COMPUTER COMMUNICATION AND NETWORKING
(ECEN 3231)

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) TCP/IP model does not have _____ layer but OSI model have this layer.
(a) session (b) presentation
(c) application (d) both (a) and (b).

(ii) Which one of the following routing algorithm can be used for network layer design?
(a) Shortest path algorithm (b) Distance vector routing
(c) Link state routing (d) All of the mentioned.

(iii) IPv6 has a ___ -bit address.
(a) 32 (b) 64 (c) 128 (d) variable.

(iv) Which of the following is an application layer service?
(a) Network virtual terminal
(b) File transfer, access, and management
(c) Mail service
(d) All of the mentioned.

(v) Ethernet uses a _____-bit physical address that is imprinted on the network interface card.
(a) 32 (b) 64 (c) 48 (d) 128.

(vi) What is the header size of UDP packet?
(a) 8 bytes (b) 8 bits
(c) 16 bytes (d) 124 bytes.

(vii) In the DNS, the names are defined in _____ structure.
(a) a linear list (b) an inverted-tree
(c) a graph (d) none of the above.

(viii) What is the last address in a block of classless addresses if one of the addresses is 12.2.2.127/28?
(a) 12.2.2.16 (b) 12.2.2.112
(c) 12.2.2.7 (d) None of the above.

(ix) The _____ method provides a one-time session key for two parties.
(a) Diffie-Hellman (b) RSA
(c) DES (d) AES.

(x) _____ is a dynamic mapping protocol in which a physical address is found for a given logical address.
(a) ARP (b) RARP
(c) Both (a) and (b) (d) None of the above.

Group – B

2. (a) What do you mean by Network Topology? Explain in brief.

(b) Explain the utility of layered network architecture. Compare ISO-OSI and TCP/IP models.

(c) Differentiate between connectionless and connection oriented services in Data networks.

4 + (2 + 4) + 2 = 12

3. (a) What are the responsibilities of the data link layer in the OSI model? Name some of the services provided by the application layer in the OSI model.

(b) Explain the different types of Wide Area Network. Why is a Star topology preferred over other network topologies?

(c) Enumerate the two fundamental principles of protocol layering.

(2 + 3) + (2 + 2) + 3 = 12

Group – C

4. (a) What is Jitter? A network with a bandwidth of 10 Mbps can pass only an average of 12000 frames per minute with each frame carrying an average of 10,000 bits. What is the throughput of this network?

(b) Explain why the size of the sender and the receiver window must be at the most one-half of 2^m in Selective Repeat ARQ Protocol.

(c) Why is flow control needed? Stop-and-Wait ARQ has two control variables S and R. What are their functions?

(2 + 3) + 4 + (1 + 2) = 12

5. (a) Mention different types of frames used in HDLC. Draw the control field formats of those frames.

   (b) Why are medium access control techniques required? List three popular medium access control techniques.

   (c) Write down the main function of Data link layer.

5 + 4 + 3 = 12

Group – D

6. (a) What do you mean by contention window? What is the significance of IFS in determination of priority of stations or frame types? Explain.

   (b) There is no acknowledgement mechanism in CSMA/CD but we need this mechanism in CSMA/CA. Explain the reason.

   (c) What is the significance of persistence methods? Explain them in brief. What is the purpose of NAV in CSMA/CA?

(2 + 2) + 3 + (3 + 2) = 12

7. (a) An ISP is granted the block 81.72.55.0/21. The ISP needs to allocate addresses for the following:
   (1) 2 organizations each with 512 addresses.
   (2) 2 organizations each with 256 addresses.
   (3) 3 organizations each with 64 addresses.
   (i) Find the total number of allocated and unallocated addresses in the ISP block.
   (ii) Find the range of addresses for each organization and the range of unallocated addresses.

   (b) In classless addressing, can two different blocks have the same prefix length? Explain.

   (c) What is a mask in IPv4 addressing? What is the default mask in IPv4 addressing?

(2 + 4) + 3 + (1 + 2) = 12

Group – E

8. (a) Explain the working of leaky bucket algorithm. Give argument why the leaky bucket should allow just one packet per kick independent of how large the packet is.

   (b) Compare TCP header and UDP header.

   (c) What is the purpose of providing two separate protocols UDP and TCP in the transport layer?

(4 + 3) + 2 + 3 = 12

9. (a) Why do we need a DNS system when we can directly use an IP address? What are the three domains in the Domain Name Space?

   (b) If Alice and Bob need to communicate using asymmetric-key cryptography, how many keys do they need? Who needs to create these keys?

   (c) Compare a piconet and a scatternet in the Bluetooth architecture? What is the difference between a BSS and an ESS? Discuss the three types of mobility in a wireless LAN.

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