MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University

FIFTH SEMESTER B.TECH (E & C) DEGREE END SEMESTER
EXAMINATION - NOV/DEC 2016
SUBJECT: COMMUNICATION NETWORKS (ECE - 309)

TIME: 3 HOURS   **MAX. MARKS: 50**

Instructions to candidates
- Answer **ANY FIVE** full questions.
- Missing data may be suitably assumed.

1A. Draw and explain the ISO: OSI reference model and explain the functions of each layer.

1B. A channel has $B = 4$ kHz and a signal-to-noise ratio of 30 dB. Determine maximum information rate for 128-level encoding.

1C. Four 1-kbps connections are multiplexed together.

Find (a) The duration of 1-bit before multiplexing,

(b) The transmission rate of the link.

(c) The duration of a time slot.

(d) The duration of a frame.

(5+3+2)

2A. A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is x^3+1. Show the actual bit string transmitted. Suppose the third bit from the left is inverted during transmission. Show that this error is detected at the receiver's end.

2B. Consider the 8-bit data word 110101100. Form the Hamming code word. Check for the errors if any in the received code word 11011010100. Also give the correct code word.

2C. Given 10 kbps link with 100ms latency and frame size of 1 kB. Using a sliding window with sender window size is 5, what is the maximum link utilization?

(5+3+2)

3A. Draw the FDDI frame format and explain its fields. Also mention the token format for the same.

3B. A large population of ALOHA users manage to generate 50 requests/sec, including both originals and retransmissions. Time is slotted in units of 40 msec.

(a) What is the chance of success on the first attempt?

(b) What is the probability of exactly k collisions and then a success?

(c) What is the expected number of transmission attempts needed?

3C. In the standard Ethernet with the transmission rate of 10Mbps, and length of the medium is 2.5Km, size of frame is 512-bits. The propagation speed of a signal in a cable is 2×10^8 m/sec. What is the efficiency?

(5+3+2)

4A. Draw the IPv4 and IPv6 headers and explain each field of the headers.

4B. Explain the exponential back off algorithm with an example to control congestion in the network layer.

4C. A computer on a 10Mbps network is regulated by a token bucket. The token bucket is filled at a rate of 2Mbps. It is initially filled to capacity with 16Megabits. What is the maximum duration for which the computer can transmit at the full 10Mbps?

(5+3+2)

5A. Explain counting to infinity problem with a suitable example and routing table updates. Also propose the remedies and update the routing table using remedies.

5B. Using Dijkstra's algorithm determine the cost of the cheapest path between a and z in the weighted graph shown in Fig. Q 5B.
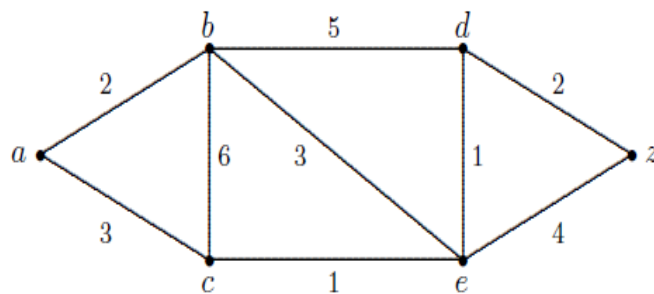

Fig. Q 5B

5C. A classful address in a block is given as 180.8.17.9. Determine the number of addresses in the block, the first address, and the last address.

(5+3+2)

6A. Draw the TCP header. Explain each field of it.

6B. Explain the services provided by the urgent agent in SMTP.

6C. Give the format of URL. Also explain each field of URL.

(5+3+2)