

G 1544

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Reg. No.....

Name.....

**B.TECH. DEGREE EXAMINATION, MAY 2016**

**Fourth Semester**

Branch : Computer Science and Engineering/Information Technology

CS 010 403/IT 010 405—DATA STRUCTURES AND ALGORITHMS (CS, IT)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

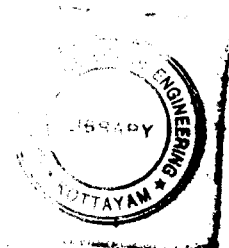
Time : Three Hours

Maximum : 100 Marks

**Part A**

*Answer all questions.  
Each question carries 3 marks.*

1. Define time complexity and space complexity of algorithm.
2. What is a sparse matrix and how is it represented ?
3. Write a note on garbage collection and compaction.
4. Give a recursive algorithm for preorder traversal of a binary tree.
5. Differentiate internal sorting and external sorting.



(5 × 3 = 15 marks)

**Part B**

*Answer all questions.  
Each question carries 5 marks.*

6. Discuss the concept of open Hashing and closed Hashing techniques with suitable examples.
7. Write an algorithm to delete an element from a circular queue.
8. Write algorithms to perform push and pop operations on a linked stack.
9. Give an algorithm for the depth first traversal of a connected graph. Explain with an example.
10. Compute the average, best and worst case time complexity of quick sort.

(5 × 5 = 25 marks)

**Part C**

*Answer all questions.  
Each full question carries 12 marks.*

11. (a) Discuss Big-Oh, Big-Omega and Big-Theta notations in detail. (5 marks)
- (b) What is a recursive function ? Explain the method to calculate the time complexity of recursive functions with an example. (7 marks)

Or

Turn over

12. Explain in detail the various collision resolution techniques.
13. Write an algorithm to convert an infix expression to postfix and evaluation of a postfix expression using stack with an example.

Or

14. How do we represent a polynomial using array? What are its disadvantages? Write an algorithm to add two polynomials using array representation.
15. Write algorithms to insert and delete a node a node from a doubly linked list prior to a node pointed to by  $p$ .

Or

16. Write algorithms to insert and delete a node from a circular double lined list.
17. Define a  $\beta$ -tree of order  $M$ . Build a  $\beta$ -tree by inserting records with following key sequence, into an empty  $\beta$ -tree of order 4 :—

$a, g, f, b, k, d, h, m, j, e, s, i, r, x, c, l, n, t, n, p.$

Or

18. Write a non-recursive algorithm to traverse a binary tree in preorder.
19. Sort the following set of elements using Heap sort. 25, 37, 48, 11, 12, 92, 58, 89.  
Also write algorithm for the same.

Or

20. Write algorithms to sort an array of elements using insertion and selection sort. Trace the steps using an example.

[5 × 12 = 60 marks]

