BAHRIA UNIVERSITY (KARACHI CAMPUS)

MIDTERM EXAMINATION – FALL SEMESTER – 2020

Data Structures & Algorithms CSC-221

Class: BS (CS)-3A, B   Morning

Course Instructor: **Lubna Siddiqui**   Time Allowed: 90 minutes

Date: 23-11-2020 **Session:** I   Max Marks: 20

Student's Name: _____   Reg. No: _____

Note
Write letter as answer in provided answer sheet
Avoid iverwriting and cutting

ANSWER SHEET

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

OBJECTIVES

Question no.1

Multiple Choice Questions.

1. Two main measures for the efficiency of an algorithm are

    A. Processor and memory   B. Complexity and capacity
    C. Time and space   D. Data and space

2. The operation of processing each element in the list is known as

    A. Sorting   B. Merging
    C. Searching   D. Traversing

3. What is the following code segment intended to do?

    ```
    Sorting(A)
     {
     for (pass=1;pass<n;pass++)
          for (c=1;c<=(n-pass);c++)
             if (A[c]>A[c+1])
             { swap (A[c], A[c+1]) }
     }
    ```

    A. Insertion Sort   B. Selection Sort
    C. Quick Sort   D. Bubble sort

4. Which of the following statements(s) is/are true in connection with searching algorithms?

    I. If a data set is un-sorted, a more appropriate searching technique is sequential searching.
    II. If a data set is sorted, a more appropriate searching technique is binary searching.
    III. If a data set is un-sorted, a more appropriate searching technique is binary searching.

    A. I only   B. I and II only
    C. I and III only   D. All are correct

5. The memory address of kth element of an array can be calculated by the formula

    A. LOC(LA[k])=Base(LA)+w(UB-LB)   B. LOC(LA[k])=Base(LA)+w(K+LB)

    C. LOC(LA[k])=Base(LA)+w(K-LB)   D. LOC(LA[k])=Base(LA)+w(UB+LB)

6. Worst case time complexity of Insertion sort is

   A. O(n)   B. $O(n^2)$
   C. O(log n)   D. O(1)

7. Which of the following is the time complexity of binary search algorithm?

   A. O(1)   B. O(n)
   C. O(log n)   D. $O(n^{2)}$

8. The memory address of the first element of an array is called

   A. Floor   B. Base
   C. First   D. Foundation

9. A/an _____ is a mathematical model for a certain class of data structures that have similar behavior.

   A. Data type   B. Method
   C. Abstract data type   D. Function

10. Which of the following represents the overflow of circular queue?

    A. (FRONT == -1)   B. (REAR == N-1)
    C. (FRONT=-1 && REAR=-1)   D.
                                ((FRONT == REAR+1) || ((FRONT == 0) && (REAR == N-1)))

SUBJECTIVE

Question no.2 (2+2)

    a. Convert following infix expression into post fix expression. Show all steps

$$(A+ B)*(C*D- E)*F / G$$

    b. Consider the following queue with n=8.
        front = 3 rear= 5

        Queue = - , - , 2, 4 ,5, - , - , -

        (for notational convenience " – " used to denote an empty cell)

        The following operations have to be performed.
        (i) 6 is added to the queue.
        (ii) Two elements are deleted from the queue.
        (iii) 10 and 12 are added to the queue.
        (iv) Two elements are deleted from the queue.
        (v) 2 and 3 are added to the queue.

What are the final front and rear values when the above operations are performed into a circular queue?

Question no. 3 (1+2)

Sara is running a small cefe named" Sara's mini café" where people can enjoy delicious foods.
. " Sara's mini café "provide self service dine in facility. When customer arrives he/she can take the token and wait for turn on first come first serve basis. A pile of 100 trays is placed on café counter .He/she take a tray from café counter and put the food items on a tray and pay the bill on the cash counter
    a. Which data structure would you consider to keep the record of trays? Justify your answer

    b. Write an algorithm that display the number of trays left on café counter.

Question no.4 (2+2+1)

Write the code for following scenario.

Rabia keeps the record of the books having information" Book_id, Title, Author name, ISBN. She keeps the record in a single link list. Assume that link list has 25 nodes.

    a. Sara wants to keep the record at the beginning of the link list.

    b. Sara wants to keep the record at the end of the link list.

    c. Sara wants to print all records.

Question no.5 (1+2)

    a. Analyze the following growth rates of following algorithms M and N. Which one is efficient and why?
Growth rate of M is $T(n)=n^2+n^3+5n$
Growth rate of N is $T(n)= 7n^3+5n^2+6n$

    b. Find the time complexity of following algorithms.

i.	ii.
``int fun(int n)
{
for (int a = 1; a <= n; a++)
{
for (int b = 1; b < n; b += a)
{
Cout<<"DSA Mid Term Exam
}
}
}```	```void Calculate(int n)
{
if(n<10)
cout<<"n is less than 10;;
else
for(int i=0;i<n;i++)
cout<< i;
}```