Enrolment No: E22CSEV0827

Name of Student: MADHAV GUPTA

Department/ School: ScSET

MID-TERM EXAMINATION, EVEN SEMESTER MARCH 2024

COURSE CODE: CSET207
COURSE NAME: Computer Networks
PROGRAM: B.Tech

MAX. DURATION — **1 HRS**

TOTAL MARKS — **20**

Q. No.	A1	A2	A3	B1	B2	B3
CO	1,2	1	1,3	1,2	1,2	1,2
PO	1,2	1	2	1,2	2	3

Mapping of Questions to Course and Program Outcomes

GENERAL INSTRUCTIONS: -

1. Do not write anything on the question paper except **name, enrolment number** and **department/school.**

2. Carrying mobile phones, smartwatches and any other non-permissible materials in the examination hall is an act of **UFM.**

COURSE INSTRUCTIONS:

a) All the questions are compulsory.

b) Please write precisely and neatly.

c) Please make clear diagram wherever required.

SECTION A   Max Marks: 12

A1) Analyze the network with n devices to determine the requisite number of cable links for mesh, ring, bus, and star topologies. Justify each calculation, highlighting the unique connectivity and features of each topology. **(4)**

A2) You are a computer engineering student interning at a telecommunications company specializing in data transmission technologies. As part of your internship, you've been assigned a project to explore various line coding schemes used in digital communication systems. Your supervisor has provided you with a dataset consisting of a binary data stream "00110011" and requested you to analyze and draw the digital signals generated by (i) Unipolar NRZ- L (ii) Manchester line coding techniques. Draw the signals using above mentioned line coding schemes neatly. **(4)**

A3) The company aims to transfer a significant 3000 MB file across a network containing 15 routers. The link between routers operates at 4 Mbps. Furthermore, each router incurs queuing time of 3 microseconds and processing time of 2 microseconds. The link spans 2500 Km with a speed of light at 2 x 10^8 m/sec. What is the estimated total delay (latency) for the file transfer, and what strategies can the company employ to minimize it?

(4)

SECTION B   Max Marks: 8

B1) Raj is employed by the central bureau of investigation (CBI) and desires to transmit confidential information to his boss. In order to accomplish this, he has employed the technique of bit stuffing, which involves strategically inserting additional bits into the data sequence. The purpose of this is to ensure synchronization and prevent any misinterpretation of the data. In this particular scenario, Raj transmits the data sequence 01110110 using a flag that serves as a frame delimiter, with a sequence of 0111. By following the guidelines and principles of the data link protocol, we can estimate the data sequence that Raj's boss would receive.

(3)

B2) Consider a scenario of self-driving connected vehicles in which a robotic sensor of one vehicle is transmitted some data stream to the other vehicle on the road-side unit. This communication channel uses Cyclic Redundancy Check (CRC) algorithm for vehicle-to-vehicle communication for detecting accidental errors during data transmission. Suppose a sensor of first vehicle is transmitting a stream 1101011011 by using the standard CRC algorithm for which the generator polynomial is $x4+x+1$. What is the actual bit string received on the second vehicle transmitted by the robotic sensor?

(3)

B3) Fill in the blanks   (1+1)

(i)   In the TCP/IP protocol stack, _____ ensures reliable and ordered delivery of data packets between communicating devices.

(ii)   If the bandwidth of the channel is 5 Kbps, how long does it take to send a frame of 100,000 bits out of this device? It takes _____ seconds to send the frame.

-ALL THE BEST-