CS415

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M S RAMAIAH INSTITUTE OF TECHNOLOGY

(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)

BANGALORE – 560 054

SEMESTER END EXAMINATIONS – JUNE 2015

Course & Branch :	**B.E.- Computer Science & Engg.**	Semester :	**IV**
Subject :	**Data Communication**	Max. Marks :	**100**
Subject Code :	**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 mesh, star, bus and ring topologies. Show how the devices are connected in their respective topologies with neat figures and identify their advantages and disadvantages.   (12)

    b) Explain the responsibilities of transport layer of OSI reference model.   (04)

    c) i. We measure the performance of a telephone line (4 KHz of bandwidth). When the signal is 10 V, the noise is 5 mV. What is the maximum data rate supported by this telephone line?   (04)

    ii. What is the transmission time of a packet sent by a station if the length of the packet is 1 million bytes and the bandwidth of the channel is 200 Kbps?

2 a) What are the 3 main causes of transmission impairment? Explain them in detail. Write the Nyquist bit rate formula that defines the theoretical maximum bit rate in a noiseless channel and Shannon capacity formula to determine the theoretical highest data rate for a noisy channel.   (08)

    b) Differentiate between logical, physical and port addresses.   (06)

    c) i. We have a channel with a 1-MHz bandwidth. The SNR for this channel is 255. What are the appropriate bit rate and signal level?   (06)

    ii. A signal with 200 milliwatts power passes through 10 devices, each with an average noise of 2 microwatts. What is the SNR? What is the SNRdB?

UNIT – II

3. a) Define scrambling and give its purpose. What is the result of scrambling the sequence 11100000000000 using the following scrambling techniques? Explain your answer. Assume that the last non-zero signal level has been positive.   (10)
    a. B8ZS
    b. HDB3 (The number of nonzero pules is odd after the last substitution)

    b) Describe the 3 strategies viz. Multilevel multiplexing, multiple slot allocation and pulse stuffing that are used when the data rate is not same in TDM.   (06)

    c) Define FHSS and explain how it achieves bandwidth spreading.   (04)

4. a) What are the 3 major classes of guided media? Describe in detail with suitable figures.   (10)
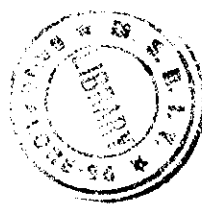
b) Draw the graph for the bit stream 010011 using the following schemes (06)
    i. NRZ-L
    ii. NRZ-I (consider starting voltage is positive)
    iii. Manchester
    iv. Differential Manchester (consider starting voltage is negative)

c) We need to use synchronous TDM and combine 20 digital sources, each of 100 Kbps. Each output slot carries 1 bit from each digital source, but one extra bit is added to each frame for synchronization. Answer the following questions: (04)
    i. What is the size of an output frame in bits?
    ii. What is the output frame rate?
    iii. What is the duration of an output frame?
    iv. What is the output data rate?

UNIT – III

5. a) Explain the structure of a packet switches with neat figures. (12)
   b) A sender has two data items to send: Ox4567 and OxBA98. What is the value of the checksum? (04)
   c) What are the 2 ways of error correction? (04)

6. a) Given the dataword 1010011110 and the divisor 10111, (10)
    i. Show the generation of the codeword at the sender site (using polynomial division).
    ii. Show the checking of the codeword at the receiver site (assume no error).

   b) Identify and briefly explain the 3 phases of virtual networks. (06)

   c) Compare and contrast circuit-switched network and packet-switched network. (04)

UNIT – IV

7. a) Explain PAP and CHAP authentication procedures that are used in Point to Point Protocol. (10)

   b) Describe reservation and polling controlled access protocols used by multiple devices to share a link. (06)
   c) A sender sends a series of packets to the same destination using 5-bit sequence numbers. If the sequence number starts with 0, what is the sequence number after sending 100 packets? (04)

8. a) Discuss the control field format for different types of HDLC frames. (10)
   b) Write the sender side algorithm for Go Back N protocol. (06)
   c) One hundred stations on a pure ALOHA network share a I-Mbps channel. If frames are 1000 bits long, find the throughput if each station is sending 10 frames per second. Find the throughput if the network uses slotted ALOHA (04)

UNIT – V
9. a) With a neat figure explain the frame format of IEEE 802.11 protocol. (10)
   b) Compare and contrast bridged ethernet, switched ethernet and full duplex ethernet. (06)
   c) An Ethernet MAC sublayer receives 1510 bytes of data from the upper layer. Can the data be encapsulated in one frame? If not, how many frames need to be sent? What is the size of the data in each frame? (04)

10. a) What is a transparent bridge? How is the problem of looping in transparent (10) bridge solved? Explain in detail.

b) What is hidden station problem? How is the hidden station problem solved. (06)

c) The address 43:7B:6C:DE:10:00 has been shown as the source address in (04) an Ethernet frame. The receiver has discarded the frame. Why?

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