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**B.Tech. DEGREE EXAMINATION, DECEMBER 2018**  
Third Semester

**CS0203 – DESIGN AND ANALYSIS OF ALGORITHMS**  
(For the candidates admitted from the academic year 2007-2008 to 2012-2013)

Time: Three hours

Max. Marks: 100

Answer **ALL** Questions

**PART – A (10 × 2 = 20 Marks)**

1. Define asymptotic notation.
2. Define space complexity and time complexity.
3. Write the recurrence relation for Max-min divide and conquer algorithm.
4. Differentiate binary search and linear search.
5. Define articulation point.
6. List the constraints of travelling salesman problem.
7. Define Hamiltonian cycle problem.
8. Define FIFO branch and bound techniques.
9. Draw the relationship between P, NP, NP-complete and NP-hard problems.
10. What is meant by nondeterministic algorithm?

**PART – B (5 × 16 = 80 Marks)**

11. a.i. Prove the following using mathematical induction

$$\sum_{i=1}^n i^3 = \left[ \frac{n(n+1)}{2} \right]^2, \text{ for all } n \geq 1 \quad (10 \text{ Marks})$$

ii. Explain about asymptotic notation with examples. (6 Marks)

(OR)

b.i. Solve the recurrence relation for  $C_n = C_{n-1} + n, n \geq 1$  with initial condition  $C_0 = 0$ . (10 Marks)

ii. Describe about space and time complexity with an example. (6 Marks)

12. a. Develop a straight forward and recursive algorithm to find a maximum and minimum number in a set of  $n$  elements. Explain with an example.

(OR)

b. Explain in detail about minimum spanning tree algorithm with necessary example.

13. a. With necessary examples and algorithms, explain in detail about Bi-connected components.

(OR)

b.i. Explain O/I Knapsack problem. Solve the following problem using dynamic programming  $n = 3, m = 15, (P_1, P_2, P_3, P_4) = 10, 10, 12, 18$  and  $(W_1, W_2, W_3, W_4) = (2, 4, 6, 9)$

ii. Write short notes about all-pair shortest path problem.

14. a. Explain in detail about 8 Queens problem with required algorithms and examples.

(OR)

b.i. Explain in detail about branch and bound technique.

ii. With necessary examples and algorithm, explain about Knapsack problem using branch and bound technique.

15. a. Explain in detail about non-deterministic algorithm with required examples.

(OR)

b. Explain in detail about NP-complete problem with required examples.

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