CS1131 (Design and Analysis of Algorithms)
Quiz-1

Time - 45 Minutes

Name_____   Roll No._____

Q1. Which of the following is correct. Mark ALL the correct Answers: **Marks 1.0**
1. $n/2 = \omega(n)$
2. $n/2 = \Omega(n^2)$
3. Both 1 and 2 are correct
4. None of the options are correct

Q2. A machine needs a minimum of 100 sec to sort 1000 names by **quick sort**. The minimum time needed to sort 100 names will be approximately _____   **Marks 1.0**

Q3. Prove that $n^3 - 3n^2 - n + 1 = \Omega(n^3)$ **Marks 1.0**

Q4. Huffman tree is constructed for the following data :{A,B,C,H,I} with frequency {0.14, 0.06, 0.07, 0.02 and 0.17} respectively.   **Marks 1.5 +0.5**
Draw the tree:

11100110 is decoded as _____

Q5. Given connected components, apply **Quick Find** and fill the table:

0	1	2	3	4	5	6	7	8	9
0	1	1	3	8	5	1	1	8	8

(a) Connect (4,7). Write the modified array

0	1	2	3	4	5	6	7	8	9

Marks 1.0

Q6 a). In a basic **fractional knapsack** implemented using a greedy algorithm, write down the **objective function, feasibility constraints and greedy choice property**

Marks 1.0

b). Use an optimal algorithm to find out how many requests can be catered if the intervals are of requests are: R1 = (1, 3), R2 = (2, 5), R3 = (4, 6), R4 = (6, 7), R5 = (5, 9), R6 = (8, 10). Show the steps.   **Marks 1.0**

Q7. Write a function for a fractional knapsack, assuming that the input arrays to this function have the items already sorted by their pi/wi ratios. The function should return the total profit obtained.

Marks 2.0

```
double GreedyKnapsack (int p[], int w[], int size){
```