Reg. No.

B.E / B.TECH. DEGREE EXAMINATIONS, MAY 2023
Second Semester
AD22201 – DATA STRUCTURES AND ALGORITHM ANALYSIS
ARTIFICIAL INTELLIGENCE AND DATA SCIENCE
(Regulation 2022)

TIME: 3 HOURS   MAX. MARKS: 100

|		RBT LEVEL
CO 1	Design and analyse time and space complexities of algorithms using different design techniques for various computing problems	2
CO 2	Solve problems using suitable linear data structures.	3
CO 3	Solve problems using suitable nonlinear tree data structures.	3
CO 4	Demonstrate the use of graph algorithms for solving problems.	3
CO 5	Design algorithms using advanced algorithm design techniques.	3

PART- A (20 x 2 = 40 Marks)
(Answer all Questions)

		CO	RBT LEVEL
1.	What is called as an algorithm?	1	2
2.	Differentiate between linear and binary search.	1	2
3.	Define brute force approach.	1	3
4.	What is called as pivot element?	1	3
5.	Mention the applications of list ADT.	2	2
6.	Convert the given infix expression into the postfix form. (a+b*c-d)	2	2
7.	List down the applications of circular queue ADT.	2	3
8.	What is called hashing?	2	3
9.	Define binary tree.	3	2
10.	Mention the process of AVL tree with its operations.	3	2
11.	What is called max heap?	3	3
12.	Mention the uses of Rabin Karp algorithm.	3	3
13.	Define the term graph with an example.	4	2
14.	Differentiate between breadth first and depth first search.	4	2
15.	What is the method of topological sort?	4	2
16.	What is called minimum spanning tree?	4	2
17.	Define dynamic programming.	5	2

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18.	State the greedy technique with one example.	5	2
19.	Define Polynomial (P) problem.	5	2
20.	How NP-hard problems are different from NP-Complete?	5	2

PART- B (5 x 10 = 50 Marks)

		Marks	CO	RBT LEVEL
21. (a)	Explain in detail about asymptotic notations used in algorithm analysis.	(10)	1	3

(OR)

		Marks	CO	RBT LEVEL
(b)	Sort the elements (45, 23, 1, 5, 12, 37, 124, 26, 57, 32, 83, 43) using quick sort. In which way, you are going to pick the pivot element. Justify the answer.	(10)	1	3
22. (a)	Create a single linked list with the input elements 12, 22, 33, 44, 55, 66. Perform the following operations and provide the pseudo code also. i) Insert a new node with element '38' at position 3. ii) Delete the node which contains the element '55'.	(10)	2	4

(OR)

			Marks	CO	RBT LEVEL
(b)	(i)	Perform the expression evaluation using stack for the given expression. (3 + 5 * 6) + (2 * 10).	(5)	2	4
	(ii)	Write about separate chaining with suitable example.	(5)	2	4
23. (a)		Construct binary search tree with the elements: 34, 30, 36, 28, 43, 40, 29, 32. Perform in-order, pre-order, and post-order traversals. Also, perform the insertion of 45, 5 into the existing tree. Provide the pseudo code for the insertion.	(10)	3	3

(OR)

		Marks	CO	RBT LEVEL
(b)	Write about the priority queues and its operations in detail. Showcase an example for the operations.	(10)	3	3

24. (a) Write a routine to find a shortest path between two given vertices in a weighted **(10)** 4 4 directed graph. Use it to find the shortest path between A and F in the following graph.
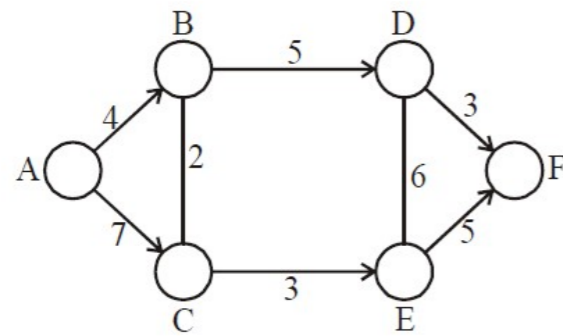
(OR)

(b) Find a minimum spanning tree for the given graph by considering D as a **(10)** 4 4 starting node using Prim's algorithm.
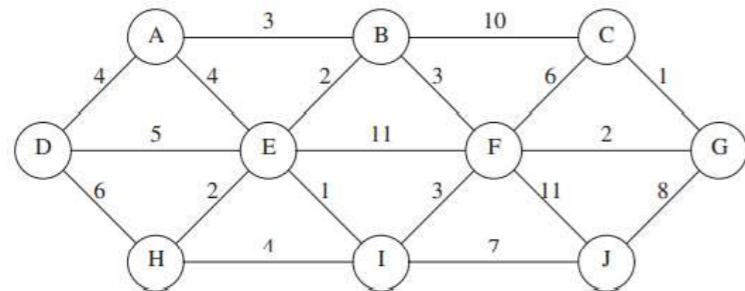
25. (a) How do backtracking is applicable in n-queens problem. Explain your **(10)** 5 4 views with suitable example.

(OR)

(b) Explain the branch and bound with an example. **(10)** 5 4

PART- C (1 x 10 = 10 Marks)

(Q.No.26 is compulsory)

	Marks	CO	RBT LEVEL

26. Describe why it is a bad idea to implement a linked list version as queue which **(10)** 2 5 uses the head of the list as the rear of the queue.

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