


United International University (UIU)
 Dept. of Computer Science and Engineering (CSE)
 Midterm Examination Year: 2019 Trimester: **Summer**
 Course: CSE 315 Title: Data Communication (Section – A,B,C,D)
 Marks: 30 Time: 1 Hours 45 mins

There are 3 (Three) questions. Answer all 3 (Three). Mark for each question is indicated on the right-hand column.

Q1.		
a)	Specify the layer of OSI model where the following services are performed. (i) Take routing decisions from source to destination (ii) Perform line coding techniques (iii) Give the users an interface to send e-mail (iv) Differentiate one frame from another (v) Maintains reliability of data transmission (vi) Data encryption	[2]
b)	How will a simple mail message M be exchanged between PC0 and Laptop0 in the following figure according to the Internet(TCP/IP) Model? Indicate the names of all the layers in your diagram. <div style="text-align: center;">  <pre> graph LR PC0 --- Router0 Router0 --- Router1 Router1 --- Laptop0 </pre> </div>	[2]
c)	(i) Which kind of technology is used to implement the WAN in today's Internet . (ii) Describe the three different methods of sending messages over a computer network.	[1+1=2]
d)	In Internet , we need two levels of addressing named IP address and port address . What does an IP and port indicate ? Write clearly with an example for each of them.	[2]
e)	(i) Give an example of the three major classes of IP addressing in Internet. (ii) Write the name of one protocol for each layer in TCP/IP model	[1+1=2]
Q2.		
a)	(i) What is an unguided medium. Give an example. (ii) Write two advantages of optical fiber medium over all other guided transmission media.	[1+1=2]
b)	(i) How do you describe antenna and antenna gain ? (ii) A directional antenna has a Gain, $G_{dB} = 6$ db . Calculate the ratio of radiated power between the directional antenna and the isotropic antenna.	[2+1=3]

c)	<p>(i) How can you measure the capacity of a noisy channel? Write the equation with proper meaning of the symbols.</p> <p>(ii) The more we increase the number of signal levels in a data communication, the better the data transmission rate. Is there any disadvantage in this scenario? Why or why not? Explain with an example.</p>	[1+2=3]
d)	<p>Given, the signal-to-noise ratio is $SNR_{dB} = 28$ and the channel bandwidth is 1.5 MHz.</p> <p>(i) Find the channel capacity.</p> <p>(ii) Find the number of signal levels you can use. [Consider 90% of the theoretical limit.]</p>	[2]
Q3.		
a)	<p>(i) Explain why framing is necessary in data communication.</p> <p>(ii) Suppose in your laptop, data from network layer contains the following bit stream: 101110111111100101111110</p> <p>What will be the frame sent from your laptop after successfully implementing bit stuffing? Draw the format of the frame. [Assume a flag pattern = 01111110].</p>	[1+2=3]
b)	<p>A periodic signal $m(t)$ is decomposed into following four sine waves.</p> $m_1(t) = 10\sin(2 * \pi * 100t)$ $m_2(t) = 8\sin(2 * \pi * 400t)$ $m_3(t) = 6\sin(2 * \pi * 700t)$ $m_4(t) = 3\sin(2 * \pi * 200t)$ <p>a) What is the signal bandwidth of $m(t)$?</p> <p>b) Demonstrate the frequency spectrum of $m(t)$.</p>	[2]
c)	<p>Convert the digital data 10110011 into digital signal according to the following line coding schemes.</p> <p>(a) Polar-RZ ($0 = +5v$; $1 = -5v$)</p> <p>(b) Differential Manchester Encoding</p> <p>($0 = \begin{array}{ c } \hline \text{---} \\ \hline \end{array} , 1 = \begin{array}{ c } \hline \text{---} \\ \hline \end{array} \text{)}$</p>	[3]
d)	<p>Suppose you have received a bit stream as the following pattern of voltage for pseudoternary line coding. Now you want to send the data to another receiver. What would be the pattern if you were using NRZ-I technique.</p> <p>Assume for NRZ-I, Initially $0 = -5v$; $1 = +5v$</p> <div style="text-align: center;"> </div>	[2]