Printed Pages: 2 **Sub Code:RCAE44**

Paper Id: 214514 **Roll No.** | | | | | | | | | | |

MCA
(SEM V) THEORY EXAMINATION 2018-19
PATTERN RECOGNITION

Time: 3 Hours ***Total Marks: 70***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a. What do you understand by mean and covariance? Explain with example.
b. Briefly discuss and compare learning and adaptation.
c. Define conditional probability. Derive Bayes' rule.
d. Differentiate between parametric and non-parametric techniques with example.
e. Give any three application areas of clustering.
f. How the performance of a classifier is estimated?
g. Write a short note on fuzzy classification.

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a. Define terms- probability and probability space. What are the axioms of probability theory? Explain.
b. Discuss normal density, univariate density and multivariate density in context of Bayesian decision theory.
c. Describe the concept of Hidden Markov Model. Explain forward Markov model with diagram.
d. Explain maximum likelihood method for parameter estimation.
e. Explain K-means clustering algorithm. Illustrate the concept of K-means with the help of three-dimensional data set of 10 points given below:
(1,1,1), (1,1,2), (1,3,2), (2,1,1), (6,3,1), (6,4,1), (6,6,6), (6,6,7), (6,7,6), (7,7,7)

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a) Define pattern with example. How a machine is trained to learn a pattern? Explain.
(b) Discuss the concept of preprocessing and post-processing in the designing of a pattern recognition system.

4. Attempt any *one* part of the following: 7 x 1 = 7

(a) What do you mean by statistical pattern recognition? Discuss its basic model with the help of a diagram.
(b) Discuss Bayesian decision theory for continuous features. Derive an expression to minimize the classification error for Bayesian classification.

5. Attempt any *one* part of the following: 7 x 1 = 7

(a) What is a linear discriminant function? Discuss different approaches to LDA.
(b) What do you mean by dimensionality reduction? Explain PCA algorithm for dimension reduction.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Explain the concept of Parzen window. Discuss conditions for –
   (i) Convergence of mean
   (ii) Convergence of variance

(b) What do you mean by nearest neighbor rule? Explain. Also discuss properties of nearest neighbor classifier

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) Define the term clustering. Discuss procedure to clusters **m** number of samples into **c** clusters.

(b) What do you understand by criteria function for clustering and cluster validation? Discuss.