



Daffodil International University

Department of Computer Science and Engineering

Faculty of Science & Information Technology

Final Examination, Summer 2021 @ DIU Blended Learning Center

Course Code: CSE225 (Day), Course Title: Data Communication

Level: 2 Term: 2 Section: ALL

Marks: 40, Modality: Open Book Exam

Date: Tuesday, August 24, 2021. Time: 01:30pm-05:00pm

Question 1:

2+5+3

- a) Find the total number of channels in the corresponding band allocated by FCC.
- AM
 - FM
- b) Suppose five stations are sending data together by using the TDM multiplexing technique. As per the rules it is not possible to do the multiplexing if the stations do not have the same input bandwidth. The input bandwidth of the five stations is listed below.

Stations 1: 170 Mbps

Stations 2: 110 Mbps

Stations 3: 200 Mbps

Stations 4: 210 Mbps

Stations 5: 190 Mbps

Now do the multiplexing of all stations together using multilevel multiplexing or [and] multiple slots or [and] pulse stuffing.

- c) Assume that a voice channel occupies a bandwidth of 9 kHz. We need to combine six voice channels into a link with a bandwidth of 54 kHz, from 30 to 84 kHz. Show the configuration, using the frequency domain. Assume there are no guard bands.

Question 2:

10+5+5+10

- a) Mr. Thapa wants to send a message to his friend Mr. Chen via a public channel. To make his message secured he added a CRC (using both binary and polynomial equation) at the end of his message. Mr. Chen received the message sent by Mr. Thapa and found error in the data and discard the message. Now consider the following parameters for necessary calculations.
- Last part of your student ID (e.g. 56789) is the message send by Mr. Thapa. Generate binary and Polynomial equation from your ID.

- Use x^3+x+1 as divisor [in both cases]
- For Polynomial Equations, your reverse ID (e.g. 98765) is the message received by Mr. Chen along with the generated CRC of Mr. Thapa.
- For Binary Calculations, follow regular procedure to generate CRC and send to Mr. Chen

Now answer the following questions.

- I. What is the CRC [both binary and polynomial] generated by Mr. Thapa?
 - II. What CRC/Reminder [both binary and polynomial] Mr. Chen is generated?
 - III. If you found any error, justify why you think this is an error.
 - IV. What type of error (if any) occurred during the data transmission? You may consider other error detection methods to calculate the error in this case.
- b) Mr. Biswas needs to send the five data items 5, 7, 9, 1 and 7 to his associate Mr. Chowdhury. Answer the following:
- I. Find the checksum (complementary) at the Mr. Biswas's side if there is no error.
 - II. Find the checksum (complementary) at the Mr. Biswas's side if the fourth data item is changed to -1.
 - III. Find the checksum (complementary) at the Mr. Biswas's side if the second data item is changed to 4 and the fourth data item is changed to 3.
- c) How does slotted aloha improves the performance of pure aloha? Explain with necessary diagram and relevant examples.
- d) Explain the encoding process of CDMA and generate a combined signal by considering the following parameters.

Number of stations: 06

Data bit for station 1 is 1

Data bit for station 2 is 0

Data bit for station 3 is 0

Data bit for station 4 is 1

Data bit for station 5 is silent

Data bit for station 6 is 1

Use Walsh table to generate the chip sequence for the six stations.

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