



## SPRING END SEMESTER EXAMINATION-2013

6th Semester B.Tech & B.Tech Dual (M.Tech/MBA)

### COMPUTER NETWORKS IT-603

[ Regular-2010 & Back-2009, 2008 Admitted Batch ]

Full Marks: 60

Time: 3 Hours

*Answer any SIX questions including Question No.1 which is compulsory.*

*The figures in the margin indicate full marks.*

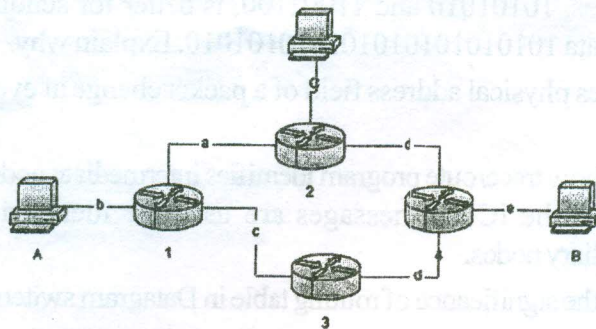
*Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.*

1. a) What is the topology used in your hostel or lab to connect  $[2 \times 10]$  systems to internet? Explain the benefits of above topology.
- b) Flow control and error control services are offered by both Transport layer and Data link layer. Why?
- c) What is the purpose of flags in framing? Which of the two flag sequences, 10101010 and 11001100, is better for sending binary data 101010101010101010101010. Explain why.
- d) Why does physical address field of a packet change at every node?
- e) Explain how traceroute program identifies intermediate nodes. Which of the ICMP messages are used for identifying intermediary nodes.
- f) Explain the significance of routing table in Datagram switched networks.
- g) What is the relation between Minimum hamming distance and error correction? Justify the relation using geometric concept.
- h) Explain the purpose of Address Resolution Protocol. Which address does it resolve?

(1)



- i) In synchronous TDM, the data rate of link is  $n$  times faster, and unit duration is  $n$  times shorter. Justify the statement.  $n$  is the number of input links.
  - j) Contrast between 1-persistent, p-persistent and non-persistent CSMA/CD.
2. a) Explain different layers of OSI model. Compare it with layers in TCP/IP model. [4]
  - b) What are different types of optical fibre cables based on their propagation modes? [4]
3. Consider a network given in the figure below. A, B, and C are the end nodes and 1, 2, 3, and 4 represent virtual circuit switches. a, b, c, d, and e are names of the links. The range of virtual circuit identifier are {0 to 7}, {8 to 15}, {16 to 23}, {24, 31} at switches 1,2,3,4 respectively.
- a) How many fields are required to identify a virtual circuit? How many virtual circuits can be established from A to B. justify your answer. Assume A and B have unlimited range of virtual circuit identifiers other than mentioned above. [2]



- b) Explain in detail, the setup phase in which A will establish a virtual circuit to B. Assume setup packet travels the path A-1-3-4-B. Mention tables at each switch that are responsible for constructing a virtual circuit. [4]

(2)

- c) What will be contents of table at switch1 if virtual paths A-1-2-C and A-1-3-4-B is already established? [2]
4. Consider a four bit generator  $G$  (divisor) = 1001 and suppose that dataword  $D = 1010$ . The codeword is of length 7.
- a) Calculate the remainder  $R$  and codeword  $C$ . [4]
- b) Explain why the divisor will successfully detect a single bit error but fail to detect a two bit error separated by 2 bits, with an example. [4]
5. a) Explain the design of Go-back-to-N flow control protocol with the help of a diagram. How does Go-back-to-N protocol improves efficiency over Stop and Wait protocol? [4]
- b) If  $m$  number of bits are used for representing a sequence number in selective repeat ARQ, then the maximum size of sliding window is  $2^{m-1}$ . Justify this statement using a boundary case example. What will happen if the size of sliding window exceeds  $2^{m-1}$ ? [4]
6. a) A local ISP provides internet services to clients spanning over a range of 1 KM. Engineers of ISP used a single copper wire to connect to all the clients, because of which all the clients are in a single collision domain. The bit rate is 10 Mbps. What is the minimum frame size required for successfully detecting a collision in this setup? Assume propagation speed of electrical signal in copper wire is  $1 \times 10^8$  m/s. [2]
- b) Now the ISP is planning to expand their operations over a range of 10 KM. Can the ISP still maintain rest of the parameters like bit rate, minimum frame size same. What will be the problem if minimum frame size is not changed? How does bitrate affected if frame size is kept constant and collisions are detected? Which of the parameters will you change for optimal performance for user? [2]

(3)



- c) Explain in detail, the working of CSMA/CA with the help of a flow diagram. [4]
7. a) Consider sending a 2400-byte datagram into a link that has an MTU of 700 bytes. Only the second fragment of the datagram has to further go through another link with MTU of 400 bytes. Suppose the original datagram is stamped with the identification number 422. How many fragments are generated? What are the values in the various fields in the IP datagram(s) generated related to fragmentation? [4]
- b) One of your alumni has created a new software services company. You were asked to provide network planning. The setup requires that there will be 4 departments. Department 1 requires 8 networks with 64 hosts each. Department 2 requires 32 networks with 32 hosts each. Department 3 requires 16 networks with 128 hosts each. Department 4 requires 8 networks with each having 256 hosts. The address range to be used starts with 10.0.0.0/16.
- (i) Write the subnets in the form a.b.c.d/x. Mention first and last network addresses of each department.
- (ii) For purpose of Routing, Each department has to be identified with a single supernet. Give the supernet address of each department in a.b.c.d/x format
8. Write short note on any 4. [2 × 4]
- a) TCP connection Timeout
- b) UDP
- c) ETHERNET
- d) Statistical Time division Multiplexing
- e) Circuit switching

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