



Jahangirnagar University

Institute of Information Technology

2nd Year 1st Semester B.Sc. (Honors) Final Examination-2020

Course No. # ICT - 2101

Course Title# Data Structures

Examination Roll No. #

19 23 40

Registration No. #

2019 36 50 283

Academic Session #

2018 - 2019

Total no of written pages in the script #

Exam Date: 10, Aug , 2021

Instructions:

1. Examinee must write his/her exam roll no. and page no. at the top of every page of the script.
2. Do not write your name or any identification mark anywhere of the script.
3. Total time for exam is 45 minutes. You will get 15 additional minutes for submission.
4. Delay in submission is not acceptable.
5. You have to submit your exam script in PDF format.
6. The examinee must submit the examination script **through online (Google classroom/email/google form etc.)** as prescribed by the examiner.
7. You must use **your EXAM ID** only for naming your submitted file.
8. After completing the exam, you must write the total number of pages used for the exam in the top sheet.

Answer to the question no-2a

The Postfix notation is used to represent algebraic expressions.

The Postfix expression $7\ 5\ 3\ *\ 2\ 4\ 6\ +\ 1\ -\ *$.

The first character scan is '7' which is an operand so push it to the stack.

Operation	expression	stack
Push		
Push	7	7
Push		$\begin{array}{ c } \hline 5 \\ \hline 7 \\ \hline \end{array}$
Push	5 * 3 = 15	$\begin{array}{ c } \hline 3 \\ \hline 5 \\ \hline 7 \\ \hline \end{array}$
Pop	$5 * 3 = 15$	$\begin{array}{ c } \hline 7 \\ \hline \end{array}$
Push		$\begin{array}{ c } \hline 2 \\ \hline 15 \\ \hline 7 \\ \hline \end{array}$
Push		$\begin{array}{ c } \hline 4 \\ \hline 2 \\ \hline 15 \\ \hline 7 \\ \hline \end{array}$
Push		$\begin{array}{ c } \hline 6 \\ \hline 4 \\ \hline 2 \\ \hline 15 \\ \hline 7 \\ \hline \end{array}$
Pop	$4 + 6 = 10$	$\begin{array}{ c } \hline 2 \\ \hline 15 \\ \hline 7 \\ \hline \end{array}$

Roll - 192340

Pop

$$2/10 = 0.2$$

$$\begin{bmatrix} 15 \\ 7 \end{bmatrix}$$

Pop

$$15 - 0.2 = 0.2$$

$$\begin{bmatrix} 7 \end{bmatrix}$$

Pop

$$7 \times 0.2 = 1.4$$

$$\begin{bmatrix} \end{bmatrix}$$

Push

$$\begin{bmatrix} 1.4 \end{bmatrix}$$

Postfix notation: 7 5 3 * 2 4 6 + / - *

Result: 1.4

Answer to question no-1

a. Given a stack of integers, sort it in ascending order using another temporary stack.

algorithm

1. Create a temporary stack
2. while input is Not empty
 - Pop and element from input stack call it temp
 - while temporary stack and Push it to the input stack
 - Push temp in temporary stack
3. The Sorted numbers are in tmpStack.

b. There is a trade off between space and time complexity when you use any data structure. for phone book implementation you can either use Tries or Hash Table.

Tries trie can help you on that Insertion and ~~Find~~ lookup time will be $O(\text{string})$ input name and find number.

Hash table:- you can also use Hash Table. for phone book implementation you can use unordered_map class of STL in C++.