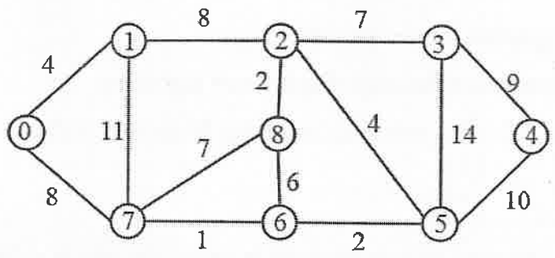
b. Write an algorithm for Kruskal's algorithm and solve the following graph to compute minimum cost spanning tree.



31. a. Write an algorithm for N queen's problem. Explain its procedure with state space tree.

(OR)

b. Let w = {5, 10, 12, 13, 15, 18} and m = 30. Find all possible subsets of 'w' that sum to 'm'. Draw state space tree and explain its algorithm.

32. a. Develop a branch and bound procedure for travelling salesman problem for

	1	2	3	4	5
1	∞	20	30	10	11
2	15	∞	16	4	2
3	3	5	∞	2	4
4	19	6	18	∞	3
5	16	4	7	10	∞

(OR)

b. Write an algorithm for randomized hiring problem with an example.

* * * * *

Reg. No.														

B.Tech. DEGREE EXAMINATION, NOVEMBER 2019

Third to Seventh Semester

15CS204J – ALGORITHM DESIGN AND ANALYSIS

(For the candidates admitted during the academic year 2015 – 2016 to 2017 – 2018)

Note:

(i) **Part - A** should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.

(ii) **Part - B** and **Part - C** should be answered in answer booklet.

Time: Three Hours Max. Marks: 100

PART – A (20 × 1 = 20 Marks)

Answer **ALL** Questions

1. How many number of comparisons are required in insertion sort to sort a file if the file is stored in reverse.
   (A) N^2 (B) N
   (C) N–1 (D) N/2

2. The main measure for efficiency algorithm are
   (A) Processor and memory (B) Complexity and capacity
   (C) Data and space (D) Time and space

3. The algorithm like quick sort does not require extra memory for carrying out the sorting procedure. This technique is called _____.
   (A) In-place (B) Stable
   (C) Unstable (D) In-partition

4. The recurrence relation capturing the optimal execution time of the towers of Hanoi problem with n discs is
   (A) $T(n) = 2T(n-2) + 2$ (B) $T(n) = 2T(n-1) + n$
   (C) $T(n) = 2T(n/2) + 1$ (D) $T(n) = 2T(n-1) + 1$

5. Which of the following sorting methods would be most suitable for sorting a list which is almost sorted?
   (A) Bubble sort (B) Insertion sort
   (C) Selection sort (D) Quick sort

6. Algorithms like merge sort, quick sort and binary search are based on
   (A) Greedy algorithm (B) Hash table
   (C) Divide and conquer algorithm (D) Parsing

7. Sub problems in dynamic programming are solved
   (A) Dependently (B) Independently
   (C) Parallel (D) Concurrent

8. Consider the polynomial $P(x) = a_0 + a_1x + a_2x^2 + a_3x^3$, where $ai! = 0$, for all i. The minimum number of multiplications needed to evaluate P on an input x is
   (A) 3 (B) 4
   (C) 6 (D) 9

9. If an optimal solution can be created for a problem by constructing optimal solution for its sub problems, the problem possesses _____ property.
   (A) Overlapping sub problems (B) Optimal substructure
   (C) Memorization (D) Greedy

10. Which of the following problem is not solved using dynamic programming?
   (A) 0/1 knapsack problem (B) Matrix chain multiplication problem
   (C) Edit distance problem (D) Fractional knapsack problem

11. In dynamic programming, the technique of storing the previously calculated values is called
   (A) Saving value property (B) Storing value property
   (C) Memorization (D) Mapping

12. Which of the following areas do closest pair problem?
   (A) Computational geometry (B) Graph colouring problems
   (C) Numerical problems (D) String matching

13. Backtracking algorithm is implemented by constructing a tree of choices called as?
   (A) State chart tree (B) State space tree
   (C) Node tree (D) Backtracking tree

14. A node is said to be _____ if it has a possibility of reaching a complete solution.
   (A) Non promising (B) Promising
   (C) Succeeding (D) Preceding

15. In what manner is a state-space tree for a backtracking algorithm constructed?
   (A) Depth first search (B) Breadth first search
   (C) Twice around the tree (D) Nearest neighbour first

16. The problem of finding a list of integers in a given specific range that meets certain conditions is called?
   (A) Subset sum problem (B) Hamiltonian circuit problem
   (C) Constraint satisfaction (D) Traveling salesman problem

17. Which data structure is used for implementing a FIFO branch and bound strategy?
   (A) Stack (B) Queue
   (C) Array (D) Linked list

18. The problem 3-SAT and 2-SAT are
   (A) Both in P (B) Both NP complete
   (C) NP complete and in P respectively (D) Undecidable and NP-complete respectively

19. You are given a Knapsack that can carry a maximum weight of 60. There are 4 items with weights {20, 30, 40, 70} and values {70, 80, 90, 200}. What is the maximum value at the items you can carrying using the knapsack?
   (A) 160 (B) 200
   (C) 170 (D) 90

20. Let S be an NP-complete problem and Q and R be to other problems not known to be in NP. Q is polynomial time reducible to S and S is polynomial time reducible to R. Which one of the following statement is true?
   (A) R is NP-complete (B) R is NP-hard
   (C) Q is NP-complete (D) Q is NP-hard

PART – B (5 × 4 = 20 Marks)
Answer **ANY FIVE** Questions

21. Write the algorithm for merge sort.

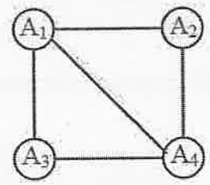
22. Find the worst case efficiency of quick sort algorithm.

23. Multiply the following two matrices using Strassen's multiplication method
$A=\begin{bmatrix}1 & 4\\ 5 & 8\end{bmatrix}$ $B=\begin{bmatrix}1\\ 2\end{bmatrix}$

24. Write a straight forward algorithm for finding max min in an array.

25. What is NP-Hard problem? How to handle NP-hard problems to find solution?

26. Colour the following graph using graph coloring algorithm. What is the minimum number of the colour required?



27. List the advantages and disadvantages of randomized algorithms.

PART – C (5 × 12 = 60 Marks)
Answer **ALL** Questions

28. a. Solve the recurrent tree for $T(n)=3T(n/4)+Cn^2$ and find the time complexity for the recurrence relation.

(OR)

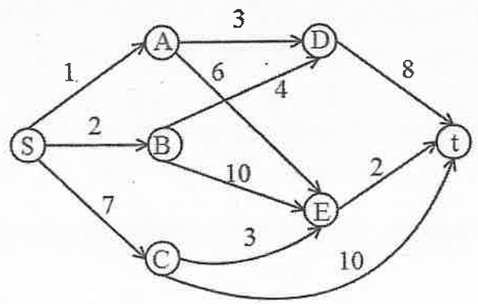
b. Calculate the computing time of the step count and operation count for sum of natural number and analyze the time complexity for the same.

29. a. Explain the merge cost algorithm with an suitable example and analyse the time complexity.

(OR)

b. Design an algorithm for finding closest pair points using divide and conquer techniques. Derive its time complexity.

30. a. Develop a pseudo code for multistage graph and find minimum cost path from S to t in the following multistage graph.



(OR)