Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

FIFTH SEMESTER B.Tech. (E & C) DEGREE END SEMESTER EXAMINATION
NOV/DEC 2017
SUBJECT: COMMUNICATION NETWORKS (ECE - 3105)

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

Instructions to candidates

- Answer **ALL** questions.
- Missing data may be suitably assumed.

1A. Draw the ISO:OSI and TCP/IP Reference models and explain the functions of each layer.

1B. i) Television channels are 6 MHz wide. How many bits/sec can be sent if 4-level digital signals are used? Assume a noiseless channel.
ii) If a binary signal is sent over a 3-kHz channel whose SNR is 20dB, What is the maximum achievable data rate?
iii) What is the bit rate that requires to digitize the human voice? Assume 8 bits per sample.

1C. Two channels, one with a bit rate of 190kbps and another with a bit rate of 180 kbps are to be multiplexed using g pulse stuffing TDM with no synchronization bits. Find a) the size of a frame in bits b) the frame rate c) the duration of a frame d) the date rate

(5+3+2)

2A. i) A channel has a data rate of 4 kbps and a propagation delay of 20msec. For what range of frame sizes does stop-and-wait give an efficiency of at least 50%?
ii) Consider the use of 10 K-bit size frames on a 10 Mbps satellite channel with 270 msec delay. What is the link utilization for stop-and-wait ARQ technique assuming $P = 10^{-3}$?
iii) A slotted ALOHA network transmits 200-bit frames on a shared channel of 200 kbps. What is the throughput if all the stations together produces 1000 frames per second?
iv) In CSMA/CD protocol, the channel has 1Mbps bit rate and maximum network span of 10 kms with no repeaters. If a medium propagation delay of 4.5 ns / meter, find the minimum frame length.

2B. For the generator polynomial, g = 110011 and the message bits, m = 11100011 find the CRC and the transmitted string T.

2C. At DLL, perform byte-stuffing for the following text:

i) CLASS COMMITTEE MEETING Given E→ ESC Character, T → Flag bytes

ii) LIVE LIKE A LION Given L→ ESC Character, E → Flag bytes

iii) EVERY ONE HAS SELF ESTEEM Given S→ ESC Character, E → Flag bytes

(5+3+2)

3A. i) Draw the frame structure of IEEE 802.3 and mention the significance of each field.
ii) Form the Hamming codeword for the 8-bit data word 11000100.
iii) If the received Hamming codeword at the receiver is 110110101001, find whether the receiver accepts the message with or without corrections.

3B. i) In a CSMA/CD LAN of 2 km using copper wire running at 100 Mbps, what would be the minimum frame size to hear all collisions?

ii) Consider the use of 10 K-bit size frames on a 10 Mbps satellite channel with 270 ms delay. What is the link utilization for Go-back-N ARQ technique with window size of 7 assuming $P = 10^{-3}$?

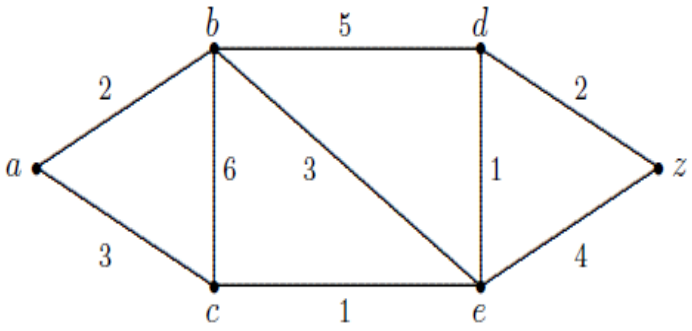
3C. The maximum length of a 10Base5 cable is 500 meters. a) How long does it take for a bit to travel from the beginning to the end of the network? b) find the maximum time it takes for a sender to detect a collision. c) find the minimum size of an Ethernet frame for collision detection d) Find the bit length in the medium.

(5+3+2)

4A. i) MIT is allotted with the block 130.34.12.64/26. The MIT needs four subnetworks, each with an equal number of hosts. Design the subnetworks with first and last addresses in each subnetwork.
ii) Draw the IPv4 header format. Mention the significance of each field.

4B. i) Let a MU Network having a capacity of 1Mb of data is arriving at the rate of 25 Mbps for 40 msec. The Token arrival rate is 2 Mbps and the capacity of bucket is 500kb with maximum output rate 25 Mbps. Find a) The burst Length b) Total output time.
ii) Let an ATM network having a leaky bucket with capacity of 1Mb and data is input at the rate of 25 Mbps. Find a) the time needed to fill the bucket b) If the output rate is 2 Mbps, the time needed to empty the bucket.

4C. Use Dijkstra's algorithm to find the shortest distance path between nodes 'a' and 'z' in the following weighted graph. Show the iterations in the form of a Table.



(5+3+2)

5A. Draw the IPv6 datagram header format and mention the significance of each field. Also write about the various types of optional headers available in IPv6.

5B. Why FTP is essential in file transfer between client and server? Explain the functioning of the FTP in detail with relevant diagrams.

5C. Write the steps of 3-way and 4-way handshaking in TCP with suitable examples.

(5+3+2)