

Reg. No.

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B.E./ B.TECH. DEGREE EXAMINATIONS, MAY 2023

Third Semester

IT18304 – DATA STRUCTURES AND ALGORITHMS

(Information Technology)

(Regulation 2018/2018A)

TIME: 3 HOURS

MAX. MARKS: 100

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Apply the concepts of ADT to design efficient algorithms.	3
CO 2	Select suitable linear data structures to solve computational problems.	4
CO 3	Choose appropriate non-linear data structures to solve computational problems	4
CO 4	Develop solution for real world problems using hashing, Sorting, and Searching algorithms	5
CO 5	Experiment the use of appropriate data structures and design efficient algorithms to develop software applications.	5

PART- A(10x2=20Marks)

(Answer all Questions)

Q. No.	QUESTION	CO	RBT LEVEL
1.	Mention the applications of linked list.	1	2
2.	Write the advantages of array over linked list.	1	1
3.	Why is stack used in recursive algorithm implementation?	2	3
4.	Show how priority queue is used in real-time applications.	2	3
5.	Write the steps to convert general tree into binary tree.	3	1
6.	Give the pre and postfix form of the expression $a + ((b * (c - e)) / f)$.	3	3
7.	List the different algorithms used to solve shortest path problems.	4	2
8.	Prove that the maximum number of edges that a graph with n vertices is $n * (n - 1) / 2$.	4	3
9.	Mention four applications of hashing.	5	2
10.	Is the heap sort always better than the quick sort? Justify your answer.	5	4

PART- B (5x 14=70Marks)

Q. No.	QUESTION	Marks	CO	RBT LEVEL
11. (a)	Explain how a linked list is used to represent a polynomial $5x^3 + 4x^2 + 3x + 2$? Give an algorithm to perform addition of two polynomials using linked list.	(14)	1	2
(OR)				
(b)	Give an algorithm to perform the following operations in a doubly linked list. (a) Insert a new node after a given node. (b) Delete last node.(c) Count the number of elements in the list.	(14)	1	2

12. (a) Write an algorithm to add and delete elements from either end of the queue and also return an element from either end. (14) 2 3

(OR)

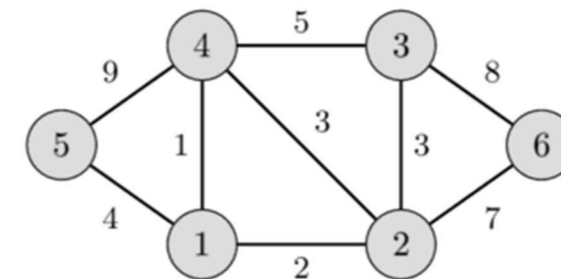
(b) Write an algorithm to convert an expression into postfix expression and evaluate the result using stack ADT. $X = A + B / C - D * E$ where $A = 2, B = 7, C = 9, D = 3, E = 5$ (14) 2 3

13. (a) (i) Write the properties of binary search tree. (4) 3 3
(ii) Write an algorithm to search and delete an element from a binary search tree. (10) 3 3

(OR)

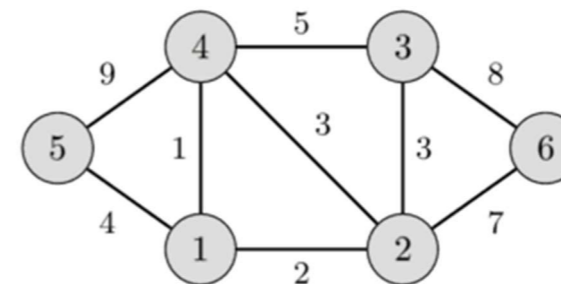
(b) (i) Show the various ways of balancing the AVL tree. (4) 3 3
(ii) Write an algorithm to insert the elements Mar, May, Nov, Aug, Apr, Jan, Dec, Jul, Feb, June, Oct and Sep in the order into the AVL tree. (10) 3 3

14. (a) Find the minimum spanning tree for the following graph using Kruscal's and Prim's algorithm. (14) 4 3



(OR)

(b) Find the shortest path using single source shortest path algorithm. (14) 4 3



15. (a) Experiment the insertion sort to insert the given sequence [4,3,10,2,8,6,5,1] and write its routine. Also, compare and contrast Insertion sort and selection sort. (14) 5 5

(OR)

(b) Construct the hash table by inserting the following keys in the order 5,28,15,19,20,33,12,17,10 with the hash function $h(k)=k \text{ mod } 9$. Analyse the contents of the hash table when the collisions are resolved by i)Chaining and ii)Linear probing . (14) 5 5

PART- C(1x 10=10Marks)
(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	(i) Identify which data structure you will prefer to store the data for the following cases. Justify your answer. a) Store the records of employees in such a manner that retrieval of max and min should be easy. b)Store and find the books from a library in a quick manner.	(5)	2	4
	(ii) Identify the data structure to arrange your dress for a week and write all the basic function of this ADT.	(5)	2	4
