



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1072

Roll No.

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### B. Tech.

(SEM. IV) EXAMINATION, 2007-08

### DATA STRUCTURING USING 'C'

Time : 3 Hours]

[Total Marks : 100

Note : Attempt all questions.

- 1 Attempt any two parts of the following :
- (a) (i) Define an array. 2
  - (ii) Consider the linear array, A (5:50), 2  
whose base address is 300 and the number of words per memory cell is 4. Find the address of A[15].
  - (iii) What do you mean by time complexity 2  
of an algorithm?
  - (iv) The time complexity of an algorithm 3  
T(n), where n is the input size given by  $T(n)=T(n-1)+n$ , if  $n>1$  and  $T(n)=1$ . otherwise is \_\_\_\_\_. Explain how you are getting the result?
  - (b) (i) Write an algorithm to evaluate a postfix 5  
expression using a stack.
  - (ii) Using the algorithm given by you in 3  
question 1(b)(i), evaluate the following postfix expression.  
5, 6, 2, +, \*, 12, 4, 1, -
  - (iii) Define : Stack 2



- (c) (i) Explain with necessary algorithms the representation of stack using linked list and array. 4
- (ii) How can a recursive procedure be converted to a non-recursive one using stack? 3
- (iii) Give a procedure to find the average of the values stored in a linear array, A. 3

2 Attempt any **two** parts of the following :

- (a) (i) Give an algorithms to insert an element after a given node in a linked list. 5
- (ii) What is doubly linked list? 2
- (iii) Explain with diagram how a linked list is represented in memory. 3
- (b) (i) Give the procedure to delete a node from a two-way list. 4
- (ii) What is a header linked list? 2
- (iii) What is a deque? 2
- (iv) What conditions will indicate that the circular queue is
- (a) Full
- (b) Empty
- (c) (i) What is a queue? 2
- (ii) Suppose a queue is stored in a circular array with N memory cells.
- (a) Find the number of elements in a queue in terms of FRONT and REAR. 3
- (b) When will the array be filled? 1
- (iii) Write an algorithm to insert an element into a queue. 4



- 3 Attempt any **four** parts of the following :
- (a) (i) What is a complete binary tree? 2  
(ii) A binary tree has 9 nodes: Its inorder and preorder traversal's node sequence are: 3  
Inorder : E A C K F H D B G  
Preorder: F A E K C D H G B.  
Draw the tree.
- (b) Give the algorithm for binary search. 3+1+1  
What is its time complexity? Compare its time complexity with that of linear search.
- (c) Discuss in brief the linear probing collision resolution technique. What is the disadvantage of this technique? How could it be overcome? 3+2
- (d) (i) What do you mean by collision and overflow in a hash table? 1+1  
(ii) Discuss in brief the hash functions you know. 3
- (e) Discuss the Huffman's algorithm. 5
- (f) What is a heap? Give an algorithm to insert an element into a heap. 1+4

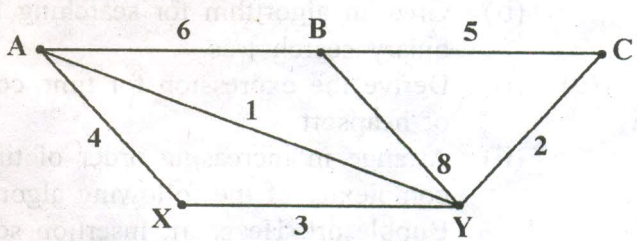
- 4 Answer any **four** :
- (a) (i) What is binary search tree? 1  
(ii) Give an algorithm for searching in a binary search tree. 4
- (b) (i) Derive the expression for time complexity of heapsort. 3  
(ii) Arrange in increasing order of time complexity of the following algorithms: Bubblesort, Heapsort, Insertion sort, Quicksort. 2
- (c) (i) Give the algorithm for bubble sort. 3  
(ii) What is its time complexity? 2



- (d) Discuss B trees in brief. 5
- (e) (i) Which traversal of a Binary Search Tree result in elements in sorted order? 1
- (ii) Obtain a height balanced tree starting from an empty tree and then on the following sequence of insertions: March, May, November, August, April, January, December, July, February, June, October, September. 4
- (f) Give algorithm for insertion into an AVL tree. 5

5 Answer any four :

- (a) Give the algorithm for Breadth First Search. 4+1  
What data structure do you use here?
- (b) (i) Define: path between two nodes in a graph; connected graph. 1+1
- (ii) Discuss in brief the different representations of a graph. 3
- (c) (i) What is the advantage of indexing a file? 2
- (ii) Compare indexing and hashing. 3
- (d) Classify indices and discuss them in brief. 5
- (e) (i) What is a spanning tree? 2
- (ii) Find the minimum spanning tree of the graph below. 3



- (f) Write short notes on any one: 5x1=5
  - (i) Sequential Files
  - (ii) B<sup>+</sup> trees.