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**Question Paper Code: 44204**

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Fourth Semester

Computer Science and Engineering

14UCS404 - DESIGN AND ANALYSIS OF ALGORITHMS

(Regulation 2014)

Duration: 1:15hrs

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

**(Answer any six of the following questions)**

- The main measure for efficiency algorithm are
  - Processor and Memory
  - Complexity and Capacity
  - Data and Space
  - Time and space
- The time complexity of binary search is
  - $O(1)$
  - $O(\log n)$
  - $O(n)$
  - $O(n \log n)$
- For the improvement of efficiency of quick sort the pivot can be
  - the first element
  - the mean element
  - the last element
  - None of these
- Best case time complexity of Quick sort is
  - $O(n^2 \log n)$
  - $O(\log n)$
  - $O(n \log n)$
  - $O(\log n^2)$
- The OBST algorithm in worst case takes \_\_\_\_\_ time if all  $c(i, j)$ 's and  $r(i, j)$ 's are calculated.
  - $O(\log n)$
  - $O(n^4)$
  - $O(n^3)$
  - $O(n \log n)$
- Prim's algorithm is based on \_\_\_\_\_ method
  - Divide and conquer method
  - Greedy method
  - Dynamic programming
  - Branch and bound

7. A linear programming problem which does not have an optimal solution is called
- (a) Unbounded (b) Infeasible  
(c) Feasible (d) Non-optimal
8. A linear programming problem which does not have an optimal solution is called
- (a) unbounded (b) infeasible  
(c) feasible (d) non-optimal
9. A decision problem D is said to be NP-complete if
- (a) It belongs to class NP (b) NP reduces to D  
(c) only (a) (d) both (a) and (b)
10. N-queens problem is solved using
- (a) branch and bound (b) backtracking  
(c) both (a) and (b) (d) approximation algorithm

PART – B (3 x 8= 24 Marks)

**(Answer any three of the following questions)**

11. Discuss the fundamentals of analysis framework and notations used in algorithm design. (8)
12. Write an algorithm to perform binary search. Analyze the algorithm for best case worst case and average case. (8)
13. Define spanning tree. Discuss the design steps in prim's algorithm to construct minimum spanning tree with an example. (8)
14. Describe in detail about outline of simplex method. Explain geometric interpretation of Linear programming with example. Trace the simplex method on the following problems.
- $$\begin{array}{l} \text{Maximize } p = 2x - 3y + 4z \\ \text{Subject to } 4x - 3y + z \leq 3 \\ \quad \quad \quad x + y + z \leq 10 \\ \quad \quad \quad 2x + y - z \leq 10 \end{array}$$
- where  $x$ ,  $y$  and  $z$  are non negative (8)
15. Define subset sum problem. Apply backtracking to solve the following instance of the subset sum problem.  $A = \{3, 5, 6, 7\}$  and  $d = 15$ . (8)