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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2013

INFORMATION TECHNOLOGY

Semester v

12

IT 9303 – COMPUTER NETWORKS

(Regulation 2008)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. What is the number of cables required to connect n-devices in a network in the following configurations – bus, ring, and star ?
2. Suppose a certain communications protocol has a per-packet overhead of 50 bytes for header and framing. If we send one million bytes of data using this protocol, and one packet is lost, and is retransmitted, give the total number of overhead + lost bytes for packet sizes of 1000, and 10000 bytes.
3. What are the functions of a monitor in a token-ring network ?
4. If the following bit-stuffed frame is received at the receiver, what will the extracted data bits be : 01111110000110111110001111101011000011111110 ?
5. What is the purpose of Address Resolution Protocol ?
6. Which ICMP messages can be used to perform trace-route ? How ?
7. For each of the following operations on a remote file server, identify whether they are delay-sensitive or bandwidth sensitive :

   (a) Open a file (b) Read the contents of a file (c) List the contents of a directory (d) Display the attributes of a file.
8. What is the silly-window syndrome in TCP ?
9. What DNS cache issues will be involved in changing the IP address of a web server name ?
10. Why is HTTP designed as a stateless protocol ? How can state information be added to it ?

Part – B (5 x 16 = 80 marks)

11. (i) Differentiate between TDMA, FDMA and CDMA. (6)

    (ii) A 120 Mbps link is established between earth and a geostationary satellite. The distance between earth and the satellite is 35,786km. Assume that data travels at the speed of light. The satellite relays a 25MB image from the satellite to earth. Assume that there is no queuing delay.

    A. Calculate the RTT of the link. (3)

    B. Calculate the time taken for the data to reach the earth if data is sent continuously. (3)

C. If data is sent in packets of size 1KB, and if the satellite has to wait for 1 RTT before sending the next packet, calculate the time taken for the data to be transmitted. (4)

12. a) (i) Explain the hidden node and exposed node problems that occur in wireless networks. How are these solved in the IEEE 802.11 standard ? (8)

(ii) Given a message of 101001101, and a CRC polynomial of $x^4 + X^3 + 1$, calculate the CRC code that will be transmitted. If an error occurs in the third bit from the left (MSB), find the resulting error code. (6)

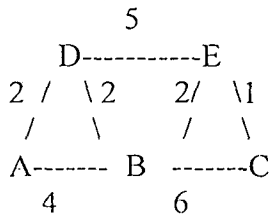
(iii) Differentiate between a hub, a switch, a bridge and a router. (2)

(OR)

b) (i) Explain the functions of an Ethernet transmitter and receiver. (10)

(ii) Suppose a node A is connected to a node B via a switch S. The A to S link is instantaneous, but the S to B link transmits only one packet per second, and one at a time. Assume that A sends to B using a sliding window protocol with window size 4. For time = 0,1,2,3,4,5 state what packets arrive at and are sent from A to B. How large can the queue at S become ? (6)

13. a) (i) Explain the link-state algorithm. Construct the routing table at node A for the network given below using link-state algorithm. (10)



(ii) Explain how DHCP is used to obtain IP addresses. (6)

(OR)

b) (i) For the routing table shown below, what does the router do with packets addressed to the following addresses ?

IP address/Mask Length	Nexthop
CE.58.0.0/ 12	Interface 0
CE.5E.C3.0/ 19	Interface 1
C4.60.0.0/ 14	R2
C4.68.40.0/ 20	R3
80.0.0.0 / 1	R4

A. C4.6C.22.1
B. CE.59.7A.2
C. 5F.2B.FF.25
D. C4.63.39.9 (6)

(ii) Explain how multicasting is carried out using the PIM protocol. (4)

(iii) Design a subnet addressing scheme for our campus with one address 167.84.0.0. Individual networks to be supported : RCC - 2000 systems, CSE/IT : 2000 systems, ECE : 500 systems, Sciences : 500 systems. Give the subnet mask, range of addresses, subnet address for each subnet. (6)

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14. a) (i) Explain connection establishment and termination in TCP with a state diagram. (12)

(ii) Suppose you are an Internet service provider and your client hosts connect directly to your routers. You suspect that some of your hosts are greedy and not implementing congestion control. What measurements can you make at the routers to establish that a client was not using slow start at all or is not using AIMD? (4)

(OR)

b) (i) Explain TCPs retransmission timeout calculations. Why are these important ?(8)

(ii) Explain the idea behind the random early detection scheme used to avoid congestion. (4)

(iii) Assume that a client is connected to a server using telnet running on top of TCP. Every character typed is echoed back. If Nagle's algorithm is used, how long will it take for the command cat abcde.txt to be displayed on the client if the RTT is 3.2 seconds, and we type at the rate of 1 character per second? (4)

15. a) (i) Explain in detail the working of the DNS protocol. (10)

(ii) If we send an e-mail with 3 attachments – test1.txt, test2.pdf, and test3.xls, what would the MIME header be ? (6)

(OR)

b) (i) Assume that sender A sends mail to B through a web-based mail. B accesses the mail from his sever through IMAP or POP3. Explain in detail the different messages/ protocols exchanged between the various entities, during this process. (10)

(ii) Assume that a web-page consisting of 8 objects is retrieved from a web-server www.exam.org. Four of the objects are on that server itself, and 4 are on another server www.test.org. Calculate the time taken in RTTs to display the page, in the following cases : A. HTTP with pipelined persistent connection; B. HTTP with non-persistent connection; C. HTTP with parallel connections. (6)

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