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## SEMESTER END EXAMINATIONS – JULY / AUGUST 2022

**Program : B.E. : Computer Science and Engineering**

**Semester : IV**

**Course Name : Data Communication**

**Max. Marks : 100**

**Course Code : CS44(O)**

**Duration : 3 Hrs**

### Instructions to the Candidates:

- Answer one full question from each unit.

### UNIT- I

- Explain the layers of TCP/IP protocol suite. CO1 (10)
  - Differentiate between Bus and Star network topologies. CO1 (06)
  - List the causes of transmission impairment. The loss in a cable is defined as (dB/Km). If the signal at the beginning of a cable with -0.3dB/km has a power of 2mW, Compute the power of the signal required at 5Km? CO1 (04)
- Discuss the identical objects of a logical connection at the sender and the receiver sites in the TCP/IP protocol suite. CO1 (06)
  - Define Encapsulation and Decapsulation. Explain the encapsulation/decapsulation at the source host, router and destination host. CO1 (08)
  - What is SNR? How do you calculate  $SNR_{db}$  from SNR? We have a channel with a 1-MHz bandwidth. The SNR for this channel is 63. What are the appropriate bit rate and signal level? CO1 (06)

### UNIT – II

- Define data rate and signal rate. Explain the following characteristics of line coding scheme. CO2 (06)  
i) Baseline Wandering ii) DC components
  - Define scrambling and give its purpose. What is the result of scrambling the sequence 11100000000000 using B8ZS scrambling technique? Assume that the last non-zero signal level has been positive. CO2 (08)
  - Draw the graph of the Manchester, Differential Manchester, using each of the following data streams, assuming that the last signal level has been positive: CO2 (06)  
i) 11111111 ii) 01010101 iii) 00110011
- Explain B8ZS and HDB3 schemes with appropriate example. CO2 (06)
  - Explain Time Division multiplexing. Two channels, one with a bit rate of 100 kbps and another with a bit rate of 200 kbps, are to be multiplexed. How this can be achieved? Find the frame rate, frame duration and the bit rate of the link? CO2 (08)
  - Explain frequency hopping spread spectrum method. CO2 (06)

## UNIT – III

5. a) Consider a dataword 1001 and the Generator polynomial 10011, Compute the sent codeword using CRC and also find the syndrome if the received codeword is 1000110. CO3 (06)
- b) Write sender site and receiving site algorithms for error detection using internet checksum. CO3 (06)
- c) Explain the 3 phases of virtual circuit network with an example. CO3 (08)
6. a) We need a three - stage space - division switch with  $N=100$ . We use 10 crossbars at the first and third stages and 4 crossbars at the middle stage. CO3 (06)
- i) Draw the configuration diagram and calculate the total number of crosspoints.
- ii) Find the possible number of simultaneous connections.
- iii) Find the possible number of simultaneous connections if we use one single cross-bar (100x100)
- iv) Find the blocking factor, the ratio of the number of connections in ii) and in iii)
- b) With a neat block diagram, explain the working of a time division switch. CO3 (08)
- c) Consider the CRC-8 polynomial  $x^8+x^2+x+1$  and answer the following questions. CO3 (06)
- i) Does it detect a single error? Defend your answer.
- ii) Does it detect a burst error of size 6? Defend your answer.
- iii) What is the probability of detecting a burst error of size 9?
- iv) What is the probability of detecting a burst error of size 15?

## UNIT – IV

7. a) Compare and contrast bit stuffing with byte stuffing using appropriate examples. CO4 (08)
- b) List and explain the properties each chip sequence should have in CDMA. CO4 (06)
- c) Explain why should the send window size be less than  $2^m$  in Go-Back-N protocol? Explain with an example. CO4 (06)
8. a) With a neat flow diagram explain the working of CSMA/CD protocol. CO4 (08)
- b) Write the sender site selective repeat algorithm by considering all the cases and explain. CO4 (06)
- c) Illustrate the exchange of HDLC frames with piggy backing and no errors. CO4 (06)

## UNIT – V

9. a) Identify the use of BLUETOOTH protocol? Differentiate between Piconets and Scatternet. CO5 (08)
- b) Discuss any four goals of the Gigabit Ethernet design. CO5 (06)
- c) With neat flow diagrams explain the 3 persistent protocols. CO5 (06)
10. a) With a neat block diagram explain Ethernet frame format. CO5 (08)
- b) Explain point coordination function and give an example of repetition interval. CO5 (06)

- c) Explain virtual LAN in detail.

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