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) 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.

(iii) 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.

(iv) Which sublayer of the data link layer performs data link functions that depend upon the type of medium?
(a) Logical link control sublayer (b) Media access control sublayer
(c) Network interface control sublayer (d) Error control sublayer.

(v) 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

(vi) Which one of the following is not a function of network layer?
(a) Routing (b) Inter-networking
(c) Congestion control (d) Error control.

(vii) In classful addressing for class A, how many valid maximum possible network ids can exist?
(a) 129 (b) 128 (c) 126 (d) 127.

(viii) Which one of the following is a version of UDP with congestion control?
(a) Datagram congestion control protocol
(b) Stream control transmission protocol
(c) Structured stream transport
(d) User congestion control protocol.

(ix) Which of the following maintains the Domain Name System?
(a) A single server (b) A single computer
(c) Distributed database system (d) None of the mentioned.

(x) 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.

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) Bits can be sent over guided and unguided media as analog signal by _____

(xiii) Automatic repeat request error management mechanism is provided by _____.

(xiv) In the _____ method, all data exchanges must be made through the primary device even when the ultimate destination is a secondary device.

(xv) The ability of a single network to span multiple physical networks is known as _____.

Group - B

2. (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

3. (a) "Physical addressing handles address problem locally but when a packet passes the boundary of a network logical addressing helps" – Justify. *[(CO1)(Analyse/IOCQ)]*
(b) Compare a TSI to a TDM bus. *[(CO2)(Understand/LOCQ)]*
(c) How is blocking related to a multistage switch? *[(CO2)(Remember/LOCQ)]*
4 + 4 + 4 = 12

Group - C

4. (a) 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)]*
(b) "Bridged Ethernet implementation eliminates the possibility of collisions" – Justify with a diagram. *[(CO3)(Analyse/IOCQ)]*
(c) Describe each of the states of a PPP connection. *[(CO3)(Remember/LOCQ)]*
4 + 4 + 4 = 12

5. (a) "The vulnerable time for CSMA is the propagation time" - Analyze with diagram. *[(CO3)(Analyze/IOCQ)]*

(b) Compare the STOP-AND-WAIT ARQ and GO-BACK-N ARQ mechanisms. *[(CO3)(Analyze/IOCQ)]*

(c) Explain the frame format of HDLC protocol. *[(CO3)(Understand/IOCQ)]*

4 + 6 + 2 = 12

Group - D

6. (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

7. (a) Demonstrate with example the benefit of Supernetting. *[(CO4)(Understand/LOCQ)]*

(b) Discuss different steps of Distance Vector Routing. *[(CO4)(Understand/LOCQ)]*

(c) Name two major classes of dynamic routing protocol. *[(CO4)(Remember/LOCQ)]*

(d) Write the IP address 135.1.1.25 mask 255.255.248.0 in CIDR notation. *[(CO4)(Evaluate/HOCQ)]*

4 + 4 + 2 + 2 = 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) SMTP is used for emailing services, then why is POP3 also necessary for emailing service? *[(CO6)(Apply/IOCQ)]*

(b) "Information that passes through different layers of TCP/IP model are referred by different names in each layer"- Explain. *[(CO5)(Understand/LOCQ)]*

(c) 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)]

4 + 4 + 4 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	43.75	29.16	27.08