

[Time: 3 Hours]

[Marks:80]

- N.B: (1) Question no. 1 is compulsory.
 (2) Attempt any 3 from the remaining questions.
 (3) Assume suitable data if necessary.
 (4) Figures to right indicate full marks.

- Q.1 Attempt any four of the following
- Compare and contrast connectionless and connection oriented services 5
 - Illustrate the working of Fiber optic cable 5
 - Explain IPv4 header format with diagram. 5
 - Convert the IP address whose hexadecimal representation is **A3.1C.7F.09** to dotted decimal notation. 5
 - What is piggybacking? An 8-bit byte with binary value **11100010** is to be encoded using an even parity Hamming code. What is the binary value after encoding? 5
 - Illustrate ARP & RARP protocol. 5
- Q.2 Attempt the following
- A regional Internet Service Provider (ISP) has been allocated the IP address block **150.50.0.0/17** to serve customers in a growing metropolitan area. The ISP must efficiently distribute this address space among three categories of clients based on their size and network requirements:
 - Large enterprises: 16 organizations, each requiring approximately 1024 IP addresses for their internal networks.
 - Medium-sized businesses: 64 organizations, each requiring 128 IP addresses.
 - Small offices and startups: 128 organizations, each requiring 64 IP addresses.
 As a network engineer, design an appropriate sub-netting scheme using VLSM to allocate address blocks to each category. Clearly specify the subnet sizes assigned and calculate how many IP addresses, if any, remain unallocated after distribution. 10
 - Explain Linked State Routing with the help of example. 10
- Q.3 Attempt the following
- The message 11100011 is to be transmitted using the CRC polynomial x^3+x^2+1
 - Determine the transmitted frame.
 - If the last bit is flipped during transmission, verify whether the error is detected. 7
 - Explain the 3-way Handshaking mechanism of TCP? Imagine that a two-way handshake rather than a three-way handshake was used to set up connections. In other words, the third message was not considered, Is there any problem arise during connection? If yes justify. 10
- Q.4 Attempt the following
- Illustrate the TCP/IP protocol architecture in detail. 10
 - Explain the working of DNS in detail 10
- Q.5 Attempt the following
- Explain the Sliding Window Protocol in detail. Describe how it improves efficiency over Stop-and-Wait. Illustrate with a suitable example. 10
 - What is Congestion control? Explain Open loop and Close loop Congestion control. 10
- Q.6 Write a short note on (Any two)
- TCP Timers
 - DHCP Protocol
 - Address resolution protocol (ARP)
 - Types of Framing
