OBE
35115

M. Sc. I Semester/M.C.A. I Semester Examination 2020-2021

Subject: Computer Science/Computer Application

Paper: CS-206

(Computer Networks)

Time: Four hours] **[Full Marks:** 70

Note: Answer any four questions, each question carry equal marks (17.5).

1.

a. What are the key differences between classful addressing and classless addressing in IPv4? Do routers have IP addresses? If so, how many? (4.5)

b. Compare the individual fields of the IPv4 header with the IPv6 header. Account for the functionality provided by each IPv4 field by showing how the same functionality is provided in IPv6. (6)

c. An organization is granted a block of addresses 120.60.2.0/24. The organization has three offices in different cities and needs to divide the addresses into three subnets as the following table: (7)

City	Number of Host
Lucknow	50
Agra	30
Varanasi	10

Find the subnet mask, the first and last address for each subnet.

2.

a. What is the need of Fragmentation of an IP datagram? When an IP datagram is to be fragmented, which option in the option field need to be copied into the header of each fragment, and which need only be retained in the first fragment? Justify the handling of each option. (5)

b. Why address mapping is required while data communication takes place in computer network? Explain non network layer protocols used for dynamic address mapping. (7.5)

c. Explain the role of various error reporting messages used in ICMP. (5)

P.T.O.

3.

a. IGMP specifies that query messages are sent in IP datagrams that have Time to live field set to 1. Why? What do you mean by physical multicast support while using IGMP? Give one example. How multicasting is performed in a network which does not support physical multicasting? Change the IPv4 multicast addresses 224.88.12.8 to Ethernet multicast addresses. (7.5)

b. Explain two-node loop instability problem associated with Distance Vector Routing approach. What are different possible solutions of this problem? (6)

c. Explain the differences between Unicast and Multicast Routing Algorithms. (4)

4.

a. Suppose an application demands to have reliable data transfer while it is using UDP as transport layer protocol? Is it possible? If yes, how? (3.5)

b. Explain TCP Header format with a neat and clean diagram. (8)

c. Suppose there are two hosts, S and R. They are communicating over a TCP connection, and R has already received from S all bytes from 1 through 233. Now, Host S sends three segments to Host R back to back. The segments sizes are 50, 70, and 90 bytes respectively. Host R sends an acknowledgement whenever it receives a segment from Host S. Answer the following(with a neat diagram): (6)

   i. What are the sequence number in the first, second and third segment sent by Host S?

   ii. Suppose R sends an ACK segment after receiving the first segment from S, what is contained in the acknowledgment number field of the segment that R sends to S?

   iii. Due to some error, if the third segment arrives before the first and second segments, what is in the ACK number field of the segment that R sends to S in response to this (third) segment?

5.

a. Define Network Congestion. Why it is considered as a serious issue in computer network? Explain the differences between Implicit signalling and Explicit signalling approach of Congestion Control. (4)

b. Explain the Congestion control mechanism adopted by TCP with a neat flow diagram. (7)

P.T.O.

c. What do you mean by Traffic Shaping? Differentiate between Leaky bucket and Token bucket approaches. (6.5)

6.

a. Differentiate between Differentiated Service model and integrated service model. (5)

b. What do you mean by packet scheduling in computer network? How it is helpful for improving quality of service? Explain any two Scheduling techniques with suitable example. (7.5)

c. What is the role of DNS? How does caching increase the efficiency of name resolution in DNS? (5)

7.

a. In electronic mail, what are the roles of a user agent and MIME? Why do we need POP3 or IMAP4 for electronic mail? (5)

b. What is the purpose of FTP? What kinds of file types can FTP transfer? Explain different transmission modes of FTP? (5)

c. What do you mean by Network Management? Explain SNMP protocol for network management. (7.5)

8.

a. What are the differences between message confidentiality and message integrity? Can you have one without the other? Justify your answer. (5)

b. What do you mean by key management in network security? Explain the role of KDC and session key used in Symmetric key distribution. (6)

c. Summarize the key differences in the services provided by the Authentication Header (AH) protocol and the Encapsulation Security Payload (ESP) protocol in IPsec. (3)

d. Explain the role of Virtual Private Network (VPN) in network security. (3.5)