

**COMPUTER NETWORKS
(INFO 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) If the least significant bit of the first byte of MAC address is 0, it means the address is _____
 - (a) Multicast address
 - (b) Broadcast address
 - (c) Unicast address
 - (d) IP address.
 - (ii) Maximum number of stations that can be attached in an Ethernet LAN is _____.
 - (a) 250
 - (b) 1000
 - (c) 100
 - (d) 500.
 - (iii) Length of Port addresses in TCP/IP are
 - (a) 4 bit long
 - (b) 16 bit long
 - (c) 32 bit long
 - (d) none of these.
 - (iv) The 1-persistent CSMA approach can be considered a special case of the p-persistent approach with p equal to
 - (a) 0.1
 - (b) 0.5
 - (c) 1.0
 - (d) 2.0.
 - (v) Which one of the following specifies the IEEE standard for Token Ring?
 - (a) 802.3
 - (b) 802.4
 - (c) 802.5
 - (d) 802.11
 - (vi) Priority of a data frame can be specified in the _____ field of the Token Ring frame format.
 - (a) Access Control Byte
 - (b) Frame Control Byte
 - (c) Frame Check Sequence
 - (d) Frame Status
 - (vii) Which statement is not true about IP protocol?
 - (a) IP is the highest layer protocol which is implemented at both routers and hosts
 - (b) IP provides connectionless service
 - (c) IP offers best effort delivery
 - (d) IP provides reliable service.

- (viii) Which of the following tasks is not done by data link layer?
(a) Framing (b) Error control
(c) Flow control (d) Channel coding.
- (ix) You have been allocated a class C network address of 211.1.1.0 and are using the default subnet mask 255.255.255.0. How many hosts can you have?
(a) 256 (b) 254 (c) 192 (d) 255.
- (x) The physical layer is concerned with _____
(a) bit-by-bit delivery (b) process to process delivery
(c) application to application delivery (d) port to port delivery.

Group- B

2. (a) We have a channel with a 1-MHz bandwidth. The SNR for this channel is 63. What are the appropriate bit rate and signal level? *[[CO2)(Apply/IOCQ]]*
(b) How can you use modulation to transmit digital data over long distances? *[[CO2)(Apply/IOCQ]]*
(c) Differentiate between bit rate and baud rate. *[[CO2)(Remember/LOCQ]]*
4 + 4 + 4 = 12
3. (a) "Physical addressing handles address problem locally but when a packet passes the boundary of a network, logical addressing helps" – Justify the statement. *[[CO1)(Analyze/IOCQ]]*
(b) Differentiate between MAC address and IP address. *[[CO1)(Remember/LOCQ]]*
(c) Explain the following terms in the context of data communication over Internet. (i) Process to Process delivery, (ii) host to host delivery, (iii) Node to Node delivery. *[[CO1)(Analyze/IOCQ]]*
3 + 3 + 6 = 12

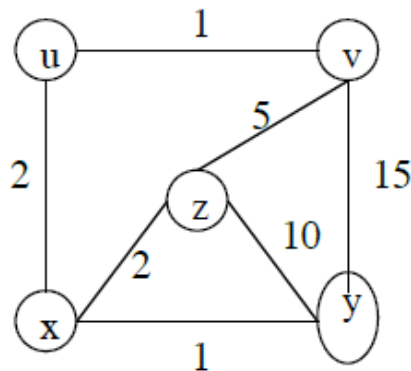
Group - C

4. (a) Explain the significance of 'A' bit and 'C' bit of the Frame Status field of Token Bus protocol. *[[CO3)(Understand/LOCQ]]*
(b) "Vulnerable time Pure ALOHA is 2* Frame transmission time" – Analyze. *[[CO3)(Analyze/IOCQ]]*
(c) Illustrate how a station with high priority data reserves the next access to the medium while a low priority communication is going on in a Token bus protocol. *[[CO3)(Remember/LOCQ]]*
4 + 4 + 4 = 12
5. (a) A pure ALOHA network transmits 200-bit frames on a shared channel of 200 kbps. What is the throughput if the system (all stations together) produces 250 frames per second? Determine the throughput if the above system produces 250 frames per second and uses slotted ALOHA protocol. *[[CO3)(Apply/IOCQ]]*
(b) The code 10010100101 was received. Using Hamming encoding algorithm determine what is the original code sent. *[[CO3) (Apply/IOCQ]]*

- (c) Differentiate between single bit error and burst error. [[CO3](Remember/LOCQ)]
(2 + 2) + 6 + 2 = 12

Group - D

6. (a) Subnet the Class C IP Address 205.11.2.0 so that you have 30 subnets.
 (i) What is the subnet mask for the maximum number of hosts?
 (ii) How many hosts can each subnet have?
 (iii) What is the IP address of host 3 on subnet 2? [[CO4](Evaluate/HOCQ)]
- (b) Consider the network shown below, and assume that each node initially knows the costs to each of its neighbors. Assume the distance vector algorithm and create the distance table entries at node z.



[[CO4](Create/HOCQ)]
(2 + 2 + 2) + 6 = 12

7. (a) Describe the advantages of VLSM over FLSM. [[CO4](Remember/LOCQ)]
- (b) Suppose an administrator has 192.168.1.0/24 network and he needs to allocate IP address block for four departments having different number of computers as listed below.
- sales and purchase department with 120 computers,
 - development department with 50 computers,
 - accounts department with 26 computers and
 - management department with 5 computers.
- Explain the allocation process of IP address block for each department using VLSM.

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

Group - E

8. (a) "Information that passes through different layers of TCP/IP model are referred by different names in each layer"- Explain. [[CO5](Understand/LOCQ)]
- (b) "UDP is unreliable and connectionless Transport Layer protocol" - In this context justify the application of UDP with a proper justification.

[[CO5](Evaluate/HOCQ)]

- (c) Explain the working principle of DNS with an example. [[CO6](Remember/LOCQ)]
4 + 4 + 4 = 12

9. (a) Explain different categories of port numbers and their usage with example.
[[CO5](Remember/LOCQ)]
- (b) What is the significance of Congestion Window (cwnd) and Receiver Window (rwnd) in the context of congestion control? What is the value of the receiver window (rwnd) for host A if the receiver host B has a buffer size of 5000 bytes and already has 1000 bytes of received and unprocessed data?
[[CO5](Evaluate/HOCQ)]
- (c) Argue on the need for two different emailing services like SMTP and POP3.
[[CO6](Create/HOCQ)]
- 4 + (2 + 2) + 4 = 12**
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<i>Cognition Level</i>	<i>LOCQ</i>	<i>IOCQ</i>	<i>HOCQ</i>
<i>Percentage distribution</i>	<i>34.37</i>	<i>32.29</i>	<i>33.33</i>

Course Outcome (CO):

After the completion of the course students will be able to

- CO1: Understand the fundamental concepts of data communication and networking, layered models, protocols, networking devices
- CO2: Understand theoretical basis for data communication, digital and analog transmission, multiplexing, switching, transmission media
- CO3: Illustrate data link layer services, framing, error control, flow control, data link layer protocols and various channel access protocols
- CO4: Examine various routing algorithms, addressing schemes and different network layer protocols
- CO5: Evaluate different Internet transport protocols and techniques for congestion control and QoS provisioning
- CO6: Design network applications using different application layer protocols

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