Exercise: 05	Linked List	31 – Jul - 2026

Spot (5 Marks)

1. A city transport department wants to create a software system to manage passengers, bus routes, and passenger travel history.

   Use the following data structures to implement the system:

   Module 1: Passenger Queue Management(Circular Queue Using Linked List)

   Passengers arrive at a bus stop and wait for a bus. New passengers join the queue. Passengers board the bus in the same order they arrive (FIFO). After boarding, they are removed from the queue.

   Operations:

   - Add a passenger to the queue.
   - Remove a passenger when the bus arrives.
   - Display all waiting passengers.

- Example:
  - Passengers in Queue:
  - P101 → P102 → P103 → P104
  - After two passengers board the bus:
  - P103 → P104

2. Module 2: Bus Route Management (Circular Linked List)

   A city bus travels continuously through several bus stops in a circular route.

   Example Route:

   Central Bus Stand → Airport → Mall → Railway Station → Central Bus Stand

   Operations:

   - Add a new bus stop.
   - Delete a bus stop.
   - Search for a bus stop.

- Display the complete route.

- Example:

Current Route:

Central → Airport → Mall → Railway → Central

Add a new stop: University

Updated Route:

Central → Airport → Mall → Railway → University → Central

3. Module 3: Passenger Travel History (Doubly Linked List)

The system stores the bus stops visited by a passenger during a journey.

Example:

Central ⇄ Airport ⇄ Mall ⇄ Railway

A passenger can:

- View the journey from the first stop to the last stop.
- View the journey in reverse order.

- Operations:
  - Add a visited stop.
  - Delete a stop from the history.
  - Display journey in forward direction.
  - Display journey in reverse direction.

Implement all the above operations using the appropriate data structures and display the results after each operation.