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MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal 576104)

VI SEMESTER B.Tech.(BME) DEGREE MAKE UP EXAMINATIONS JUNE 2019 SUBJECT: ARTIFICIAL NEURAL NETWORKS (BME4001) (REVISED CREDIT SYSTEM) Friday, 14th June 2019: 2 PM to 5 PM

TIME: 3 HOURS

MAX. MARKS: 50

Instructions to Candidates:

1. Answer all the questions.

2. Draw labeled diagrams wherever necessary.

- 1. (a) How does learning take place in supervised networks? Explain the role of "target" in 03 Supervised learning, and compare it with the unsupervised learning.
 - (b) Realize the function $f = (\overline{A.C})$ using McCulloch-Pitt's neuron model. Test the 04 network.
 - (c) What is an activation function? In what way it helps in the design of an artificial 03 neuron.
- 2. (a) Design a Hebbian network for realizing AND function. Draw the net diagram and test 04 it with $X = [-1 \ 1]^T$
 - (b) Write an algorithm for training a Perception net. Draw the architecture of the network. 03
 - (c) Describe Content Addressable Memory (CAM). Differentiate auto-associative net and 03 hetero-associative net.
- (a) Describe the training of a multilayer back propagation network. Draw the network 04 architecture with '5' number of nodes at the input unit, '4' number of nodes at the hidden unit and '2' number of nodes at the output unit. Describe the rules used for updating the weights.

(b) The data provided in Table-3(b) are the results obtained from a screening test, that was performed on a group of 1000 people. From the given true and test results, find the following: a) sensitivity and b) specificity.

| | | Test results | | | | |
|---------------|-----|-----------------|-----------------|--|--|--|
| | | +ve (Predicted) | -ve (Predicted) | | | |
| Actual status | +ve | 45 (TP) | 5 (FN) | | | |
| | -ve | 15(FP) | 935 (TN) | | | |

| Tabl | e-3(b) |
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- (c) Describe the challenges need to be addressed during the development of new neural 03 network application with respect to the following:
 - i. Data collection
 - ii. Feature extraction and choice
 - iii. Model selection
- 4. (a) Construct an Auto-associative network for storing input vector [1 1 -1 -1] and [1 1 -1 04 1]. Test retrieval capability of the network with the following test inputs: [1 1 -1 -1] and [1 1 1 -1].
 - (b) Describe the calculation of response of an artificial neuron with sigmoidal function at 03 the node.
 - (c) With an architecture explain the feedback network. Give an example. 03
 - 5. (a) Design a two input perceptron network, for performing the NOR gate function. 03
 - (b) Explain the identification of two class problem which involves following two classes: 04 tachycardia and bradycardia.
 - (c) Explain the method defined for setting a weight of an auto associative network with 3 03 nodes, when the input needs to be stored is [1 0 1].