(iii)   WWW

(iv)   Router

(v)   DNS

14/5/25 (Eve)

[This question paper contains 8 printed pages.]

Your Roll No...............

Sr. No. of Question Paper : 5056   J

Unique Paper Code   : 2344000020

Name of the Paper   : Computer Networks

Name of the Course   : **GE (Common Program)**

Semester   : VI

Duration : 3 Hours   Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.

2. **Section A** (Question No. **1**) is compulsory.

3. Attempt any **four** questions from **Section B** (Questions **2** to **7**).

4. Parts of a question must be answered together.

P.T.O.

Section A

(Compulsory)

1. (a) Which layer(s) in OSI Model performs the following operations?

    I. Flow Control

    II. Raw bit transfer

    III. Routing   (3)

    (b) Determine the number of cables and connections required to connect 10 computers in a full mesh topology.   (3)

    (c) A link uses Frequency Division Multiplexing (FDM) for 10 channels, each with a 2kHz bandwidth and a 20 Hz guard band. Find the minimum total bandwidth required.   (3)

    (d) Give any three differences between the OSI model and the TCP/IP model.   (3)

    (c) Briefly explain the following CSMA protocols :

      (i) 1-persistent

      (ii) p-persistent   (7)

6. (a) Describe the format and function of each field in an IPv4 header.   (7)

    (b) State the significance of the following special IP addresses.   (8)

      (i) 0.0.0.0

      (ii) 255.255.255.255
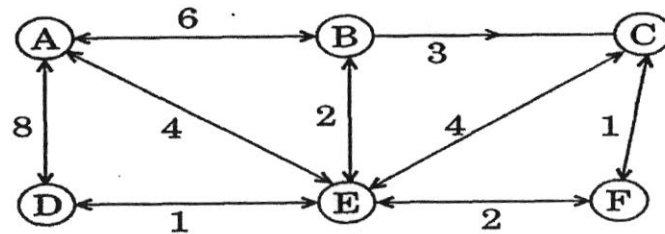
      (iii) 127.0.0.0

      (iv) 224.0.0.0

7. Write short notes on the following :   (3×5=15)

    (i) HTTP

    (ii) SMTP

(b) Describe the following protocols :–   (7)

    (i) Internet Message control protocol

    (i) Address Resolution Protocol

5. (a) Consider an extremely noisy channel in which the value of the signal-to-noise ratio is 63. Compute the bit rate if the bandwidth of the channel is 2 kHz.   (4)

  (b) Distinguish between virtual-circuit and datagram networks.   (4)

(e) State the advantages and disadvantages of using optical fiber as a transmission medium.   (3)

(f) Define Simplex, Half Duplex, and Full Duplex mode of transmission with one example each.

    (3)

(g) Define the term 'subnetting' and explain its importance in IP addressing.   (3)

(h) A bit stream 1011101 is transmitted using CRC method. Generator polynomial is $x^3 + x + 1$. Find the transmitted frame.   (3)

(i) Explain, in brief, connection-oriented and connectionless services with examples.   (3)

(j) Give any two differences between IPv4 and IPv6.   (3)

Section B

2. (a) A 12-bit odd-parity Hamming code whose binary value is 111001001111 arrives at a receiver. Identify the original value of the message. Assume that not more than 1 bit is in error.   (7)

    (b) The following character encoding is used in a data link protocol: (8)

    A: 01000111; B: 11100011; Flag: 01111110; ESC: 11100000

    show the bit sequence transmitted (in binary) for the four-character frame:

    A B ESC FLAG A ESC

    when each of the following framing methods are used:

    (i) Character Count

    (ii) Flag bytes with Byte Stuffing

    (iii) Starting and ending flag bytes, with bit stuffing

3. (a) Brief explain UDP and TCP. Explain the TCP Segment header with diagram.   (8)

    (b) State the functionality of following networking devices Repeaters, Hubs, switches and Bridges with respect to ISO-OSI model. Name the layers in which these devices operate.   (7)

4. (a) Consider the following network with the indicated link cost. Using shortest path algorithm, find the shortest path from source node A to all other nodes: (8)