COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra.)
SHIVAJI NAGAR, PUNE - 411 005

END Semester Examination

CT-09005- Computer Networks

Course: B.Tech   Branch: Computer Engineering

Semester: Sem V

Year: 2014-2015   Max.Marks:60

Duration: 3 Hours   Time:- **2:00PM - 5:00PM**   Date: **2 5 NOV 2014**

**Instructions:**   MIS No. ☐☐☐☐☐☐☐☐☐

1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of anything like stationery, calculator is not allowed.
5. Assume suitable data if necessary.
6. Write your MIS Number on Question Paper
7. Answer any SIX full questions

Sl.No		Marks
1a	An organization is granted the block 16.0.0.0/8. The administrator wants to create 500 fixed length subnets.	4

    i.   Find the required subnet mask
    ii.   Find the number of addresses in each subnet
    iii. Find the first and last addresses in subnet 1
    iv. Find the first and last addresses which can be allocated in subnet 500.

b   Consider the following network topology, with hosts A and B connected through router R: 4
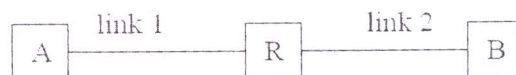
Which among the header fields in the following list the router R will change between when it receives the packet from Link1 and when it transmits the packet on Link2, when both are Ethernet links? Why?

Ethernet Header:
    A. Source address
    B. Destination address
    C. Checksum

IP Header:
    A. Source address
    B. Destination address
    C. Protocol
    D. TTL
    E. Header Length
    F. Header Checksum
    G. Identification

c   The options are part of main header in IPv4. Why does IPV6 use separate extension headers?   2
Explain the advantages.

2a   Fragmentation can degrade performance and increase the chances of packet loss. IPv6, for   3
      example, does not allow fragmentation. Explain how IPv6 achieves this.

b   Consider a global unicast IPv6 address: 2001:DB8:2A3C:F282:2B0:D0FF:FEE9:4143. What is the   3
      global unicast prefix of the organization, the subnet identifier and its interface identifier?

c   Consider a network with five nodes, N1 to N5, as shown below: 4
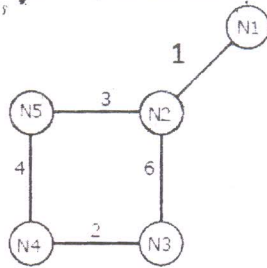
      Show the link state packets originated at every node. Show how does node N1 calculate the routing
   table from the link state packets?

3a   Explain the purpose of the following ICMP messages   3
            i. Time exceeded
            ii. Source quench
            iii. Redirection

b   Multicast routers need to know whether a group has members on a given network. Is there any   3
      advantage to them knowing the exact set of hosts on a network that belong to a given multicast
      group?

c   Consider the following features of TCP   4
            i)   Lost TCP acknowledgements do not necessarily force retransmission.
            ii) TCP never ACK an out-of-order segment
      By considering proper scenarios, justify the above features of TCP and show that TCP is reliable.

4a   With the help of state transition diagram, explain the path of state transitions in TCP for a normal   3
      connection termination initiated by a client and the server immediately agrees for the same.

b   A client uses UDP to send 16 bytes of data to a server. Calculate the efficiency (ratio of useful   3
      bytes to total bytes) of this transmission. Compare the efficiency, if TCP is used instead. Assume
      there is no options present at the IPv4 level

c   The following figure shows an activity of TCP. Explain the function of TCP during this activity.   4
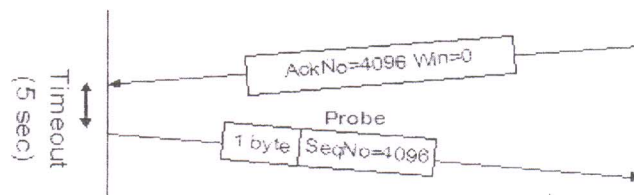

5a   In a TCP connection, the value of $cwnd$ is 3000 and the value of $rwnd$ is 5000. The host has sent   4
      2000 bytes which has not been acknowledged. How many more bytes can be sent? Justify your
      answer

b   Assume a TCP sender transmits 4 TCP segments with respective sequence numbers 1200, 2400,   4
      3600, and 4800. The sender receives four acknowledgements with the following sequence
      numbers, 2400, 2400, 2400, and 2401. Complete the figure in the next page to show what TCP
      segments are exchanged between sender and receiver in order to complete the all the segments
      reception at the receiver.

Seq # 1200

ACK
Seq # 2400
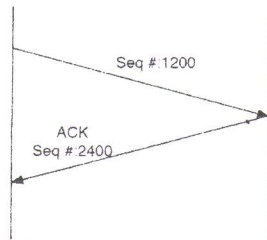
c   If flow control and error control are performed at the data link layer, then why is it also necessary 2
to perform flow and error control at the transport layer?

6a   Explain the functioning of centre based trees used by multicast routing protocols.   2

b   Consider the following graph of TCP congestion control, where the y-axis describes the TCP 5
window size of the sender.
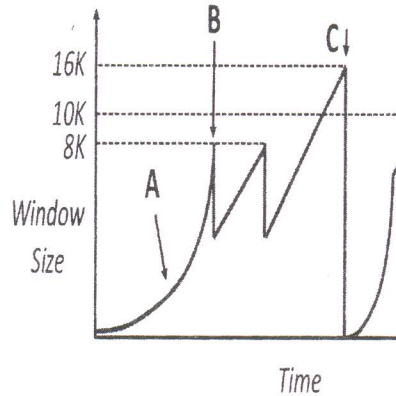
i.   What is the process at A called by?
ii.   Name the event at B that occurs that causes the sender to decrease its window.
iii.   What will be the new window size after B?
iv.   Does the event at B necessitate that the network discarded a packet (Yes or No)? Why?
v.   Name the event at C that occurs that causes the sender to decrease its window
vi.   Does the event at C necessitate that the network discarded a packet (Yes or No)? Why or
why not?

c   What are the different types of routers used in a MPLS network? Define their roles.   3

7a   Why does FTP use two standard ports where as other protocols in general use only one port? 2

b   Consider a transition where the client initializes by sending a request message and the server 4
replies by sending a response. With a proper diagram illustrate the HTTP transaction between the
client and server.

c   Assume that socket API is used to write a simple client/server application. Assume that a single 4
client is communicating with a single server using TCP. The following scenario shows the order in
which the functions are called on both the client and the server. Assume that all functions are
blocking, and there may be some latency between the client and server. Can the server ever get the
data sent by the client? (Yes or No). If not, explain why not and how to correct the sequence.

Client	Server
socket()	
connect()	
send()	
	socket()
	bind()
	listen()
	accept()
	recv()
close()	
	close()