CHAPTER : 4

QUEUE

STUDY NOTES

- Like Stack, Queue is also a data structure that works on First-In-First-Out (FIFO) principle.
- Queue works on the principle of First In First Out (FIFO). This means the element that enters the queue first will be the first one to be retrieved.
- FIFO is also known as a First Come First Served (FCFS) approach.
- In a queue, the objects are added from the REAR or TAIL and removed from the HEAD or FRONT.
- Following the FIFO approach queue supports the following functions:
  - ❖ **Enqueue:** for inserting new elements.
  - ❖ **Dequeue:** for removing elements from queue.
  - ❖ **Is Empty:** to check if the queue has any elements left.
  - ❖ **Peek:** to view element in front of the queue.
  - ❖ **Is Full:** to check if more elements can be added to the queue.
- Deque is an arrangement in which addition and removal of element(s) can happen from any end, i.e. head/front or tail/rear.
- Deque supports following functions:
  - ❖ **Insertfront:** inserts a new element at the front of the deque.
  - ❖ **Insertrear:** inserts a new element at the rear of the deque.
  - ❖ **Deletionfront:** to remove an element from the front of the deque.
  - ❖ **Deletionrear:** removes one element at a time from the rear of the deque.

QUESTION BANK

MULTIPLE CHOICE QUESTIONS

1. Queue works on the principle of:
   (a) First in first out
   (b) First in last out
   (c) Last in first out
   (d) First in last out
2. Which of the following statements is not true for a queue?
   (a) Queue follows First Come First served approach.
   (b) Element that has been longest in the queue will be removed last.
   (c) Elements are added from the TAIL and removed from the HEAD.
   (d) None of the above.
3. Which is not a real life application of queue?
   (a) Stack of plates
   (b) Line outside the ATM machine
   (c) Call centre service
   (d) Voting lines.

4. Which of the following is not an application of queue in computer science?
   (a) Operating systems handling multiple tasks (b) Undo operation on word document
   (c) Queue for getting to access a website (d) Print command

5. Which operation is not an operation on queue?
   (a) Enqueue (b) Dequeue (c) Update (d) isEmpty

6. The operation of inserting new elements from the rear end is known as:
   (a) Enqueue (b) Dequeue (c) IsEmpty (d) Peek

7. Which queue operation is used to remove one element at a time from the front of the queue?
   (a) Enqueue (b) Dequeue (c) IsEmpty (d) Peek

8. Which operation is used to avoid underflow exception?
   (a) Enqueue (b) Dequeue (c) IsEmpty (d) Peek

9. Which operation is used to view elements from the front of the queue without removing them from the queue?
   (a) Enqueue (b) Dequeue (c) IsEmpty (d) Peek

10. Which operation is used to check whether anymore elements can be added to the queue or not?
    (a) Enqueue (b) Dequeue (c) IsFull (d) Peek

11. Which function is used to add an element at the end of the list which is the rear of the queue?
    (a) add (b) insert (c) append (d) write

12. The function isEmpty checks whether the queue is empty or not using the:
    (a) Index of the list (b) len() function (c) size() function (d) All of these

13. What is the parameter passed to the Dequeue function of a queue?
    (a) Name of the queue (b) Elements of the queue (c) No parameter (d) Length of the list

14. The dequeue function is defined with the help of which Python function?
    (a) delete() (b) remove() (c) pop() (d) close()

15. How does the peek() function of queue read the element at the front?
    (a) using index 0 (b) pop() (c) append() (d) read()

16. Look at the following code:

```
def x(firstQueue):
    if isEmpty(firstQueue):
        print('Queue is empty')
        return None
    else:
        return firstQueue[0]
```

    Function x is the :
    (a) peek() function (b) size() function (c) dequeue() function (d) isEmpty() function

17. Look at the following code:

```
def x(firstQueue):
    return len(firstQueue)
```

    x represents which function of the queue?
    (a) peek() function (b) size() function (c) dequeue() function (d) isEmpty() function

18. Look at the following code:

```
def x(firstQueue):
if not (isEmpty(firstQueue)):
return firstQueue.pop(0)
else :
```

```
print("Queue is empty")
```
What does x represent?

(a) peek() function
(b) size() function
(c) dequeue() function
(d) isEmpty() function

19. Look at the following code:

```
def x(firstQueue):
    if len(firstQueue)==0:
        return True
    else:
        return False
```

What does x represent?

