SEMESTER - II)

Deep Learning (ETUA40182A) Elective V

(PATTERN 2018)

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

(*) Instructions to candidates:

1) **Answer Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6.**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Question No.		Question Description		CO mapped	Blooms Taxonomy Level
Q.1)	**a)**	Covid test of 137 samples in a society located in suburban of Pune city is as shown in the Table. Calculate the probability of tested positive and having symptoms P (T+ | S). **Truth / Positive / Negative / Total** Symptoms: 44 / 23 / 67 Healthy: 10 / 60 / 70 Total: 54 / 83 / 137 Bayes theorem formula -**1 mark** Correct probabilities – **1mark** Correct answer – **0.65 – 2 marks**	**(4)**	CO4	Apply
	b)	In multivariate system, the normalized distributions P(x) and Q(x) are defined as P(x)= N $(x; \mu_1, \Sigma_1)$ and Q(x)= N $(x; \mu_2, \Sigma_2)$ prove that KL Divergence $D_{KL}(P(x)\|\|Q(x))$ is given by $\frac{1}{2}[\ log\frac{\|\Sigma_2\|}{\|\Sigma_1\|}$ - k +tr$(\Sigma_2^{-1}\Sigma_1) + (\mu_1 - \mu_2)^T\Sigma_2^{-1}\ (\mu_1 - \mu_2)]$ Correct derivation – **6 marks. (Marks can be given for in**	**(6)**	CO4	Understand

		between steps also)			
		OR			
Q.2)	**a)**	With suitable example, explain what you mean by frequency histogram and relative frequency histogram. Frequency histogram with diagram: **2 Marks** Frequency histogram with diagram: **2 Marks**	**(4)**	CO4	
	b)	In conditional VAE trained on fashion MNIST database having fashion items distributed in 10 classes , it is expected to generate a sneaker which belongs to class 7 .There are two samples in latent space namely z1 and z2. Construct the conditional VAE for the given requirements. Draw the complete concept diagram. What will be the size of latent vector? Preparing vector =**[0,0,0,0,0,0,0,1,0,0,z1,z2]= 2 marks** CVAE diagram = **4 marks**	**(6)**	CO4	Crea t
Q.3)	**a)**	The discriminator in GAN has achieved optimality and distribution of the generator $p_g(x) = 0.7$. Calculate the value of distribution of the image dataset $P_{data}(x)$. Formulae : **2 marks** Correct answer : **0.7 = 2marks**	**(4)**	CO5	Appl y
	b)	An Engineer who want to develop fun application where he wants to develop application for image to image translation. Suggest him a suitable deep learning architecture, draw and explain its working. Suggestion of cycle GAN : **2 marks** Correct diagram : **4 marks**	**(6)**	CO5	Crea te
		OR			
Q.4)	**a)**	Vanishing gradients is a serious drawback in GAN. Suggest a technique to reduce vanishing gradient problem. Correct diagram : **4 marks**	**(4)**	CO5	Appl y
	b)	In certain application the DCGAN is used to generate a colour image of 64x64x3 size. Develop a discriminator of DCGAN using 4 convolution layers. The input will a vector of 100x1 size of random samples. Discriminator diagram : **4 marks** Description : **2 marks**	**(6)**	CO5	Crea t
Q.5)	**a)**	In a deterministic environment shown below, agent can move left, right, up and down. When agent moves into position (0, 2) he wins and gets 10 points and if moves into (1, 2) position he losses and gets a penalty of 10 points. In an episode agent moves from start (0, 0) goes right to (0,1) then again right to (0,1) and moves right. What will be the reward if discount factor of 0.9 is considered? The arrows indicate the direction of the movement of the agent ($\uparrow up, \downarrow$	**(4)**	CO6	Appl y

		$down, \rightarrow right, \leftarrow left$) START (0,0) | (0,1) | (0,2) WIN (0,1) | (1,1) | (1,2) Loose Movements and calculation of Q for Q(0,0) and Q(0,1) : **2 marks** Correct Answer :) $Q((0,1), \rightarrow) = 10$**: 2 marks**			
	b)	Starting with necessary requirements, write the deep Q network algorithm. Necessary requirements :**2 marks** Algorithm : **4 marks**	**(6)**	CO6	Understand
		OR			
Q.6)	**a)**	In a reinforcement based three step game reward at step 0(initially) is 20, step 1 is -10 and step 2 is 30. Taking discount factor equal to 0.9, calculate the total reward. *Total reward equation* $R_t = \gamma^0 r_t + \gamma^1 r_{t+1} + \gamma^2 r_{t+2} + \cdots + \gamma^{t+n} r_{t+n}$ Formula of total reward : **1 mark** Correct answer : **3 marks : 35.3**	**(4)**	CO6	Apply
	b)	Illustrate the entire reinforcement learning process using block diagram indicating all the components. Block diagram : **3 marks** Process description : **3 marks**	**(6)**	CO6	Understand