Reg. No. | | | | | | | | | | | | |

B.E / B.TECH. DEGREE EXAMINATION, MAY 2023

Sixth Semester

EC18016-MACHINE LEARNING

(Electronics and Communication Engineering)

(Regulation 2018)

TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Distinguish between supervised and unsupervised classifiers	**4**
CO 2	Categorize the data and identify the patterns.	**4**
CO 3	Illustrate methods for automatic training of classification systems	**2**
CO 4	Examine classification problems probabilistically and estimate classifier performance	**4**
CO 5	Use the principles of Bayesian parameter estimation and apply them in relatively simple probabilistic models	**3**

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Examine the parametric estimation method.	**1**	**4**
2.	Distinguish between supervised and unsupervised learning.	**1**	**3**
3.	Organize how to tackle over fitting and under fitting?	**2**	**4**
4.	Develop the F1 score? How would you use it?	**2**	**3**
5.	Why dimensionality reduction is useful?	**3**	**2**
6.	What is the first principal component of a data? How one can compute it?	**3**	**2**
7.	Analyze General Expectation-Maximisation (EM) Algorithm.	**4**	**4**
8.	Compare and contrast the gradient descent and Delta rule.	**4**	**4**
9.	Differentiate Deep learning and Machine Learning.	**5**	**4**
10.	Describe Markov Chains.	**5**	**2**

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PART- B (5 x 14 = 70 Marks)

			Marks	CO	RBT LEVEL
11. (a)	**(i)**	Describe about the basic statistic properties used in Machine learning algorithmic perspective.	**(7)**	**1**	**3**
	(ii)	Derive probability density function of Gaussian distribution w .	**(7)**	**1**	**3**
		(OR)			
(b)		Obtain the uni-variate and multivariate normal density functions.	**(14)**	**1**	**3**
12. (a)		Does the patient have cancer or does he not? A patient takes a lab test and the result comes back positive. The test returns a correct positive result in only 98% of the cases in which the disease is actually present, and a correct negative result in only 97% of the cases in which the disease is not present. Furthermore, 0.008 of the entire population have this cancer. 1. What is the probability that this patient has cancer? 2. What is the probability that he does not have cancer? 3. What is the diagnosis?	**(14)**	**2**	**4**
		(OR)			
(b)		Apply K nearest neighbor classifier to predict the diabetic patient with the given features BMI, Age. If the training examples are,	**(14)**	**2**	**4**

BMI	Age	Sugar
33.6	50	1
26.6	30	0
23.4	40	0
43.1	67	0
35.3	23	1
35.9	67	1
36.7	45	1
25.7	46	0
23.3	29	0
31	56	1

Assume K=3,

Test Example BMI=43.6, Age=40, Sugar=?

13. (a)	Let the probability that a bull week is followed by another bull week be 90%, a bear week be 7.5%, and a stagnant week be 2.5%. Similarly, let the probability that a bear week is followed by another bull week be 15%, bear week be 80% and a stagnant week be 5%. Finally, let the probability that a stagnant week be followed by a bull week is 25%, a bear week be 25% and a stagnant week be 50%. Obtain the transition probabilities and probabilities for future states of a discrete Markov process.	**(14)**	**3**	**2**
	(OR)			

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(b)	Cluster the following eight points (with (x, y) representing locations) into three clusters: A1(2, 10), A2(2, 5), A3(8, 4), A4(5, 8), A5(7, 5), A6(6, 4), A7(1, 2), A8(4, 9) Initial cluster centers are: A1(2, 10), A4(5, 8) and A7(1, 2). The distance function between two points a = (x1, y1) and b = (x2, y2) is defined as- P(a, b) = |x2 – x1| + |y2 – y1|	**(14)**	**3**	**2**
14. (a)	Assess for which problems ANN learning is well suited and write down the characteristics.	**(14)**	**4**	**4**
	(OR)			
(b)	**(i)** Examine Perceptron with a neat diagram.	**(4)**	**4**	**4**
	(ii) Describe about perceptron with an example and draw the decision surface represented by a two-input perceptron.	**(10)**	**4**	**4**
15. (a)	Describe in detail about the Hidden Markov Models.(HMM) also generate the Forward, Viterbi and Baum Welch Algorithm.	**(14)**	**5**	**3**
	(OR)			
(b)	**(i)** Illustrate two graphical models and show the various relationships between the nodes.	**(10)**	**5**	**3**
	(ii) Explain about conditional table.	**(4)**	**5**	**3**

PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	Consider the two-dimensional patterns (2, 1), (3, 5), (4, 3), (5, 6), (6, 7), (7, 8). Compute the principal component using PCA Algorithm.	**(10)**	**3**	**3**