PART-B

UNIT1

1. Discuss various methods used for mathematical analysis of recursive algorithms. Nov/Dec 2018, APR/MAY 2017
2. Solve the following recurrence equations using iterative or tree. Nov/Dec 2019
3. Write an algorithm using recursion that determines the GCD of two numbers. Determine the time and space complexity Nov/Dec 2019
4. Elaborate asymptotic analysis of an algorithm with an example.APR/MAY 2018, Nov/Dec 2018, NOV/DEC-2017, APR/MAY 2017, Nov/Dec 2019, MAY/JUNE 2016
5. Briefly explain the mathematical analysis of recursive algorithm with example.APR/MAY 2018, APR/MAY 2017
6. Use the most appropriate notation to indicate the time efficiency class of sequential search algorithm in the worst, best and the average case. NOV/DEC 2016
7. State the general plan for analysis the time efficiency of non recursive algorithm and explain with an example. APR/MAY 2017, NOV/DEC 2016
8. Discuss the steps in mathematical analysis for recursive algorithms. Do the same for finding the factorial of a number. NOV/DEC-2017
9. Give the algorithm to check whether all the elements in a given array of n elements are distinct. Find worst case complexity of the same. MAY/JUNE 2016
10. Give the recursive algorithm for finding the number of binary digits in n's binary representation, where n is a positive decimal integer. Find the recurrence relation and complexity. APR/MAY 2019, MAY/JUNE 2016

UNIT2

11. Derive the worst case analysis of merge sort using suitable illustrations. APR/MAY 2018, NOV/DEC-2017, NOV/DEC 2019, MAY/JUNE 2016
12. Write an algorithm for quick sort and write its time complexity with example list are 5,3,1,9,8,2,4,7 Nov/Dec 2018, APR/MAY 2017 , NOV/DEC 2016, APR/MAY 2019
13. Explain the method used for performing multiplication of 2 integers. Explain how divide and conquer method can be used to solve the same. MAY/JUNE 2016
14. Explain the brute force method to method to find closest points in a set of n points in k dimensional space. NOV/DEC-2017, Nov/Dec 2019,
15. State the travelling salesman problem. Elaborate the steps in solving the travelling salesman problem using brute force approach Nov/Dec 2018, Nov/Dec 2019
16. Write the algorithm to perform binary search and compute run time complexity. APR/MAY 2017
17. There are 4 people who need to be assigned to execute 4 Jobs (one Person per job) and the problem is to find an assignment with the minimum total cost. The assignment cost is given below, solve the Assignment problem by exhaustive search. NOV/DEC 2016

	Job 1	Job 2	Job 3	Job 4
Person 1	9	2	7	8
Person 2	6	4	3	7
Person 3	5	8	1	8
Person 4	7	6	9	4

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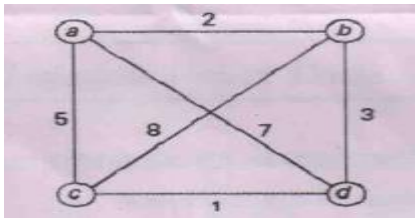
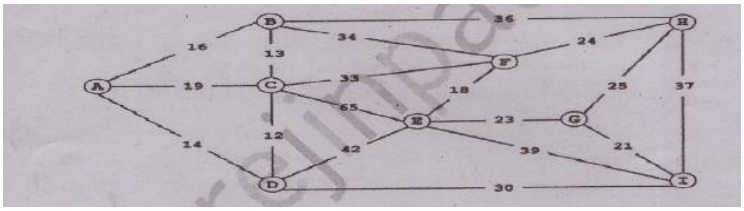
18. Explain Heap sort algorithm with an example
19. Explain merge sort algorithm with an example. NOV/DEC-2017
20. Write down the algorithm to construct an convex hull based on brute force technique. APR/MAY 2019
21. Find all the solutions to the travelling salesman problem [cities and distances shown below] by exhaustive search. Give the optimal solution. Nov/Dec 2018, MAY/JUNE 2016

