



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous College Affiliated to University of Mumbai)

End Semester Examination

November/December 2019

Max. Marks: 60

Class: S.E.

Course Code: CE31/IT31

Name of the Course: Advanced Data Structures

Duration: 3 hrs

Semester: III

Branch: COMP/IT

Instructions:

- (1) All Questions are Compulsory
- (2) Draw neat diagrams
- (3) Assume suitable data if necessary

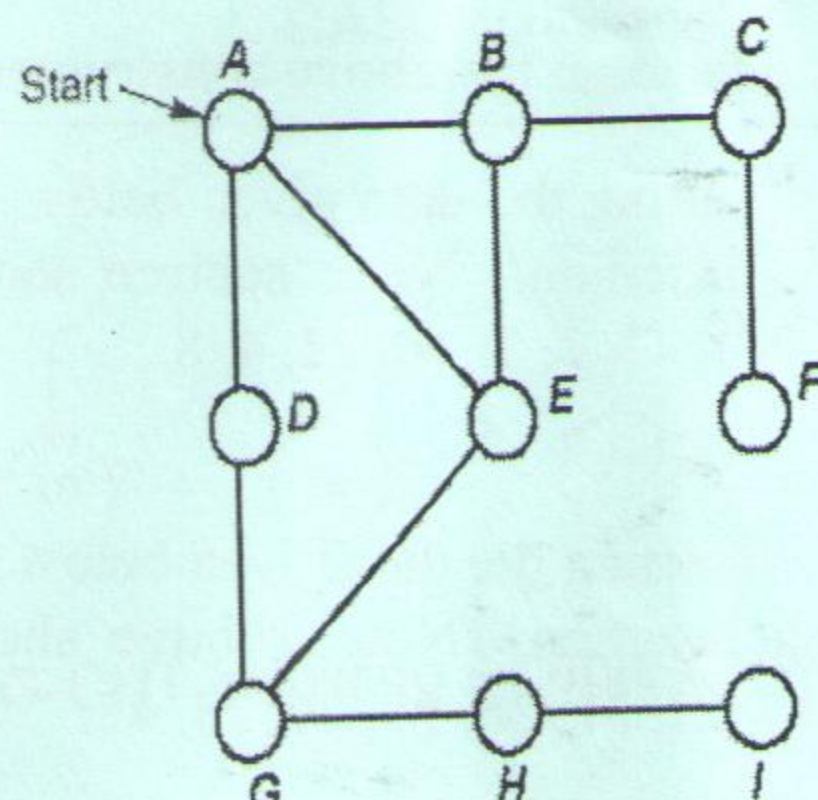
Q. No.	Question	Max Mks	CO-BL-P I
Q1 (a)	Write a function to perform following operations on doubly linked list: i) insert at a specific location into the list ii) delete the given data from the list OR Write a function to perform following operations on Circular Singly linked list: i) insert after the given element into the list ii) delete the given element from the list	06	1-3-1.4.1
Q1 (b)	Construct a Binary tree, using INORDER and POSTORDER traversal sequence given below:- Inorder: RQONPSZ Postorder: RONQSZP	04	2-3-4.1.2
Q2 (a)	Construct an AVL tree, where nodes are inserted in the following order. Mention the type of rotation when applied. Show the balance factor of each node after insertion. 10, 20, 15, 25, 30, 16, 18, 19. Perform Deletion of node 15 and node 25 on the above constructed AVL tree	04 02	2-3-4.1.2
Q2 (b)	Construct a B-Tree of order-4 by inserting the data given below in the same sequence. Show the steps of each insertion. (Note: subtree should be left heavy after splitting) 5, 3, 21, 9, 1, 13, 2, 7, 10, 12, 4, 8. OR Construct a B+ Tree of order-4 by inserting the data given below in the same sequence. Show the steps of each insertion. (Note: subtree should be left heavy after splitting) 1, 4, 7, 10, 17, 21, 31, 25, 19, 20, 28, 42.	06	2-3-4.1.2



