

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2021

B.Tech VII Semester

COURSE CODE: 20B1WEC732

MAX. MARKS: 35

COURSE NAME: Machine Learning for Wireless Communications

COURSE CREDITS: 03

MAX. TIME: 2 Hours

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

Q.1 What is MIMO? What are the advantages of MIMO antenna system in Communication System? How machine learning improve the performance of MIMO system in wireless communication? [CO3, CO4] [1+1+2 =4 Marks]

Q.2 Answer the following questions

- What is BER in wireless communication system?
- Derive the expression for BER (in terms of SNR) when bit 1 is transmitted in a wired communication system.
- Compute the value of SNR (in dB) required to achieve the BER of 10^{-6} in wire-line communication system [CO2] [1+1+2 =4 Marks]

Q.3 What is cognitive cycle? How Cognitive Radio is useful in 5G communication system. Write any one application of machine learning in cognitive radio. [CO3, CO4] [1+1+2 =4 Marks]

Q.4 Find the value of α , β and γ to best fit the given sample data points on the system given by the equation $y = \alpha x_1^\beta x_2^\gamma$. Where x_1 , x_2 and y are the SNR, Bandwidth and Throughput respectively

SNR	Bandwidth	Throughput
0.5	1	5
1	1	7
2	4	10

[CO1, CO4] [4 Marks]

Q.5 How Gradient descent algorithm is different with regression analysis? Find out the updated value of a_0 and a_1 after 3rd iteration for the given sample data points for the equation $Y = a_0 + a_1X$. Where, X =SNR, and Y =Throughput. Consider initial guess $a_0 = 0$ and $a_1= 0$.

SNR	Throughput
0.5	1.2
2	2.4
3	3.5

[CO1, CO4] [4 Marks]

Q.6 Explain Accuracy and Precision. Find out accuracy and precision for the given confusion matrix.

[CO1] [2+2=4 Marks]

0	30	20	10
1	50	60	10
2	20	20	80
	0	1	2

predicted label

Q.7 Differentiate between Mean and Mode. Where do we prefer to compute mean and where we prefer mode, explain with a suitable example.

[CO1] [1+1+1=3 Marks]

Q.8 Differentiate between Supervised, Unsupervised and Reinforcement Learning.

[CO1] [3 Marks]

Q.9 What is feature scaling? Why it is needed? How we can achieve it, explain it by considering suitable example?

[CO1] [3 Marks]

Q.10 What are the requirements of good clustering?

[CO1] [2 Marks]