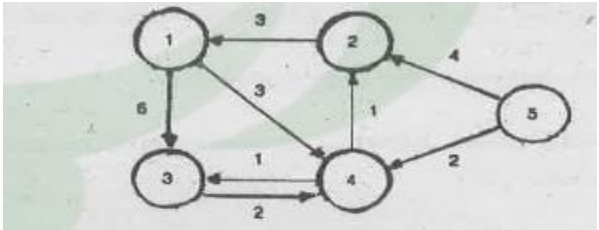


UNIT 3

22. Discuss about the algorithm and pseudo code to find the minimum spanning tree using prims algorithm. Find the minimum spanning tree for the graph shown below. Nov/Dec 2018, NOV/DEC-2017, NOV/DEC 2019



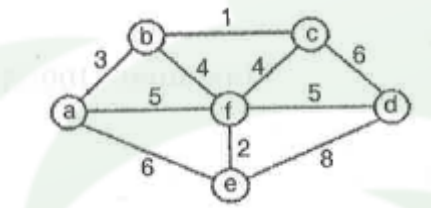
23. Explain Floyds warshall algorithm using dynamic programming. Trace the algorithm for the given example Nov/Dec 2018



24. Solve the all pairs shortest path problem for the diagraph the following weight matrix. NOV/DEC 2016, APR/MAY 2019

0	2	∞	1	8
6	0	3	2	∞
∞	∞	0	4	∞
∞	∞	2	0	3
3	∞	∞	∞	0

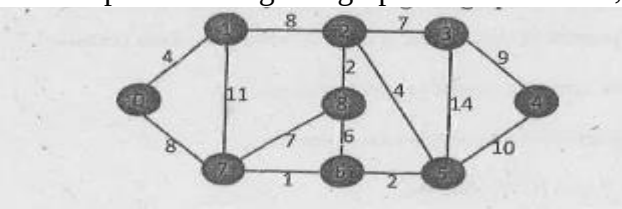
25. Explain the memory function method for the knapsack problem and give the algorithm. APR/MAY 2018
26. Give the pseudo code for prims algorithm and apply the same to find the minimum spanning tree of the graph shown below. APR/MAY 2018, NOV/DEC 2016, NOV/DEC 2019



27. Explain multi stage graph using dynamic programming technique. APR/MAY 2022
28. Solve the following instance of the 0/1 knapsack problem given the knapsack capacity in W=5 using dynamic programming and explain it. APR/MAY 2017, Nov/Dec 2019

Items	Weight	Value
1	4	10
2	3	20
3	2	15
4	5	25

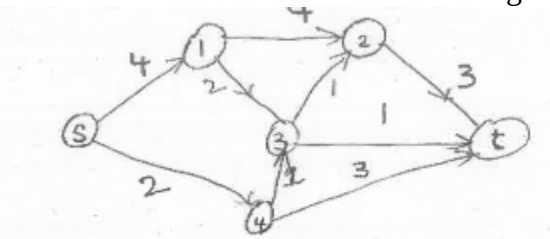
29. Write the procedure to compute Huffman code with example.
30. Explain how greedy approach is used Dijikstra's algorithm for finding the single source shortest path for the given graph. Nov/Dec 2018, NOV/DEC-2017, NOV/DEC 2019



31. Write the Huffman's algorithm . construct the Huffman tree for the following data and obtain its Huffman's code. NOV/DEC-2017, APR/MAY 2017, APR/MAY 2019, NOV/DEC 2019

Character	A	B	C	D	E	–
Probability	0.5	0.35	0.5	0.1	0.4	0.2

32. Determine the max-flow in the following network. APR/MAY 2019



33. Solve the following set of equations using simplex algorithm: APR/MAY 2018, APR/MAY 2019

    Max :18x1+12.5x2

    Sub to :x1+x2<=20

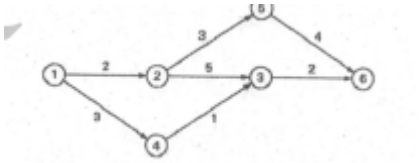
    a. X1<=12

b. X2<=16
c. X1,x2>=0

34. What is iterative improvement? Elaborate step in simplex method with an example. Nov/Dec 2018, APR/MAY 2017, Nov/Dec 2019, MAY/JUNE 2016

