



## COLLEGE OF COMPUTING AND INFORMATION SCIENCES

### Final Term Assessment Summer 2021 Semester

Class Id	107170	Course Title	DSA-Theory
Program	BSCS	Campus / Shift	Main Campus / Morning
Date	27-Jul-2021	Total points	40
Duration	03 Hours	Faculty Name	M.Minhal Raza/Mr.Azam
Student Id		Student Name	

#### Instructions:

- Filling out Student-ID and Student-Name on exam header is mandatory.
- Do not remove or change any part of exam header or question paper.
- Write down your answers in given space or at the end of exam paper with proper title "Answer for Question# \_ \_".
- Answers should be formatted correctly (font size, alignment and etc)
- Handwritten text or image should be on A4 size page with clear visibility of contents.
- Only PDF format is accepted (Student are advise to install necessary software)
- In case of CHEATING, COPIED material or any unfair means would result in negative marking or ZERO.
- **"INTERNRT COPIED ANSWERS ARE NOT ALLOWED". DRAW NEAT AND CLEAN DIAGRAM. WRITE CLEAR,VISIBLE AND CONCISE CONTENT. AVOID WRITING USELESS,IRRELEVANT, UN NESSECARRY, AND REPTITIVE CONTENT.WRITE ONLY WHAT IS REQUIRED".**
- A mandatory recorded viva session will be conducted to ascertain the quality of answer scripts where deemed necessary.
- Naming convention should be SID-Name-CID. Ex: 50188-Kashif-106255.pdf.
- **Caution:** Duration to perform Final Assessment is **03 hours only**. **Therefore**, if you failed to upload answer sheet on LMS (in PDF format) within 03 hours limit, you would be considered as **ABSENT/FAILED**.

**Note: Attempt All questions. Each question carry equal marks**

**Question No. 1**

**Choice the suitable data structure for the following scenarios**

- a) Suppose you to make for a software for inventory system. The inventory may increase or decrease from time to time. Which is the most ideal data structure you chose for the above scenario we have study so far in the course and why?
- b) We want to build a table of contents for a textbook. The textbook consists of chapters, chapters consist of sections, and sections consist of subsections.
- c) If you were to build your own online video player, but you want your costumer to be able to start playing the video before its 100% downloaded. You will probably need to download the video as frames, what data structure would be the best choice to store these frames before you start displaying them to your consumer?

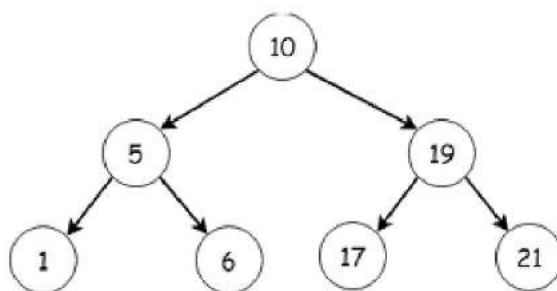
**Question No. 2**

Give short answer for the following questions

- a) Can we apply binary search procedure on unsorted list? Why or why not?
- b) Which searching algorithm is of divide-and-conquer type?
- c) How you can check, that, a given binary tree is an also binary search tree?

**Question No.3**

Consider the following binary tree:



- a) Construct its sequential Memory Array Representation
- b) Perform pre order traversal on the above tree.
- c) A binary search tree is generated by inserting the following integers: 50, 15, 62, 5, 20, 58, 3, 8, 37, 60, 24

What will be the number of nodes in the left of the root respectively?

#### Question No.4

- a A local zoo wants to keep track of how many pounds of food each of its three monkeys eats each day during a typical week. This information is stored in a two dimensional  $3 \times 7$  array, where each row represents a different monkey and each column represents a different day of the week. Write an algorithm to find the average amount of food eaten by each monkey for the whole week.
- b Given the following array A, Write and apply the algorithm for deleting the minimum element from the array. Explain each step properly along with the diagram and array representation.

A= [17, 2, 34, 23, 6, 11, 49, 7, 22, 33]

#### Question No.5

- a) Write an algorithm for a **recursive** method `int sum (int, int)` with takes 2 parameter as an input and return the sum of these numbers (negative or positive), for example:
- `sum (6, 5 )` return 11
  - `sum (-4, 3)` return -1
  - `sum (-3, -4 )` return -7
- b) Transform Infix to Postfix using stack.
- $(X + Y) * Z - (W - U) * (V + Q)$
- c) Evaluate the following Postfix expression using stack.
- `9 1 + 7 3 + /`

#### Question No. 6

A) Below is the Sorting Algorithm Do Something . Analyze its Time Complexity In Big Oh(O) Notation.

```
Do Something(A,N) :  
For(I=N;I>=1;I--) Max=I Max val=A[I]  
For(j=1;j<I;j++) If(A[j]>A[max])  
Max=j  
Max val=A[j]  
A[max]=A[I]  
A[I]=max val  
Cnt3rd=0  
For(I=1;I<=n;I++) If(A[I]==A[3])  
Cnt3rd++  
Return Cnt3rd
```

Suppose a array containing on your registration-ID ,Apply the above algorithm and Show the working of starting only 2 Iterations of First Pass.Calculate Number of Comparison and Swapping.

X	X	X	X	X
---	---	---	---	---

**Question No.7**

- a) Consider the initial and final states of a QUEUE as shown below:

INITIAL: A, B, C, D (A is the front end).

FINAL: D, C, B, A

Write the series of insertion and deletion operations that will transform the QUEUE from its initial to its final state

- b) What will be value of rear and front if there is only one element in the queue?
- c) .Give one application of Input restricted de-queue