

(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH. (INFORMATION TECHNOLOGY | COMPUTER AND COMMUNICATION TECHNOLOGY)

END SEMESTER EXAMINATIONS, DECEMBER 2021 – JANUARY 2022 SUBJECT: PATTERN RECOGNITION [ICT 4053]

REVISED CREDIT SYSTEM (17/12/2021)

DURATION:75 Mins.

MAX. MARKS: 20

3marks

Instructions to candidates

- Answer **ALL** questions.
- Missing data, if any, may be suitably assumed.
- 1A. Given the following data elements for 2 class problem, {(7.1, 4.2), (-1.4,-4.3), (4.5,0), (6.3, 1.6), (4.2, 1.9), (1.4, -3.2), (2.4, -4), (2.5, -6.1), (8.4, 3.7), (4.1, -2.2) } belongs to class omega1. { (-3,-2.9), (0.5,8.7), (2.9, 2.1), (-0.1,5.2), (-4,2.2), (-1.3, 3.7), (-3.4,6.2), (-4.1, 3.4), (-5.1, 1.6), (1.9,5.1) } belongs to class omega2. If W^T₀= [-5, 0.9, 1] and η =0.3, Calculate the weight vector at the end of second iteration using perceptron criteria
- 1B. Given three classes and discriminant functions as follows:

 $G_1(X)=X_1 - 2X_2 - 15$

 $G_2(X)=3X_1 - X_2 - 15$

 $G_3(X) = X_1 + 4X_2 - 15$

Locate the class for data point (0,3)

- 1C. Suggest a solution when exhaustive search for clustering becomes completely **2marks** infeasible?
- 2A. Explain the Hidden Markov Model and determine the state transition probability **5marks** of the spoken word "later" and "alter", i.e. $P(later/\theta)$ and $P(alter/\theta)$
- 2B. Explain the working of K Nearest Neighbor algorithm with an example and **3marks** justify its application.
- 2C. Illustrate an example of reducing a 2D-graph to a 1D-graph, so as to maximize 2marks the separability of two categories in Multiple Linear Discriminant analysis.