3E1138

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B. Tech. III - Sem. (Main / Back) Exam., Dec. 2019
PCC Computer Science & Engineering
3CS4-05 Data Structures and Algorithms
CS, IT

Time: 3 Hours **Maximum Marks: 120**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 Define data structure. Mention any two applications of data structures.

Q.2 Mention the purpose of B^+ - Trees.

Q.3 What is the difference between internal sorting and external sorting?

Q.4 What is meant by abstract data type?

Q.5 What are the applications of stack?

Q.6 What do you mean by circular linked list?

Q.7 Compare graph and tree.

Q.8 Differentiate between linear and non-linear data structure.

Q.9 What is a dequeue?

Q.10 Define Hash function.

PART – B

(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 Difference between linear queue and circular queue. Also write the advantage and disadvantage of circular queue. [8]

Q.2 What do you mean by tower of Hanoi problem? Explain with suitable example. [8]

Q.3 Convert following expressions in its equivalent post fix expressions – [8]

(i) A * (B + C * D) + E

(ii) A * B ^ C + D

Q.4 Define Binary Search Tree. Write algorithm to implement insertion operation on Binary search tree. [8]

Q.5 The in – order & pre – order traversal sequence of nodes in a binary tree are given below:

In-order: E A C K F H D B G

Pre-order: F A E K C D H G B

Draw the binary tree. [8]

Q.6 What is a priority queue? How can it be implemented? Explain an application of priority queue. [8]

Q.7 What is a Threaded Binary Tree? Explain the advantages of using a threaded binary tree. [8]

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) [4×15=60]

Attempt any four questions

Q.1 Create the linked list to represent the following polynomials – [15]

$5x^5 + 4x^4 + 6x^2 - 4$

$8x^6 + 4x^4 + 3x^3 + 2x^2 + x$

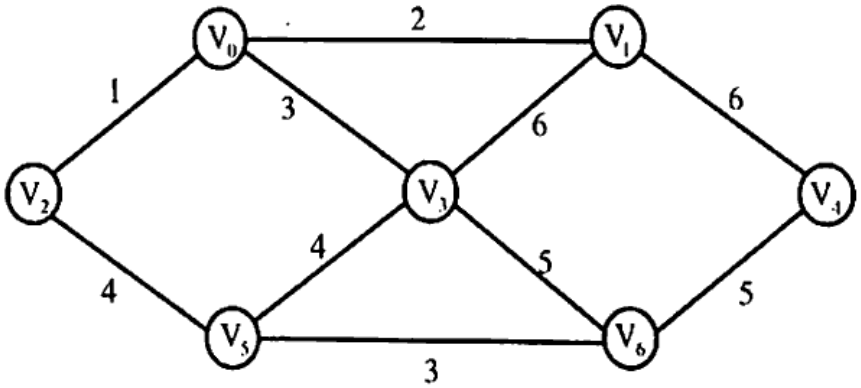
Write a function add () to add these polynomials and print the resultant linked list.

Q.2 Define a B–Tree. What are the application of B–Tree? Draw a B–Tree of order 4 (four) by insertion of the following keys in order :

Z, U, A, I, W, L, P, X, C, J, D, M, T, B, Q, E, H, S, K, N, R, G, Y, F, O, V. [15]

Q.3 What is sorting? Write an algorithm to sort the real number using insertion sort and selection sort. What is the time complexity for both selection and insertion sort? [15]

Q.4 (a) Define the spanning tree. Write the Prim's algorithm to find the minimum cost spanning tree of the following: [8]



(b) Describe the Dijkstra's algorithm for finding shortest path with help of suitable example. [7]

Q.5 (a) What is AVL tree? Explain the balancing methods of AVL tree with an example. [8]

(b) What do you mean by hashing and collision? Discuss the advantages and disadvantages of hashing over other searching techniques. [7]
