

**3E1138**

Roll No.

Total No of Pages: **4****3E1138****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**[ersahilkagyan.com](http://ersahilkagyan.com)*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. NIL2. 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<sup>+</sup> - 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.

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## 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)

[4x15=60]

Attempt any four questions

Q.1 Create the linked list to represent the following polynomials -

[15]

⊙

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

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

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

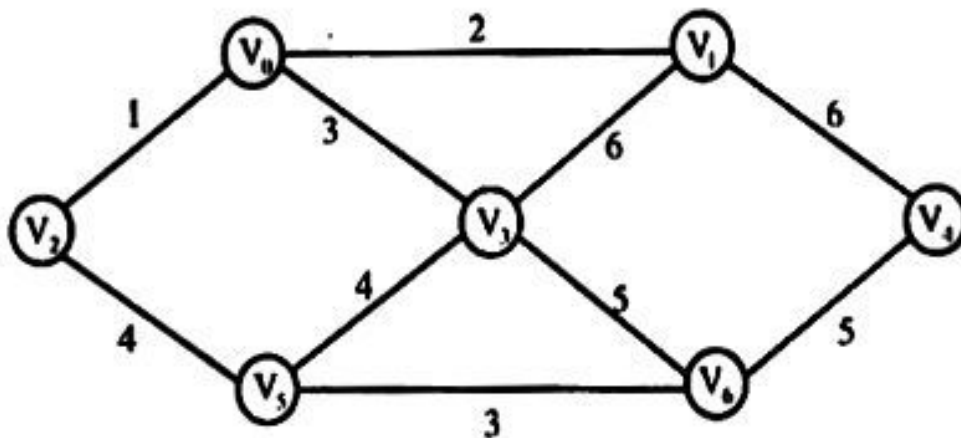
Q.2 Define a B-Tree. What are the application of B-Tree? Draw a B-Tree of order 4 (four)

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: <http://www.rtuonline.com> [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]

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