Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

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A Constituent Institution of Manipal University

I SEMESTER M.TECH. (COMPUTER NETWORKING AND ENGINEERING)

END SEMESTER EXAMINATIONS, NOVEMBER 2017

SUBJECT: COMMUNICATION NETWORK PROTOCOLS[ICT 5101]

REVISED CREDIT SYSTEM
(16/11/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer ALL the questions.
- Missing data if any, may be suitably assumed.

1A. In TCP, timers are used for the controlled operation. Discuss the various timers and its use. Show time-line diagram for the following scenario. Assume that the connection is established 5

(i) The client sends a segment carrying bytes 1401 to 1700
(ii) The server sends a segment carrying bytes 2001 to 2100 and acknowledging the first segment from the client.
(iii) The client sends a segment carrying bytes 1701 to 1900 and acknowledging the segment received, but the segment is lost.
(iv) The client sends a segment carrying bytes 1901 to 2100, but the segment is lost.
(v) Time out occurs at the client site.
(vi) The client resends a segment in response to time-out, this packet arrived.
(vii) The server sends an acknowledgment after ACK-delaying timer expires.
(viii) Another time-out occurs at the client site.
(ix) The client resends a segment in response to time-out, which arrives at the sender.
(x) The server sends an acknowledgment after ACK-delaying timer expires.

1B. Write a client and server program to set up data exchange between two machines using UDP sockets. 3

1C. Write the syntax of the socket option system calls to enable or disable Nagle's algorithm. 2

2A. The link state update packet is an important packet in OSPF. Discuss the functionalities and its use in OSPF . 5

2B. Describe the logic adopted in RPM. Show with necessary schematic that the grafting and pruning improves the performance of the Distance vector Multicast routing protocol. 3

2C. Explain the role of Karn's algorithm in RTT measurement. 2

3A. Write the schematic showing all the modules (IP package) used in the implementation of IP. 5

An ISP is granted a block of addresses starting with 190.90.0.0/17. The ISP wants to distribute these blocks to 3400 customers as follows:

(i) The first group has 100 medium-size businesses; each needs approximately 64 addresses.

(ii) The second group has 300 small businesses; each needs approximately 32 addresses.

(iii) The third group has 3000 households; each needs 4 addresses.

Design the subblocks and give the slash notation for each subblock. Find out how many addresses are still available after these allocations.

3B. Explain one of the strategies used to provide for a smooth transition from IPv4 to IPv6. 3
An organization is assigned the block 2000:1110:1287/48. What is the IPv6 address of an interface in the third subnet if the IEEE physical address of the computer is $(F5\text{-}A9\text{-}23\text{-}14\text{-}7A\text{-}D2)_{16}$.

3C. The state of SCTP receiver is as follows: 2

(i) The receiving queue has chunks 1 to 8, 11 to 14, and 16 to 20.

(ii) There are 1800 bytes of space in the queue.

(iii) The value of lastAck is 4.

(iv) No duplicate chunk has been received.

(v) The value of cumTSN is 5.

Show the contents of the SACK message sent by the receiver.

4A. Write the state transition diagram for the implementation of TCP client and SCTP client. 5
A series of 1000-bit frames have to be transmitted using the sliding window protocol (GoBack–N). Determine the link utilization for the following types of data link assuming a transmission bit rate of 1 kbps and 1 Mbps.

(i) A twisted-pair cable of 1 km in length

(ii) A satellite link of 72 ,000 km. Assume that the velocity of propagation of the first link is 2×10^{8} ms^{-1} and that of the second link 3×10^{8} ms^{-1}. Assume that the bit error rate is negligible and window size is 127.

4B. Develop and explain one application that uses Raw sockets, error reporting, and the query message of ICMP. 3

4C. What is silly window syndrome? Write the algorithms to address it. 2

5A. Describe the operation of BGP and RIP routing protocols. Assume suitable network scenario for each of the protocol. List the differences between these two protocols. 5

5B. Discuss the process adopted in SCTP to avoid the occurrence of DoS attack and to handle urgent data. 3

5C. Justify the need for general query and special query messages in IGMP. 2