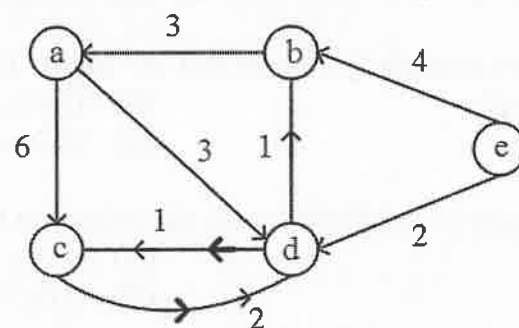31. a. Compute all pair shortest path using Floyd-Warshall algorithm.

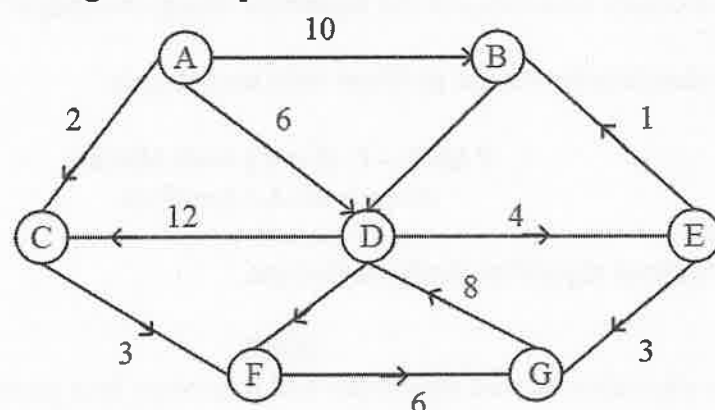(OR)

b. Using dynamic programming and Knapsack algorithm technique solve for the given data. Capacity of Sack is 18.

Item i	Value vi	Weight wi
1	15	2
2	10	1
3	9	5
4	5	3
5	7	4

32. a. Solve subset-sum problem and draw the state space tree. M = 30, W = {5,10,12,13,15,18}.

(OR)

b. Solve the given travelling salesman problem

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B.Tech. DEGREE EXAMINATION, MAY 2019
Third Semester

IT1004 – DESIGN AND ANALYSIS OF ALGORITHMS
(For the candidates admitted during the academic year 2013 – 2014 and 2014 – 2015)

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. Consider four for loops, which loop will take less time to complete
 (A) for (i = 0, i < n; i + +) (B) for (i = 0, i < n; i + = 2)
 (C) for (i = 1, i < n; i * = 2) (D) for (i = n, i > −1; i / = 2)

2. What does algorithmic analysis count?
 (A) The number of arithmetic and the operations that are required to run the program
 (B) The number of lines required by the program
 (C) The number of variables used in the program
 (D) The number of mathematical expressions used in the program

3. Express the formula $(n-1)*(n-5)$ in terms of big oh notation.
 (A) $O(1)$ (B) $O(\log n)$
 (C) $O(n)$ (D) $O(n^2)$

4. What does it mean when a algorithm X is asymptotically more efficient than Y?
 (A) X is better choice for all inputs (B) Y is better choice for all inputs
 (C) X is better choice for all inputs except small inputs (D) X is better choice for all inputs except large input

5. The recurrence relation capturing the optimal time of the tower of Hanoi problem with 'n' disc is
 (A) $T(n) = 2T(n-2)+2$ (B) $T(n) = 2T(n-1)+n$
 (C) $T(n) = 2T(n/2)+1$ (D) $T(n) = 2T(n-1)+1$

6. Let n > = m
 int gcd (n,m)
 { if (n% m = = 0) return m;
  n = n % m;
  return gcd (m, n);
 }
 How many recursive calls are made?
 (A) $\theta (\log n)$ (B) $\pi (n)$
 (C) $\theta (\log \log n)$ (D) $\theta (\log n^2)$

7. How many number of comparisons are required in insertion sort to sort set of 'n' numbers which is already sorted?
   (A) N^2 (B) N
   (C) N−1 (D) N/2

8. Choose the parameters used to measure the efficiency of any algorithm
   (A) Data and space (B) Time and space
   (C) Complexity and capacity (D) Processor and memory

9. A list of 'n' strings each of length 'n', is sorted into lexicographic order using the merge sort algorithm. Pick the worst case time complexity
   (A) O (n log n) (B) O (n^2 log n)
   (C) O (n^2) (D) O (n)

10. The best case time complexity of quick sort is
    (A) O (log n) (B) O (n^2)
    (C) O(n log n) (D) O (n)

11. The minimum number of comparisons required to find the minimum and the maximum of 100 numbers is _____.
    (A) 146 (B) 147
    (C) 140 (D) 148

12. Which algorithm design technique is used in finding all pairs of shortest distances in a graph?
    (A) Back tracking (B) Dynamic programming
    (C) Greedy (D) Divide and conquer

13. Which of the following is not a greedy algorithm?
    (A) Prim's algorithm (B) Huffman coding
    (C) Kruskal algorithm (D) Bellmen ford shortest path algorithm

14. Given a directed graph where the edges are labeled with survival probabilities, we can compute the _____ between two nodes with Floyd Warshall
    (A) Transitive Hull (B) Minimax distance
    (C) Max min distance (D) Safest path

15. _____ is the method used by cant sorter.
    (A) Radix sort (B) Insertion sort
    (C) Heap (D) Quick

16. Partition and exchange sort is _____.
    (A) Quick sort (B) Tree sort
    (C) Bubble sort (D) Heap sort

17. Which of the following sorting algorithm is of divide and conquer type?
    (A) Bubble sort (B) Insertion sort
    (C) Merge sort (D) Selection sort

18. Dynamic programming employs _____ approach.
    (A) Top-down (B) Bottom-up
    (C) Mix of both top-down and bottom-up (D) Inverse approach approach

19. A connected graph contains 'N' nodes and 'N' edges. The graph is called as _____.
    (A) A cyclic graph (B) Cyclic graph
    (C) Forest (D) Biconnected graph

20. The time complexity of the shortest path algorithm can be bounded by
    (A) O (n^2) (B) O (n)
    (C) O (n^4) (D) O (n^3)

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

21. Write a recursive algorithm to compute factorial of a given number "N"?

22. Draw the table of comparing orders of growth for asymptotic notations.

23. Compute using $\begin{bmatrix} 5 & 6 \\ 4 & 3 \end{bmatrix} \times \begin{bmatrix} 1 & 2 \\ 8 & 9 \end{bmatrix}$ Strassen's matrix multiplication.

24. Solve 4 Queens problem using backtracking.

25. Construct Huffman code for given data {a-25, e-10, i-20, o-6, u-11}.

26. Explain memory function and the algorithm design technique used in it.

27. Explain Hamiltonian circuit problem with an example.

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

28. a. Explain various algorithm design technique.

    (OR)

    b. Write an algorithm to find maximum and minimum in a given set of integers. Compute its efficiency.

29. a. Explain all asymptotic notations with example.

    (OR)

    b. Write both recursive and non-recursive algorithm to compute Fibonacci series. Compare their performance.

30. a. Write the algorithm and perform quick sort on the given data:
       11, 46, 8, 17, 12, 5, 16, 76, 42, 1

    (OR)

    b. Construct a Binary search tree and perform all traversal techniques on the given data:
       11, 46, 8, 17, 12, 5, 10, 76, 42, 1