COURSE CODE (CREDITS): 20B1WEC732 (3)   MAX. MARKS: 15

COURSE NAME: Machine Learning for Wireless Communication

COURSE INSTRUCTORS: Dr. Alok Kumar   MAX. TIME: 1 Hour

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

Q1. Answer the following questions.

a) What is the importance of machine learning in wireless communication system? Give two examples of classification and regression in context of wireless communication.

b) How various generations of wireless communication is different from each other on the basis of used standards, data rate and applications?   [CO1, CO2] [2+2 =4 Marks]

Q.2 Explain the two key metrics (BER and SNR) used in wireless communication system. How BER is affected with SNR. Derived the expression for BER (in terms of SNR) when bit 0 was transmitted. Compute the required value of SNR (in dB) to achieved the $BER=10^{-6}$. Assume wired channel.   [CO2] [1+2+1 =4 Marks]

Q.3 If a cellular system has the following characteristics: uniform cell size, cluster size = 7, user density = 100 users/sq km, allocated frequency spectrum = 900 - 949 MHz, bit rate required per user = 10kbps uplink and modulation rate = 1bps/Hz. Find the following

a) How much bandwidth is available per cell using FDD?

b) How many users per cell can be supported using FDMA?

c) If the available spectrum is divide in to 35 channels and TDMA is employed within each channel. What is the bandwidth and data rate per channel?   [CO2] [3 Marks]

Q.4. How machine learning is beneficial for handoff procedure? What are the different types of handoff occurred in wireless communication systems. Explain any two handoff strategies.

     [CO1, CO2] [4 Marks]