BRAC UNIVERSITY
Department of Computer Science and Engineering

15 min

Examination: Semester Midterm Duration: 1 Hour Semester: Spring 2022 Full Marks: 30

CSE 320: Data Communications

Answer the following questions.
Figures in the right margin indicate marks.

SET A

Name:	ID:	Section:

1. CO1 a) Considering the following scenarios: 2

- There are 10 labs in UB06, each having 40 PCs that can communicate with each other. LAN
- PCs in BU01 can communicate with PCs at BRAC Centre (Both are in different networks). WAN
- BRAC Center can communicate with BRAC CDM located at Rajendrapur. WAN
- A number of fire stations located in a city are connected, so office staff can easily communicate with one another. MAN

Match each of the above scenarios to an appropriate network type (LAN, WAN, MAN). Give reasons for your choice.

b) **Identify** different topologies in the following computer network of hybrid topology. 3

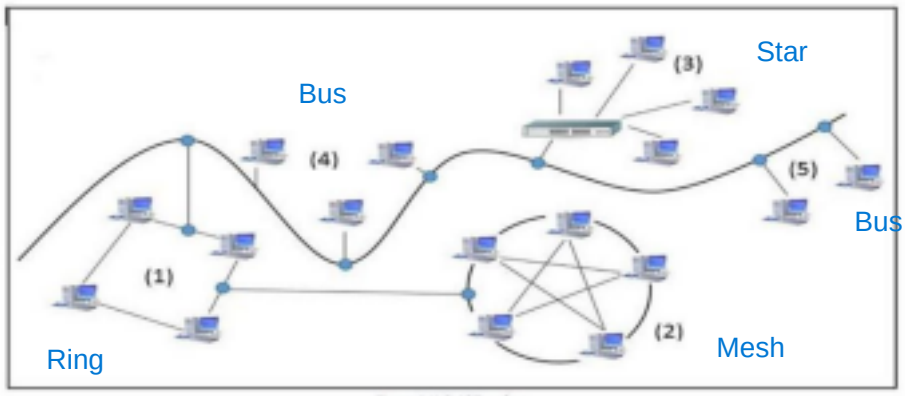

Figure 1 Hybrid Topology

2. CO2 a) **Compare** between Attenuation and Noise and also **explain** how both of the impairments can be solved. 2+2

b) Consider a communications channel being used by a cable modem network. 6

The channel has use of the spectrum between 104MHz and 119MHz. The signal power is 22mW and the noise power is 2mW.

- **Interpret** the theoretical maximum capacity of the channel in bps.
- Assuming the capacity of the channel could be realized, **distinguish** how many signal levels would be needed?
- **Discuss** what advantage/disadvantage, if any, would there be in using twice this number of signal levels.

3. CO2 a) **Convert** the following bit stream to a signal using an appropriate encoding scheme that matches the requirements given. Write which signal encoding scheme you are using. 5

Data: 1 0 1 0 1 1 0 1 1 1 0 0 0 0 1 Manchester

Requirements

- The encoding scheme must occupy a low bandwidth. Any self synchronization and DC component problem may be ignored.
- The encoding scheme must be self-synchronizing and should not have a DC component problem. High bandwidth is Acceptable.

b) The following table depicts a sampled analog signal for digital signal representation. By applying the concept of Pulse Code Modulation, assume there will be 3-bit code words for each sampled amplitude. **Show** the 10

normalized quantized value and quantization code for the given analog signal value at different time stamps. Assume that, the sampling amplitudes are between -40V to +40V.

Time	Analog Signal Value (V)
0	5.3
1	12.7
2	-6.8
3	-18.4
4	19.5

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