(3 Hours) **[Total Marks: 80]**

NB: 1) Question No. 1 Compulsory.
2) Attempt any three from the remaining questions.
3) Assume suitable data wherever necessary.

Q.1 Answer **any FOUR**

a) Explain different types of network addresses. 5
b) Compare TCP and UDP. 5
c) List the categories of UTP cables. How is noise interference minimized in twisted pair cables? 5
d) Distinguish between synchronous and statistical TDM. 5
e) What is sub netting? List advantages and disadvantages of the same. 5

Q.2.a Explain Different ARQ techniques. Also explain the maximum window size for each with justification. 10

Q.2.b What is piggybacking? Give and example of Piggybacked frame. 10
ketch the appropriate HDLC frames for the following scenario involving Primary station 'A' and two Secondary stations B and C.

1. Primary station A wishes to establish a Normal Response mode link with Secondary stations B and C.
2. Both the stations B and C , send positive ackowledgements to A.
3.Station A sends a polling command to B and B sends 4 data frames. The third frame is lost during transmission.
4. Assuming Selective repeat ARQ, station A sends negative acknowledgement to station B.
5. Station B resends the frame and A sends positive acknowledgement.
6. Station A now polls station C and station C responds with ready response. A sends three data frames to C and C sends positive acknowledgement to indicate the receipt of error free data frames.

Q.3.a Differentiate between IPv4 and IPv6. ExplainTunneling. Determine the class and network address for the following IP addresses(Assuming subnetting is not being used and use default mask) 10
1). 84.42.58.11 2). 195.38.14.13 3). 144.62.12.9

Q.3.b What is meant by 'blocking' in circuit switching networks? Bring out the advantages of multi stage space division switching over single stage switching. (1). Sketch the three stage Space Division switch with N=15, group size of n=5, k=2. What is the condition required to make it non blocking? (2). For the same specifications sketch three stage TST switch using TSI modules. 10

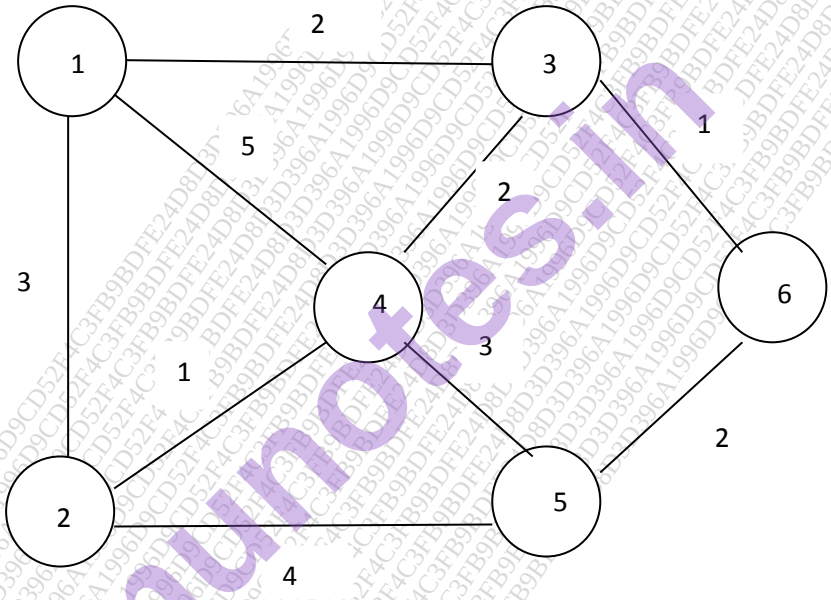
Q.4. a Draw OSI reference model and explain function of each layer. Name the layers responsible for (1). end to end reliability (2). link to link reliability. 10

Q.4. b Define the utilization or efficiency of the line and derive the expression for stop and wait flow control. Calculate the maximum link utilization for the following cases:- 10

1. Stop and wait flow control
2. Sliding window flow control with window sizes of 4 and 7 .

Link specifications:
Frame length= 1000 bits/frame
Velocity of propagation = 2 X 10^8 m/sec
Link distance= 20km
Data rate= 20 Mbps

Q.5.a Apply Dijkstra's and Bellman Ford algorithm to the given network and find the least cost path between source node 1 to all other nodes. 10



Q.5.b Draw and Explain TCP header format with the help of a neat diagram. 10

Q.6. Write short note on:**(Any TWO)** 20

a) Congestion control techniques
b) ADSL
c) Compare IPv4 and IPv6
d) CSMA/CD