RAMAIAH
INSTITUTE OF TECHNOLOGY

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(Autonomous Institute, Affiliated to VTU)
Bangalore – 560 054

SEMESTER END EXAMINATIONS – MAY/JUNE 2017

Course & Branch	: **B.E : Computer Science and Engineering**	Semester	:	**IV**
Subject	: **Data Communication**	Max. Marks	:	**100**
Subject Code	: **CS1544/CS415**	Duration	:	**3 Hrs**

Instructions to the Candidates:
- Answer one full question from each unit.
- Write figures wherever necessary.

UNIT - I

1. a) Differentiate between star, ring, mesh and bus topologies. — CO1 (08)
    b) Identify and explain the different causes of transmission impairment. — CO1 (08)
    c) 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 (04)

2. a) Explain the layers of TCP/IP protocol suite. — CO2 (08)
    b) Differentiate between Nyquist bit rate and Shanon channel capacity and explain the process of calculating the overall latency (delay) of sending a message from source to destination — CO1 (08)
    c) What is the total delay (latency) for a frame of size 5 million bits that is being sent on a link with 10 routers each having a queuing time of 2 μs and a processing time of 1 μs. The length of the link is 2000 Km. The speed of light inside the link is 2×10^8 m/s. The link has a bandwidth of 5 Mbps. Which component of the total delay is dominant? Which one is negligible? — CO1 (04)

UNIT - II

3. a) Explain MLT3 scheme with example. — CO3 (06)
    b) We want to digitize the human voice. What is the bit rate assuming 8 bits per sample. — CO3 (04)
    c) What are the two principles used to achieve the goals of spread spectrum and Explain FHSS with example and block diagrams. — CO3 (10)

4. a) Explain B8ZS and HDB3 schemes with appropriate example. — CO3 (06)
    b) Which characteristics of an analog signal are changed to represent the digital signal in each of the following digital to analog conversion — CO3 (04)
        i) ASK
        ii) FSK
        iii) PSK
        iv) QAM.
    c) A multiplexer combines four 100-kbps channels using a time slot 0f 2 bits. Show the output with four arbitrary inputs. What is the frame rate? What is the frame duration? what is the bit rate? what is the bit duration. — CO3 (05)
    d) Define constellation diagram and draw the constellation diagram for the following: — CO3 (05)
        i. QPSK with peak amplitude value of 3
        ii. 8-QAM with 2 different peak amplitude values, 1 and 3 and four different phases.

UNIT - III

5. a) With a neat block diagram, explain the working of a Time Division Switch. CO3 (06)

    b) 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. CO4 (06)

    c) A sender needs to send the four data items 0x3456, 0xABCC , 0x02BC and 0xEEEE CO4 (08)
    Answer the following:
    - i) Find the checksum at the sender site.
    - ii) Find the checksum at the receiver site if there is no error.
    - iii) Find the checksum at the receiver site if the second data item is changed to 0xABCE.
    - iv) Find the checksum at the receiver site if the second data item is changed to 0xABCE and the third data is changed to 0x02BA.

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. CO4 (06)
    - i) Draw the configuration diagram.
    - ii) Calculate the total number of crosspoints.
    - iii) Find the possible number of simultaneous connections.
    - iv) Find the possible number of simultaneous connections if we use one single cross-bar (100x100)
    - v) Find the blocking factor, the ratio of the number of connections in iii) and in iv)

    b) Consider the CRC-8 polynomial x^8+x^2+x+1 and answer the following questions. CO4 (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?

    c) Generate the codeword from the following dataword 1011101 using Hamming code. Introduce an error in bit position 3 and demonstrate how this error is detected and corrected at the receiver. CO4 (08)

UNIT – IV

7. a) Compare and contrast bit stuffing with byte stuffing using appropriate examples. CO5 (06)

    b) Justify with examples why, the size of the sender and receiver window must be at most one-half of 2^m in Selective Repeat ARQ. CO5 (06)

    c) With a neat flow diagram explain the working of CSMA/CD protocol. CO6 (07)

8. a) Explain the reason for moving from the stop-and-wait ARQ protocol to the Go-back-N ARQ protocol and finally moving from Go-Back-N ARQ protocol to selective repeat ARQ protocol. Specify the window sizes at both sender and receiver site for all the 3 ARQ protocols. CO5 (06)

    b) With a neat block diagram, explain the transition phases of PPP. CO5 (06)

    c) Explain the working of CDMA with appropriate example. CO6 (08)

UNIT - V

9. a) Explain Ethernet frame format in detail. CO6 (08)

   b) Explain bridged Ethernet, switched Ethernet and full duplex Ethernet. CO6 (08)

   c) Differentiate between piconet and scatternet Bluetooth architecture. CO6 (04)

10. a) Explain the frame format of wireless LAN. CO6 (12)

    b) Differentiate between point co-ordination function and distributed co-ordination function. CO6 (08)

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