

M.E. COMPUTER SCIENCE AND ENGINEERING FIRST YEAR SECOND SEMESTER – 2017

Time: 3 hours

**Pattern Recognition**

Full Marks: 100

Answer any five questions

All Questions have equal marks

- Q1. (a) What are Eigen value and Eigen Vector?  
(b) How Principal Component Analysis (PCA) work? Provide suitable examples.  
(c) Mention some applications where PCA is useful. [20]
- Q2. (a) What are support vector and kernel?  
(b) Discuss with suitable examples the principle of Support Vector Machine (SVM)?  
(c) Does the location of a decision boundary depend on the kernel? Answer with proper Justification. [20]
- Q3. (a) What is Bayes theorem?  
(b) Discuss the working principle of Naive Bayes Classifier?  
(c) Describe the KNN Algorithm. How one should chose the value of 'K'? [20]
- Q4. (a) How evolutionary algorithm can be used to build supervised classifier? Discuss the significance of objective function that you will be using to build the classifier.  
(b) Define entropy. Discuss the principle of Decision Tree based classifier. [20]
- Q5. (a) Discuss the FCM Algorithm. When FCM performs better than K Mean?  
(b) When one should use K-Median Algorithm over K-Mean?
- Q6. (a) Discuss the following three Hierarchical Clustering algorithms.  
(i) Single Linkage (ii) Average Linkage (iii) Complete Linkage [20]  
(b) Describe Spanning Tree based clustering.  
(c) What is the motivation of Multiobjective Clustering?
- Q7. (a) What is clustering validity index? Give some examples of cluster validity index.  
(b) With suitable example demonstrate how cluster validity index can be used to find the appropriate number of clusters in a data sets? [20]
- Q8. (a) Define Mutual Information? Discuss how it can be used for Feature Selection.  
(b) With suitable example show how Genetic Algorithm can be used for feature selection? [20]