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Question Paper Code : 70437

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Fourth Semester

Computer Science and Engineering

CS 8451 — DESIGN AND ANALYSIS OF ALGORITHMS

(Common to : Computer and Communication Engineering/Information Technology)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write an algorithm to accept two numbers, find the greatest and print the result.
2. What is problem solving and list some important problem type.
3. State the travelling salesman problem.
4. What is a heap? Give example.
5. Outline a binary search tree with an example.
6. What is a multi-stage graph?
7. Define iterative refinement.
8. What is a bipartite graph?
9. Define backtracking.
10. State the Hamiltonian circuit problem.

PART B — (5 × 13 = 65 marks)

11. (a) Outline worst case running time, best case running time and average case running time of an algorithm with an example. (13)

Or

- (b) (i) Present an outline of asymptotic notations. (7)
 (ii) What is a recursive algorithm? Outline with an example. (6)

12. (a) State the knapsack problem. Outline the steps to solve the knapsack problem using exhaustive search with an example. (13)

Or

- (b) What is divide and conquer? Outline the steps in the merge sort algorithm with an example. (13)

13. (a) What is dynamic programming? Outline the steps to solve a problem using dynamic programming with an example. (13)

Or

- (b) (i) Outline the container loading problem with an example. (7)
 (ii) What is a Huffman tree? Outline the steps to construct a Huffman tree with an example. (6)

14. (a) Outline the steps in the simplex method for iterative improvement with an example. (13)

Or

- (b) What is bipartite matching? Outline the steps in the stable marriage algorithm with an example. (13)

15. (a) (i) Are all problems solvable in polynomial time? Outline. (5)
 (ii) Outline class P problem and class NP problem with an example. (8)

Or

- (b) Outline how backtracking can be used for the N-Queens problem with an algorithm and example. (13)

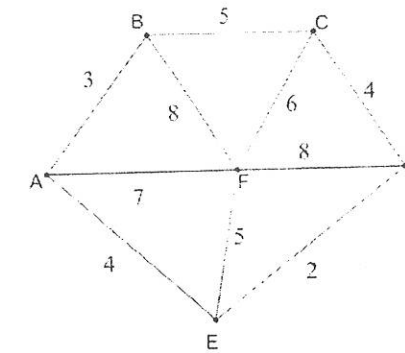
PART C — (1 × 15 = 15 marks)

16. (a) Outline the step by step procedure to sort the following numbers using quick sort algorithm:

12, 24, 02, 09, 55, 44, 22, 99, 88, 77, 66, 111, 101. (15)

Or

- (b) A cable company wants to connect five villages to their network which currently extends to the market town of A as presented in the figure below: (15)



Using Kruskal's algorithm construct a minimum spanning tree and find the minimum length of cable needed.
