Department Of computer Science and Engineering

Exam: Midterm Year: 2017 Trimester: Fall Course: CSI217
Title: Data Structure Marks: 30 Time: 2hours

Answer any 4 question out of 6

1. a) Compare advantages and disadvantages of linked list over Array with proper example.[2]
   b) Design an algorithm that finds a number from an array with highest occurrence that is find a number of highest frequency. [3.5]

Sample input	Sample Output
2 3 4 2 3 3 5 2 3 3	3
1 2 3 3 2 2 1 1 5 1 1 1	1

   c) Discuss the importance of Data structure in computer science. [2]

2. a) Consider the following situations. Explain with proper reasons which searching algorithm will perform better on which situation. [2]

Case1	10	12	13	13	20	11	100	120	11
Case2	200	100	50	25	12.2	6	3.5	2	1

   b) Design a recursive algorithm for binary search. [2.5]
   c) Apply Insertion sort for the following data. Show each steps.[3.0]

12	12.2	11.5	11.25	10	9.5	100

3. a) What is the advantages of dynamic memory allocation over static memory allocation.[1]
   b) Consider you have a linked list which contains just an integer number in each node. Now design an algorithm that deletes its last node and append that node at the front of the list. [2.5]
   c) Declare a variable for linked list data structure in C programming language. [2]
   Student (name, id, marks, birthday (day, month, year), next)
   Where, name is a **string** filed, id is an **integer**, marks is **float** type, birthday is another data structure which contains day, month and year field of **integer** type and **next** filed hold the address of the next node of the list.

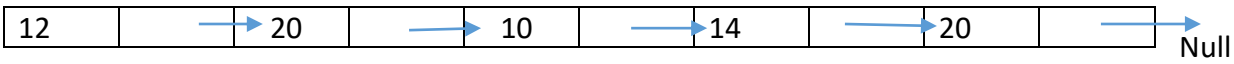
d) Construct a code that count the total number of node in a linked list. [2]

4. a) Explain the working principle of Bubble sort using an example. [2]
   b) Apply quick sort algorithm for the following dataset up to second partition. [3.5]

27	7	12	5	100	1	2	8	10	15

   c) Design an algorithm that can identify duplicate elements from an array. [2]

5. Consider you have the following linked list.



   a) Construct a complete code that takes an integer from user and insert it into end of the list. [3]
   b) Design an algorithm that delete the node that contain highest value. [3]
   c) Design an algorithm that finds the middle node of a linked list. [1.5]

6. Draw a diagram for each of the statements given bellow. You need to draw a picture for each of the following instructions. [7.5]

```
1.  struct list
2.  {
3.      int data ;
4.      struct list *next ;
5.  } ;
6.  list *tempprev, *temp, *tempsuc ;
7.     tempprev = (list*) malloc(sizeof(list)) ;
8.     temp = (list*) malloc(sizeof(list)) ;
9.     tempsuc = (list*) malloc(sizeof(list)) ;
10.    tempprev->data = 5 ;
11.    tempsuc->data = 10 ;
12.    temp->data = 100 ;
13.    temp->next = tempprev;
14.    temp->next->next = tempsuc;
15.    tempsuc->next=temp;
16.    free(tempsuc);
17.    temp->next->next = temp ;
18.    list *temp1 = (list*) malloc(sizeof(list)) ;
19.    temp1->data = 200 ;
20.    temp1->next = temp;
```