Printed page: 03 **Subject Code: … AMTAI0113**

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY ,GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

MASTER OF TECHNOLOGY (M. Tech)

(SEM: I THEORY EXAMINATION (2020-2021)

SUBJECT NAME: PATTERN RECOGNITION

Time: 3 Hours **Max. Marks:70**

General Instructions:

- All questions are compulsory. Answers should be brief and to the point.
- This Question paper consists of .....03.....pages & ...8.....questions.
- It comprises of three Sections, A, B, and C. You are to attempt all the sections.
- Section A -Question No- 1 is objective type questions carrying 1 mark each, Question No- 2 is very short answer type carrying 2 mark each. You are expected to answer them as directed.
- Section B - Question No-3 is Long answer type -I questions with external choice carrying 4marks each. You need to attempt any five out of seven questions given.
- Section C - Question No. 4-8 are Long answer type –II (within unit choice) questions carrying 7 marks each. You need to attempt any one part *a* or *b.*
- Students are instructed to cross the blank sheets before handing over the answer sheet to the invigilator.
- No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION – A

1.	**Answer all the parts-**		**[5x1=5]**	**CO**
	a.	Define pattern.	**(1)**	**CO1**
	b.	Give difference between Clustering and classification.	**(1)**	**CO1**
	c.	Define K-nearest neighbour.	**(1)**	**CO4**
	d.	Explain random variable with example.	**(1)**	**CO2**
	e.	Differentiate supervised learning and unsupervised learning.	**(1)**	**CO1**
2.	**Answer all the parts-**		**[5×2=10]**	**CO**
	a.	Briefly explain segmentation and grouping.	**(2)**	**CO1**
	b.	Define discriminant functions. Explain linear discriminant function.	**(2)**	**CO3**
	c.	What is Logistic Discrimination/ Regression? Explain with an example.	**(2)**	**CO3**
	d.	Explain Generalized Linear Classifiers with example.	**(2)**	**CO3**
	e.	What is clustering? Give criterion function of clustering.	**(2)**	**CO5**

SECTION – B

3.	**Answer any five of the following-**		**[5x4=20]**	**CO**
	a.	Explain forward and backward algorithm for Hidden Markov Model (HMM).	**(4)**	**CO3**
	b.	Explain Bayesian decision theory. Describe its categories.	**(4)**	**CO2**
	c.	What are the problems arise by activities in design of pattern recognition System?	**(4)**	**CO1**
	d.	Write algorithm for K-means clustering with the help of diagram.	**(4)**	**CO4**
	e.	When a test pattern is classified by a decision tree, is the pattern subjected to a sequence of queries, corresponding to the nodes along a path from root to leaf? Explain.	**(4)**	**CO4**
	f.	What are Parameter estimation methods? Explain in detail.	**(4)**	**CO3**
	g.	How can one decide on using a linear or nonlinear classifier for the dataset? Explain with justification.	**(4)**	**CO2**

SECTION – C

4	**Answer any one of the following-**		**[5×7=35]**	**CO**
	a.	What are the challenges of Pattern recognition?	**(7)**	**CO1**
	b.	Distinguish between the pre-processing, feature extraction and classification operations of pattern recognition system.	**(7)**	**CO2**
5.	**Answer any one of the following-**			
	a.	Explain Bayesian Belief Networks with the help of example.	**(7)**	**CO2**
	b.	Explain Minimum-error-rate classification and its relation to Bayesian risk minimization.	**(7)**	**CO2**
6.	**Answer any one of the following-**			
	a.	What happens if PCA (Principal Component Analysis) is applied on nonlinear data? Explain with example.	**(7)**	**CO3**
	b.	Describe a Support Vector Machine. Define the optimization task solved in SVM learning.	**(7)**	**CO3**
7.	**Answer any one of the following-**			
	a.	How can we use unsupervised clustering models for classification tasks?	**(7)**	**CO5**
	b.	Describe the perceptron learning algorithm and its properties. Explain how the perceptron learning algorithm can be viewed as gradient descent.	**(7)**	**CO3**
8.	**Answer any one of the following-**			
	a.	Given the observation sequence $O = (o_1, o_2, \ldots\ldots, o_T)$ and the model = (A, B) how do we choose a corresponding state sequence $q = (q_1, q_2, \ldots\ldots, q_T)$ that is optimal in some sense (i.e. best explains the observations)?	**(7)**	**CO5**
	b.	Explain Hidden Markov model (HMM). In which case Hidden Markov model parameter set to zero initially will remain at zero throughout the re-estimation procedure?	**(7)**	CO5