COMPUTER NETWORKS
(ECE3132)

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) A physical address in a computer network is also called:
(a) IP address (b) MAC address
(c) Port number (d) Socket address

(ii) Which OSI layer is responsible for physical addressing?
(a) Data link layer (b) Physical layer
(c) Transport layer (d) Network layer

(iii) In Selective Repeat ARQ, the maximum sender/receiver window size is:
(a) m (b) $2^m - 1$ (c) 2^m (d) 2^{m-1}

(iv) In an Ethernet MAC frame, the minimum and maximum payload size is:
(a) 64 bytes and 1518 bytes (b) 46 bytes and 1500 bytes
(c) 42 bytes and 1526 bytes (d) 48 bytes and 1492 bytes

(v) An IPv4 address is of how many bits?
(a) 18 bits (b) 32 bits (c) 56 bits (d) 64 bits

(vi) The three-way handshake is used in:
(a) TCP connection establishment (b) UDP connection establishment
(c) IP addressing (d) ARP resolution

(vii) Which of the following is a valid Class C IP address?
(a) 127.0.0.1 (b) 150.200.10.5
(c) 192.168.1.100 (d) 233.1.2.3

(viii) HTTP uses the services of which transport layer protocol?
(a) UDP (b) TCP (c) ICMP (d) IP

(ix) Bluetooth uses a 2.4GHz ISM band divided into
(a) 79 channels (b) 69 channels
(c) 70 channels (d) 80 channels

(ix) An Extended Service Set (ESS) is formed by connecting:
(a) Multiple BSSs through a distribution system
(b) Multiple LANs through a router
(c) Switches and hubs only
(d) Bluetooth devices

Fill in the blanks with the correct word

(xi) The divisor in a cyclic code is normally called the _____ polynomial.

(xii) In _____ ARQ, the size of the sender and receiver window must be at most one half of 2m

(xiii) _____ is the first field of the 802.3 MAC frame contains 7 bytes that alerts the receiving system to the coming frame.

(xiv) An IPv6 address is _____ bits long.

(xv) DNS was designed to have a _____ name space.

Group - B

2. (a) Differentiate between simplex, half-duplex & full duplex mode of communication. *[(CO1)(Analyse/IOCQ)]*

(b) Mesh topology is usually implemented as a backbone connecting the main computer of a hybrid network –Justify. *[(CO1) (Analyse/IOCQ)]*

(c) Illustrate the packet names and the addresses of different layers of TCP/IP protocol through a pictorial representation. *[(CO2) (Remember/LOCQ)]*

6 + 3 + 3 =12

3. (a) Identify the five components of a data communication system. *[(CO1)(Remember/LOCQ)]*

(b) A network uses a fully interconnected mesh topology to connect 20 nodes together in duplex mode. Calculate the number of links that will be required to connect the nodes. *[(CO2)(Evaluate/HOCQ)]*

(c) Distinguish between LAN, MAN and WAN. *[(CO1)(Analyze/IOCQ)]*

4 + 3 + 5 = 12

Group - C

4. (a) Evaluate the bandwidth-delay product in a Stop- and Wait ARQ if the bandwidth of the line is 1Mbps and 1 bit takes 20ms to take a round trip.? If the system data frames are 1000bits in length what is the utilization percentage of the link? Find the utilization percentage of the link if the link uses Go-Back-N ARQ with 15 frame sequence? *[(CO2)(Evaluate/HOCQ)]*

(b) The maximum window size in Go-Back-N ARQ is 2^m-1-Justify with proper diagram? *[(CO2)(Apply/IOCQ)]*

6 + 6 = 12

5. (a) Apply the checksum method to detect error free & erroneous condition in the following cases.

(i) Generated and transmitted bit patterns are 10101000 & 00111011
(ii) The bit patterns of case (i) being transmitted as 10100111 & 01111011

[(CO2) (Evaluate/HOCQ)]

(b) A bit stream 1101011011 is transmitted using the standard CRC method. The generator polynomial is $x^4 + x + 1$. Write the actual bit string transmitted.

[(CO2) (Evaluate/HOCQ)]

6 + 6 = 12

Group - D

6. (a) Identify the layers of TCP/IP in which a bridge operates. Discuss its functions? Describe the difference between a bridge and a repeater. *[(CO4)(Remember/LOCQ)]*

(b) Define IPv6 addresses? *[(CO4) (Remember/LOCQ)]*

(c) Identify the classes of the following addresses?
(i) 230.12.87.14
(ii) 245.5.20.101
(iii) 128.16.87.20
(iv) 250.19.250.63
(v) 160.45.182.199. *[(CO4)(Apply/IOCQ)]*

(2 + 2 + 1) + 2 + 5 = 12

7. (a) Distinguish between Unicast, Multicast and Reserved addresses.

[(CO4)(Analyse/HOCQ)]

(b) Identify the classes of each of these addresses with proper reasoning.
(i) 00110011 00001111 10110011 11001110
(ii) 11001100 01010101 00001111 11001111
(iii) 14.23.120.8
(iv) 252.5.15.111
(v) 11001100. 26.18.103
(vi) 200.05.16.132. *[(CO4)(Apply/IOCQ)]*

6 + 6 = 12

Group - E

8. (a) Classify the two types of network architecture of Bluetooth. *[(CO5)(Analyse/IOCQ)]*

(b) TELNET uses only one TCP connection for both data and control. Explain how embedding of control characters is achieved with an example. *[(CO5)(Apply/IOCQ)]*

(c) What is the purpose of the Network Virtual Terminal (NVT) in TELNET communication? Discuss how it solves the problem of heterogeneity among systems. *[(CO5)(Analyze/IOCQ)]*

4 + 4 + 4 = 12

9. (a) Analyse the role of firewall in modern networking system. *[(CO6)(Analyse/IOCQ)]*

(b) Describe the packet filter firewall. *[(CO6) (Remember/LOCQ)]*

(c) Distinguish between packet filter and Proxy firewall. *[(CO6)(Analyse/HOCQ)]*

2 + 4 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	18.75	46.87	34.38