

(3 Hours)

[Total Marks : 100

- N.B. : (1) Question No.1 is compulsory.
 (2) Attempt any four questions out of remaining six questions.

Q.1 a) Compare IP network and Telephone network. [10]

b) Error –Control procedures are specified in each layer of the OSI Reference Model.

Indicate the layers at which each of the following errors might occur. [10]

- (i) Noise on the transmission link converts a 0 bit to a 1 bit
- (ii) A packet is routed to the wrong destination.
- (iii) A frame is received out of sequence.
- (iv) A packet- switching network delivers a data unit to a terminal attached to it out of sequence.
- (v) A printer printing halfway through a line is suddenly commanded by mistake to return to the beginning of a line.
- (vi) During a half duplex mode session the transmitting user starts receiving data from the user at the other end.

Q.2 a) Explain SONET multiplexing and SONET frame structure. [10]

b) Consider a multistage switch that consists of N inputs grouped into N/n groups of n input lines. Each of the first stage switch consists of $n \times k$ array of crosspoints. [10]

- (i) For $N = 32$, compare the number of crosspoints required by a nonblocking switch with $n = 16$ and repeat for $n = 8$.
- (ii) For $N = 16$, $n = 4$, $k = 2$ find the maximum number of connections that can be supported at any given time.

Q.3 a) Derive the transmission efficiency of Go back N ARQ. State the effect of Bit Error Rate and Delay- Bandwidth Product on the transmission efficiency. [10]

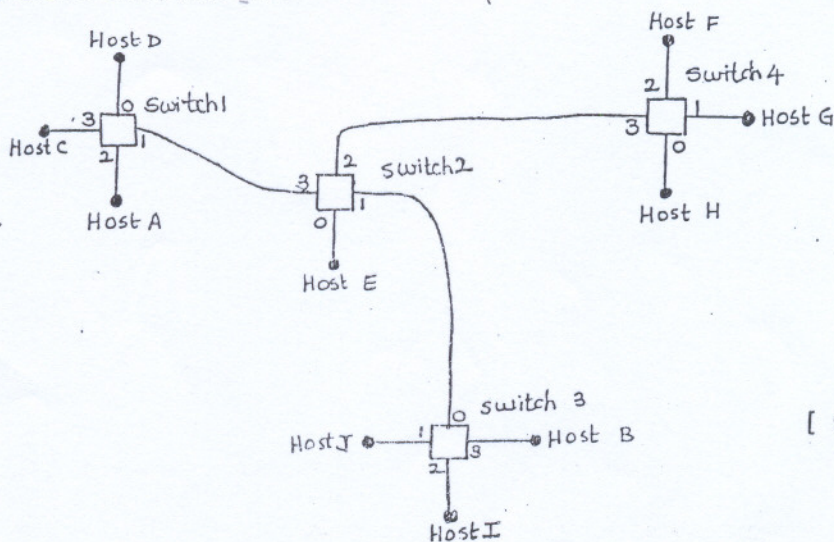
b) Write detailed note on HDLC data link control. [10]

Q.4 a) Explain the various transmission media in detail. [10]

b) Explain the spanning tree algorithm with reference to frame forwarding, address learning and loop resolution. [10]

Q.5 a) Using the example network given in figure 1 give the virtual circuit tables for all the switches after each of the following connections is established. Assume that the sequence of connections is cumulative ; i.e. the first connection is still up when the second connection is established, and so on. Also assume that the VCI assignment always picks the lowest unused VCI on each link, starting with 0. [10]

- (i) Host A connects to Host B.
- (ii) Host C connects to Host G.
- (iii) Host E connects to Host I.
- (iv) Host D connects to Host B.
- (v) Host F connects to Host J.
- (vi) Host H connects to Host A.



[TURN OVER

b) Define the following parameters for a switching network: [10]

N = number of hops between two given end systems

L = message length in bits

B = data rate, in bits per second (bps), on all links

P = fixed packet size, in bits

H = overhead (header) bits per packet

S = call setup time (circuit switching or virtual circuit) in seconds

D = propagation delay per hop in seconds

For $N = 4$, $L = 3200$, $B = 9600$, $P = 1024$, $H = 16$, $S = 0.2$, $D = 0.001$, compute the end-to-end delay for circuit switching, virtual circuit packet switching and datagram packet switching. Assume that there are no acknowledgements. Ignore processing delay at the nodes.

Q.6 a) Explain TCP in detail. Compare TCP and UDP. [10]

b) Identify the address class of the following IP addresses: 200.58.20.165; 128.167.23.20

Also perform CIDR aggregation of the following /22 IP addresses: 128.56.24.0/22;

200.96.87.0/22

[10]

Q.7 Write detailed note on (any two) [20]

a) Hubs, Bridges and Switches.

b) Dijkstra's algorithm for finding the least cost path from a specified node S to a specified node T.

c) BISDN Reference Model, ATM cell header.