Time: 3 Hours   Max. Marks: 100

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A   20

1. Attempt all parts:-

1-a.   Which of the following are transport layer protocols used in networking? (CO1,   1
          K2,K6)

    (a)   TCP and FTP

    (b)   UDP and HTTP

    (c)   TCP and UDP

    (d)   HTTP and FTP

1-b.   A topology that involves Tokens. (CO1, K2,K6)   1

    (a)   Star

    (b)   Ring

    (c)   Bus

    (d)   Daisy Chaining

1-c.   Which is more efficient for error detection? (CO2, K2, K6)   1

    (a)   Parity check

    (b)   Cyclic redundancy check

    (c)   Parity & Cyclic redundancy check

    (d)   None of the mentioned

1-d.   The data link layer divide the stream of bits received from the network layer into   1
          data units is known as_____. (CO2, K2, K6)

    (a)   frame

(b)   segment

(c)   datagrams

(d)   message

1-e.   How many unique IPv4 addresses are available in total? (CO3, K3, K4, K6)   1

(a)   2^16

(b)   2^32

(c)   2^64

(d)   2^128

1-f.   A router receives a packet with the destination address 132.7.21.84. Find the network address of the packet. (CO3, K3, K4, K6)   1

(a)   1.32.7

(b)   132.7

(c)   13.27

(d)   21.84

1-g.   What does the sliding window protocol help with in TCP? (CO4, K2, K4)   1

(a)   Reducing congestion

(b)   Encrypting data packets

(c)   Managing flow control and optimizing transmission rates

(d)   Avoiding network errors

1-h.   Which algorithm is used in TCP to increase the window size exponentially? (CO4, K2, K4)   1

(a)   Slow start

(b)   Congestion avoidance

(c)   Fast retransmit

(d)   Additive Increase/Multiplicative Decrease (AIMD)

1-i.   A company implements public-key cryptography for secure communication between its employees and the company servers. What is the key characteristic that distinguishes public-key cryptography from symmetric key cryptography? (CO5, K2)   1

(a)   Public-key utilizes shorter key lengths compared to symmetric key.

(b)   Public-key uses a key pair (public and private) for secure communication.

(c)   Public-key employs a single key for both encryption and decryption.

(d)   Public-key offers faster processing speed compared to symmetric key.

1-j.   Application layer offers _____ service. (CO5, K2)   1

(a)   End to end

(b)   Process to process

(c)   Host to host

(d)   Node to node

2. Attempt all parts:-

2.a.	How are the guided media different from unguided transmission media? (CO1, K2,K6)	2
2.b.	Compare bit stuffing and byte stuffing in DLL Layer. (CO2, K2, K6)	2
2.c.	Define the term IP address and MAC address with example. (CO3, K3, K4, K6)	2
2.d.	Explain "round-trip time" (RTT) in networking? (CO4, K2, K4)	2
2.e.	Explain why the World Wide Web is essential in modern communication. (CO5, K2)	2

SECTION-B   30

3. Answer any <u>five</u> of the following:-

3-a.	What is the total delay (Latency) for a frame of size 5 million bits that is being sent on a link with 10 routers each having a queuing time of 2 micro second and a processing time of 1 microsecond. The length of the link is 2000 km. The seed of light inside the link is $2*108$ m/s. The link has a Bandwidth of 5 Mbps. (CO1, K2, K6)	6
3-b.	Explain each layer of the OSI Model with the help of diagram. (CO1, K2, K6)	6
3-c.	Summarize Stop and wait protocol with its advantages and disadvantages. (CO2, K2, K6)	6
3-d.	Explain the checksum method along with an example to illustrate how it works? (CO2, K2, K6)	6
3-e.	Discuss IPv4 routing mechanisms. Explain the concepts of routing tables, routing protocols and how routers use these tables to forward packets to their destination. (CO3, K3, K4, K6)	6
3.f.	List the key characteristics that differentiate TCP from UDP? Also discuss the working of Transmission control protocol. (CO4, K2, K4)	6
3.g.	Explain the following protocols in detail: (a) POP (b) SMTP (c) VPN (CO5, K2)	6

SECTION-C   50

4. Answer any <u>one</u> of the following:-

4-a.	Explain the following types of multiplexing with diagram: a) TDM b) FDM c) WDM (CO1, K2, K6)	10
4-b.	Discuss various types of networks topologies in computer network. Also discuss various advantages and disadvantages of each topology. (CO1, K2, K6)	10

5. Answer any <u>one</u> of the following:-

5-a.	Compare the following controlled access protocol in detail: a) Reservation	10

b) Polling
c) Token Passing (CO2, K2, K6)

5-b.	Differentiate between Simple Parity checking and Two-dimensional Parity checking method. If the receiver receives the hamming code 1001001, perform the error detection and error correction. (CO2, K2, K6)	10

6. Answer any <u>one</u> of the following:-

6-a.	Define Routing? Explain its types and discuss the different routing algorithms and protocols used in networking. (CO3, K3, K4, K6)	10
6-b.	Explain the following with diagram (a) IP (b) CIDR (c) ARP (d) RARP (CO3, K3, K4, K6)	10

7. Answer any <u>one</u> of the following:-

7-a.	List the main parameters of Quality of Service (QoS) in computer networks, and how do they influence the performance of real-time applications? (CO4, K2, K4)	10
7-b.	Let the size of congestion window of a TCP connection be 32 KB when a timeout occurs. The round-trip time of the connection is 100 msec and the maximum segment size used is 2 KB. Determine the total time taken (in msec) by the TCP connection to get back to 32 KB congestion window. (CO4, K2, K4)	10

8. Answer any <u>one</u> of the following:-

8-a.	(a) How does cryptography enhance data security in computer networks. Also provide examples of common encryption and decryption methods. (b) Explain firewall and its various types. What role do firewalls play in protecting against unauthorized access. (CO5, K2)	10
8-b.	Explain the following a) Domain Name System b) WWW c) HTTP d) FTP (CO5, K2)	10