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**Reg. No. :**

**Question Paper Code: 44024**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Fourth Semester

Computer Science and Engineering

14UCS404 - DESIGN AND ANALYSIS OF ALGORITHMS

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Given two non-negative functions f(n) = 5n2 + 6n + 1 and g(n) =n2. Calculate upper bound value, C is

(a) C = 5 (b) C = 6 (c) C = 12 (d) C = 11

2. The Efficiency applied to a sequence of operations performed on the same data structure is

(a) Best case efficiency (b) Worst-case efficiency (c) Average case efficiency (d) Amortized efficiency

3. The running time of quick sort depends heavily on the selection of

(a) No of inputs  (b) Size of elements (c) Arrangement of elements in array (d) Pivot element

4. For the improvement of efficiency of quick sort the pivot can be

(a) the first element (b) the mean element (c) the last element (d) None of these

5. Prim’s algorithm is based on \_\_\_\_\_\_\_\_\_\_\_\_\_ method

(a) Divide and conquer method (b) Greedy method (c) Dynamic programming (d) Branch and bound

6. Huffman trees provide

(a) Fixed length codes (b) Variable length codes (c) 3 bit codes (d) ASCII codes

7. A linear programming problem which does not have an optimal solution is called

(a) Unbounded (b) Infeasible (c) Feasible (d)Non-optimal

8. Fold-Fulkerson can find a maximum matching in a bipartite graph in \_\_\_\_\_\_\_\_\_\_ time

(a) *O(mn)* (b) *O(m)* (c) *O(n)*  (d) *O(m+n)*

9. A\_\_\_\_\_\_\_\_\_\_\_\_ is a round trip path along n edges of G that visits every vertex once and returns to its starting position.

(a) MST  (b) TSP (c) Multistage Graph (d) Hamiltonian cycle

10. Which design strategy stops the execution when it find the solution otherwise starts the problem from top?

(a) Back tracking (b) Divide and conquer (c) Branch and Bound (d) Dynamic programming

PART - B (5 x 2 = 10 Marks)

11. What is the use of asymptotic notations?

12. Analyze the computing time for Binary search.

13. Differentiate dynamic programming and greedy technique.

14. Show the Mathematical formulation to solve a max flow problem.

15. Define the Hamiltonian circuit**.**

PART - C (5 x 16 = 80 Marks)

16. (a) Explain briefly about various fundamental steps used to design an algorithm. (16)

Or

(b) Discuss the fundamentals of analysis framework and notations used in algorithm

design. (16)

17. (a) (i) Using brute force method, write a pseudo code to find the two closest points in a

set of n points and also identify the basic operation . How many number of times the basic operation can be executed. (8)

(ii) Let A and B be the two 2 x 2 matrices. Using Strassen's matrix multiplication find the product of C = A x B. Find how many number of multiplication and addition operations are performed? (8)

Or

(b) Explain quick sort algorithm with suitable example. (16)

18. (a) Design a to find a solution for following instances of the knapsack problem using

dynamic programming algorithm and memory function algorithm. Capacity W = 5. (16)

|  |  |  |
| --- | --- | --- |
| Item | Weight | Value |
| 1 | 2 | $12 |
| 2 | 1 | $10 |
| 3 | 3 | $20 |
| 4 | 2 | $15 |

Or

(b) Write the Huffman’s algorithm. Construct the Huffman’s tree for the following data and obtain its Huffman’s code. (16)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Character | *A* | *B* | *C* | *D* | *E* |
| Probability | 0.1 | 0.1 | 0.2 | 0.2 | 0.4 |

19. (a) Apply the maximum matching algorithm to the following bipartite graphs. (16)



Or

(b) Describe in detail about outline of simplex method. Explain geometric interpretation of Linear programming with example. Trace the simplex method on the following problems.

Maximize *p= 2x-3y=4z*

Subject to *4x-3y+z<=3*

*x+y+z <=10*

*2x+y- z<=10*

where *x, y* and *z* are non negative (16)

20. (a) Define subset sum problem. Apply backtracking to solve the following instance of

the subset sum problem. A = {3, 5, 6, 7} and d = 15. (16)

Or

(b) Write short notes on NP-Hard and NP-Completeness. (16)