

COMPUTER NETWORKS
(INFO 3102)

Time Allotted : 2½ hrs

Full Marks : 60

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group - A

1. Answer any twelve:

12 × 1 = 12

Choose the correct alternative for the following

- (i) What kind of transmission medium is most appropriate to carry data in a computer network that is exposed to electrical interferences?
(a) Unshielded twisted pair (b) Optical fiber
(c) Coaxial cable (d) Microwave.
- (ii) Which layer is responsible for process to process delivery in a general network model?
(a) Session Layer (b) Data link Layer
(c) Transport Layer (d) Network Layer.
- (iii) "Parity bits" are used for which of the following purposes?
(a) Encryption of data (b) To transmit faster
(c) To detect errors (d) To identify the user.
- (iv) From which layer does the data link layer take packets and encapsulate them into frames for transmission?
(a) Transport Layer (b) Application Layer
(c) Network Layer (d) Physical Layer.
- (v) Which kind of address is used in the source and destination address field of IEEE 802.3 data frame?
(a) Socket Address (b) IP Address
(c) MAC address (d) None of the above.
- (vi) What is the term for an endpoint of an inter-process communication flow across a computer network?
(a) Port (b) Machine (c) Socket (d) Pipe.
- (vii) What is the maximum number of segments that can be included in 10base5 standard Ethernet implementation?
(a) 2 (b) 3 (c) 4 (d) 5.

- (viii) Which class of IP address is suitable for a large organization?
 (a) Class A (b) Class B
 (c) Class C (d) Class D.
- (ix) ICMP is primarily used for _____
 (a) error and diagnostic functions (b) addressing
 (c) forwarding (d) routing.
- (x) Which of the following are transport layer protocols used in networking?
 (a) TCP and FTP (b) UDP and HTTP
 (c) TCP and UDP (d) HTTP and FTP.

Fill in the blanks with the correct word

- (xi) When collection of various computers seems a single coherent system to its client, then it is called _____.
- (xii) Data in the network layer is transferred in the form of _____.
- (xiii) The ability of a single network to span multiple physical networks is known as _____.
- (xiv) An endpoint of an inter-process communication flow across a computer network is called _____.
- (xv) Header of a frame generally contains information like _____.

Group - B

2. (a) Explain the significance of Switching? What are different switching techniques used in computer networks? Discuss. [[CO2](Apply/IOCQ)]
 (b) Explain the TCP/IP model? [[CO1](Understand/LOCQ)]
7 + 5 = 12
3. (a) Construct the Hamming code for the bit sequence 1001101. [[CO3](Evaluate/HOCQ)]
 (b) How does the checksum checker know that the received data unit is undamaged? [[CO3](Evaluate/HOCQ)]
 (c) How does a single-bit error differ from a burst error? [[CO3](Understand/LOCQ)]
6 + 4 + 2 = 12

Group - C

4. (a) Explain the mechanism of Stop-and-Wait ARQ with diagram. [[CO3](Analyse/IOCQ)]
 (b) Describe the process of Piggybacking? [[CO3] (Remember/LOCQ)]
 (c) In Go-Back-N ARQ, if the sequence number is of n bits, then show that the maximum size of the sender window is $2^n - 1$. [[CO3](Apply/IOCQ)]
6 + 2 + 4 = 12
5. (a) How would you identify whether a destination address in an Ethernet frame is unicast or multicast or broadcast address? [[CO3](Analyse/IOCQ)]

- (b) Identify three significant difference between CSMA and ALOHA. *[[CO3](Analyse/IOCQ)]*
- (c) "Reservation field in Token ring helps the station having high priority data to capture the token earlier overriding the other low priority neighbouring stations" - Justify with an example? *[[CO3](Analyse/IOCQ)]*
- 3 + 4 + 5 = 12**

Group - D

6. (a) Describe the steps of Link State Routing. *[[CO4](Remember/LOCQ)]*
- (b) What is the maximum number of IP addresses that can be assigned to hosts on a local subnet that uses the 255.255.255.224 subnet mask? *[[CO4](Apply/IOCQ)]*
- (c) Demonstrate with example the benefit of Supernetting. *[[CO4](Understand/LOCQ)]*
- 6 + 2 + 4 = 12**
7. (a) How would you decide which class of IP address to use for a particular network? How many bits are allocated for Network ID and Host ID in 23.192.157.234 address? *[[CO4](Remember/LOCQ)]*
- (b) Argue on the benefits of using VLSM over FLSM. *[[CO4](Evaluate/HOCQ)]*
- (c) List the tasks performed by Network layer. *[[CO4](Remember/LOCQ)]*
- (2 + 2) + 4 + 4 = 12**

Group - E

8. (a) Describe the token bucket mechanism for congestion control with suitable diagram. *[[CO5](Understand/LOCQ)]*
- (b) Explain the following concepts;
- (i) Node-to-node data transfer
- (ii) Host-to-host data transfer
- (iii) process-to-process data transfer. *[[CO5](Understand/LOCQ)]*
- (c) Which problem in the leaky bucket approach is addressed by using a token bucket mechanism? *[[CO5](Apply/IOCQ)]*
- 4 + 6 + 2 = 12**
9. (a) What is DNS and how does it work? *[[CO6](Remember/LOCQ)]*
- (b) State the differences between TCP and UDP. *[[CO5](Understand/LOCQ)]*
- (c) SMTP is used for emailing services, then why is POP3 also necessary for emailing service? *[[CO6](Apply/IOCQ)]*
- 6 + 3 + 3 = 12**

| Cognition Level | LOCQ | IOCQ | HOCQ |
|-------------------------|------|-------|-------|
| Percentage distribution | 50% | 35.42 | 14.58 |

Course Outcome (CO):

After the completion of the course students will be able to :

1. Understand the fundamental concepts of data communication and networking, layered models, protocols, networking devices.
2. Understand theoretical basis for data communication, digital and analog transmission, multiplexing, switching, transmission media.
3. Illustrate data link layer services, framing, error control, flow control, data link layer protocols and various channel access protocols.
4. Examine various routing algorithms, addressing schemes and different network layer protocols.
5. Evaluate different Internet transport protocols, techniques for congestion control and QoS provisioning.
6. Design network applications using different application layer protocols.

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