COURSE CODE: 10B11Bi612   MAX. MARKS: 25

COURSE NAME: Machine Learning for Bioinformatics

COURSE CREDITS: 03   MAX. TIME: 1.5HR

Note: All questions are compulsory. Be concise and clear. Use technical lexicon.

1. Fill in the blanks: (4)
   (a) In an artificial neuron, the output (neuronal impulse) is calculated as the transfer function applied on ……………
   (b) In ANN, uniform learning happens when ………………..
   (c) Besides the sigmoidal function, the Softmax function is used for activation in ANN which is mathematically expressed as …………
   (d) Each presentation of all patterns in an ANN is called ………..

2. Choose the most appropriate option(s) and justify your choice: (2+2)
   (a) The number of training cycles to train multilayer perceptron are decided by
   (i)   The number of hidden layer neurons
   (ii)   The number of samples present in the dataset
   (iii)   The error threshold may be set so as to stop training
   (iv)   The fixed number of cycles may be provided so as to stop the optimization after a certain time limit
   (v)   Rolling a die and deciding on the basis of the outcome obtained or tossing a coin
   (vi)   Until you feel tired of the training process
   (vii)   All of the above

   (b) The sequential mode of training an MLP is better than the batch mode of training because
   (i)   The former is more time consuming than the latter
   (ii)   The latter is more time consuming than the former
   (iii)   The former is easier to implement than the latter
   (iv)   None of the above
   (v)   Both are equally time consuming

3. Is ANN better than KNN? Why or why not? (2)
4. Why we cannot use threshold function for activation in MLP? (2)

5. Explain the meaning of each term in the following formula with reference to backpropagation: (3)

$$\Delta w_k(i) = -\gamma \frac{\partial E}{\partial wk} + \alpha \Delta w_k$$

6. (a) Explain the application of ANN to the protein secondary structure prediction. (5)
   (b) Discuss how the plasticity of human brain is explained by Hebb's rule. (2)
   (c) Explain how we can cicrcumvent the problem of local minima in MLP. (3)