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Q3 (a)	Construct K-D tree by consequent Insert Operation for the following given data: (6,2) (7,1) (2,8) (3,6) (4,7) (8,4) (5,3) (1,5) (9,5) (5,5) (4,10) (3,9). Then, after final construction of K-D tree, delete following nodes step by step in the given sequence (5,5) (3,6) (2,8) (6,2).	06	2-3-4.1.2
Q3 (b)	Construct a Binary Search Tree by inserting the data in the given order: 12, 15, 3, 35, 21, 42, 14, 11 and then delete the data 15 and 12 from the binary search tree.	06	2-3-4.1.2
Q4 (a)	Apply heap sort procedure to sort the given array and show the intermediate steps for only sorting procedure. $A = \{5, 13, 2, 25, 7, 17, 20, 8, 4\}$	06	3-3-1.4.1
Q4 (b)	Given the values {2341, 4234, 2839, 430, 22, 397, 3920}, a hash table of size 7, and hash function $h(x) = x \bmod 7$, show the resulting tables after inserting the values in the given order with each of the following collision strategies. 1- Separate chaining 2- Double hashing with second hash function $h'(x) = (2x - 1) \bmod 7$	03 03	4-3-4.1.2
Q5(a)	Consider the Graph given below 1- Suggest a suitable graph traversal algorithm to get shortest distance to reach to every other city in the graph starting from city 'A' 2- Apply the suggested traversal algorithm on the given graph with city 'A' as starting node and show the status of the data structure used at every step. Policy: Assume the procedure considers increasing order of cities and also 3- After applying the suggested graph traversal algorithm, draw the resulting tree starting from city 'A'	01 04 01	2-3-1.4.1





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Q5 (b)

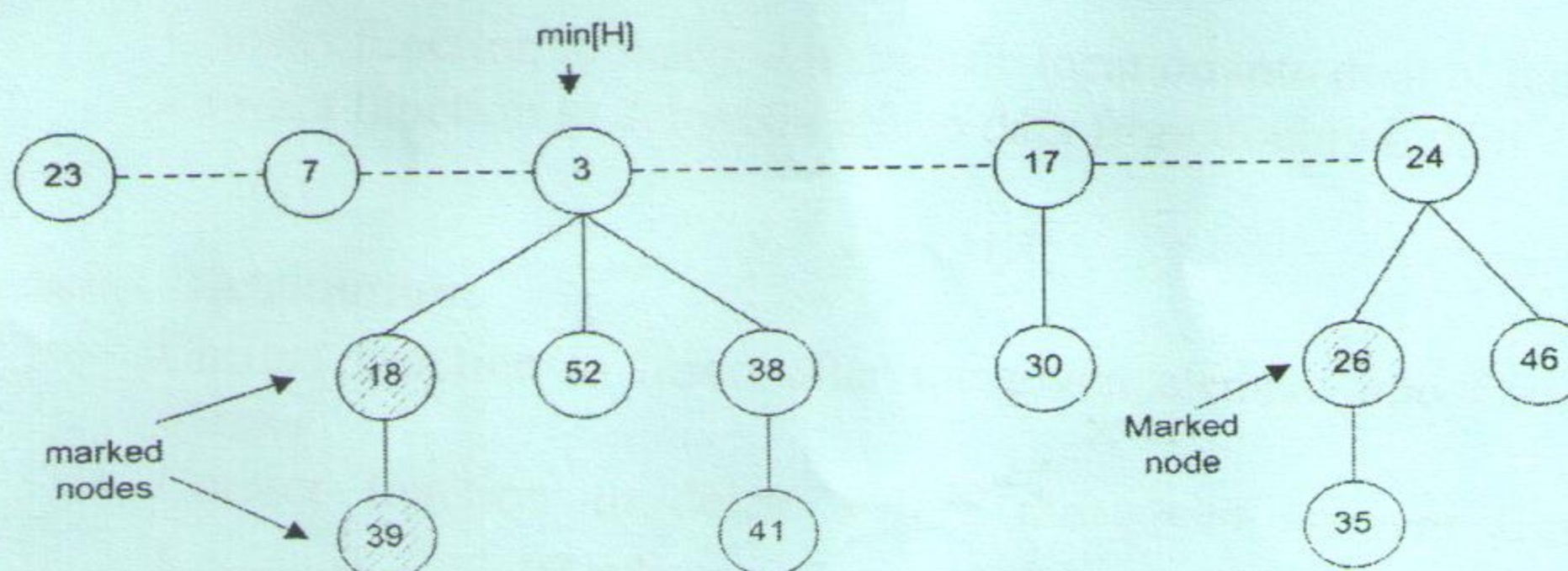
- a- Calculate the potential function for the given Fibonacci heap
b- Insert node with key value 21 in given Fibonacci heap. show the updated Fibonacci heap

02

02

04

3-3-1.4.1



- c- Extract the Minimum node from the updated Fibonacci heap resulting from question 5.b . Show updated heap at each step

08

OR

Perform Decrease Key operation on the given Fibonacci heap, consider darkened nodes are marked nodes. Decrease key of node with key 14 to 10. Show the updated Fibonacci heap at every step and write the applied rule/justification at each stage.

