Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 30152

M.C.A. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Third Semester

(Bridge Course)

BX 4006 — BASICS OF COMPUTER NETWORKS

(Regulations 2021)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   What is encapsulation?

2.   How many links are needed to connect five devices using mesh, star, bus and ring topology network?

3.   List some of the error detection techniques.

4.   Define bit stuffing.

5.   Mention the use ICMP protocol.

6.   An organization is granted the block 211.17.180.0/24. The administrator wants to create 32 subnets. Find the subnet mask.

7.   Compare circuit switching and packet switching.

8.   List some of the routing protocols.

9.   Mention the use of DNS server.

10. Compare threat and vulnerability.

PART B — (5 × 13 = 65 marks)

11. (a) With a neat sketch, explain the role played by the seven layers in the OSI model to make communication possible among heterogeneous systems.

Or

(b) How guided media differ from unguided media? Briefly explain any three methods used for data transmission using guided media and two methods used for data transmission using unguided media.

12. (a) (i) Draw the process flowchart for CSMA/CA used in wireless LAN and explain it in detail. (7)

(ii) Draw the Ethernet Frame Format and explain the purpose of each field. (6)

Or

(b) Obtain the Frame Check Sequence generated by the CRC generator that uses polynomial divisor X^4+X+1 on the data stream of 1101011011 and show how the receiver checks the received bit for no error.

13. (a) An ISP is granted a block of addresses starting with 160.40.0.0/16. The ISP wants to distribute these blocks to 3 groups of customers as follows.

(i) Group I has 64 customers, each need 256 addresses.

(ii) Group II has 128 customers, each need 128 addresses.

(iii) Group III has 128 customers, each need 64 addresses.

Design the sub-blocks and give the slash notation for each sub-block. Find out how many addresses are still available after these allocations.

Or

(b) Explain the setup, data transfer and teardown process in data transmission of any network. Below table shows the types of networks and the addressing mechanism used in each of them.

Network	Setup	Data transfer	Teardown
Circuit-Switched	End-to-End	–	End-to-End
Datagram	–	End-to-End	–
Virtual-circuit	End-to-End	Local	End-to-End

Answer the following questions :

(i) Why does a circuit-switched network need end-to-end addressing during the setup and teardown phases? Why are no addresses needed during the data transfer phase for this type of network? (5)

(ii) Why does a datagram network need only end-to-end addressing during the data transfer phase, but no addressing during the setup and teardown phases? (3)

(iii) Why does a virtual-circuit network need addresses during all three phases? (5)

14. (a) Draw a UDP Header format and explain each one of the field in it. The following is a dump of a UDP header in hexadecimal format.

$(CB84000D001C001C)_{16}$

(i) What is the source port number?

(ii) What is the destination port number?

(iii) What is the total length of the user datagram?

(iv) What is the length of the data?

Or

(b) Explain in detail the connection establishment, data transfer and termination procedure of TCP using three-way handshake protocol with an example.

15. (a) Describe the general architecture and working principle of an SMTP in Internet for sending an e-mail.

Or

(b) Write down the algorithm of RSA. In a public key crypto system using RSA algorithm the intruder intercepts the cipher text as 11 and whose public keys are (7,187). Find the private key value d and perform encryption and decryption process.

PART C — (1 × 15 = 15 marks)

16. (a). Draw the flowchart of the link state routing algorithm. Compute the shortest path for the node A in figure below using Dijkstra's path algorithm. For each step in the algorithm, indicate the current node, the assigned labels and whether the labels are permanent or tentative. Finally, list the shortest path to all destination nodes as seen from the node A.

Or

3   30152
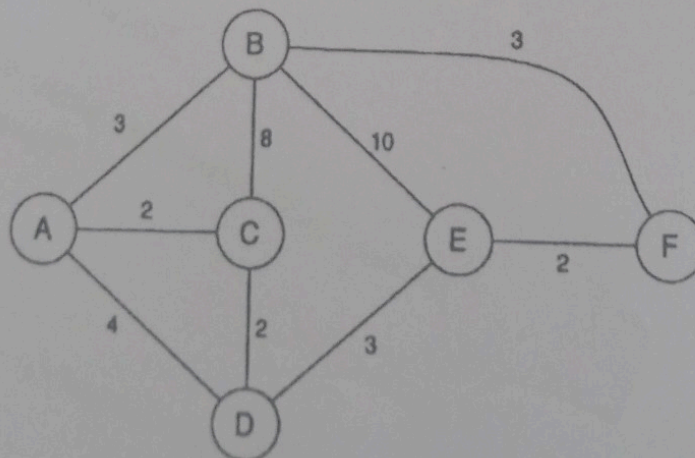
(b) Draw a neat sketch of TCP header format and explain each field in it. Work out the following is a TCP header in hexadecimal from.

(05320017 00000001 00000001 500207 FF 00000000)$_{16}$

To find,

(i) Source port number

(ii) Destination port number

(iii) Sequence number

(iv) Acknowledgement Number

(v) Length of the header

(vi) Type of the segment

(vii) Window Size.

———————————