Section - A

1. Explain bit Stuffing:

Bit Stuffing is the process of inserting non-information bits into data to break up bit patterns that might be interpreted as control flags.
For example: in HDLC, after five consecutive 1s in the data, a 0 is inserted to prevent confusion with frame delimiters.

2. Explain the mechanism of Stop-and-wait ARQ.

In Stop-and-wait ARQ (Automatic Repeat Request), the sender sends one frame and waits for an acknowledgment (Ack) before sending the next.
If no Ack is received within a timeout period, the sender retransmits the frame. This ensures error control but has low efficiency.

3. What is Piggybacking?

Piggybacking is a technique in which the acknowledgement of received frames is included with outgoing data frames instead of sending a separate acknowledgment. This improves efficiency by reducing the number of frames sent.

4. What is Hidden Station Problem?

The Hidden Station Problem occurs in wireless networks when a node is visible to an access point but not to other nodes communicating with that access point. This leads to collision because the hidden node is unaware of ongoing transmissions.

Section - B

1. What do you mean by multiple accesses? Explain CSMA/CD.

ans:

multiple access refers to the ability of multiple users or devices to share the same communication medium.

CSMA /CD (Carrier Sense multiple Access with collision Detection)

- Before sending, a device listens to the channel (Carrier sense).
- If the channel is free, it transmits.
- If a collision is detected, all devices stop and wait a random time before retrying.

It's used in wired Ethernet networks to manage access and reduce collisions.

2. Differentiate between Circuit switching and Packet switching:

Circuit Switch network	Packet Switch network
• Circuit switching is a method that is used when dedicated channel or circuit needs to be established.	• Packet switching is a method of grouping data which is transmitted over a digital network into packets.
• It is implemented at Physical layer.	• It is implemented at Network layer
• Circuit switching is more reliable	• Packet switching is less reliable.
• circuit switching is initial cost is low.	• Packet switching network have high installation cost.

Section - C

1. Explain the flow control mechanism.

Ans Flow control ensures that a sender does not overwhelm a receiver by sending data too fast. Common flow control techniques:

- Stop-and wait: Sender waits for ACK after each frame.
- Sliding Window Protocol: Sender can send multiple frames before needing an ACK, using a window size.

These methods prevent buffer overflow and ensure smooth data transfer.

2. Explain FDMA, CDMA and TDMA.

- FDMA (Frequency Division multiple Access):
  Divides the frequency band into separate channels. Each user gets a unique frequency.
- TDMA (Time Division Multiple Access):
  Allocates unique time slots to users on the same frequency.
- CDMA (code Division multiple Access):
  All users share the same frequency and time, but each user is assigned a unique code to differentiate their data.