**BRAC UNIVERSITY**

**Department of Computer Science and Engineering**

| Examination: Semester Final  Duration: 1 Hour 45 min | Semester: Fall 2022  Full Marks: 40 |
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CSE 320: Data Communications

Answer the following questions.

Figures in the right margin indicate marks.

**SET A**

| Name: | ID: | Section: |
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| **1. [CO3]** | a) | **Explain** how FHSS achieves bandwidth spreading and privacy in brief.  Suppose, you are given with the k-bit pattern and Carrier Frequency as follows:  **k-bit pattern**   | 10 11 01 00 | | --- |  | **k-bit** | **Carrier Frequency** | | --- | --- | | 00 | 250kHz | | 01 | 150 kHz | | 10 | 350 kHz | | 11 | 450 kHz |   **Draw** FHSS cycle 3 times using the above pseudo random generated k-bit pattern and given frequency table. (\*\* Hint: Draw the Carrier frequency graph against hop period) | 2+4 |
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| **[C05]** | b) | Write four functions of the data link layer. **Discuss** the importance of calculating minimum hamming distance during the making of codewords in Blocking coding technique? | 4 |
| **2. [CO3]** | a) | **Consider**, some students of Brac University have opened a new telecommunication company named “BracT”. They want to use the concept of multiplexing to multiplex 10 channels. The channels send 240 pages in one second where each page consists of 300 characters. If two characters at a time are to be multiplexed using TDM with 1 synchronization bit. Answer the following questions:   1. What is the input data rate for each of the connections? 2. What is the input bit duration? 3. What is the frame rate? 4. What is the duration of a frame? 5. What is the output data rate? 6. What is the output bit duration? | 6 |
| b) | Suppose you have five channels among which 4 channels have a bandwidth of 1400 kbps and one with 1250 kbps. How would you multiplex this? Drawand **validate** with visual representation. | 4 |
| **3. [CO2]** | a) | **Show** the staircase in the following graph and generate the digital data from the given analog signal using the Delta Modulation (DM) technique.  You have to answer this question in the question paper only. | 6 |
| **[CO4]** | b) | From the following scenarios, **find** the best suited transmission mediums and give proper reasoning for your selection.  i) In Bangladesh, BTCL is the central organization that provides telephone line connections to every organization, offices and houses.  ii) Bangladesh Betar is the state-owned radio broadcaster of Bangladesh.  iii) We are connected to the internet through the cables provided by our local ISP.  iv) Most of the people now-a-days use wireless keyboards. | 4 |
| **4. [CO5]** | a) | Assume a packet is made only of four 16-bit words (55E)16, (B2)16, (95)16, and (DD)16. **Show** the checksum at the sender.  If the second data item is changed to (C0)16 and the last data item is changed to (E1)16 during transmission, check if the receiver can detect any error or not.  (Hint: The given words are in hexa-decimal value, that means, each digit can be represented by 4 bits. Remember hexadecimal values range from 0000 – FFFF). | 3+3 |
|  | b) | What is “Taking Turns” MAC protocols? How is Polling better than CSMA/CD, state three points. | 4 |

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