## **Question Paper**

Exam Date & Time: 06-Jan-2024 (02:30 PM - 05:30 PM)



## MANIPAL ACADEMY OF HIGHER EDUCATION

FIFTH SEMESTER B.TECH. EXAMINATIONS - JANUARY 2024 SUBJECT: CSE 3152- COMPUTER NETWORKS

Marks: 50

## Answer all the questions.

1A) Compare and contrast circuit-switched and packet-switched network. What advantages does TDM (3) have over FDM in a circuit-switched network? 1B) What is an application layer protocol? Illustrate HTTP request-response behavior with neat (3)diagram. 1C) Analyse the performance of a simple centralized DNS server for the current Internet with respect (4)following issues: a) Failure b) Traffic volume c) Positioning of Centralized DNS server d) Maintenance 2A) In a network using the selective repeat protocol with m= 8 and the sending window of size 14, the (4)values of variable  $S_f$  (send-base) = 123,  $S_n$  (next\_sqno)= 131, and  $R_n$  (rx-base)= 126, Packet 127 has already been acknowledged at the sender site; packets 127, 128, 129 are received out-of-order at the receiver site. Assume that network does not duplicate the packets. Draw the send and receive window which reflects above status. a) What are the sequence numbers of pending data packets (in transit, corrupted, or lost)? b) What are the acknowledgment numbers of pending ACK packets (in transit, corrupted, or lost)? c) The sending window with  $S_f = 153$  and  $S_n = 159$ . A timeout occurs. How many packets are to be resent? What are their sequence numbers? 2B) Consider transferring an enormous file of L bytes from Host A to Host B. Assume an MSS of 536 (3)bytes. a. What is the maximum value of L such that TCP sequence numbers are not exhausted? Recall that the TCP sequence number field has 4 bytes. b. For the L you obtain in (a), find how long it takes to transmit the file. Assume that a total of 66 bytes of transport, network, and data-link header are added to each segment before the resulting packet is sent out over a 155 Mbps link. Ignore flow control and congestion control so that A can pump out the segments back to back continuously. 2C) Discuss the role of various timers used by TCP. In a TCP connection, assume the old RTTD = 7ms. (3) If the new RTTS = 17ms and the new RTTM = 20ms, calculate the new value of RTTD. Let  $\beta$ =0.25 3A) Discuss how congestion window cwnd is updated when there is a new ACK received in slow start, (3) congestion avoidance and fast recovery states? Also, discuss how cwnd is updated when there is a duplicate ACK count is equal to 3 these states? 3B) Discuss the following DHCP steps: (3)i) DHCP server discovery ii) DHCP server offer(s) iii) DHCP request. 3C) Consider the virtual circuit network with interface (Ex: 1,2,3) and VC numbers (Ex: 24,...,114) (4)shown in Figure 1. Suppose host A wants to send packets to host B through VC path

Duration: 180 mins.

 $A \rightarrow R5 \rightarrow R1 \rightarrow R3 \rightarrow R6 \rightarrow B$  and assigns VC numbers 24, 44, 64, 94 and 114 to the five links in this path for this virtual circuit. Also, suppose host A wants to send packets to host C through VC path  $A \rightarrow R5 \rightarrow R1 \rightarrow R4 \rightarrow C$  and assigns VC numbers 11, 21, 31 and 41 to the four links in this path for this virtual circuit. Write the complete forward table with interface and VC number entries in all the routers in the VC path between A and B, A and C after the connection establishment.



Figure 1.

- 4A) Write two widely utilized routing protocols for intra-autonomous system routing on the Internet. (3) Examine the configuration of authentication methods, including 'simple' and 'MD5,' between OSPF routers.
  4B) The OSPF routing protocol uses a MAC rather than digital signatures to provide message integrity. (3) Illustrate a MAC was chosen over digital signatures.
- 4C) What is multicasting. How to identify the receivers of a multicast packet? Also write some (4) applications of multicasting.
- 5A) Write the process of random access MAC protocols in a step-by-step manner. (3)
- 5B) A switch is said to be self-learning, interpret how this self-learning capability is accomplished. (3)
- 5C) Suppose nodes A and B are on the same 10 Mbps broadcast channel, and the propagation delay (4) between the two nodes is 245 bit times. Suppose A and B send Ethernet frames at the same time, the frames collide, and then A and B choose different values of K in the CSMA/CD algorithm. Assuming no other nodes are active, can the retransmissions from A and B collide? For our purposes, it suffices to work out the following example. Suppose A and B begin transmission at t = 0 bit times. They both detect collisions at t = 245 bit times. Suppose KA = 0 and KB = 1. At what time does B schedule its retransmission? At what time does A begin transmission? (Note: The nodes must wait for an idle channel after returning to Step 2.) At what time does A's signal reach B? Does B refrain from transmitting at its scheduled time?

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