Scenario: Pizza Shop Order Queue

Consider a pizza shop where customers place orders and chefs prepare pizzas. In this scenario, multiple customers can place orders simultaneously, and multiple chefs prepare pizzas based on those orders. The shop has a limited **Order Queue** that can hold only a certain number of orders at a time, ensuring the system does not become overwhelmed with too many orders.

Requirements and Marks Breakdown:

Shared Resource: A limited **Order Queue** that can only hold a certain number of pizza orders at a time to avoid overloading the system. **[5 Marks]**

Customer [1 Mark]:

- 100 customers place pizza orders into the **Order Queue**.
- If the queue is full, customers must wait until there is space available to place their order.
- **[Implement/extend appropriate interfaces/classes: 2 Marks]**
- **[Implement appropriate procedures/functions: 2 Marks]**

Pizza Chef [1 Mark]:

- 10 chefs take orders from the **Order Queue** and prepare the pizzas.
- If the queue is empty, chefs must wait until there are orders available.
- **[Implement/extend appropriate interfaces/classes: 2 Marks]**
- **[Implement appropriate procedures/functions: 2 Marks]**

Mutual Exclusion [5 Marks]:

- Ensure that only one customer or chef can access the **Order Queue** at a time to avoid race conditions and ensure consistency.

Total [20 Marks]