

**COMPUTER NETWORKS**  
**(CSEN 3201)**

**Time Allotted : 3 hrs**

**Full Marks : 70**

*Figures out of the right margin indicate full marks.*

*Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.*

*Candidates are required to give answer in their own words as far as practicable.*

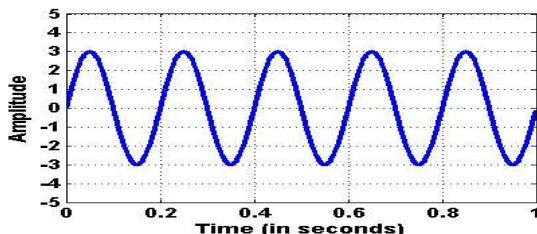
**Group - A**  
**(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) What is the address resolution protocol (ARP) used for?
    - (a) Finding the IP address of the default gateway
    - (b) Finding the MAC address that corresponds to an IP address
    - (c) Finding the IP address that corresponds to a MAC address
    - (d) Finding the IP address from the DNS.
  - (ii) Identify the class of IP address 121.1.2.3
    - (a) Class A
    - (b) Class B
    - (c) Class C
    - (d) Class D.
  - (iii) In Go back N ARQ, if frames 4, 5, 6 are received successfully then the receiver can send an ACK \_\_\_\_\_ to the sender.
    - (a) 5
    - (b) 6
    - (c) 7
    - (d) any of these
  - (iv) The address space of IPV6 is
    - (a)  $2^{128}$
    - (b)  $2^{16}$
    - (c)  $2^{32}$
    - (d)  $2^{48}$ .
  - (v) Host to Host delivery is the function of \_\_\_\_\_ layer
    - (a) transport
    - (b) network
    - (c) physical
    - (d) application
  - (vi) Assume that Source S and Destination D are connected through an intermediate router R. How many times a packet has to visit the network layer and data link layer during a transmission from S to D?
    - (a) Network layer - 4 times, Data link layer - 4 times
    - (b) Network layer - 4 times, Data link layer - 6 times
    - (c) Network layer - 2 times, Data link layer - 4 times
    - (d) Network layer - 3 times, Data link layer - 4 times.
  - (vii) Which type of topology is best suited for large businesses which must carefully control and coordinate the operation of distributed branch outlets?
    - (a) Ring
    - (b) Local area
    - (c) Hierarchical
    - (d) Star.

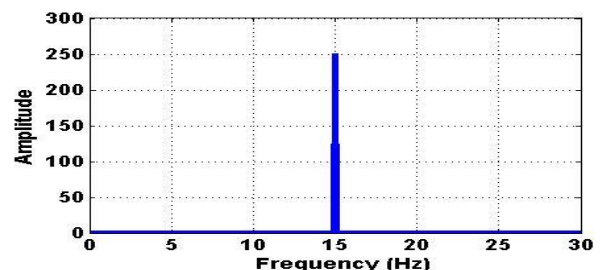
- (viii) Which of the following statements could be valid with respect to the ICMP (Internet Control Message Protocol)?
  - (a) It reports all errors which occur during transmission.
  - (b) A redirect message is used when a router notices that a packet seems to have been routed wrongly.
  - (c) It informs routers when an incorrect path has been taken.
  - (d) The "destination unreachable" type message is used when a router cannot locate the destination.
- (ix) Which of the following IP addresses can be used as (a) loop-back addresses?
  - (a) 0.0.0.0            (b) 127.0.0.1            (c) 255.255.255.255            (d) 0.255.255.255.
- (x) Which of the following is true with regard to the ping command?
  - (a) Ping stands for Packet Internet Generator.
  - (b) The ping command checks the port level connectivity between source destinations end points.
  - (c) Ping summarizes the packet loss and round-trip delay between two IP end points.
  - (d) The ping command activates the RARP protocol of the IP layer.

### Group- B

- 2. (a) Differentiate between bit rate and baud rate with suitable examples. [[C01](Remember/LOCQ)]
- (b) Convert the following signals from (i) time domain to frequency domain and (ii) frequency domain to time domain respectively.



(i)



(ii)

[[C01](Apply/IOCQ)]

- (c) Encode the following message using the (i) NRZ-I (ii) Bipolar AMI and (iii) Differential Manchester Encoding Schemes.  
Message: 1001111100001? [[C02](Apply/IOCQ)]

$$2 + (2 \times 2) + (2 \times 3) = 12$$

- 3. (a) Which of the OSI layers handle each of the following?
  - (i) Dividing the transmitted bit streams into frames.
  - (ii) Determining which route through the subnet to use. [[C01](Remember/LOCQ)]
- (b) Illustrate the different causes of Transmission Impairment with suitable diagrams. [[C05](Remember/LOCQ)]
- (c) Compare and contrast circuit switching vs. packet switching? What are the phases of a circuit switching? Explain with a suitable example, how the setup

request frame and the acknowledgement frame contribute towards updating the entries in the forwarding tables of the switches in Virtual Circuit Switching.

