

3E1652-1612

Roll No. \_\_\_\_\_

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B. Tech. (Sem. III) (Main / Back) Examination, December - 2017  
Computer Sc. & Engineering  
3CS2A Data Structures and Algorithms  
CS, IT, EX, EC, EI

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

*Attempt any five questions, selecting one question from each unit.  
All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

*Use of following supporting materials is permitted during examination.  
(Mentioned in form No. 205)*

1. \_\_\_\_\_ Nil \_\_\_\_\_ 2. \_\_\_\_\_ Nil \_\_\_\_\_

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UNIT - I

1 (a) Define algorithm. What do you understand by best, worst and average case analysis of an algorithm. 8

(b) Using suitable example explain row major and column major form of array. 8

OR

1 (a) Explain the difficulties in estimating exact execution time of Algorithms. 8

(b) Explain Asymptotic notations : Big-Oh, theta, Omega using suitable example. 8

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## UNIT - II

2 (a) Define the concept of recursion using stack using suitable examples. What are the difficulties in dealing with infix expression ?

(b) Convert following expressions in its equivalent postfix expressions.

(i)  $A*(B+C*D)+E$

(ii)  $A*B^C+D$

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OR

2 (a) Explain tower of Hanoi problem. Explain using suitable diagram and example.

(b) Explain transposition of sparse matrices with algorithms of varying complexity.

## UNIT - III

3 (a) Compare binary search and sequential search.

(b) Using suitable diagram explain the concept of Head Node in linked lists.

OR

3 (a) Write the algorithm for insertion and deletion in doubly and circularly connected linear linked lists.

(b) Write down the following polynomial.

$$3x^4 - 2x^2 + 9x - 11 \text{ by a linked list.}$$

## UNIT - IV

- 4 (a) Define the concept of balanced trees. Write pseudo code for insertion into and deletion from AVL tree. 8
- (b) Define the different applications of trees for representation of sets. 8

OR

- 4 (a) Define the following binary tree
- (i) Complete binary tree. 8
  - (ii) Strictly binary tree. 8
- (b) Write an algorithm for inorder traversal of a threaded binary tree. 8

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## UNIT - V

- 5 (a) Compare Internal sorting and External sorting. 8
- (b) By taking suitable example explain the principle of operation of heap sort. 8
- (c) Prove that Heap sort, Merge sort and Quick sort takes  $\Omega(n \log n)$  time in the worst case. 8

OR

5 Write short notes on following :

- (a) DFS traversal Algorithms 8
- (b) Comparison of sorting Algorithms in terms of time complexity. 8