Class Test #1 on CSE 1201

1st year EVEN Semester, 2016 Series

Time: 25 min, Full Marks: 20 (8+12)

Answer all the questions

Q1. Suppose a 10-element array is used to implement a *Queue*. If **REAR** and **FRONT** points at index 2 and 6 respectively then find the total number of elements in the *Queue*.

Q.2 Draw a flowchart to copy all the elements of a Queue into a Stack.

Class Test #2 on CSE 1201

1st Year EVEN Semester, 2016 Series

Time: 30 min, Full Marks: 20

Answer all the questions

Q1. Suppose we have 2 circular link lists headed by addresses **h1** and **h2** respectively. Then write an algorithm to merge (without copying elements) these lists into one circular list headed by address **h1**.

Q2. Write statements to delete a node pointed by **p** in a double link list. Assume that **p** is not the first node address.

Dept. of CSE// CT #1 CSE 1201 Time: 20 mins

Q 1 What do you mean by complexity of an algorithm? Explain with an example. 05

Q 2 Briefly describe the followings. (i) Flow chart for an algorithm (ii) Complexity of Linear Search and (iii) Complexity of Bubble Sort. 05 + 05 + 05

Dept. of CSE, RUET

Class Test: 2 CSE 1201(Data Structure) Time: 20 Min Marks: 20

Q.1 Explain how a Hash Function Searching is better than any linear Searching? Describe the problem of this function. (10)

Q.2 For a binary tree, write in order, preorder and post order traversing on it. (03)

Q.3 Write the difference between binary and binary search Tree. Define Heap tree and hence search/insert a data on it. (07)

Heaven's Light Is Our Guide

RAJSHAHI UNIVERSITY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
1st Year Even Semester Examination 2017

COURSE NO: CSE 1201 COURSE TITLE: Data Structure
FULL MARKS: 72 TIME: 3 HRS

N.B. (i) Answer any SIX questions taking any THREE from each section.
(ii) Figures in the right margin indicate full marks.
(iii) Use separate answer script for each section.

SECTION : A

Q.1. (a) Define data structure and hence describe data structure operations with example. 6
(b) Explain the following terms: (i) time complexity and (ii) space complexity of an algorithm. 4
(c) A program p reads in 500 integers in range [0 100] representing the scores of 500 students. It then prints the frequency of each score above 50. What would be the best way for p to store the frequencies? 2

Q.2 (a) What is the basic difference between traversing and searching? 2
(b) Suppose you have a unsorted array of size 100. Now you need to search one data from them. Then explain which one of the followings is the best way to do so and why? (i) sort the array and search and (ii) directly search the unsorted array. 4
(c) What does the following declaration mean? 3

```
int (*ptr)[10];
```

Find the output of the following program

```
#include<stdio.h>
int main(){
  int a[5]={5,1,15,20,25};
  int i,j,m;
  i = ++a[1];
  j = a[1]++;
  m = a[i++];
  printf("%d, %d, %d",i,j,m);
  return 0;
}
```

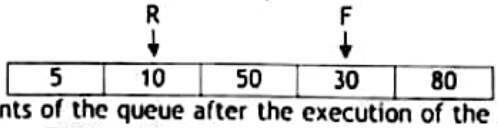
(d) Explain the problem of using array data structure in programming and how to solve this problem. 3

Q.3. (a) Differentiate between list and array. 2
(b) What is sparse matrix? 1
(c) Find the triplet representation of the following matrix. 4

$$\begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 8 \\ 0 & 9 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 2 & 0 \\ 0 & 0 & 0 & 0 & 3 & 0 \\ 0 & 2 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 0 & 0 & 0 \end{pmatrix}$$

(d) Write an algorithm using flowchart to find the triplex representation of a sparse matrix. 5

Q.4. (a) Why Butterfly is so appealing? 2
(b) Consider the current scenario of a circular queue 5



Then list the elements of the queue after the execution of the following statement sequentially: Dequeue; Enqueue(18); Enqueue(25); Dequeue();
(c) Write an algorithm that implements a stack using a link list. 5

