Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY, MANIPAL 576104

(Constituent College of Manipal University)

FIRST SEMESTER M.Tech (Network Engg.) DEGREE END SEMESTER EXAMINATIONS NOV/DEC- 2015

SUBJECT : NETWORK PROTOCOLS AND PROGRAMMING – ICT-501

TIME: 3 HOURS **01/12/2015** **MAX. MARKS: 50**

Instructions to candidates

- **Answer any 5 FULL questions.**
- **Assume any missing data suitably.**

1A. Suppose host A is sending a large file to host B over a TCP connection. The two end hosts are 10 msec apart (20 msec RTT) connected by a 1Gbps link. Assume that they are using a packet size of 1000 bytes to transmit the file. Also assume for simplicity that ACK packets are extremely small and can be ignored.

i. At least how big would the window size (in packets) have to be for the channel utilization to be greater than 80%?

ii. Assuming infinite initial threshold, no losses and competing traffic, approximately how long (in seconds) would it take for the normal slow start mechanism to achieve 80% utilization?

1B. Explain how CIDR reduces the number of entries in a routing table. An ISP has a block of 1024 addresses. It needs to divide the addresses to 1024 customers. Does it need subnetting? Explain your answer.

1C. An end system sends 50 packets per second using the User Datagram Protocol (UDP) over a full duplex 100 Mbps Ethernet LAN connection. Each packet consists 1500 bytes of Ethernet frame payload data. What is the throughput (in Kbps), when measured at the UDP layer?

[5+3+2]

2A. Write the procedure for the implementation of OSPF routing algorithm. Given a graph as shown in Fig. Q.2A and a source vertex in graph(vertex 0), find shortest paths from source to all vertices in the given graph using Dijkstra's algorithm.

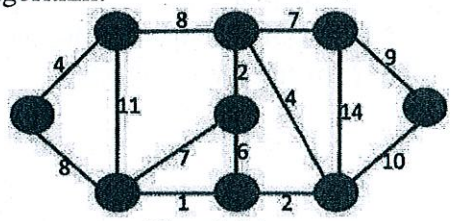

Fig. Q.2A

2B. Raw sockets are preferred in some applications rather than TCP and UDP sockets. Why? Explain with syntax how IP_HDRINCL socket option is set and also mention its use.

2C. What are the differences between membership report and leave report in IGMP? Also explain the role of IGMP in Multicast routing.

[5+3+2]

3A. Differentiate multicasting from multiple unicasting. Describe Reverse Path Broadcasting (RPB). What is the problem associated with Reverse Path Forwarding(RPF)? Explain with a sketch, how RPB differs from RPF.

3B. Compare and contrast TCP segment and SCTP packet. Explain why SCTP header is shorter when compared to TCP header?

3C. Write a procedure for any one of the transition strategies for transition from IPv4 to IPv6.

[5+3+2]

4A. In SCTP as part of transport layer implementation, the concept of chunks, multistreaming, multihoming is used unlike TCP(bytes and single stream). What are the performance benefits of such implementations in SCTP when compared to TCP? How does SCTP eliminate DoS attack?

4B. Consider that only a single TCP connection uses 10 Mbps link which does not buffer any data. Suppose that this link is the only congested link between the sending and receiving hosts. Assuming that the TCP sender has a huge file to send to the receiver, and the receiver's receive buffer is much larger than the congestion window. We also make the following assumptions: each TCP segment size is 1500 bytes; the two-way propagation delay (RTT) of this connection is 100 msec; and this TCP connection is always in congestion avoidance phase, that is, ignore slow start.

i. What is the maximum window size (in segments) that this TCP connection can achieve?

ii. What is the average window size (in segments) and average throughput (in bps) of this TCP connection?

4C. With necessary example, explain the concept of Address aggregation and Longest mask matching.

[5+3+2]

5A. The fragmentation module is incorporated in IP. Why? With necessary schematic, explain briefly the different modules in the design of IP.

5B. Describe the role of ICMP echo request-reply query message and destination–unreachable in ping and trace route applications.

5C. What is the purpose of authentication extension header in IPv6? Explain the procedure for calculation of authentication data.

[5+3+2]

6A. Develop a state transition diagram for SCTP and write a socket program for TCP server to setup a connection with the client.

6B. In RIP, why is the expiration timer value six times that of the periodic timer value? What is the size of a RIP message that advertises only one network? What is the size of a RIP message that advertises *N* packets? Devise a formula that shows the relationship between the number of networks advertised and the size of a RIP message.

6C. In some Internet application implementation, the developer might choose UDP rather than TCP to run an application Why? Justify with an example.

[5+3+2]