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Question Paper Code : 40390

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Fourth Semester

Computer Science and Engineering

CS 8451 — DESIGN AND ANALYSIS OF ALGORITHMS

(Common to B.E. Computer and Communication Engineering /
B.Tech. Information Technology)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define the notation big-omega.
2. What is meant by time complexity of an algorithm?
3. State the travelling salesman problem.
4. How binary search algorithm works?
5. State the principle of optimality.
6. What is the container loading problem.
7. Outline the steps in iterative improvement.
8. Define a bipartite graph.
9. What is a Hamiltonian circuit? Give example.
10. State the subset-sum 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) Outline a recursive algorithm and a non-recursive algorithm with an example. (13)

12. (a) Elaborate how a brute force algorithm works with an example. (13)

Or

- (b) Apply the merge sort algorithm to sort the following numbers in ascending order :

999, 99, 888, 88, 777, 77, 666, 66, 555, 55, 444, 44, 333, 33, 222, 22, 111, 11

Illustrate each step of the sorting process. (13)

13. (a) State the knapsack problem and outline the steps to solve the knapsack problem using dynamic programming with an example. (13)

Or

- (b) What is a minimum spanning tree? Outline the steps in the Kruskal's algorithm to find a minimum spanning tree with an example. (13)

14. (a) Elaborate the maximum flow problem with an example and relevant diagrams. (13)

Or

- (b) Outline the steps in the stable marriage algorithm with an example. (13)

15. (a) (i) Present an outline of P, NP, NP Hard and NP Complete problems. (8)

- (ii) Compare LIFO search and FIFO search. (5)

Or

- (b) State the n-queen (s) problem and outline the steps to solve the n-queen (s) problem using backtracking. (13)

PART C — (1 × 15 = 15 marks)

16. (a) What is a Huffman tree? Outline the steps to build a Huffman tree with an example. (15)

Or

- (b) Outline the steps to solve the travelling sales man problem using branch and bound technique. (15)