**Step 1: Identify - (a)**

1. **BoundedQueue (int capacity)** - set maximum size of queue and initialize parameters(constructor)

Exception: IllegalArgumentException 🡪 if capacity is negative number

1. **void enQueue (Object o)** - add new object in queue

Exception: NullPointerException -> if o is null

Exception: IllegalStateException -> if queue is full

1. **Object deQueue ()** - return first element in queue

Exception: IllegalStateException -> if queue is empty

1. **boolean isEmpty()** - return true if queue is empty
2. **boolean isFull()** - return true if queue is full
3. **String toString()** - return all elements in queue (ex: [1, 2, 3])
4. **Parameters:**
   1. Object[] - store all elements in queue
   2. size - total number of elements
   3. front - index of first element
   4. back - index of last element
   5. capacity - maximum limit of size

**Step2: Develop Characteristics - (b)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Method | Params | Returns | Values | Exception | ChID | Characteristic | Covered by |
| Bounded  Queue | 1,2,3,4,5 |  |  |  | C1 | positive integer of arguments |  |
|  |  |  |  | IllegalArgument  Exception |  |  | C1 |
| enQueue | 1,2,4,5 |  |  |  | C2 | add non-null value |  |
|  |  |  |  | NullPointer  Exception |  |  | C2 |
|  |  |  |  | IllegalState  Exception | C3 | constraint satisfied |  |
| deQueue | 1,2,3,5 | Object | Object |  | C4 | return non-null value |  |
|  |  |  |  | IllegalState  Exception |  |  | C3 |
| isEmpty | 2 | boolean | True or false |  |  |  | C4 |
| isFull | 2,5 | boolean | True or false |  |  |  | C4 |

**Step3: Design a partitioning - (c)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ID | Characteristic | BoundedQueue() | enQueuer() | deQueuer() | isEmpty() | isFull() |
| C1 | positive integer of arguments |  |  |  |  |  |
| C2 | add non-null value |  |  |  |  |  |
| C3 | constraint satisfied |  |  |  |  |  |
| C4 | return non-null value |  |  |  |  |  |

**Step4: Define Test Requirements - (d)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Method | Characteristics | Test Requirements | Infeasible TRs | Revised TRs | Number of TRs |
| BoundedQueue | C1 | {T, F} |  |  | 2 |
| enQueue | C2, C3 | {TT, FT, TF} | FT | FT🡪FF | 3 |
| deQueue | C3, C4 | {TT, FT, TF} | FT | FT🡪FF | 3 |
| isEmpty | C4 | {T, F} |  |  | 2 |
| isFull | C4 | {T, F} |  |  | 2 |