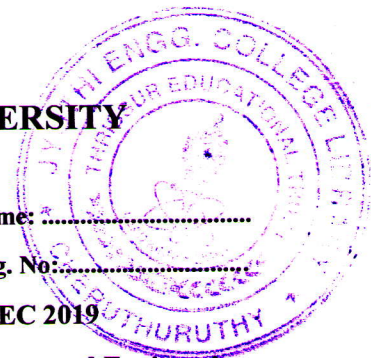


**APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER**



Q. P. Code : CS-1B-19-1

(Pages: 2)

Name:

Reg. No:

FIRST SEMESTER M.TECH. DEGREE EXAMINATION DEC 2019

Branch: Computer Science and Engineering Specialization: Computer Science and Engineering

08CS6021 : Advanced Data Structures

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	A strict analysis of an algorithm generated the time complexity as a function $f(n) = n^3 + 3n^2 + 3$. Denote the complexity of the algorithm in Theta notation and justify your answer.	3

Answer b or c

- | | | |
|---|--|---|
| b | Write an algorithm to check whether a given binary tree is an AVL search tree. | 6 |
| c | What is the advantage of heap over array in building a priority queue? Write an algorithm to build a min-heap. | 6 |

Q.no.	Module 2	Marks
2.a	What is the advantage of a B+ tree over a B tree in database indexing	3

Answer b or c

b	Create an AVL tree for the sequence 21, 44, 12, 56, 5, 49, 63, 24, 96, 34, 3, 42. Write functions for AVL tree rotations	6
c	Derive the worst case search time of a redblack tree. What is the advantage of a redblack tree over a binary search tree?	6

Q.no.	Module 3	Marks
3.a	Write the algorithm for insertion in a skiplist	3

Answer b or c

- b Create a treap for the sequence 28, 46, 32, 53, 23, 98, 32, 5, 41, 63, 21, 96, 33, 2, 43, 75, and 61 with node priorities same as that of key values. 6
- c What is the difference between amortized analysis and average case analysis? Perform amortized analysis using aggregate and potential method on insert operation of dynamic tables. 6

Q.no. Module 4 Marks

- 4.a What is the advantage of a skew heap over a leftist heap? 3

Answer b or c

- b Create a leftist heap using the sequence 34, 41, 5, 25, 94, 2, 55, 6, 30, 9, 20, 85, and 49. Perform extract min once and show the resulting heap. 6
- c Consider a queuing system in which the elements are queued up according to their priority. The system supports operation which will either remove elements with highest priority or elements with least priority. Select a suitable data structure for this system and develop algorithms for the same. 6

Q.no. Module 5 Marks

- 5.a State and prove the properties of a binomial tree 4

Answer b or c

- b Conduct a complexity analysis of Dijkstra's algorithm using Fibonacci heap and justify its advantage over an array and a binary heap. 8
- c Construct a binomial heap using the sequence 35, 56, 23, 94, 13, 2, 98, 45, 66, 20, 93, and 67. Perform extract min once and show the resulting heap. 8

Q.no. Module 6 Marks

- 6.a Why we need a multidimensional data structure? 4

Answer b or c

- b Develop algorithms for insertion, find minimum and delete nodes from a K-D tree. Insert into a 2-D tree the following elements in sequence (33,41), (25,27), (10,12), (55,70), (36,42), (38,22), (28,61), (21, 14), (31,39), (21, 55). 8
- c Develop algorithm for insertion in an R tree. 8