**BRAC UNIVERSITY**

**Department of Computer Science and Engineering**

| Examination: Semester Midterm  Duration: 1 Hour 10 min | Semester: Fall 2022  Full Marks: 30 |
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CSE 320: Data Communications

Answer the following questions.

Figures in the right margin indicate marks.

**SET D**

| Name: | ID: | Section: |
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| **1. CO1** | a) | **Label** the frames (1 & 2) shown below in Figure No. 1 with appropriate port, IP and MAC addresses. The sender Host A has two applications running; one for FTP with port number 51024 and the other for accessing the web server with port number 52348. Frame 1 is coming from TEST web server to HOST A and Frame 2 is intended for the web server from Host A. Web server use port number 80 to send data to clients. (For indicating MAC addresses just mention the device or device interface).     | D.MAC | S.MAC | D.IP | S.IP | D.Port | S.Port | Frame 1 | | --- | --- | --- | --- | --- | --- | --- |  | D.MAC | S.MAC | D.IP | S.IP | D.Port | S.Port | Frame 2 | | --- | --- | --- | --- | --- | --- | --- | | 3 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| b) | **Show** diagrammatically a hybrid topology with a mesh backbone and three-star networks consisting of 4 nodes at each hub. In the topology drawn, **identify** any possible problems or failures that could bring the whole network down. Justify your answer. | 3 |
|  | c) | **Identify** the name of the TCP/IP model layers based on the following functionalities.   1. The layer responsible for compressing the message. 2. The layer responsible for giving service to the user. 3. The layer responsible for restarting browsers which was idle for a long time. 4. The layer responsible for translating data. | 4 |
| **2. CO2** | a) | i) **Discuss** the difference between Noise and Distortion.  ii) A digital signal has 35 levels, 130 levels, 1040 levels. How many bits are needed per level? | 2+3 |
| b) | Given, a composite periodic signal passing through a channel consists of 9 frequency components of 150, 250, 300, 400, 550, 700, 900, 1100 and 2150 MHz. The signal-to-noise ratio in decibel for this channel is 36. **Predict** the appropriate bit rate and signal level for the channel. | 5 |
| **3. CO2** | a) | **Convert** the following bit stream to digital signal using an appropriate encoding scheme that matches the requirements given. Write which signal encoding scheme you are using.  Data: 1 1 0 1 1 1 0 0 0 0 0 0 0 1  Requirements   * The encoding scheme does not support self-synchronization for long 0’s. Additionally, this scheme maintains a bipolar nature.      * Now apply a technique to prevent long sequences of 0’s in the above bipolar scheme without increasing the number of bits and signals.     [Draw the signal in the question paper only. Please don’t answer it in the answer scripts.] | 5 |
|  | 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.   | Time | Analog Signal Value (V) | | --- | --- | | 0 | 3.3 | | 1 | -12.7 | | 2 | 26.8 | | 3 | -31.4 | | 4 | -18.6 | | 5 |

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