Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL (A constituent unit of MAHE, Manipal)

FIFTH SEMESTER B.TECH. (E & C) DEGREE END SEMESTER EXAMINATION NOVEMBER 2018 SUBJECT: COMMUNICATION NETWORKS (ECC. 2105)

SUBJECT: COMMUNICATION NETWORKS (ECE - 3105)

TIME: 3 HOURS

MAX. MARKS: 50

Instructions to candidates

- Answer ALL questions.Missing data may be suitably assumed.
- 1A. i. The digital signal is designed to permit 960 kbps on a transmission link with a bandwidth of 180KHz. Determine (a) number of levels (b) S/N ratio.
 - ii. What is the minimum SNR needed to put a T1 carrier on a 100KHz line?
- 1B. 20 digital sources are multiplexed using synchronous TDM. Out of which 5 are with a bit rate of 100 kbps, 10 with a bit rate of 50 kbps, and the last 5 with a bit rate of 90 kbps. Design a synchronous TDM for these sources (The unit of data is 1 bit), and find:

a) The output frame rate b) The output data rate c) Efficiency of the system

1C. Draw the ISO:OSI Reference model and mention the functions of each layer.

(4+3+3)

(4+3+3)

- 2A. If the data to be transmitted at DLL is 1110011001011. Form the codeword using CRC method with the generator polynomial 11001.
- 2B. The frames of 2KB each are generated at node A and sent to node C through node B. The links between A and B, B and C are full-duplex. The stop-and-wait protocol used in the links which error-free.



The data rate between A and B is 100 kbps.

The propagation delay is 4 μ sec/km for both lines.

ACK frames are separate have negligible length. Find the data rate of $B \rightarrow C$ link to avoid buffer overflow at node B.

- 2C. Mention any THREE techniques to perform framing at DLL with an example for each technique.
- 3A. In a 100Base-FX Ethernet,
 - a) How long does it take for a bit to travel from the beginning to the end of the network? Ignore any propagation delay in the equipment.
 - 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.

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- 3B. A network of 'N' stations share a 128-kbps channel using slotted ALOHA protocol. Each station outputs a 2kb frame on an average of once every 100 seconds, even if the previous one has not yet been sent (e.g., the stations can buffer outgoing frames). What is the maximum possible number of nodes in the network?
- 3C. Consider a 4000m, 16Mbps token ring containing 80 stations. Every station has data to transmit with equal priority. The maximum data allowed to transmit is 1000 bytes before giving up the token. Once a station gives up a token how long will it take for that station to get the token again? Assume frame processing time at each station is 4-bits.

(4+3+3)

- 4A. An ISP is granted a block of addresses with 198.100.78.128/20. The ISP needs to distribute these addresses to three groups of customers as follows:
 - a) The first group has 16 customers; each needs 64 addresses.
 - b) The second group has 16 customers; each needs 56 addresses.
 - c) The third group has 8 customers; each needs 28 addresses.

Design the sub-blocks and find out the range of addresses are still available after these allocations.

4B. Find the shortest path to node 6 from all the nodes using Bellman Ford in the following topology before and after the link breaks between nodes 3 and 6. [Destination node is '6']



4C. Let a MU Network having a capacity of 100Mb of data is arriving at the rate of 25 Mbps for 4sec. The Token arrival rate is 5 Mbps and the capacity of bucket is 20Mb with max. output rate 25 Mbps. Find: i) The burst Length ii) Total output time.

(4+3+3)

- 5A. Mention the stages in delivering an email from sender to receiver using SMTP with necessary diagrams.
- 5B. Draw the TCP Header format and explain each field.
- 5C. Write the steps to map the host name to an IP Address using DNS Protocol.

(4+3+3)