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Printed Pages : 4 TCS – 407

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

PAPER ID : 1072 Roll No. | | | | | | | | | | |

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), whose base address is 300 and the number of words per memory cell is 4. Find the address of A[15]. 2

(iii) What do you mean by time complexity of an algorithm? 2

(iv) The time complexity of an algorithm 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? 3

(b) (i) Write an algorithm to evaluate a postfix expression using a stack. 5

(ii) Using the algorithm given by you in question 1(b)(i), evaluate the following postfix expression. 3

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 recurssive 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 2

(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. What data structure do you use here? 4+1

(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

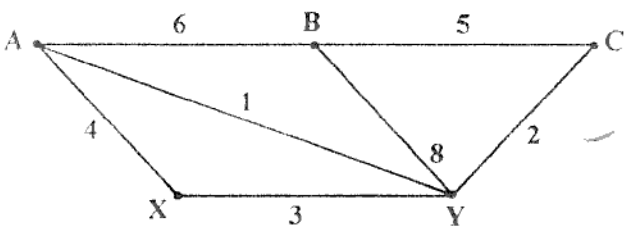
(c) (i) What is the advantage of indexing a file? 2

(ii) Compare indexing and hashing. 3

(d) Classify indices and discuss them in brief. 5

(e) (i) What is a spanning tre? 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^+ trees.