B.TECH/IT/6TH SEM/INFO 3243 (BACKLOG)/2022

PATTERN RECOGNITION (INFO 3243)

Time Allotted : 3 hrs

Full Marks: 70

 $10 \times 1 = 10$

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and <u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A (Multiple Choice Type Questions)

- 1. Choose the correct alternative for the following:
 - (i) When two classes can be separated by a separate line, they are known as_____. (a) linearly separable (b) linearly inseparable classes (c) may be separable or inseparable, it depends on system (d) none of the mentioned (ii) Principal component analysis is one important application in_____. (a) data dimension reduction (b) data encryption (c) noise filtering (d) data communication Clustering algorithm usually employ _____ (iii) (b) unsupervised learning (a) supervised learning (c) reinforcement learning (d) competitive learning
 - (iv) Which of the following could be possible stopping criteria in K-means clustering?
 - (a) Convergence. (No further change in centroids)
 - (b) Maximum number of iterations.
 - (c) Both (a) and (b)
 - (d) None of these.
 - (v) Which of the following is a non-parametric technique?
 (a) Bayesian estimation
 (b) Gaussian Mixture Model
 (c) Parzen Windows
 (d) Expectation Maximization.
 - (vi) Fisher's linear discriminant analysis is used in _____.
 (a) unsupervised classification
 (b) supervised classification
 (c) reinforcement classification
 (d) competitive classification
 - (c) reinforcement classification (d) competitive classification

B.TECH/IT/6TH SEM/INFO 3243 (BACKLOG)/2022

Impurity of an attribute is high means (vii) (a) this attribute makes the most difference to the classification (b) this attribute makes the less difference to the classification (c) this attribute can be used for verification of unknown patterns (d) this attribute makes not so difference to the classification. Error correction learning is type of_____ (viii) (a) supervised learning (b) unsupervised learning (d) none of the mentioned (c) can be supervised or unsupervised In a three layer network, number of classes is determined by? (ix) (a) Number of units in second layer (b) Number of units in third layer (c) Number of units in second and third layer (d) None of the mentioned. If the variance covariance matrix is diagonal matrix then the features (x)

- are_____.
 - (a) independent

(c) zero mean value

(b) dependent(d) uniformly distributed.

Group – B

- 2. Estimate the variance of a multivariate Gaussian distribution using MLE.
- 3. (a) Explain Bayes classifier with an example.
 - (b) Write the advantages of Naïve Bayes Classifier over Bayes classifier.

6 + 6 = 12

12

Group – C

- 4. (a) Write the steps of K-NN classifier.
 - (b) Let the patterns (0, 3), (0, 2), (0, 1), (0, 0), (-1, 0), (-2, 0) belong to C1 and (1, 3), (1, 1), (1, 0), (0, -1) belong to C2. Classify the pattern (1, 4) using k–NN algorithm where value of k is 1 and 3.

6 + 6 = 12

- 5. (a) Write the forward algorithm of Hidden Markov Model.
 - (b) Write the decoding algorithm of Hidden Markov Model.

6 + 6 = 12

Group – D

6. Explain decision tree based classifier with an example.

12

7. Write the K-means clustering algorithm. Explain with a suitable example.

INFO 3243

12

B.TECH/IT/6TH SEM/INFO 3243 (BACKLOG)/2022

Group – E

8. What do you mean by dimension reduction? Explain PCA (Principal Component Analysis).

(4 + 8) = 12

- 9. (a) What do you mean by feature selection? Why feature selection algorithm is required for pattern classification?
 - (b) Write the branch and bound algorithm for feature selection.

(2+3) + 7 = 12