# BRAC UNIVERSITY
## Department of Computer Science and Engineering

Examination: Semester Midterm | Semester: Spring 2022
Duration: 1 Hour 15 min | 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.
- PCs in BU01 can communicate with PCs at BRAC Centre (Both are in different networks).
- BRAC Center can communicate with BRAC CDM located at Rajendrapur.
- A number of fire stations located in a city are connected, so office staff can easily communicate with one another.

**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

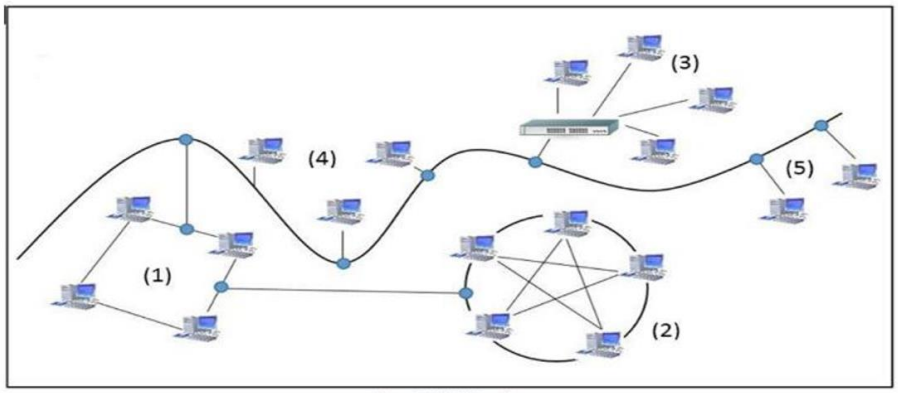


Figure 1 Hybrid Topology

**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. The channel has use of the spectrum between 104MHz and 119MHz. The signal power is 22mW and the noise power is 2mW. 6

- **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

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 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. 10

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

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