[(CO2)(Analyse/IOCQ)]

$$1 + 3 + (2 + 1.5 + 4.5) = 12$$

### **Group - C**

4. (a) Illustrate the Go-Back-N ARQ protocol with suitable diagram. State its advantage over the Selective Repeat ARQ protocol. [(CO3)(Analyse/IOCQ)]
- (b) What do you understand by the term 'byte stuffing'? Design two simple algorithms or pseudo-code for byte stuffing. The first adds bytes to the message at the appropriate positions at the sender; the second removes the stuffed bytes at the receiver. [(CO3)(Create/HOCQ)]
- (c) Explain the Exponential Back off Algorithm in context of CSMA. Explain the Polling method of medium access.

[(CO2)(Remember/LOCQ)]

$$(3 + 2) + (1 + 2 + 2) + 2 = 12$$

5. (a) The two-dimensional parity check can detect up to 3 errors. However, errors affecting 4 bits may not be detected. Explain with suitable diagram. [(CO5)(Defend/IOCQ)]
- (b) Taking 1100, 1110, 1010 as data (3 blocks each of 4 bits) show the steps that happen at the sender and the receiver side if Checksum is used as the method of error detection. [(CO2)(Analyse/IOCQ)]
- (c) What is the purpose of the Backward Learning Algorithm? Create a system of 3 LANS with 4 bridges as given. The bridges B1 to B4 connect the LANS as follows:  
(i) B1 connects LAN1 and LAN 2  
(ii) B2 connects LAN1 and LAN 3  
(iii) B3 connects LAN2 and LAN 3  
(iv) B4 connects LAN1, LAN2 and LAN3.  
Choose B1 as the root bridge. Show the forwarding and blocking ports, after applying the spanning tree procedure. [(CO4)(Apply/IOCQ)]

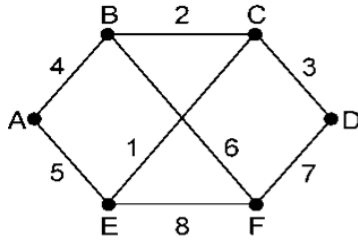
$$4 + 4 + 4 = 12$$

### **Group - D**

6. (a) Compare and contrast static routing vs. Dynamic Routing. [(CO4)(Evaluate/HOCQ)]
- (b) What do you understand by the count to infinity problem? How can we overcome them? [(CO4)(Apply/IOCQ)]
- (c) A block of addresses is granted to a small organization. We know that one of the addresses is 205.16.37.39/28. What is the first address, the last address and the number of IP addresses available in the block? [(CO3)(Create/HOCQ)]

$$4 + (2.5 + 2.5) + 3 = 12$$

7. (a) Explain how ICMP packets contribute in congestion control of a network. [[CO2](Remember/LOCQ)]  
 (b) What are the different fields in the link state packet? Specify their significance. [[CO4](Remember/LOCQ)]  
 (c) Build the link state packets for the following network. Explain the packet distribution procedure and challenges.



[[CO4](Analyze/HOCQ)]  
 $4 + 4 + (2 + 2) = 12$

### Group - E

8. (a) Illustrate the TCP 3-way handshaking procedure with suitable diagram. State the significance of the seq. no in this respect. [[CO6](Remember/LOCQ)]  
 (b) What is a SYN flooding attack? [[CO3](Understand/LOCQ)]  
 (c) What is congestion? Explain the working of any 2 open loop and any 2 closed loop congestion control algorithms. [[CO5](Remember/LOCQ)]  
 $(3 + 2) + 4 + 4 = 12$
9. (a) What do you mean by silly window syndrome? Explain the solution when the syndrome is created by the sender. [[CO5](Remember/LOCQ)]  
 (b) What are the 2 methods of traffic shaping? Illustrate how they contribute to the traffic shaping with suitable diagrams. [[CO6](Understand/LOCQ)]  
 (c) Compare and contrast the UDP and the TCP protocols. [[CO3](Analyse/LOCQ)]  
 $(2 + 2) + (2 + 4) + 2 = 12$

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	46.07	38.23	15.68

**Course Outcome (CO):**

After the completion of the course students will be able to

1. Learn the terminology and concepts of the OSI reference model, TCP-IP reference model and the need for the layered architecture.
2. Understand the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks
3. Analyse the requirements for a given organizational structure and select the most appropriate networking architecture and technologies
4. Demonstrate various types of routing techniques
5. Defend and argue the various quality of service measures to improve network throughput.
6. Synthesize the strength and shortcomings of the underlying protocols, and then go on to hypothesize new and better application layer protocols.

\*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question