Q.P. Code – 68433

Fourth Semester B.C.A. Degree Examination, September 2020

(CBCS Scheme)

Computer Science

ANALYSIS AND DESIGN OF ALGORITHMS

Time : 3 Hours] [*Max. Marks : 90*

Instructions to Candidates : Answer all Sections.

SECTION – A

I. Answer any **TEN** questions : (10 × 1 = 10)

1. Define Algorithm.

2. What is Time complexity?

3. Define order of growth.

4. Write control abstraction of divide and conquer.

5. Define minimum spanning tree.

6. What is meant by feasible solution?

7. What is tree traversal?

8. Define degree of a node.

9. Define strongly connected graph.

10. What is multistage graph?

11. Define Complete Binary Tree.

12. Define Hamiltonian cycle.

SECTION – B

II. Answer any **FIVE** questions :   (5 × 3 = 15)
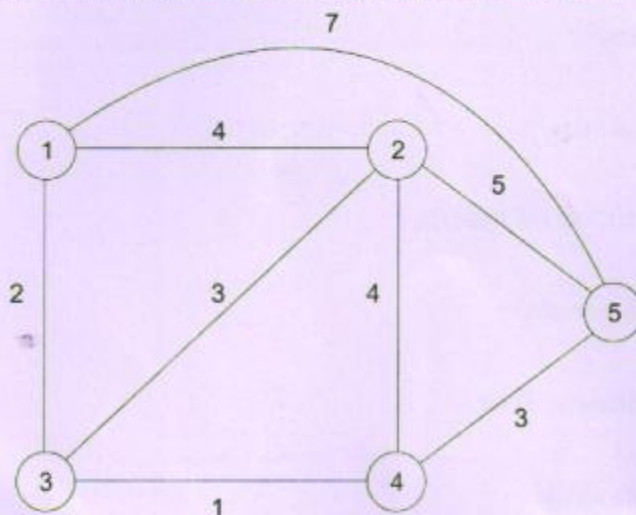
13. Illustrate different Asymptotic notations.

14. Write Linear search algorithm to find given element into an array.

15. Write Dijikstra's algorithm

16. Explain different methods for representation of graph.

17. Explain Backtracking.

18. Write short note on Flow Shop scheduling.

19. Differentiate between Knapsack problem with 0/1 Knapsack problem.

SECTION – C

III. Answer any **SIX** questions :   (6 × 5 = 30)

20. Write an algorithm to find maximum and minimum in a set of members using divide and conquer technique.

21. Trace the merge sort algorithm to sort the following elements :

     (41, 32, 11, 92, 66, 74, 87, 38)

22. Solve the job sequencing problem with number of jobs $n = 5$, their profits are $P = (1, 5, 20, 15, 10)$ and deadlines are $D = (1, 2, 4, 1, 3)$.

23. Find the minimum cost spanning tree using Prim's algorithms.
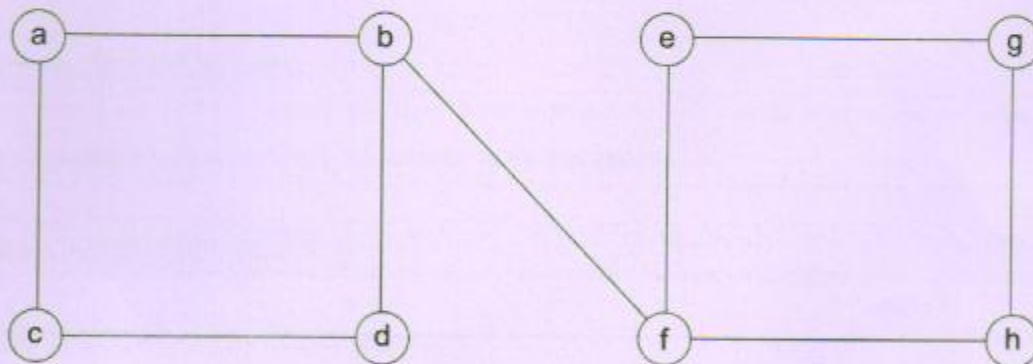
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24. Explain BFS with an example.

25. Explain recursive binary search algorithm.

26. Write a C++ program to find GCD and factorial using recursion technique.

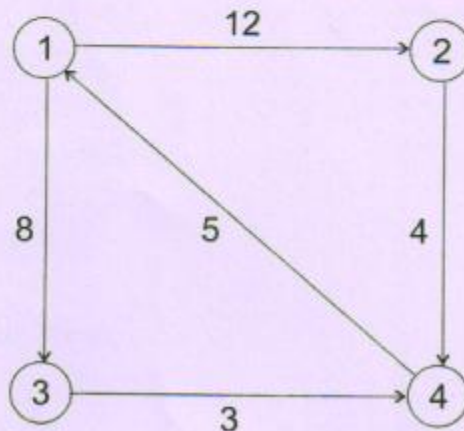27. Explain Graph colouring with an example.

SECTION – D

IV. Answer any **FIVE** questions : (5 × 7 = 35)

28. (a) What are the characteristics of an algorithm?

    (b) Write control abstraction for backtracking method. (4 + 3)

29. For the Knapsack problem $n = 3$, $m = 20$, $P = (25, 24, 15)$ and $W = (18, 15, 10)$ find the feasible solution and optimal solution.

30. Explain DFS algorithm. Transverse the graph using DFS.

31. Determine all pair shortest path for the weighted graph.

3

32. (a) Apply backtracking to solve the following instance of subset sum problem :
    $M = 30$, $n = 6$, $S = [5, 10, 12, 13, 15, 18]$.

    (b) Write short note on principle of optimality.   (4 + 3)

33. Find optimal tour cost for TSP for given cost matrix :

$C_{(i,j)}$	1	2	3	4
1	0	10	15	20
2	5	0	9	10
3	6	3	0	12
4	8	8	9	0

34. Explain 4 Queen problem with constraints.

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