SIM3

35. What is bipartite graph? Is the subset of bipartite graph bipartite? Outline with an example. Nov/Dec 2019,
36. Outline the stable marriage problem with an example. Nov/Dec 2018, Nov/Dec 2019
37. Summaries the simplex method Nov/Dec 2018, NOV/DEC-2017, APR/MAY 2017, NOV/DEC 2016, NOV/DEC 2019, MAY/JUNE 2016
38. State and prove max-flow and min-cut theorem. NOV/DEC 2016
39. Apply the shortest augmenting path problem to the network shown below. MAY/JUNE 2016



40. Prove that the stable marriage algorithm terminates after no more then n2 iteration with a stable marriage output. NOV/DEC-2017, NOV/DEC 2016
41. Draw a decision tree and find the number of key comparisons in the worst and average cases for the three element bubble sort. NOV/DEC 2016
42. Write backtracking algorithm for 4 queen's OR 8 queens or N queens problem and discuss the possible solution. Nov/Dec 2018, APR/MAY 2017 , NOV/DEC 2016, Nov/Dec 2019
43. Solve the following instance of knapsack problem by branch and bound algorithm. NOV/DEC 2016, NOV/DEC 2019

Item	Weight	Profit	
1	5	$40	
2	7	$35	
3	2	$18	W = 15
4	4	$4	
5	5	$10	
6	1	$2	

44. Consider the travelling salesman instance defined by the following cost matrix Nov/Dec 2018, APR/MAY 2019

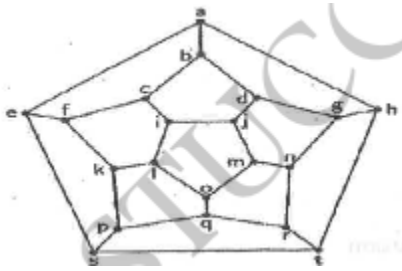
∞	20	30	10	11
15	∞	16	4	2
3	5	∞	2	4
19	6	18	∞	3
16	4	7	16	∞

Draw the state space tree and show the reduced matrix corresponding to the each of the node.

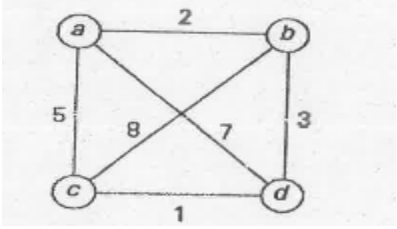
45. Find the optimal solution using branch and bound for the following assignment problem. NOV/DEC-2017

	Job1	Job 2	Job 3	Job 4
A	9	2	7	8
B	6	4	3	7
C	5	8	1	8
D	7	6	9	4

46. Give the method for establishing lower bounds. NOV/DEC-2017
47. Find the Hamiltonian circuit or disprove its existence in the graph given below. NOV/DEC-2017



48. Apply branch and bound algorithm to solve travelling salesman problem8 queen's



49. What is class NP? Discuss about any five problems for which no polynomial- time algorithm has been bound. APR/MAY 2018, APR/MAY 2017
50. Elaborate on the nearest-neighbor algorithm and multifragment heuristic algorithm for TSP problem. APR/MAY 2018
51. Give any five undesirable problem and explain the famous halting problem. MAY/JUNE 2016
52. State subset sum problem and complete state space tree of the backtracking algorithm applied to the instance A=[3,5,6,7] and d=15 of subset sum problem. APR/MAY 2019, MAY/JUNE 2016
53. Outline the steps to find an approximate solution to NP hard optimization problems using optimization algorithms with an example. NOV/DEC 2019