Part I – STACK (LIFO)

A.Basics

Q1: Pressing back in MTN MoMo removes the last step entered. This shows LIFO because the **most recent action is undone first**, just like popping from the top of a stack.

Q2: Undoing steps in UR Canvas removes the last action performed. This is similar to a stack pop because the **last item added is removed first**, following LIFO

.

B. APPLICATION

Q3: In BK Mobile Banking, transactions are added to history. A stack can enable undo because each new transaction is **pushed onto the stack**, and popping removes the last entry to correct mistakes.

Q4: Irembo forms require balanced fields. Stacks ensure correctness by **pushing opening elements** and popping them when the corresponding closing element appears. If the stack is empty, the form is balanced.

C. LOGICAL

Q5: Task sequence: Push("CBE notes"), Push("Math revision"), Push("Debate"), Pop(), Push("Group assignment"). The top of the stack is **"Group assignment"**.

Q6: Undoing three recent actions during exams pops the last three items. The stack then contains only the **earlier ac tions**, showing LIFO allows selective undoing without affecting older entries

D.ADVANCED THINKING

.

Q7: In RwandAir booking, backtracking step-by-step works because each action is pushed onto a stack, and pressing back **pops the last step**, enabling reverse navigation.

Q8: Reversing "Umwana ni umutware" with a stack: push words → pop words. Result: **"umutware ni Umwana"**, demonstrating reversal using LIFO.

Q9: DFS in Kigali Public Library uses a stack to explore the deepest shelves first. The last visited location is popped, making **stack better than a queue** for depth-first search.

Q10: In BK Mobile app, transaction history can use a stack so users can **undo or revisit recent transactions** by popping actions from the top.

Part II – QUEUE (FIFO)

A. BASICS

Q1: At a Kigali restaurant, customers are served in arrival order. This shows FIFO because the **first customer in line is served first**, and new arrivals wait at the rear.

Q2: YouTube playlists play videos sequentially. The front video is removed first, similar to **dequeue operation**, following FIFO.

B. APPLICATION

Q3: At RRA offices, people waiting to pay taxes form a line. This is a real-life queue because people **join at the rear and leave from the front**, maintaining order.

Q4: SIM replacement in MTN/Airtel centers uses queues to **serve customers fairly**. FIFO ensures requests are processed in the same order they arrive.

C. LOGICAL

Q5: Equity Bank operations: Enqueue("Alice"), Enqueue("Eric"), Enqueue("Chantal"), Dequeue(), Enqueue("Jean"). The front of the queue is **Eric**, since Alice was dequeued.

Q6: RSSB pension applications are handled in arrival order. FIFO ensures fairness because **first applicant is served first**, preventing favoritism.

D. ADVANCED THINKING

Q7: Linear queue: wedding buffet line; Circular queue: buses looping Nyabugogo; Deque: boarding bus from front/rear. These **map queues to real-life scenarios**.

Q8: At Kigali restaurants, customer orders are queued and **dequeued when ready**, ensuring they receive food in the order they ordered.

Q9: At CHUK, emergencies are served first. This is a **priority queue** because urgent patients jump the line instead of waiting in FIFO order.

Q10: In moto/e-bike taxi apps, drivers are enqueued. Passengers are assigned to the **front driver first**, ensuring fair matching using a queue system.

IN FEW WORD

A STACK: is a lenear data structure that follow LIFO(first in , first out), while

QUEUE: is a linear data structure that follows FIFO(first in , first out) and the element added is the first one to be removed while in stack the last element added is the first one to be removed.