Indian Institute of Technology(IIT) Jodhpur
Assignment 1, **Weightage -20**

Q1. Alice has some cards with numbers written on them. She arranges the cards in decreasing order. She challenges Bob to pick out the card containing number 120 by turning over as few cards as possible. Write a recursive function to help Bob locate the card containing number 120. Show assumptions and actions step by step. The numbers on card are as below.

10 34 48 59 63 74 85 120 140

Write an algorithm or programming code in any preferable language (using C/C++/Java/Python) and also give dry run for the same (Take any example of your choice for dry run). [10]

Q2. Modify Binary Search such that integer overflow problem during calculation of mid=(high+low)/2 does not occur.

Given a group of n (index: **0-n-1**) marbles, all marbles have a specific number based on their type. These marbles are stored in an array. Find the marble type [i.e: its number] which has occurred maximum times in an array.

Can the above solution be solved in less than O(nlogn) time complexity. If yes provide the approach. Justify your answer.

A Memory block with size of 4 GB having sentence [String] in each line needs to be arranged.

What would be an efficient way to solve this problem? [10]