MODULE 3 – ARTIFICIAL NEURAL NETWORKS

1. What is Artificial Neural Network?
2. Explain appropriate problem for Neural Network Learning with its characteristics.
3. Explain the concept of a Perceptron with a neat diagram.
4. Explain the single perceptron with its learning algorithm.
5. How a single perceptron can be used to represent the Boolean functions such as AND, OR
6. Design a two-input perceptron that implements the boolean function A \( \land \neg B \). Design a two-layer network of perceptron’s that implements A XOR B.
7. Consider two perceptrons defined by the threshold expression \( w_0 + w_1x_1 + w_2x_2 > 0 \).
   - Perceptron A has weight values \( w_0 = 1, w_1=2, w_2=1 \)
   - and perceptron B has the weight values \( w_0 = 0, w_1=2, w_2=1 \)
   True or false? Perceptron A is more-general than perceptron B.
8. Write a note on (i) Perceptron Training Rule (ii) Gradient Descent and Delta Rule
9. Write Gradient Descent algorithm for training a linear unit.
10. Derive the Gradient Descent Rule
11. Write Stochastic Gradient Descent algorithm for training a linear unit.
12. Differentiate between Gradient Descent and Stochastic Gradient Descent
14. Derive the Back Propagation Rule
15. Explain the followings w.r.t Back Propagation algorithm
   - Convergence and Local Minima
   - Representational Power of Feedforward Networks
   - Hypothesis Space Search and Inductive Bias
   - Hidden Layer Representations
   - Generalization, Overfitting, and Stopping Criterion