

Full Marks: 30

Attempt question 1 and any three from the rest  
All parts of the same question must be answered together

1. **Mandatory Question**

(a) Draw the (i) NRZ-I (ii) NRZ-L (iii) Bipolar-AMI (iv) Manchester, (v) Differential Manchester encodings waveform for the bit sequence **0 1 0 1 1 1 0 0**.

(b) What is the use of Carrier Signal in communication system? What is bandwidth of an Information Signal?

(c) The following 8 bits '**1 1 0 1 1 0 0 1**' are to be transmitted using the CRC polynomial  $x^3 + 1$ . What is the bit pattern that should be transmitted?

(d) "The maximum length of a 10mbps Ethernet LAN is 2500 meter, whereas it gets reduced to 250 meter in the case of a 100mbps Ethernet LAN" – explain.

$[5 + 3 + 3 + 4 = 15]$

2. In a 10mbps Ethernet (CSMA/CD) network, two stations A and B situated apart 2000 meter and the propagation speed is  $1.75 \times 10^8$  meter/sec. If a station A transmitting at time  $T_1$ , then answer with justification.

(a) Does the protocol allow station B to start transmitting at time  $T_1 + 9 \mu s$ ?

(b) Does the protocol allow station B to start transmitting at time  $T_1 + 12 \mu s$ ?

25.7  
22.8 us  
11.4 [5]

3. Two stations in the network use two-dimensional even parity scheme for error detection purpose. The bit sequence of a received frame at the Rx station is as follows:

**1 1 0 0 1 0 1 0 0 0 1 1 0 0 1 1 1 0 0 0 1 0 0 0 1 1 1 0 1 0 1 1 1 1 0 0 1 0 0 1 0**

(a) Specify the actual information bits (information without parity bits) sent by the Tx station. Assume that no error occurred in the actual information part.

(b) Is this frame going to be accepted by the receiver - why?

$[4+1=5]$

4. (a) Explain 'p-persistent CSMA'. Discuss the effects of the choice of the value of 'p' on the performance of p-persistent CSMA.

(b) Ethernet uses which type of p-persistent CSMA?

$[4+1=5]$

5. (a) In the Go-Back-N ARQ protocol, state the restriction on the maximum window size, and justify the restriction.

(b) Is the same restriction sufficient for selective reject/Repeat ARQ? Justify your answer.

$[3+2=5]$