Exam: Midterm   **Instructor**: Shahela Saif
Type of Paper: Regular   **Maximum Marks**: 20
Semester: Fall 2010   **Time Allowed**: 150 min

Note:
1. Use of course work slides or other helping material is not allowed.
2. Submit your work in the assignments folder as other regular assignments.
3. Copied submissions will be cancelled altogether.
4. Viva will be conducting from all or some students.

Question .No.1   **(20)**

A parking garage contains a single lane that holds up to ten cars. Cars arrive at the south end of the garage and leave from the north end. If a customer arrives to pick up a car that is not in the northernmost, all cars to the north of the car are moved out, the car is driven out, and the other cars are restored in the same order that they were originally. Whenever a car leaves, all the cars to the south are moved forward so that at all times the free spaces are in the south part of garage.

Write a program to implement the above scenario. You will need to maintain a queue for parked-cars and one for waiting-cars. License plate number is to be stored for all cars that are parked. The program should print a message each time a car arrives or departs. When a car arrives, the message should specify whether or not there is room for car in garage (parking area). If there is no room for car, the car waits until there is room or until a departure line is read for the car. When room becomes available, another message should be printed.

Hints:

1. Car to be removed may be looked up by license plate, or you may simply give the index number of the car (e.g. 5th car in the list or car with license plate 'XYZ').

2. Check has to be enforced on insertion method to allow for 10 insertions only. If another request for parking arrives, insert to waiting queue. If waiting queue is full also, deny request. This may be done by creating a function for parking cars which may subsequently insert to or delete values from parked-cars/waiting queues.

3. Check has to be enforced on deletion method that if a car exists in waiting queue, that should be added to parked cars queue and deleted from waiting cars queue. This can be done by creating a function for removing a car which may subsequently insert to or delete values from parked-cars/waiting queues.

4. A car may be directly taken out from waiting queue but it will be added to waiting queue only when parked car queue is full.

Note: The use of linked list structure or queue structure for parked cars/waiting cars queue is left as a choice to the student.

Grading Criteria:

On completion of basic functionality of list/queue: 10 marks

On completion of specific functions: 10 marks.

Extra Credit: (01)

For indented, neat and commented code.