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Seat No.	
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**[5152]-563**

**S.E. (Comp.) (First Semester) EXAMINATION, 2017**  
**DATA STRUCTURES AND ALGORITHMS**  
**(2015 PATTERN)**

**Time : Two Hours****Maximum Marks : 50**

1. (a) Show that  $f(x) = O(x^3)$  if function  $f(x)$  is defined as  
 $f(x) = 5x^3 + 6x^2 + 1$  [3]
- (b) Differentiate between linear and non-linear data structure with example. [3]
- (c) Explain divide and conquer strategy with example. Also comment on the time analysis. [6]

*Or*

2. (a) Explain fast Transpose of sparse matrix with suitable example. Discuss time complexity of fast transpose. [6]
- (b) Explain polynomial representation using arrays with suitable example. [3]
- (c) Derive recurrence relation to represent set of natural numbers giving remainder one when divided by three. [3]
3. (a) Represent the following polynomial by using-generalized linked list : [3]  
 $(a, b(c, d(e, g), h)(f))$
- (b) Write an algorithm for postfix evaluation with suitable example. [6]
- (c) Write a pseudo C code to reverse singly linked list. [3]

P.T.O.

Or

4. (a) Convert the following prefix expression into postfix.  $* + a - bc / - de + - fgh$  [3]  
(b) Write an algorithm to convert infix expression to postfix expression. [6]  
(c) Write an algorithm to delete intermediate node from Doubly linked list. [3]
5. (a) What is circular queue ? Explain the advantages of circular queue over linear queue. [6]  
(b) Write pseudo C/C++ code to represent queue as an ADT. [7]

Or

6. (a) Explain array implementation of priority queue with all basic operations. [6]  
(b) Write pseudo C/C++ code to implement circular queue using linked list. [7]
7. (a) Explain quick sort and sort the given list using quick sort : 39, 09, 81, 45, 90, 27, 72, 18 [6]  
(b) Write an algorithm for binary search. Derive recurrence relation and find out time complexity of the search. [7]

Or

8. (a) Explain heap sort and sort the given list using heap sort : 08, 03, 02, 11, 05, 14, 00, 02, 09, 04, 20. [6]  
(b) Write a short note on stability of sorting. Compare bubble sort, insertion sort and selection sort with one example and discuss time complexity. [7]