(a) peek() function
(b) size() function
(c) dequeue() function
(d) isEmpty() function

20. In the dequeue function, how are elements removed from the front of the queue?

(a) Using remove(0) (b) Using index(0) (c) Using queue_name[0] (d) Using pop(0)

21. An arrangement in which addition and removal of elements can happen from any end is known as:

(a) Dequeue (b) Push (c) Pop (d) enqueue

22. A dequeue is also known as:

(a) Double ended queue (b) Double ended stack (c) Double ended (d) Doubly

23. By adding and deleting the elements in a deque from the same end you can make it work like a:

(a) list (b) stack (c) queue (d) none of the above

24. By adding and deleting the elements in a deque from the opposite ends you can make it work like a:

(a) list (b) stack (c) queue (d) none of the above

25. Which operation is used to insert an element in the front of the dequeue?

(a) INSERTFRONT
(b) INSERTREAR
(c) DELETIONFRONT
(d) DELETIONREAR

26. Which operation inserts a new element at the rear of the dequeue?

(a) INSERTFRONT
(b) INSERTREAR
(c) DELETIONFRONT
(d) DELETIONREAR

27. Which operation removes an element from the front of the dequeue?

(a) INSERTFRONT
(b) INSERTREAR
(c) DELETIONFRONT
(d) DELETIONREAR

28. Which operation removes an element from rear of the dequeue?

(a) INSERTFRONT
(b) INSERTREAR
(c) DELETIONFRONT
(d) DELETIONREAR

29. A dequeue is a:

(a) Linear list
(b) Ordered list
(c) Ordered linear list
(d) None of these

30. Deque supports stack but not queue.

(a) True (b) False

31. Enqueue and dequeue operations are supported by:

(a) isEmpty (b) isfull (c) peek (d) All of these

32. In queue, insertion and deletion happen at the same end.

(a) True (b) False

33. Deque is a version of queue in which insertion and deletion can occur from any end.
(a) True (b) False

34. In Python, the use of predefined methods takes care of Front and Rear.
(a) True (b) False

35. Queue is an ordered linear data structure following FIFO strategy.
(a) True (b) False

INPUT TEXT BASED MCQs

Read the following passage and answer the following questions (36 to 39).

Following the FIFO approach, data structure queue supports the following operations:

- **Enqueue:** is used to insert a new element to the queue at the rear end. We can insert elements in the queue till there is space in the queue for adding more elements. Inserting elements beyond capacity of the queue will result in an exception - known as Overflow.
- **Dequeue:** is used to remove one element at a time from the front of the queue. We can delete elements from a queue until it is empty, trying to delete an element from an empty queue will result in exception- known as Underflow.

36. Which function is required to perform enqueue and dequeue?
(a) isEmpty (b) peek
(c) isFull (d) All of these

37. Which of the following is the right code for peek function in a queue?
(a)
```
def peek(myQueue):
    if isEmpty(myQueue):
                    return None
    else:
        return myQueue[0]
```
(b)
```
def peek(myQueue):
    if isEmpty(myQueue):
        print('Queue is empty')
    else:
        return myQueue[0]
```
(c)
```
def peek(myQueue):
    return myQueue[0]
```
(d) None of these

38. In a parent teacher meeting parents come and collect report cards of their wards. Suddenly, a parent comes rushing and request to allow him to collect the report card first as he is getting late for the meeting. His request is granted. This is an example of:
(a) Stack (b) Queue (c) Deque (d) None of these

39. While using a list to implement queue any side can be made rear or front of the queue but it is important for the programmer to fix either of the ends index[0] or index[n-1] as Front and fix opposite as Rear.
(a) True (b) False

ANSWERS

Multiple Choice Questions

1. (a)	2. (b)	3. (a)	4. (b)	5. (c)	6. (a)	7. (b)	8. (c)	9. (d)	10. (c)
11. (c)	12. (b)	13. (b)	14. (c)	15. (d)	16. (a)	17. (b)	18. (c)	19. (d)	20. (d)
21. (a)	22. (a)	23. (b)	24. (c)	25. (a)	26. (b)	27. (c)	28. (d)	29. (b)	30. (b)
31. (d)	32. (b)	33. (a)	34. (a)	35. (a)					

Input Text Based MCQs

36. (d)	37. (a)	38. (c)	39. (a)

HINTS/EXPLANATION

1. Queue works on the principle of First in first out.
2. In a queue, the element that has been longest in the queue will be removed last.
3. Stack of plates is not a real time example of Queue.
4. Undo operation involves stack operation because the first action is undone at the end.
5. Update is not a queue operation.
6. The Enqueue is used to insert new elements from the rear end in a queue.
7. The Dequeue operation is used to remove one element at a time from the front of the queue
11. The append() function is used to add an element at the end of the list.
12. The function isEmpty checks whether the queue is empty of not using the len() function. If the length of the list is 0 then the queue is empty.
13. The dequeue function removes the first element from the FRONT of the queue. It just needs the name of the queue on which this operation need to be performed.
16. It is the peek() function because the code only sees the first element of the queue.
17. Since x returns the length of the queue it represents the size() function.
19. X represents isEmpty() function because the function only checks whether the length is 0 or not.
21. An arrangement in which addition and removal of elements can happen from any end is known as dequeue.
22. A dequeue is also known as a double ended queue.
24. By adding and deleting the elements in a deque from the opposite ends you can make it work like a queue.
25. The Insertfront operation is used to insert an element in the front of the dequeue.
27. The Deletionfront operation removes an element from the front of the dequeue.
30. The Deque supports both stack and queue
32. In queue, insertion takes place from the REAR and deletion happen from the FRONT.
34. True. In Python, the use of predefined methods takes care of Front and Rear.