F – 54302

BE Degree Examination December 2022

Fifth Semester

Computer Science and Engineering

20CST51 – COMPUTER NETWORKS

(Regulations 2020)

Time: Three hours   Maximum: 100 marks

Answer all Questions

Part – A (10 × 2 = 20 marks)

1. Define processing delay and queuing delay.   [CO1,K1]

2. Differentiate between packet switching and circuit switching.   [CO1,K2]

3. List two Internet applications and the application layer protocols that they use.   [CO2,K1]

4. Define handshaking.   [CO2,K1]

5. Consider sending a 3000 byte datagram into a link that has a MTU of 500 bytes. Suppose   [CO3,K2]
    the original datagram in stamped with the ID 422. How many fragments are generated?

6. State the significance of selective repeat protocol.   [CO3,K1]

7. Mention the important of CIDR addressing.   [CO4,K1]

8. Recall the role of DHCP in networking applications.   [CO4,K1]

9. State the purpose of ARP in a network.   [CO5,K1]

10. Draw the Ethernet frame structure.   [CO5,K1]

Part – B (5 × 16 = 80 marks)

11. a. i) Consider two hosts A and B, connected by a single link of rate R bps.   (8) [CO1,K3]
            suppose that the two hosts are separated by 'm' meters and the propagation
            speed along the link is s meters/sec. Host A is to send a packet of size L bits
            to Host B. Answer the following:

            1) Express propagation delay d_{prop}, in terms of 'm' and 's'

            2) Calculate the transmission time of a packet, 'd_{trans}' in terms of L and R.

            3) Give the expression for end-to-end-delay (Ignore processing and
                queuing delay)

            4) Suppose Host A begins to transmit at time t = 0. At time t = d_{trans},
                where is the last bit of the packet?

            5) Suppose s = 2.5 * 10^8, L = 2000 bytes and R = 10 Mbps. Find the
                distance 'm' so that d_{prop} equals d_{trans}.

        ii) Classify the different types of access networks. Provide a brief comparison   (8) [CO1,K2]
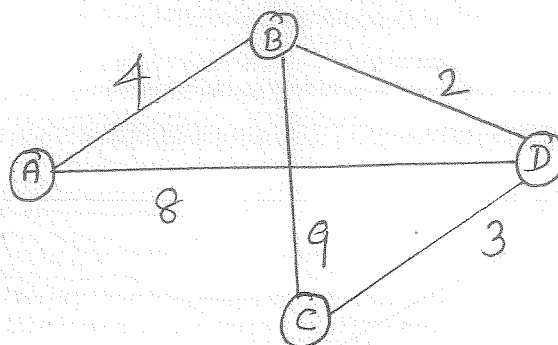   of them.

(OR)

b. i) Draw the IP protocol stack for a typical network. Highlight the role of each (8) [CO1,K2]
layer in the protocol stack.

ii) Suppose two hosts, A and B are separated by 20,000 kms and are connected (8) [CO1,K3]
by a direct link of R = 5 Mbps. Suppose the propagation speed over the link
is $2.5 * 10^8$ meters/sec.

1) Calculate the bandwidth-delay product, R x d_{prop}.

2) Consider sending a file of 8,00,000 bits from Host A to Host B. suppose
the file is sent continuously as one large message. Find the maximum of
bits that will be in the link at any given time?

3) Find the width (in meters) of a bit in the link.

12. a. i) Write a simple TCP program for a server that accepts of input from a client (10) [CO2,K3]
and prints the lines onto the server's standard output.

ii) With a neat sketch, list the steps involved when a DNS server redirects a (6) [CO2,K1]
user's request to a CDN server.

(OR)

b. i) Support user A, with a web-based e-mail account like Gmail, sends a (10) [CO2,K3]
message to user B, who accesses A's mail using IMAP mail server. Show
diagrammatically how the message moves from A to B List the application
layer protocols that are used to move the message between A and B along
with their roles.

ii) Enumerate the steps involved while transferring a web page from a server (6) [CO2,K1]
to a client in case of non persistent connections.

13. a. i) Draw the structure of TCP header. Provide a brief summary on the (8) [CO3,K2]
significance of each field in the TCP header.

ii) Identify the components of the congestion control algorithm used by TCP. (8) [CO3,K2]
Present a note on each component.

(OR)

b. i) State the significance of flow control service of TCP protocol. Explain how it (8) [CO3,K2]
eliminates the possibility of the sender overflowing the receiver's buffer.

ii) With a neat sketch, illustrate how TCP connection is established and closed (8) [CO3,K2]
between two hosts.

14. a. i) Write the steps in LS routing algorithm. Apply the same and find the (10) [CO4,K3]
shortest path between A and all the nodes in the following graph
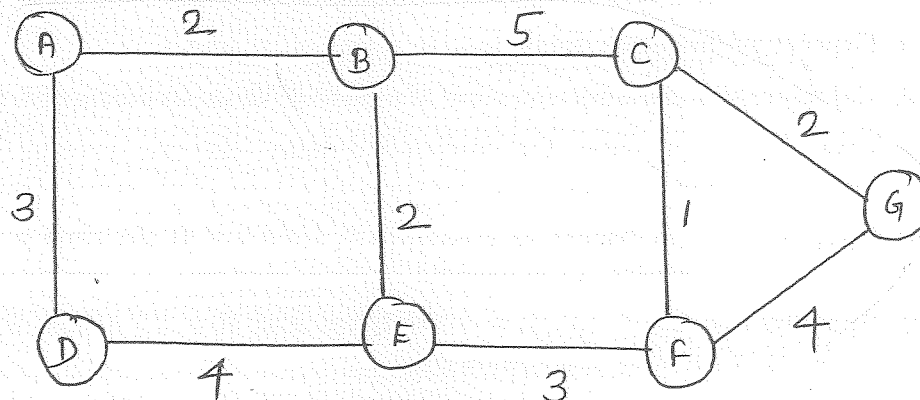
ii) List the components of SDN controller, and highlight the role of each (6) [CO4,K2]
component.

(OR)

b. i)   Name the packet scheduling algorithms. Explain any two of them.   (6) [CO4,K2]

ii)   Write the distance vector routing algorithm. Apply the same and find the (10) [CO4,K3]
routing table at all the routers (A, B, C and D) in the following graph.

15. a. i)   List the operations of a slotted ALOHA protocol.   (5) [CO5,K1]

ii)   Identify different types of error detection and correction mechanisms (11) [CO5,K2]
supported at the link layer. With examples, illustrate any two of them

(OR)

b. i)   Enumerate the steps in CSMA/CD from the perspective of adapter attached   (5) [CO5,K1]
to a broadcast channel.

ii)   Summarize the different symmetric key cryptography algorithms. Provide (11) [CO5,K2]
suitable examples.

Bloom's Taxonomy Level	Remembering (K1)	Understanding (K2)	Applying (K3)	Analysing (K4)	Evaluating (K5)	Creating (K6)
Percentage	21	47	32	-	-	-