Problem 4: Implementation of Queues

Data Structures Lab (CS111)

In this practice problem, you need to implement queues using different approaches. This problem has two parts:

1. Create a queue with array of size 5. Then implement following operations for the created queue:

   - *enqueue()*, *dequeue()*, *queuesize()*. **[5 marks]**

2. Now implement a queue using a circular list such that each node of the queue has an array of size 5. Initially the queue has only one node. When number of elements of queue becomes > 5 and $<= 10$ insert one more list node and your implementation should treat the whole list as a single queue. Continue this process with the increasing number of elements in the queue such that the number of nodes in the list at any point of time is $\lceil \frac{n}{5} \rceil$ where n is the number of elements in the queue. Implement *mixedenqueue()* function to perform enqueue operation on this queue. Similarly implement *mixeddequeue()* function to perform dequeue operation in a way that number of nodes in the list is always $\lceil \frac{n}{5} \rceil$. This means, you need to remove nodes of the list when number of elements decreases. For example, when you have 11 elements in the queue there should be 3 nodes in the list. Now if you perform one dequeue operation, number of elements in the queue becomes 10. So you need to remove a node from the list. You can implement any number of extra functions which might help you to implement this queue. **[15 marks]**