AUTUMN END SEMESTER EXAMINATION-2018
5th Semester B.Tech & B.Tech Dual Degree
COMPUTER NETWORKS
IT3001
[For 2017(L.E.), 2016 & Previous Admitted Batches]

Time: 3 Hours   Full Marks: 60

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) For a P2P file-sharing application, do you agree with the   [2×10]
         statement, "There is no notation of client and server sides
         of a communication session"? Why or why not?

    (b) What are the source and destination IP addresses in a
         datagram that carries the ICMP message?

    (c) What is the use of subnet mask in IP addressing?

    (d) Mention the destination IP address used in a packet for
         limited broadcast. Specify an application layer protocol
         that uses this limited broadcast address for its
         functionality.

    (e) A system has n-layer protocol hierarchy. Applications
         generate messages of length M bytes. At each of the
         layers, an h-byte header is added. What fraction of the
         network bandwidth is filled with headers?

    (f) If an IP packet has arrived with the first 8 bits as 0100
         0010 then whether the receiver will accept or reject this
         packet. Justify?

(g) In TCP, if the value of HLEN is 1010, how many bytes TCP header contains and how many bytes are in Options field?

(h) In TCP, how many sequence numbers are consumed by SYN+ACK segment? Justify.

(i) Explain a way to do reassembly of IP fragments at the destination.

(j) One way of detecting errors is to transmit data as a block of n rows of k bits per row and adding parity bits to each row and each column. Will this scheme detect all single errors? Double errors? Triple errors?

2. (a) Sketch the packet flow of TCP connection initiation and connection termination using a timing diagram. [4]

(b) A link has a transmission speed of 106 bits/sec. It uses data packets of size 1000 bytes each. Assume that the acknowledgment has negligible transmission delay, and that its propagation delay is the same as the data propagation delay. Also assume that the processing delays at nodes are negligible. The efficiency of the stop-and-wait protocol in this setup is exactly 25%. Calculate the propagation delay in milliseconds. [4]

3. (a) Describe the need of NAT and explain how it works with an example. [4]

(b) Describe the functionalities of DNS. If all DNS servers are crashed (taken offline), will the user be able to access the Internet? Briefly, explain the same. [4]

4. (a) What is the limitation of Go-Back-N ARQ? How this limitation is taken care by Selective-Repeat ARQ? [4]

(b) Explain the working principle of CSMA/CD. Justify, why there is no need for CSMA/CD on a full-duplex Ethernet LAN. [4]

5. (a) What is the formula to calculate the number of redundancy bits required to correct a bit error in a given number of data bits? Explain an error correction technique on the following data: Data send 1001101 and data received 1000101. [4]

(b) [4]
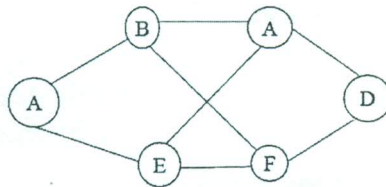
Consider the network in the above figure. Distance vector routing is used, and the following vectors have just come in to router C: from B: (5, 0, 8, 12, 6, 2); from D: (16, 12, 6, 0, 9, 10); and from E: (7, 6, 3, 9, 0, 4). The measured delays to B, D and E are 6, 3 and 5 respectively. What is C's new routing table and mention the outgoing line.

6. (a) A router has the following (CIDR) entries in its routing table: [4]

Address/mask	Next hop
135.46.56.0/22	Interface 0
135.46.60.0/22	Interface 1
192.53.40.0/23	Router 1
Default	Router 2

For each of the following IP addresses, what does the router do if a packet with that address arrives?

(i) 192.53.56.7

(ii) 192.53.40.7

(iii) 135.46.63.10

(iv) 135.46.57.14

(b) Explain two reasons for using layered architecture in computer network communication. List two ways in which the OSI reference model and the TCP/IP reference model are the same. Also list two ways in which they differ. [4]

7. (a) Consider sending a 3000 byte datagram into a link that has an MTU of 500 bytes. Suppose the original datagram is stamped with identification number 422. How many fragments are generated? What are their characteristics? [4]

(b) Contrast and compare distance vector routing with link state routing. [4]

8. Write short notes (any two). [4×2]

(a) ICMP

(b) Congestion control in TCP

(c) Checksum technique

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