

- 499 -

Total No. of Pages: 02

FIFTH SEMESTER

END SEMESTER EXAMINATION

Roll No _____

B.Tech. (IT)

November-2018

IT-307-PATTERN RECOGNITION

Time: 03 Hours

Max. Marks: 40

Note: Attempt *FIVE* questions.

Question No.1 is compulsory to attempt

Assume suitable missing data, if any.

Q.No.1

[2x4=8]

- [a] What are the different ways to classify patterns?
- [b] What do you mean by similarity (Proximity) or dissimilarity measure?
Give two examples of each.
- [c] State and explain the three conditions of clustering.
- [d] Prove that dot product of two vectors is zero if they are orthogonal to each other. Verify it with an example.

Q.No.2

[4x2=8]

- [a] Describe a perceptron network? And discuss its applications and limitations?
- [b] Explain a single layer perceptron model which can classify a pattern (take own example) effectively.

Q.No. 3

[8]

Let blue, green, and red be three classes of objects with prior probabilities given by $P(\text{blue}) = 0.3$, $P(\text{green}) = 0.4$, $P(\text{red}) = 0.3$. Let there be three types of objects: pencils, pens, and paper. Let the class conditional probabilities of these objects be given as follows:

$P(\text{pencil} \text{green}) = 0.3$	$P(\text{pen} \text{green}) = 0.5$	$P(\text{paper} \text{green}) = 0.2$
$P(\text{pencil} \text{blue}) = 0.5$	$P(\text{pen} \text{blue}) = 0.2$	$P(\text{paper} \text{blue}) = 0.3$
$P(\text{pencil} \text{red}) = 0.2$	$P(\text{pen} \text{red}) = 0.3$	$P(\text{paper} \text{red}) = 0.5$

Use Bayes classifier to classify pencil, pen, and paper.

Q. No. 4

[4x2=8]

- [a] Demonstrate K-NN algorithm with the help of some example and highlights the limitations of K-NN. In this algorithm how does, "The computational complexity for classifying new samples grows linearly with the number of samples in the training dataset in the worst-case scenario"

P.T.O.

Q-500 -

- [b] How do you optimize the construction of hyper plane using the theory of Support Vector Machines (SVM)? Give mathematical treatment for trade-off between large margin and small margin errors.

Q.No. 5

[4x2=8]

A set of data is given as: $X_1 = [2, 1]^T$, $X_2 = [3, 2]^T$, $X_3 = [2, 3]^T$ and $X_4 = [1, 2]^T$. Compute the followings parameters:

- [a] Mean value of vector X .
[b] Covariance matrix of the data.

Q.No. 6

[4x2=8]

Performance of a classifier with respect to a data set is as given in confusion matrix.

Actual classes	Predicted Classes		
	60	10	10
	20	50	10
	5	5	70

Determine the following parameters to evaluate the classifier performance.

- [a] Precision
[b] Accuracy
[c] Recall
[d] Error rate