

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT  
MAKEUP EXAMINATION (APRIL 2018)

B-Tech (2<sup>nd</sup> SEM)

Course Code: 10B11CI211

Max. Marks: 25

Course Name: DATA STRUCTURES

Max. Time: 1 HRS 30 MIN.

Course Credit: 4

**Note: All questions are compulsory. Skip syntax error if there any.**

- 1) [5x1=5]
- a. N items are stored in a sorted doubly linked list. For a delete operation, a pointer is provided to the record to be deleted. For a decrease-key operation, a pointer is provided to the record on which the operation is to be performed. An algorithm performs the following operations on the list in this order:  $\Theta(N)$  delete,  $O(\log N)$  insert,  $O(\log N)$  find, and  $\Theta(N)$  decrease-key. What will be the time complexity of all these operations if put together. Explain with reason.
  - b. Express the formula  $(n - 2) * (n - 4)$  using big-O notation.
  - c. Entries in a stack are "ordered". Explain the meaning of this statement?
  - d. What is the value of the postfix expression  $6\ 3\ 2\ 4\ +\ -\ */$
  - e. Write condition(s) when a Normal queue and a Circular queue gets overflow.
- 2) A function  $f$  defined on stacks of integers satisfies the following properties:  
 $f(\phi) = 0$  and  
 $f(\text{push}(S, i)) = \max(f(S), 0) + i$  for all stacks  $S$  and integers  $i$ .  
If a stack  $S$  contains the integers 2, -3, 2, -1, 2 in order from bottom to top,  
what is  $f(S)$ ? [3]
- 3) Given a singly linked list, write a function to find the last element from the beginning whose  $n \% k \neq 0$ , where  $n$  is the number of elements in the list and  $k$  is an integer constant. For example, if  $n = 19$  and  $k = 3$  then we should return 18<sup>th</sup> node. [3]
- 4) Write a C Program to identify whether the String is Palindrome or not using Queue. [4]
- 5) Construct the binary search tree from the following given keys:  
[17,5,20,67,50, 72,19,35,40,1,23,58]  
Calculate the height of this binary tree. Identify the various leaf nodes, and ancestor nodes. [5]
- 6) Convert the following given Infix expression to Postfix expression using Stack:  
 $A + (B * C - (D / E \wedge F) * G) * H$  [5]