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Name....................

Reg. No....................

FIFTH SEMESTER B. TECH. (ENGINEERING) DEGREE EXAMINATION DECEMBER 2004

CS/IT 2K 504—DIGITAL DATA COMMUNICATION

Time : Three Hours

Maximum : 100 Marks

*Answer **all** questions.*

1. (a) Identify the *five* components of data communications system.

   (b) Differentiate LAN, MAN, and WAN.

   (c) What is the difference between network layer delivery and transport layer delivery ?

   (d) Bring out the significance of Nyquist and Shanon's theorems.

   (e) Give the meaning of the following terms relating to the DCT algorithm :—

      (i) DC coefficient.

      (ii) Horizontal and vertical spatial frequency coefficients.

   (f) What is meant by run-length encoding ? Give an example.

   (g) Mention the advantages of optical fiber over twisted-pair and coaxial cable. List also the disadvantages.

   (h) Mention the different types of timers to be deployed in data link layer.

   (8 × 5 = 40 marks)

2. (a) Assume *six* devices are arranged in mesh topology. How many cables are needed ? How many ports are needed for each device ?

   (5 marks)

   (b) Discuss the consequences of failure of a node or link in all the topologies.   (5 marks)

   (c) Differentiate half-duplex and full-duplex transmission modes. Give an example.

   (5 marks)

Or

3. Explain in detail the time division multiplexing and frequency division multiplexing.

   (8 + 7 = 15 marks)

4. (a) Define Synchronization. How is it achieved ?   (3 marks)

   (b) Assume four sources each generating 250 characters per second. If the interleaved unit is character and one synchronizing bit is added to each frame, find the following :—

      (i) The data rate of each source.

      (ii) The duration of each character in each source.

      (iii) The frame rate.

Turn over

      (iv) The duration of each frame.

      (v) The number of bits in each frame.

      (vi) The data rate of the link.

(6 × 2 = 12 marks)

Or

5. (a) Write notes on the following :—

      (i) Odd and even parity check.   (ii) Cyclic redundancy check.

      (iii) Padding.

(3 × 4 = 12 marks)

  (b) Calculate the overhead in bits per voice channel for T1 (1.544 Mbps) line. What is the percentage of overhead per voice channel ?

(3 marks)

6. (a) Explain in detail the stop-and-wait protocol with reference to the following :—

      (i) Normal operation.   (ii) Lost data frame.

      (iii) Lost ack frame.   (iv) Delayed acknowledgment.

      (v) Piggybacked acknowledgement.

(5 × 3 = 15 marks)

Or

7. (a) How is the bandwidth-delay product related to the system efficiency ?   (3 marks)

  (b) ACK 7 has been received by the sender in a Go-Back-N sliding window system. Frames 7,0,1,2, and 3 are sent. For each of the following separate scenarios discuss the significance of the receiving of :—

      (i) An ACK 1.   (ii) An ACK 4.

      (iii) An ACK 3.

(3 × 3 = 9 marks)

  (c) Consider an error-free 64 kilo bps satellite channel used to send 512 byte data frames in one direction with very short acknowledgement coming back the other way. What is the maximum throughput for window sizes of 1, 7, and 15 ? The earth to satellite propagation time is 270 milliseconds.

(3 marks)

8. (a) What is the need for bit stuffing ?   (1 marks)

  (b) Give the bit stuffing and destuffing algorithms.   (2 marks)

  (c) Bit-stuff the following data :—

                  000111111011111100111100111111001

(2 marks)

  (d) Explain in detail the HDLC protocol.   (10 marks)

Or

9. (a) Identify the various network components for baseband transmission.   (5 marks)

  (b) Bring out the importance of synchronization in data communication.   (5 marks)

  (c) What is meant by 'Packet Switching' ?   (5 marks)

(4 × 15 = 60 marks)