Printed Pages – 5 Roll No. : .....

322453(22)

B. E. (Fourth Semester) Examination, ~~2020~~ APR-MAY 2022

(New Scheme)

(CSE Engg. Branch)

DATA STRUCTURES

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Attempt all questions. Part (a) of each unit is compulsory. Attempt any two parts from (b), (c) and (d) each question.*

Unit-I

1. (a) How will you specify the complexity of an algorithm? 2

(b) Calculate the address of $x[0,30]$ in a 2D Array

$x\ [-20 \ldots 20, 10 \ldots 35]$

stored in column major order in the main memory. Assume Base Address $B = 500$. 7

(c) What are the limitations of linear search an how can it be resolved using binary search write the algorithm for binary search. 7

(d) Explain how address calculation is done it two dimensional array. If each element of a array data [20] [50] requires 4 bytes storage and base address of data is 2000. Determine the location of data [10] [10] when the array stored as :

(i) Row major

(ii) Row minor 7

Unit-II

2. (a) What is simulating recursion? 2

(b) Write each step to convert following expression to postfix expression by using stack.

$$A+(B*C-(D/E\wedge F)*G)*H.$$ 7

(c) Write an algorithm for recursive solution to the tower of Hanoi Problem for N disks. 7

(d) Write the basic operation that can be performed on a singly linked list. Write down the step required for splitting of a given singly linked list in two singly united list. Also write the algorithm for splitting one singly linked list in two singly linked list. 7

Unit-III

3. (a) A complete binary tree of level 5 has how many nodes? 2

(b) Suppose A, B, C, D, E, F, G, H are 8 data items and suppose they are assigned weight as follows :

Data item	:	A	B	C	D	E	F	G	H
Weight	:	22	5	11	19	2	11	25	5

Construct the tree T with minimum weighted path length using Huffman's algorithm. 7

(c) Construct the binary tree from its given preorder and inorder traversal :

Pre order : A B D E C F G H I

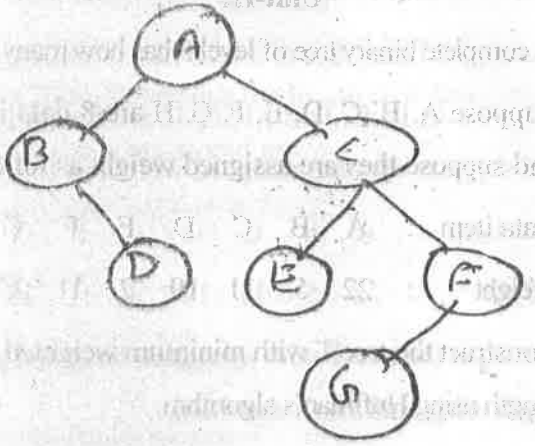
In order : D B E A F C H G I 7

(d) What are the limitations of linear search and how can it be resolved using binary search. 7

Unit-IV

4. (a) Define the path and adjacency matrix. 2

(b) Write an algorithm for postorder traversal. Find the postorder traversal for the given tree. 7



(c) Define B tree of order on. Also insert the following entries into an initially empty B-tree of order 5. 7

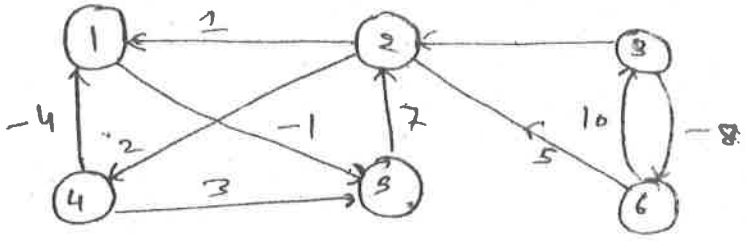
a, g, f, b, k, c, h, n, j, d, r, i, s, x, e, l, m, t, u, v,

(d) Explain Warshall's algorithm for finding shortest path between every pair of vertices of graph with example. 7

Unit-V

5. (a) Write time complexity for linear search algorithm over an array of n- element. 2

(b) Use Floyd-Warshall's algorithm for finding the shortest path of the given figure. Show the matrix $P^{(k)}$ produced at each iteration. 7



(c) Perform the insertion operation on initially empty AVL tree 3, 5, 11, 8, 4, 1, 12, 7, 2, 6, 10. 7

(d) What are the various graph representation methods? Compare the various methods. 7