

**Fourth Semester B. Tech. (Computer Science and Engineering)
(Data Science) Examination**

COMPUTER NETWORK

Time : 3 Hours]

[Max. Marks : 60

Instructions to Candidates :—

- (1) All questions are compulsory.
- (2) All questions carry marks as indicated.
- (3) Explain your answer with neat sketches, wherever applicable.

1.
 - (a) In what way the TCP/IP and OSI models are same ? In what way are they different ? 5 (CO 1)
 - (b) Consider a chip sequence, $c1 = [+1, +1, +1, +1]$, $c2 = [+1, -1, +1, -1]$, $c3 = [+1, +1, -1, -1]$ and $c4 = [+1, -1, -1, +1]$.
Consider that station 1 and 3 are silent. Station 2 and 4 has Data bits 0 and 1 for transmission respectively.
 - (i) What will be the data on the channel ?
 - (ii) Show that the bit received (at station 2) is 0. Apply decoding technique of CDMA. 5 (CO 1)
2.
 - (a) How many parity bits are needed to transmit the bit pattern containing "11010110111011101111" ? Find out the Hamming code, if this bit pattern is sent in ODD parity. 5 (CO 2)
 - (b) Compute the minimum size of the sending window if sliding-window ARQ is to be used with a transmission efficiency of 100% under error-free conditions. Assume that the user data frame size is 1250 bytes, link rate is 1 Mbps and round-trip propagation delay is 10ms. Ignore ACK frame size, header/CRC overhead and processing delays. Also discuss ARQ/PAR protocol. 5 (CO 2)

3. (a) How many persistence strategies do CSMA adopts ? Explain them. Elaborate the working of CSMA/CD and CSMA CA. 5 (CO 2)
- (b) A network with CSMA/CD protocol in the MAC layer is running at 1 Gbps over a 1 km cable with no repeaters. The signal speed in the cable is 2×10^8 m/sec. What is the minimum frame size for this network ?

OR

ALOHA users generate 100 requests/sec, including both originals and retransmissions. Time is slotted in units of 60 msec :

- (a) What is the chance of success on the first attempt ?
- (b) What is the probability of exactly k collisions and then a success ?
- (c) What is the expected number of transmission attempts needed ? 3 (CO 3)
- (c) Write and Explain Hidden station and Exposed Station problem. 2 (CO 1)
4. (a) State and explain the optimality principle for routing. For hierarchical routing with 4800 routers, what region and cluster sizes should be chosen to minimize the size of the routing table for a three-layer hierarchy ? A good starting place is the hypothesis that a solution with k clusters of k regions of k routers is close to optimal, which means that k is about the cube root of 4800 (around 16). Use trial and error to check out combinations where all three parameters are in the general vicinity of 16. 5 (CO 3)
- (b) (i) Find the number of addresses in the block if one of the addresses is 140.120.84.20/22.
- (ii) Find the last address in the block if one of the addresses is 140.120.84.20/22.

OR

A host with IP address 140.01.3.29 and physical address B46551022D10 has a packet to send to another host with IP address 140.01.43.14 and physical address A46EF45F83AB. The two hosts are on the same Ethernet network. Show the ARP request and replay packets encapsulated in Ethernet frames. 3 (CO 2)

- (c) Write a short note on RARP protocol. 2 (CO 1)

5. (a) Imagine that a two-way handshake rather than a three-way handshake were used to set up connections. In other words, the third message was not required. Are deadlocks now possible ? Give an example or show that none exist.

OR

For a 1-Gbps network operating over 4000 km, the delay is the limiting factor, not the bandwidth. Consider a MAN with the average source and destination 20 km apart. At what data rate does the round-trip delay due to the speed of light equal the transmission delay for a 1-KB packet ?
4 (CO 2)

- (b) Explain the fields in TCP header in detail. 3 (CO 1)
- (c) If the TCP round trip time is 15 msec and acknowledgments come after 25, 36 and 20 msec respectively. What is the new RTT estimate ? Used $\alpha = 0.7$. 3 (CO 3)
6. (A) Illustrate the Bluetooth architecture in detail. 4 (CO 3)
- (B) Explain in detail the operations involved in SNMP protocol. 3 (CO 3)
- (C) Describe the working of File transfer protocol in detail. 3 (CO 3)

