NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI-15
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
II YEAR B.TECH , CYCLE TEST 2
CSPE43 ADVANCED DATA STRUCTURES AND ALGORITHMS

DATE: 13-04-2023 **Duration: 1 Hr** **Max Marks: 20**

CO Mapping:

CO2: Use special tree data structures for a given real-world problem **(Q.NO: 1,2)**

CO4: Appreciate the backtracking and branch and bound technique to solving NP problems **(Q.No: 3, 4, 5)**

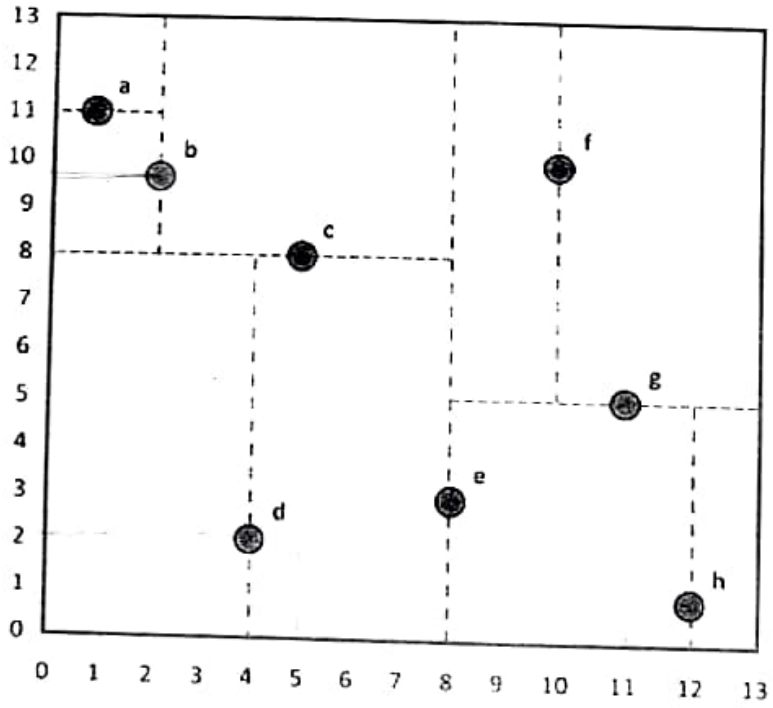
ANSWER ALL THE QUESTIONS

1. Segment Tree (ST) with lazy propagation is constructed to address max query for the given array A[0,6]= {18,17,13,19,15,11,20}. Apply the following update operations for incrementing the corresponding values
   (i) Range update (0 3) by 3
   (ii) Range update (0,3) by 1
   (iii) Range update (0 0) by 2
   (iv) Max query (3 6)

   (4)

2. Construct an unbalanced KD tree for the following data points shown in the graph. From the resultant tree, delete the root node.

   (4)



3. Construct an optimal Binary search tree for the keys (10,20,30) using dynamic programming approach with probabilities p (1 : 3) = (0.5, 0.1, 0.05) and q(0 : 3) = (0.15, 0.1, 0.05, 0.05). (4)

4. Solve following instance of knapsack (max. capacity =15) using FIFO Branch and Bound. (4)

item	Profit	Weight
1	10	2
2	10	4
3	12	6
4	18	9

5. Find at least two Hamiltonian Cycles using Backtracking in a given graph. (4)