

**Birla Institute of Technology & Science, Pilani**  
**Work-Integrated Learning Programmes Division**  
**Second Semester 2019-2020**

**Mid-Semester Test**  
**(EC-2 Regular)**

Course No. : SS ZG519  
Course Title : DATA STRUCTURES AND ALGORITHMS DESIGN  
Nature of Exam : Closed Book  
Weightage : 35%  
Duration : 2 Hours  
Date of Exam : Saturday, 07/03/2020 (AN)

No. of Pages	= 2
No. of Questions	= 5

Note:

1. Please follow all the *Instructions to Candidates* given on the cover page of the answer book.
2. All parts of a question should be answered consecutively. Each answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Q.1 (a) Write the pseudocode for a method that returns the average of the elements in an array  $A$  of  $n$  integers.

Note: Name your method as average. Use a while loop in case you need a looping construct.

Q.1 (b) Identify the number of primitive operations for each statement in the pseudocode.

Q.1 (c) Compute the running time of the algorithm  $T(n)$  and express the running time in Big-Oh notation. [3 + 3 + 2 = 8]

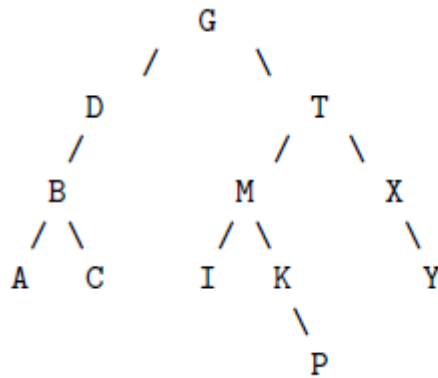
Q.2. Solve the following recurrence equation using iterative back substitution method.  
 $T(n) = T(n-1) + 4$  if  $n \geq 1$ ,  $T(0) = 4$  [7]

Q.3. Consider array based implementation of stack  $S$ . Assume that the maximum size of the stack is 3 elements. Show the contents of the stack after each operation along with the value of the top ( $t$ ) for the following sequence of operations in the format shown in the table given below. Mention exceptions like empty/full if any for an operation. Mention 'No error' if the operation does not result in error. The initial value of top ( $t$ ) is -1.

Operations: PUSH (A), POP, POP, PUSH (B), PUSH (X), PUSH (Z), PUSH (R) [7]

Operations	S[0]	S[1]	S[2]	Value of Top (t)	Error
PUSH (A)					
POP					
POP					
PUSH (B)					
PUSH (X)					
PUSH (Z)					
PUSH (R)					

- Q.4. Illustrate the result of inserting the elements 10, 12, 1, 14, 6, 5 and 8 one at a time, into an initially empty binary min-heap in that order. Draw the resulting min-heap after each insertion. [7]
- Q.5. For the given binary tree, write the order in which the nodes are visited for preorder, postorder and inorder traversals. [3 \* 2 = 6]



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