

Answer only five of the following problems:

**Problem 1:**

- 1.1 Why should we divide a network into two LANs with the same protocol and then connect them using a bridge?
- 1.2 At a propagation speed of  $400 \text{ m}/\mu\text{s}$ , what is the effective length added to a ring by a bit delay at each repeater at 60 Mbps?

**Problem 2:**

Compare, using schematics whenever possible, between the following two levels of addressing: MAC address, and LLC address.

**Problem 3:**

- 3.1 Using schematics, describe the LAN access technique in a token ring LAN.
- 3.2 Using schematics, discuss the IPv4 versus IPv6 frame format.

**Problem 4:**

- 4.1 Using a schematic, describe the TCP/IP operation at the sender, receiver and router sides.
- 4.2 Using a schematic, compare IPv4 address space, and IPv6 address space.

**Problems 5:**

For the bit stream 1101010, sketch the waveforms for differential Manchester and Miller coding.

**Problem 6:**

Using schematics, describe the protocol architecture for a router, and a bridge.

**Problem 7:**

Consider the  $M$  by  $N$  grid of stations shown in figure 1 which are to be connected by a local area network. Let the stations be spaced a distance  $d$  apart and assume that interconnection cables will be run in ducts that connect nearest-neighbor stations (that is, ducts can not run diagonally, only horizontally and vertically) Show that for a bus configuration, the cable length for interconnecting the stations is  $(MN-1)d$ . Repeat for a ring topology.

