

QUESTION 1

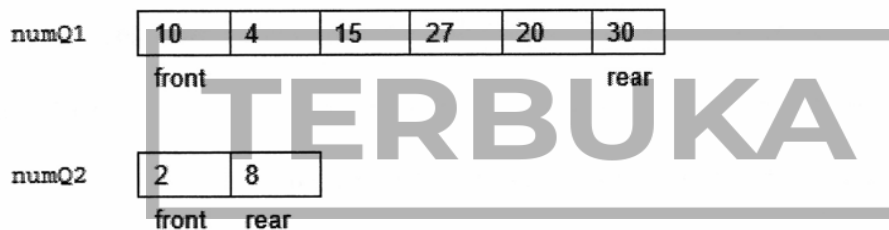
a) Given the following Queue ADT that listed 3 methods related to a queue:

```
public class Queue
{
    public Object dequeue() {}
    public void enqueue(Object obj) {}
    public boolean isEmpty() {}
}
```

i) Briefly describe the purpose of `dequeue()`, `enqueue()` and `isEmpty()` methods.

(5 marks)

ii) Given 2 integer queues namely `numQ1` and `numQ2` as shown in the following diagrams:



Illustrate the latest diagram of `numQ1` and `numQ2` after the execution of the following program fragment.

```
int num;
for (int i=0; i < 4; i++)
{
    num = Integer.parseInt(numQ1.dequeue().toString());
    if ((num * 4) % 2 == 0)
        numQ2.enqueue (num);
}
```

(5 marks)

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- b) Young Motivator Competition is a program organized by UiTM's Motivator Club to showcase students' talents to become a university young motivator. To store the information about the competition, the following ADTs are given to represent the Motivator and Queue class:

```
public class Motivator
{
    private String motivatorID;        //e.g: M101,M102, etc
    private String motivatorName;
    private String faculty;           //e.g: FSKM, FSG, FPP
    private String programCode;       //e.g: CS110, CS240, AS120
    private double marks;              //total marks given by judges

    public Motivator (String, String, String, String, double) {...}
    public String getMotivatorID () {...}
    public String getMotivatorName () {...}
    public String getFaculty () {...}
    public String getProgramCode () {...}
    public double getMarks () {...}
    public String toString () {...}
}

public class Queue
{
    public void enqueue (Object elem) {}
    public Object dequeue () {}
    public boolean isEmpty () {}
    // definition of other methods
}
```

Write a program fragment for each of the following tasks:

- i) Insert the information of 10 motivators who will join the competition and store it in a queue named `motivatorQ`.
(5 marks)
- ii) Count and display the number of motivators where the first two characters of the `programCode` starts with "CS". Retain the original order of the data in `motivatorQ`.
(5 marks)
- iii) Diamond Award will be awarded to the motivator who obtained the highest mark in the competition. Find and display the motivator's information that will be awarded with Diamond Award.
(5 marks)