



United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Mid Term Exam Trimester: Spring - 2019

Course Code: CSE 315 Course Title: Data communications

Sec: All

Total Marks: 30

Duration: 1 hour 45 min

Answer all questions.

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

<p>Ques-1</p>	<p>(a) The OSI and the TCP/IP are two main models that use the concept of protocol layering. The TCP/IP model and the OSI model differ from each other. Compare the TCP/IP model and the OSI model by illustrating their diagrams. The diagram must show all the layers and an example of TCP/IP protocol suite for each layer.</p> <p>(b) A receiver is received a codeword of 101001111 which is transmitted using Cyclic Redundancy Check (CRC) as an error detection scheme. Consider a polynomial generator of $G = x^3 + x + 1$, demonstrate the procedure and action of the receiver part in detecting an error.</p> <p>(c) Let's consider a telephone system with modem that allows bandwidth of 3100 Hz. What is the maximum data rate that can be achieved signal with two levels? A dialup modem achieves 56Kbps using 3100 Hz. What needs be done to achieve that? Show the calculation.</p> <p>(d) A channel uses spectrum of between 3MHz and 4MHz, with $SNR_{dB} = 24dB$. How many signal levels are required to achieve Shannon capacity?</p>	<p>4</p> <p>3</p> <p>3</p> <p>3</p>
<p>Ques-2</p>	<p>(a) How do you describe line coding and decoding?</p> <p>(b) If a periodic signal is decomposed into five sine waves with frequencies of 100, 300, 500, 700, and 900 Hz, what is the bandwidth? Draw the spectrum, assuming all components have a maximum amplitude of 10 V.</p> <p>(c) Convert the digital data 10011100 into digital signal according to the following line coding schemes (1 = +ve Voltage ; 0 = Zero Voltage).</p> <ul style="list-style-type: none"> • Unipolar NRZ • Unipolar RZ • (1 = +ve Voltage ; 0 = -ve Voltage). • Polar NRZ-L • Polar NRZ-I 	<p>2</p> <p>3</p> <p>4</p>

Ques-3	<p>(a) Three guided media are commonly used for data transmission, explain how do they differ from one another. For unguided media, transmission and reception are achieved by means of an antenna. How do you describe an antenna?</p>	2									
	<p>(b) In bit stuffing each frame begins and ends with a special bit pattern called a flag byte.</p> <p>Given an input stream 100011111100111101111110001111. Show the procedures of bit stuffing occurs at the sender data link layer and the bit unstuffing occurs at the receiver data link layer.</p>	3									
	<p>(c) Given below a set of Code Words and a set of Message Words those represent the Code Word set.</p> <table><thead><tr><th><u>Message Word</u></th><th><u>Code Word</u></th></tr></thead><tbody><tr><td>00</td><td>00000</td></tr><tr><td>01</td><td>00111</td></tr><tr><td>10</td><td>11001</td></tr><tr><td>11</td><td>11110</td></tr></tbody></table> <p>Demonstrate an example of Forward Error Correction (FEC) for the following cases: (a) one bit of error, and (b) two bits of error, when 00111 Code Word is transmitted in a system.</p>	<u>Message Word</u>	<u>Code Word</u>	00	00000	01	00111	10	11001	11	11110
<u>Message Word</u>	<u>Code Word</u>										
00	00000										
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