Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

VII SEMESTER B.TECH. (BME) DEGREE MAKEUP EXAMINATIONS DEC/JAN 2016-17

SUBJECT: PATTERN RECOGNITION (BME 421)

(REVISED CREDIT SYSTEM)

Friday, 30th December 2016, 2 pm to 5 pm

TIME: 3 HOURS **MAX. MARKS: 100**

Instructions to Candidates:

1. **Answer FIVE full questions.**
2. **Draw labeled diagram wherever necessary**

1A. With a neat block diagram, explain the elements of pattern recognition system. Describe the role of classifier in healthcare. **10**

1B. What is "posterior probability"? Define the relation between the posterior probability and class conditional probability. Explain how it is used for classification. **06**

1C. Given the classes named *A* and *B.* Each of the features x and y, can take either of the values as shown in the table-1. What is the probability that a new sample with x=1, y=1 belongs to class B? **04**

Table-1

Class	**Samples**	***x=1***	***x=2***	***y=1***	***y=2***
A	6	4	2	5	1
B	6	2	4	4	2

2A. Explain the hierarchical clustering of the data given in table-1 using the *single linkage* algorithm and *Euclidean distance.* **08**

Table-1

Samples	x_1 ***Value***	x_2 ***Value***
1	2	3
2	4	6
3	6	8
4	9	8

2B. In a classification problem Normal and Abnormal are the classes of interest, and the prior probabilities associated with the classes are P (Normal) =0.6, P(Abnormal) = 0.4. The feature x is normally distributed for class both the classes. Find the equation for the discriminating function between the classes. **06**

2C. Explain the supervised approach for training with an example. **06**

3A. With a neat diagram, explain the architecture of a perceptron network. With a flow chart explain how it can be used for the classification. **10**

3B. Explain the ward's method for classification. With a suitable example describe how the method helps in forming the clusters. **10**

4A. Explain the following: **08**

i. Error estimation

ii. Auto associative neural network

4B Realize a AND function using McCulloch Pitt neuron model and test the net with the following vectors: (1 0) and (11). **08**

4C Explain how the basic artificial neuron is similar to a biological neuron. **04**

5A. When the clustering approach is identified as "TOP-DOWN"? Explain. Apply the identified technique to find 3 clusters from the Cluster C= {(2, 4), (5, 4), (5, 6), (6, 6), (10, 10), (12, 12)}. Use the City block distance. **10**

5B. With a neat architecture, explain the training and testing in case of a multilayered back propagation network. **10**

6A. With a neat block diagram, describe how ECG system can be built along with a classifier. Discuss the benefits of adding classifier to ECG machine. **10**

6B. Explain the training algorithm for Hebbian network. Describe the design of an OR gate function using Hebb's architecture and show that the network can be tested. **10**