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Srinivas Institute of Technology
Library

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Third Semester M.C.A Degree Examination, January/February 2005
Master of Computer Applications
Data and Computer Communications

[Max.Marks : 100

Time: 3 hrs.]

Note: 1. *Answer any FIVE full questions.*
2. *Answer to the point.*
3. *Answer with figures, charts, graphs.*

1. (a) MAP the following to one or more of seven OSI layers:

    i)   route determination

    ii) flow control

    iii) interface to outside world

    iv) access to the networks provided for the end user

    v)   ASCII changed to EBC DIC

    vi) Packet Switching

    (Note : Answer to all subsections must be correct to get any marks in this question) **(6 Marks)**

   (b) What is the difference between confirmed service and an unconfirmed service? For each of the following tell whether it might be a confirmed service, an unconfirmed service, both or neither

    i)   Connection established

    ii) Data transmission

    iii) Connection release **(6 Marks)**

   (c) A collection of five routers is to be connected in a point to point subnet. Between each pair of routers, the designers may put a high speed line, a medium speed line, a low speed line or no line. If it takes 100ms of computer time to generate and inspect each topology, how long will it take to inspect all of them to find the one that best matches the expected load? **(8 Marks)**

2. (a) Data pass through a point at a rate of 100 Kbps every 5 seconds. What is the through put? Explain your answer. **(5 Marks)**

   (b) We measure the performance of a telephone line $(Bw = 4KHz)$, when the signal is 10V, the noise is 5mv. What is the maximum data rate supported by this telephone line? **(5 Marks)**

   (c) Suppose that data are stored on 80 Kbytes floppy diskettes that weigh 1 OZ each. Suppose that a Boeing 747 carries 10 tons of these floppies at a speed of 600 mph over a distance of 3000 miles. What is the data transmission rate in bits per second of this system? (explain the answer). **(10 Marks)**

3. (a) Calculate the Bit rate for the given BAUD rate and type of digital modulation schemes: **(4 × 2=8 Marks)**

    i)   1000 BAUD, FSK

    ii)   1000 BAUD, ASK

    iii)   1000 BAUD, 8 PSK

    iv)   1000 BAUD, 16 QAM

  (b) Using Nyquist theorem, calculate the sampling rate for the following analog signals. **(4 × 2=8 Marks)**

    i)   an analog signal with BW = 2KHz

    ii)   an analog signal with frequencies for 2KHz to 6KHz

    iii)   a signal with a horizontal line in the time-domain representation.

    iv)   A signal with a vertical line in the time-domain representation.

  (c) A given channel with an intended capacity of 20Mbps. The Bw of the channel is 3MHz. What signal to noise ratio is required to achieve this capacity? **(4 Marks)**

4. (a) Draw the sender and receiver windows for a system using Go Back and ARQ given the following : **(4 × 2=8 Marks)**

    i)   Frame 0 is sent ; Frame 0 is acknowledged

    ii)   Frame 1 and 2 are sent; Frame 1 and 2 are acknowledged.

    iii)   Frames 3, 4, & 5 are sent; NAK 4 is received

    iv)   Frame 4, 5, 6 & 7 are sent; frames 4 through 7 are acknowledged. **(8 Marks)**

  (b) Computer A uses STOP N WAIT ARQ protocol to send packets to COMPUTER B. If the distance between A and B is 4000 Km, how long does it take computer A to receive acknowledgement for a packet? Use speed of light for propagation speed. Assume time between receiving and sending the acknowledgement is zero. **(6 Marks)**

  (c) Consider a Half Duplex point to point link using STOP N WAIT scheme.

    i)   What is the effect on line utilization of increasing the message size so that fewer messages will be required? Other factors remain constant.

    ii)   What is the effect on line utilization of increasing the number of frames for a constant message size?

    iii)   What is the effect on line utilization of increasing frame size? **(3 × 2=6 Marks)**

5. (a) Complete the following table for the different protocols in LAN medium access. Take one protocol and explain the different attributes including FRAME FORMAT.

                                         (8 Marks)

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Characteristics	Pure ALOHA	Slotted ALOHA	CSMA/ CD	CSMA/ CA	Token passing
Multiple Access					
Carrier Sense					
Collision checking					
Acknowledge					

(b) A disadvantage of the contention approach for LANs is the capacity wasted due to multiple stations attempting to access the channel at the same time. Suppose that the time is divided into discrete slots with each N stations attempting to transmit with probability p during each slot. What fraction of slots is wasted due to multiple simultaneous transmission attempts?

(12 Marks)

6. (a) A data rate has a peak rate of 500 Mbps and an average rate of 50Mbps.

What type of service would you recommend; circuit or packet. Give reasons for the above choice. **(4 Marks)**

(b) Consider an ATM system with a maximum transfer rate of 11Gbps. Assume that at its input there is an incoming natural bit rate with a profile of 7 Gbps for 10 seconds, ramping upto 12Gbps within 5 seconds (five seconds) and ramping down to 8gbps in 4 seconds. Comment on the bandwidth utilization. **(8 Marks)**

(c) Comment on the main difference between the various AAL types and their applicability. **(8 Marks)**

7. The information in four analog signals is to be multiplexed and transmitted over a telephone channel that has a 400 to 3100Hz band pass. Each of the analog base band and of base band signal is band limited to 500Hz. Design a communication system (block diagram) that will allow the transmission of these four signals over the telephone channel using

i) FDM with SSB subcarriers

ii) TDM using PCM

Show the block diagram of the complete system, including the transmission, channel and reception portions. Include the bandwidth of the signals at the various points in the system. **(20 Marks)**

8. Write short notes on the following : **(5×4=20 Marks)**

i) FRAME RELAY

ii) packet switching virtual datagram services

iii) High level data link control

iv) FDDI

v) Transparent bridges

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