



Reg. No. : .....

Name : .....

Third Semester B.Tech. Degree Examination, November 2014  
(2013 Scheme)

13.306 : DATA STRUCTURES AND ALGORITHMS (FR)

Time : 3 Hours

Max. Marks : 100

PART – A



Answer **all** questions. **Each** question carries **2** marks.

1. What are the different classification of data structures ?
2. What is step-wise refinement ?
3. Define DEQUE with an example.
4. Prove that a binary tree of height  $h$ , there are at most  $2^{h-1}$  leaf nodes.
5. What are the disadvantages of the sequential representation of binary tree ?
6. Give an example for the adjacency matrix representation of a graph.
7. Write a short note on memory management.
8. What is fragmentation ? Explain.
9. Compare linear search and binary search.
10. Express the time complexity of heap sort using Big-oh notation.

PART – B

Answer **one full** question from **each** Module. **Each** question carries **20** marks.

Module – I

11. a) Explain the top-down and bottom-up strategies of programming. 5
- b) Write the row major and column major arrangement of a two dimensional array. 5
- c) Write an algorithm to add two polynomials using arrays. 10

OR



12. a) Write an algorithm for inserting a node at the end of a singly linked list. 6
- b) What are all the operations possible on a doubly linked list? 5
- c) Calculate the total computation time for the following 'for' loops.
- ```
for i <--- 2 to m - 1
  for j <--- 3 to i
    {
      sum <--- sum + A[i][j]
    }
}
```
- 5
- d) Arrange the following growth rates in the increasing order.  
 $O(n^4)$ ,  $O(1)$ ,  $O(n^3)$ ,  $O(n)$ ,  $O(n \log n)$ ,  $O(n^2 \log n)$  4

### Module – II

13. a) Write the algorithm to implement push and pop operations on a stack using linked list. 5
- b) Write an algorithm to input two string and then compare both string. 5
- c) Define the following with one example :
- i) Binary Tree
  - ii) Full binary tree
  - iii) Complete binary tree
  - iv) Skew binary tree. 4
- d) Convert  $A + (B * C - (D/E - F) * G) * H$  into postfix form. 6

OR

14. a) Write an algorithm for searching a binary search tree. 8
- b) Give the definition of a graph. Briefly explain one application of a graph. 8
- c) What are the traversals possible on a binary search tree? 4



**Module – III**

- 15. a) Explain garbage collection and storage compaction with necessary figures. 8
- b) Illustrate the buddy system memory management. 8
- c) Write the best-fit algorithm. 4

OR

- 16. a) Explain boundary tag method. 10
- b) Compare first-fit and worst-fit strategies. 6
- c) Give an example for dynamic memory allocation. 4



**Module – IV**

- 17. a) Explain the different hashing techniques. 10
- b) Give algorithm for linear search using array data structure. 5
- c) Find the time complexity of binary search. 5

OR

- 18. a) What is the purpose of partition algorithm in quick sort? 5
- b) Find the time complexy of quick sort. 10
- c) Sort the following array using Heap-Sort techniques  
< 5, 8, 3, 9, 2, 10, 1, 45, 32> 5

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