322453(22)

B. E. (Fourth Semester) Examination, April-May 2020

(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) Explain efficiency of an algorithm in terms of space and time complexity.   2

(b) Write an algorithm to add two polynomials respresented using linked list. 7

(c) A 2D array dymed as [1 .... 7] [1 ...... 5] require four (4) bytes of storage space for each element if the array is stored in row major ferm, then calculate the address of element at location [5, 3] where the base address is 400. 7

(d) Write an algorithm to insert a new node at the end of singly linked list. 7

Unit-II

2. (a) What do a sentinel element mean? 2

(b) Write an algorithm efor recursive solution to the tower of Hanoi problem for N diss. Also show the diagramatic execution of algorithm via three for N = 3 dist and count the number of moves. 7

(c) (i) Write the steps to convert any infix expressions to portfix expression. 4

(ii) Convert the following infix expression into postfix expression. 3

$$((A+B)/D) \uparrow ((E-F)*G)$$

(d) What is stack and also explain Push and POP operation of stack with algorithm and diagram. 7

Unit-III

3. (a) How many number of nodes a complete binary tree has for the depth/level of 5? 2

(b) Explain Huffman algorithm using following example : 7

Item   :   A   B   C   D   E   F   G
        :   15 10 5   3   7   12 25

(c) The following letters are inserted in order into an empty Binary Search Tree :

S, T, P, Q, M, N, O, R, K, A, B

Draw the Tree T and find the inorder and post order traversal of Tree T. 7

(d) Explain the array and linked list representation of binary tree. 7

Unit-IV

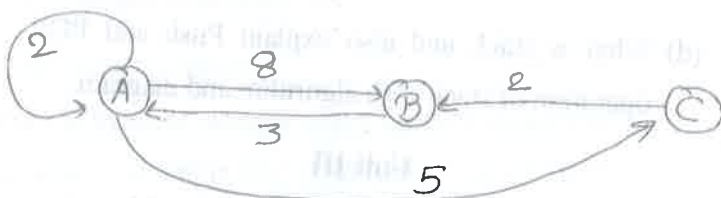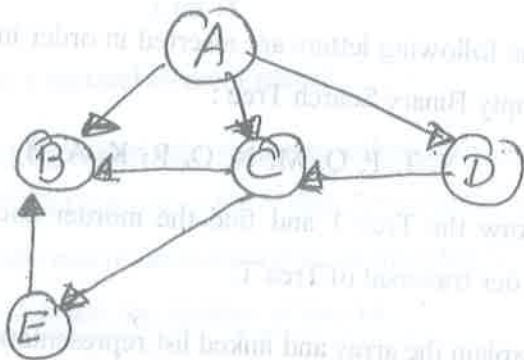4. (a) Explain path and adjacency matrix in graph. 2

(b) Explain warshalls algorithm for finding shortest path, through the following graph.   7

(c) (i) Write the algorithm to traverse the graph using BFS (Breadth First Search).   4

(ii) Trace the graph using BFS to find shortest path from *A* to *E*. Assume each edge of lenth 1.   3

(d) (i) Explain spanning tree along with its properties.   5

(ii) List down the application of spanning tree.   2

Unit-V

5. (a) What is the time complexity of Binary Search?   2

(b) Explain the AVL search tree.   7

(c) Write an algorithm for insertion sort. Also trace the following elements using same.   7

11, 6, 21, 2, 31, 27, 101, 16, 9

(d) What is flash function? Explain it through an example. 7