Daffodil International University
Department of Computer Science & Engineering
Faculty of Science & Information Technology
Mid Term Examination **Semester: Spring 2017**
Course Code: 233 (Day) **Course Title: Data Communication**

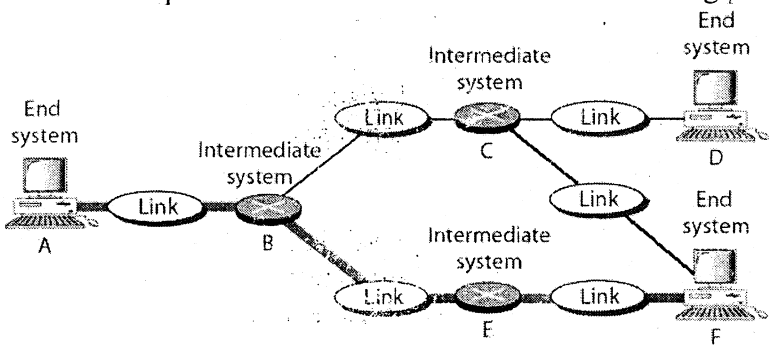
Time: 1.5 Hours **Full Marks: 25**

Answer any 3 question from the following including question 1. [Question 1 must be answered]. Figures in the right-hand margin indicate full marks. All the questions should be answered sequentially.

1. a) Ana and Eva are two friends. They arrived on a street which has two pavements (Left Side Pavement & Right Side Pavement) in a street. On the left side pavement, people can actually move both ways simultaneously. But on the right side pavement, people can move both ways, but not at the same time. From this analogy, explain the two types of data flow mentioned here. **[2.5]**

   b) A digitized voice channel, is made by digitizing a 4-kHz bandwidth analog voice signal. We need to sample the signal at twice the highest frequency (two samples per hertz). We assume that each sample requires 8 bits. What is the required bit rate? **[2.5]**

2 a) Consider the following figure. How hop-to-hop delivery and source to destination delivery of frames and packets will occur from A to F if the routing path is ABCF. **[3]**



b) Match the following to one or more layers of the OSI model: **[4]**
   i). Format and code conversion services
   ii). Establishes, manages, and terminates sessions
   iii) Route selection
   iv) Interface to transmission media

c) From the figure below calculate the attenuation of a composite signal travelling from point A to D. Also state at which point do you need amplification and why. **[3]**

3 a) What is the total delay (latency) for a frame of size 5 billion bits that is being sent on a link with 8 routers each having a queuing time of 2 microsecond and a processing time of 1 microsecond. The length of the link is 2040 Km. the link has a bandwidth of 5 Mbps. The speed of light along the link is $2x10^8$ m/s. **[4]**

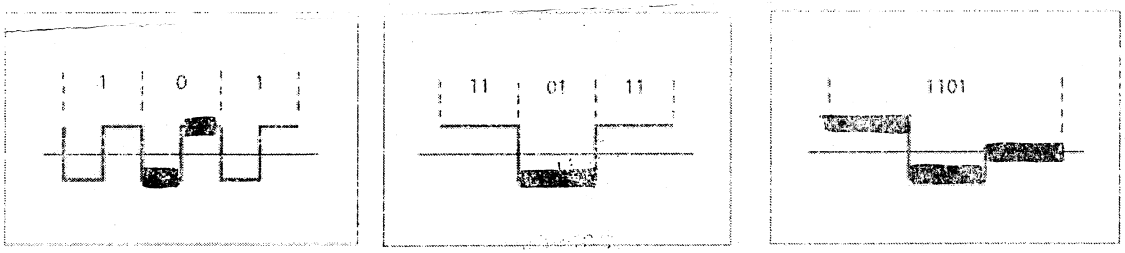
b) A signal can be sent with 3 bits per level through a link. It has a bandwidth of 200 kb/ps. What will be the links capacity for noiseless channel? What will be the SNR of the channel if it is completely noiseless? **[2+1]**

c) Suppose we have 8 digital bits to send (01011010). Draw the signals with the following line coding schemes: **[3]**

i) NRZ-I ii) D-Manchester

4 a) You have been given the responsibility of creating a network within Daffodil Tower as your 4^{th} year project work. What type of network will you create in this case? State your reason behind this. **[1]**

b) If bit rate is 100 kbps and c is between 0 & 1, what will be the baud rate for the below three cases. **[3]**



c) Suppose, you have a hybrid network in which the primary network is arranged in star topology and it can be connected with 4 devices at max? The central hub of the star topology is connected through ring topology with other devices. Each ring topology can have 3 devices at max. How many connection links do you need in this arrangement? Answer by drawing the network. **[3]**

d) A line has a signal-to-noise ratio of 1000 and a bandwidth of 4000 KHz. What is the maximum data rate supported by this line? **[1.5]**

e) A periodic composite signal with a bandwidth of 2000 Hz is composed of two sine waves. The first one has a frequency of 100 Hz with a maximum amplitude of 20 V. The second one has a maximum amplitude of 5 V. Draw the bandwidth. **[1.5]**