APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY

08 PALAKKAD CLUSTER

Q. P. Code: CS0821121-I **(Pages: 3)**

Name: .....

Reg. No: .....

FIRST SEMESTER M.TECH. DEGREE EXAMINATION DECEMBER 2021

Branch: Computer Science And Engineering **Specialization: Computer Science And Engineering**

08CS6021 Advanced Data Structures

(Common to CSE)

Time: 3 hours **Max. Marks: 60**

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

Q. No.	Module 1	Marks
1. a	You need to find the Kth largest element in an array. Suggest a method with best time complexity to solve this problem.	3
	Answer b or c	
b	Write a program that reads a binary tree and checks whether it is a binary search tree or not	6
c	Create a min heap using the following sequence 20, 44, 12, 52, 5, 49, 63, 22, 96, 33, 2, 45. Do one extract min operation and show the resultant heap.	6

Q. No.	Module 2	Marks
2. a	What is the advantage of using B+ tree over B tree in database indexing.	3
	Answer b or c	
b	Create a splay tree using the following sequence 10, 54, 46, 52, 35, 41, 63, 12, 76, 30, 21, 55, 19. Do a find operation for element 12 and show the resultant tree.	6
c	Derive the worst case search time of Red Black tree. What is the advantage of a Red Black tree over a binary search tree?	6

Q. No.	Module 3	Marks
3. a	What is the difference between amortized analysis and average case analysis?	3

Answer b or c

b Develop algorithms to perform insertion, deletion and search on a Skiplist — 6

c Insert the characters K, F, P, M, N, L, G into an empty treap with priorities 17, 22, 29, 10, 15, 26, 13 respectively. — 6

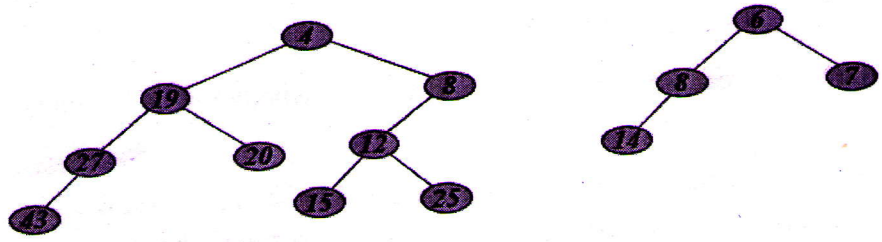
Module 4

Q. No.		Marks
4. a	Give one application of leftist heap	3

Answer b or c

b Develop algorithms to perform various operations in a min-max heap — 6

c Merge the skew heaps given below into a single skew heap — 6



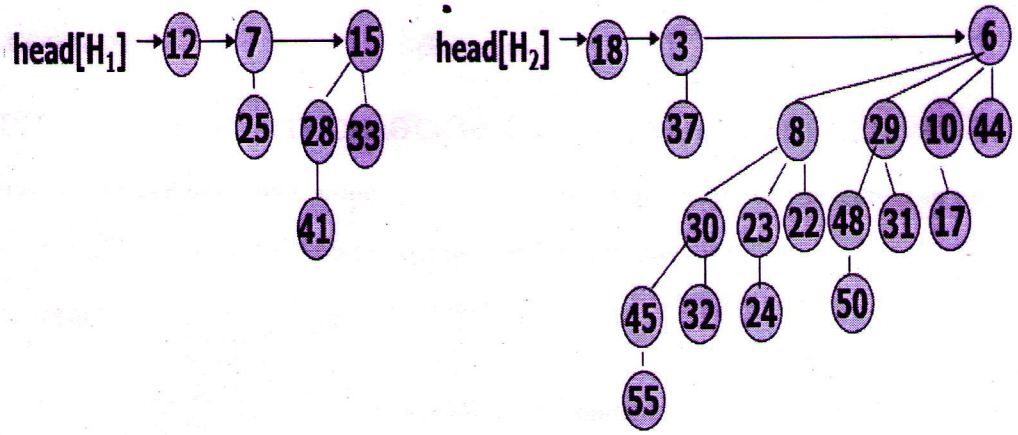
Module 5

Q. No.		Marks
5. a	Differentiate a Fibonacci heap from a binomial heap.	4

Answer b or c

b How can a Fibonacci heap used to improve the performance of dijisktra's algorithm. Explain with the help of algorithmic components. — 8

c What are the properties of binomial trees? Merge the following binomial trees 8



Q. No.	Module 6	Marks
6. a	Suggest any one application of R tree.	4

Answer b or c

b	With the help of an algorithm, insert into a 2-D tree the following elements in sequence (3,61), (45,99), (3,2), (71,80), (15,49), (8,45), (98,6) , (1,45), (15,69), (45, 59), (24, 42). Delete the elements in the same sequence.	8
c	Explain how an MX-Quad tree differ from a k-d tree? Explain the structure of an MX-Quad tree with an example.	8