[Time: Three Hours]   [Marks:80]

Note:
1) **Question 1 is compulsory.**
2) **Solve any three questions out of the remaining questions**

Q1
(a) Discuss and compare various types of networks.   **05**

(b) The size option field of an IP datagram is 20 bytes. What is the value of HLEN?
     What is the value in binary?   **05**

(c) Compare connectionless and connection-oriented services.   **05**

(d) The received string of bits is 110011001100. Is it acceptable? If so, what is the data
     bit sequence? Consider the divisor is 10101.   **05**

Q2 (a)   What is routing in a network? Explain the shortest path routing protocol.   **10**

Q2 (b)   Explain the different transmission media in networking.   **10**

Q3 (a)   Explain OSI reference model and the services and functions of each layer.   **10**

Q3 (b)   Construct Huffman code for the given symbols $\{x_1, x_2, ……., x_8\}$ with probabilities   **10**
         $P(x) = \{0.07, 0.08, 0.04, 0.26, 0.14, 0.09, 0.07, 0.25\}$. Find the coding efficiency.

Q4 (a)   Explain TCP segment header format in detail.   **10**

Q4 (b)   Explain ALOHA and Slotted ALOHA.   **10**

Q5 (a)   What is congestion and what are the causes of congestion? Explain token bucket   **10**
         algorithm of congestion control.

Q5 (b)   Explain CSMA/CD.   **10**

Q6   Write short notes on the following (any four):   **20**
         a. SMTP
         b. HDLC
         c. ARP, RARP
         d. Traditional Ethernet frame
         e. Hubs, switches, bridges

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