[This question paper contains 4 printed pages.]

Your Roll No.....

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Sr. No. of Question Paper : 2273

Unique Paper Code : 2342573601

Name of the Paper : COMPUTER NETWORKS

Name of the Course : **B.A/B.SC. (PROG)**

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 is compulsory.
3. Attempt any 4 questions from Section B.
4. Parts of a question must be answered together.

Section A

1. (a) Define Computer Networks. explain any two objectives of computer network. 3

   (b) Find out the following: 3

   (i) Class of IP address: 213.10.45.21
   (ii) Network ID of IP address: 168.168.168.168
   (iii) Default Subnet Mask of IP address: 131.132.133.134

   (c) Calculate the transmission delay for a 1000-byte packet over a 1 mbps link. 3

   (d) If a subnet mask is 255.255.255.192, how many subnets and hosts per subnet are possible? 3

   (e) Discuss the difference between Layer-II and Layer-III Switch. 3

   (f) Differentiate between connection less and connection-oriented protocols with the help of examples. 3

P.T.O.

(g) Name the Protocols to be used in the following scenarios: 3

i. To map an IP address to a MAC address.
ii. To assign the IP address to the host automatically.
iii. To map a MAC address to an IP address.

(h) Explain the modes of communication with appropriate examples. 3

(i) What are the purposes of the FIN, RST, and URG flags in the TCP header. 3

(j) Discuss how both switches and bridges handle frame forwarding and MAC address learning. 3

Section B

2. (a) Given the IP address 10.0.0.0/24, an organization needs to create two subnets with the following requirements: 8

- Subnet 1: 100
- Subnet 2: 50

For each of these subnets, give the

i. First IP address and last IP address assigned
ii. Subnet mask in the w.x.y.z/s notation
iii. Identify the range of IP addresses available
iv. Number of host and network bits

(b) Write any four differences between Star Topology and Mesh Topology. Also, find the number of links required to establish a mesh topology with n devices. (4+3)

3. (a) Differentiate among Stop-and-Wait, Go-Back-N and Selective Repeat protocols. 8

(b) The received hamming code is 1011010: 7

i. Detect if any error exists.
ii. Find the error position.
iii. Correct the code.

4. (a) Explain the functions of each layer of OSI model. Also, compare it with TCP/IP model. 8

(b) (i) Differentiate between IPv4 and IPv6. (4+3)

(ii) Explain CIDR notation and its advantages.

5. (a) Consider a network with 4 nodes: A, B, C, and D. the link costs are as follows: 8
A→B: 2, A→C: 5, B→C: 2, B→D: 4, C→D: 1

i. Show the final converged routing table for Node A.
ii. Show the final converged routing table for Node C.

(b) A 1500-byte packet is sent over a 10 Mbps link with a distance of 1000 km and propagation speed 2.5 x 10^8 m/s. Find: 7
i. Transmission delay
ii. Propagation delay

6. (a) Consider a network comprising five routers labelled as A, B, C, D, and E. The interconnections and their associated costs are given as follows: 8

- Link between A and B: Cost 2
- Link between A and C: Cost 4
- Link between B and C: Cost 1
- Link between B and D: Cost 5
- Link between C and D: Cost 3
- Link between C and E: Cost 7
- Link between D and E: Cost 2

Using Dijkstra's algorithm, illustrate the step-by-step process of determining the shortest path from router A to router E.

(b) What is the CSMA/CD Protocol? What is the minimum frame size required to ensure collision detection in the CSMA/CD protocol? 7

7. (a) What are the key characteristics of infrared waves and microwaves? 3

(b) Write short notes on the following terms: 2*6=12

(i) WWW
(ii) Jitter
(iii) SMTP
(iv) Subnetting
(v) NIC
(vi) DNS