SECTION : B

Q.5 (a) With example, explain the followings: (i) best case, (ii) average case and (iii) worst case complexity of an algorithm. 3
(b) Suppose you have the following pseudocode. Now you find out the estimated time complexity for a particular CPU of 2.5 GHz clock speed and hence make necessary comments. 5

```
ALgorithm: arrayMax(A,n)
Input: array A of n integers
Output: maximum element of A
```

```
currentMax←A[0]
for i←1 to n-1 do
  if A[i]>currentMax then
      currentMax←A[i]
      return currentMax
```

(c) Write the runtime complexity of the following program segments: 4

```
(i)   for(i=1;i<n;i=i*2(...);
(ii)  for(i=0;i<n;i++)
         for(j=0;j<n;j++)
                  for(k=0;k<n;k++)
                           sum++;
(iii) for(int i=0;i<n;i++){
                  n = n/3;
                  sum++;
      }
(iv)  if(condition)
         for(int i = 0; i<n;i++)
              sum++;
      Else
        for(int i=0; i<n;i++)
          for(int j=0;j<n;j++)
              sum++;
```

Q.6

(a) For a tree, define (i) Sub-tree, (ii) Traversing and (iii) Levels. 3

(b) What is the minimum height of a binary tree with N nodes? 2

10 (c) Draw the BST that is created if the following numbers are inserted in the tree in the given order: 12, 15, 3, 35, 21, 42, 14. Also draw its equivalent balanced BST. 3

(d) The following array representation a binary tree with first element as the root. Then sort the array in ascending order using max heap technique. 4

15	19	10	8	17	16

Q.7

(a) What are the properties of a B-tree? 2

(b) Write down the steps to sort the following numbers using Quick-Sort technique: 4
5, 7, 6, 1, 3, 2, 4

8

(c) Draw a flowchart to implement merge sort for n elements. 4

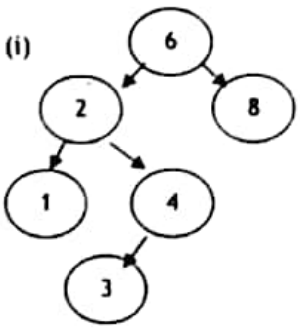
(d) Find the following complexities for merge sort with n elements: (i) Worst-Case time complexity, (ii) Best-Case time complexity, (iii) Average case time complexity and (iv) Space complexity. 2

Q.8

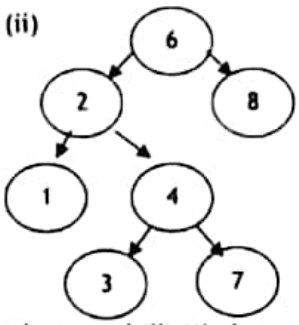
(a) What is difference between binary tree and binary search tree? Explain with example. 3

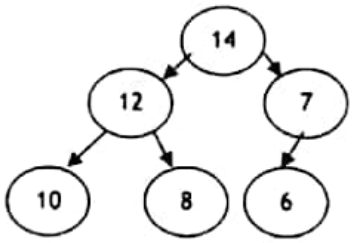
(b) Write the name of following trees and also write why? 3

(i)



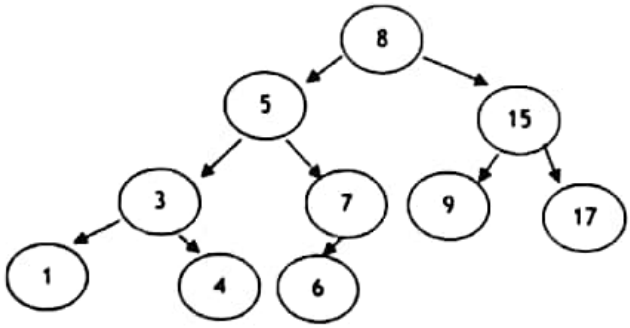
(ii)





(c) Define with example (i) Max heap and (ii) Min heap for a tree 3

(d) For the following complete binary search tree, describe the operations as mentioned bellow: (i) insert 8 and (ii) delete 6. 3



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