United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Final Exam Trimester: Fall - 2019

Course Code: CSE 315 Course Title: Data communications

Total Marks: **40** Duration: 2 Hours

Figures are in the right-hand margin indicating full marks.

Q1 **(a)**	How can one measure the overall uncertainty for an information source where the probability of outcomes is unequal? **Show** the equation of the measurement and **describe**.	**[3]**
(b)	Let's consider a random variable X which takes five values a, b, c, d and e with probabilities of 1/2, 1/4, 1/8, 1/16 and 1/16. What is its entropy? What is the maximum information that this random variable could have?	**[3]**
(c)	Let's consider a bin that is populated with fifteen balls of three different colors namely red, yellow and green. Among them if there are 6 red balls, 3 green balls, 2 yellow balls and 4 blue balls. What is expected amount of information or entropy each time you choose a ball from the bin?	**[3]**
Q2 **(a)**	Sender and Receiver are performing Cycle Redundancy Check for detecting error in their communication. Now at one time receiver received a codeword of 1111010101. If the generator polynomial was $G(x) = X^4 + X^2 + 1$Then **demonstrate** if there is any error in the code word received by the receiver?	**[3]**
(b)	Sender and Receiver are using Checksum while transmitting data. Now at a particular point receiver received the following codeword you have to detect if there was any kind of error while transmission 1101 1100 1001 1100 1110 1101	**[2]**
(c)	Four (04) channels, each with a 50-kHz bandwidth, are to be multiplexed together. What is the minimum bandwidth of the link if there is a need for a guard band of 10 kHz between the channels to prevent interferences? **Demonstrate** the configuration using frequency domain.	**[2]**
(d)	How do you describe and demonstrate various kind of multiplexing?	**[2]**
(e)	Digital-to-analog conversion is the process of changing one of the characteristics of an analog signal based on the information in digital data. How do you **describe** Amplitude Modulation, Frequency Modulation and Phase Modulation?	**[2]**
Q3 **(a)**	What are the ways of performing Digital to Analog conversion? Why do we need to convert an analog signal into another signal using modulation?	**[2]**

(b)	Suppose you want to call your friend who live inside the same MTSO. Now write down the steps for establishing the call between both of you?	**[2]**
(c)	Describe the principal of frequency reuse in the cellular technology? What is the problem if you use two same frequency band in nearby base station?	**[2]**
(d)	Assume a system of 128 cells with a cell radius of 0.8 km, a total frequency bandwidth that supports 336 traffic channels, and a reuse factor of N = 7. What is the total number of concurrent calls that can be handled?	**[2]**
(e)	Compare between 3G and 4G cellular system based on design year, services, data rate, multiplexing, core network, etc.	**[2]**
Q4 **(a)**	Media Access Control controls the access of transmission medium. Two of the media access control protocols are CSMA-CD and CSMA-CA. Show comparison between them?	**[2]**
(b)	There are different kind of wireless topology. Name and Explain the most widely used wireless topology?	**[2]**
(c)	Explain the following Term 1) BSS 2) DS 3) ESS	**[2]**
(d)	Compare between IEEE 802.11b and IEEE802.11g standards.	**[2]**
(e)	**Demonstrate and describe** a Single-cell and Multiple-Cell Wireless LAN	**[2]**