

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS-2022

B.Tech-VII Semester (CS/IT/ECE)

COURSE CODE (CREDITS): 20B1WEC732 (3)

MAX. MARKS: 25

COURSE NAME: Machine Learning for Wireless Communication

COURSE INSTRUCTORS: Dr. Alok Kumar

MAX. TIME: 1 Hour and 30 Minutes

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Q1. What are the different techniques that can be employed to improve the energy efficiency of a wireless sensor network? Justify the answer with suitable example. [CO2, CO3] [3 Marks]

Q.2 Explain the working of reinforcement machine learning. How we can use reinforcement machine learning in cellular wireless communication? Write two different applications of reinforcement learning in the field of wireless communication. [CO1, CO2] [3 Marks]

Q.3 Differentiate between multi-labeled and multi class classification with suitable diagram. Write any two applications in the field of wireless communication where multiclass classification can be applied? [CO1, CO3] [3 Marks]

Q.4. Find the value of a_0 and a_1 to best fit the given sample data points on the system given by the equation $y = a_0 + a_1x$. Also find out the coefficient of determination. [CO4] [3 Marks]

| x | y |
|-----|-----|
| 10 | 41 |
| 12 | 55 |
| 14 | 45 |
| 16 | 60 |
| 18 | 78 |
| 24 | 80 |

Q.5. What are the different types of distance metrics used in machine learning? Explain Cosine Distance Metric & Cosine Similarity by considering suitable example. Where we prefer computation of Manhattan distance over Euclidean distance? [CO1] [3 Marks]

Q.6 What is Gradient Descent? How does the learning rate affect the performance of a Gradient Descent Algorithm? What's the difference between Batch Gradient Descent and Stochastic Gradient Descent? [CO1] [3 Marks]

Q.7 What is ROC-AUC curve and how to interpret it? [CO1] [3 Marks]

Q.8. Write down the mathematical steps used to compute the value of α , β and γ to best fit the given sample data points on the system given by the following equation:

$$y = \alpha x_1^\beta x_2^\gamma.$$

Where y is the received power at secondary user. x_1 , and x_2 are the distance of secondary node from BTS and primary user respectively. [CO1, CO4] [4 Marks]

| x_1 | x_2 | y |
|-------|-------|-----|
| 0.5 | 1 | 25 |
| 1 | 1 | 17 |
| 2 | 4 | 10 |
| 3 | 6 | 9 |
| 5 | 8 | 8 |
| 7 | 12 | 2 |