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B.Tech. Degree VI Semester Examination April 2018

CS 15-1601 COMPUTER NETWORKS (2015 Scheme)

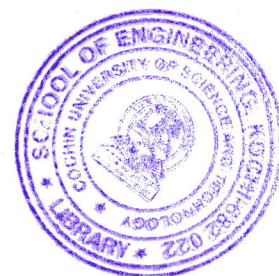
Time : 3 Hours

Maximum Marks : 60

PART A (Answer *ALL* questions)

(10 × 2 = 20)

- I. (a) Consider different activities related to e-mail.
- m1: Send an e-mail from a mail client to a mail server.
- m2: Download an e-mail from mailbox server to a mail client.
- m3: Checking e-mail in a web browser.
- Which is the application level protocol used in each activity?
- A : m1: HTTP m2: SMTP m3: POP
- B : m1 : SMTP m2: FTP m3 : HTTP
- C m1 : SMTP m2: POP m3 : HTTP
- D:m1: POP m2: SMTP m3: IMAP
- (b) How is circuit switching different from packet switching?
- (c) Distinguish between datagram and virtual circuit.
- (d) What is the format of an IP address? What are the different classes of IP address?
- (e) Compute CRC checksum for the message 1101011011 using the generator polynomial $x^4 + x^2 + 1$.
- (f) Draw and explain Ethernet frame format.
- (g) Compare TCP and UDP.
- (h) A datagram of 4000 bytes (20 bytes of IP header plus 3980 bytes of IP payload) arrives at a router and must be forwarded to a link with an MTU of 1500 bytes. Suppose that the original datagram is stamped with an identification number 777, show the fragmentation details of the given IP datagram.
- (i) How big are the MAC address space, the IPv4 address space and the IPv6 address space?
- (j) What are the different interconnecting devices?



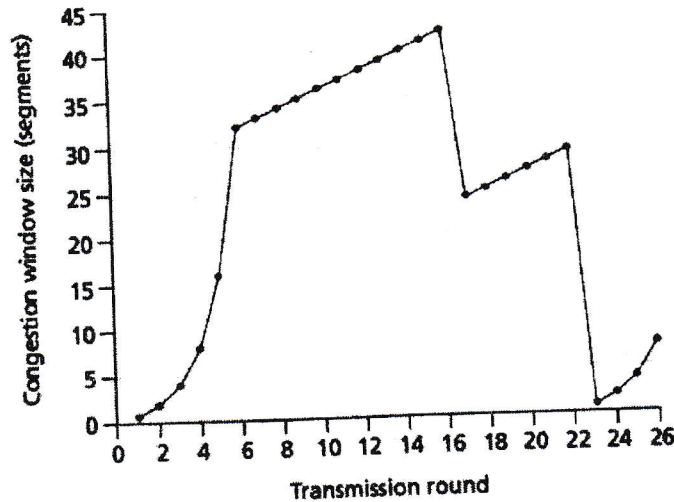
PART B

(4 × 10 = 40)

- II. (a) Discuss the various layers in TCP/IP protocol and briefly explain the major responsibilities of each layer. (7)
- (b) Differentiate between persistent and non persistent connections used in http. (3)
- OR**
- III. (a) Why is it said that FTP sends control information “out-of-band”? (3)
- (b) How is domain name translated to an IP address? (4)
- (c) What are the basic functions of SMTP? (3)

(P.T.O.)

- IV. (a) Describe the various fields of TCP segment header. (4)
 (b) The transmission control protocol uses a method called congestion control to regulate the traffic entering the network. The behavior of TCP congestion control can be represented as a graph in which the x-axis indicates the time, and the y-axis indicates congestion window size. Please use the graph shown below to answer the following questions. Note that the graph does not explicitly show timeouts, but you should be able to figure out when timeouts happened based on the events shown. (6)



- Identify the intervals of time when TCP slow start is operating. Give two reasons why slow start is used.
- Identify the intervals of time when TCP congestion avoidance is operating. Why should congestion avoidance be used instead of slow start during these intervals?
- Identify the intervals of time when TCP fast retransmission is used. Please explain what fast retransmission does and how it is triggered.

OR

- V. (a) How can one estimate the timeout in TCP? (4)
 (b) With a neat state diagram illustrate how connection is established and closed in TCP. (6)

- VI. (a) Consider a network with five nodes, N1 to N5, as shown below:
 The network uses a distance vector routing protocol. Once the route is stabilized, the distance vectors at different nodes as following:

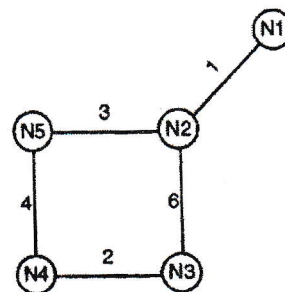
N1: (0, 1, 7, 8, 4)

N2: (1, 0, 6, 7, 3)

N3: (7, 6, 0, 2, 6)

N4: (8, 7, 2, 0, 4)

N5: (4, 3, 6, 4, 0)



Each distance vector is the distance of best known path at that instance to nodes, N1 to N5, where the distance to itself is 0. Also, all links are symmetric and the cost is identical in both directions. In each round, all nodes exchange their distance vectors with their respective neighbours. Then all nodes update the distance vectors. In between two rounds, any change in cost of a link will cause the two incident nodes to change only that entry in their distance vectors.

The cost of link N2-N3 reduces to 2 (in both directions). After the next round updates, what will be the new distance vector at node, N3?

- (b) Explain IPv4 datagram format in detail. (5)

OR

(Contd...3.)

- VII. (a) Illustrate the working of link state routing using figure in VI (a). What is the distance table at N3? (5)
- (b) An organization is granted the block of addresses starting with 130.34.12.64/26. The organization needs 4 subnetworks, each with an equal number of host. Design the subnetworks and give the slash notation of each subblock. (5)
- VIII. (a) Explain the sliding window protocol with a neat diagram. (5)
- (b) What are some of the possible services that a link layer protocol can offer to the network layer? (5)
- OR**
- IX. (a) In GB3 if every 5th packet is lost and we need to send 10 packets, how many packets need to be transmitted in total? (4)
- (b) Explain any two random access protocol used in data link layer with the advantage and disadvantage of each. (6)

