STAMFORD UNIVERSITY BANGLADESH

Department of Computer Science and Engineering

Midterm Examination, Summer 2022 Semester

CSE 339 : Data Communication and Computer Network

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Date and Time: 28/08/22 & 8:00 PM-010:00 PM

Batch: MCSE **Campus:** Siddeswari

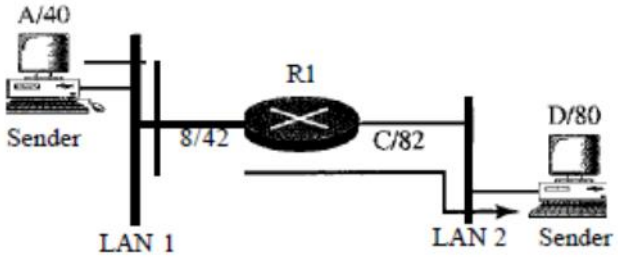
Duration: 2 hours **Full Marks: 30**

(There are **THREE** questions. Answer all of them. Figures in the right margin indicate marks

1. a) For n devices in a network, what is the number of cable links required for a mesh, ring, bus, and star topology? [02]

   b) For each of the following four networks, discuss the consequences if a connection fails. [02]
   a. Five devices arranged in a mesh topology
   b. Five devices arranged in a star topology (not counting the hub)

   c) In the following scenario, assume that the communication is between a process running at computer A with port address i and a process running at computer D with port address j. Show the contents of packets and frames at the network, data link, and transport layer for each hop [03]



   d) Write down the importance of Shannon and Nyquist formula in data communication. What is the theoretical capacity of a channel of bandwidth: 20 KHz and SNRdB =40? [03]

2. a) Fill the column of the following table with the name of layers of OSI model. [03]

Layers	Services
	Physical topology, transmission medium, line configuration, data rate, synchronization of bits, representation of bits
	Fill management, directory services, browser, mail services
	Dialog control, establishment of a link, synchronization,
	Logical addressing, routing, packet
	Translation, encryption, compression
	Service port addressing, segmentation, assembly, connection control, acknowledgment or not , flow control
	Framing, MAC addressing, flow control, error control, access control

   b) We have a channel with a 1 MHz bandwidth. The SNR for this channel is 63. What are the appropriate bit rate and signal level? [02]

c) We have a channel with 4 KHz bandwidth. If we want to send data at 100 Kbps, what is the minimum SNRdB? [02]

d) We measure the performance of a telephone line (4 KHz of bandwidth). If the peak voltage value of a signal is 20 times the peak voltage value of the noise, what is the maximum data rate supported by this telephone line? [03]

3. a) Complete the following table with appropriate layers and protocols. [02]

TCP/IP layers	Protocols
Data link layer	?
Network	?
?	TELNET, SMTP, FTP, DNS
?	TCP , UDP

b) A signal travels from point A to point B. At point A, the signal power is 100 W. At point B, the power is 90 W. What is the attenuation in decibels? [02]

c) A non-periodic composite signal contains frequencies from 10 to 30 KHz. The peak amplitude is 10 V for the lowest and the highest signals and is 30 V for the 20-KHz signal. Assuming that the amplitudes change gradually from the minimum to the maximum, draw the frequency spectrum. [02]

d) Which signal has a wider bandwidth, a sine wave with a frequency of 100 Hz or a sine wave with a frequency of 200 Hz? [02]

e) What is the transmission time of a packet sent by a station if the length of the packet is 1 million bytes and the bandwidth of the channel is 200 Kbps? [02]

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