2022

BCA 3rd Semester Examination

Design and Analysis of Algorithm

PAPER — 2101

Full Marks : 100

Time : 3 hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Answer Q. No. **1** and *any* **four** from the rest.

1. Answer *any* **five** questions : 2×5=10

(a) Define divide and conquer strategy.

(b) Define graph colouring.

(c) Explain about Branch and Bound method.

(d) Explain the properties of an algorithm with an example.

(e) Compare the time complexities of solving the All Pairs Shortest Path problem using Floyd's algorithm and using the Dijkstra's algorithm by varying the source node. Justify your answer.

(f) Differentiate between Big oh and omega notations with example.

(g) What are NP class problem?

(h) What is deterministic algorithm?

2. (a) Show the result of running Merge sorting technique on the sequence 38, 27, 43, 3, 9, 82, 10.

(b) Derive the best, worst and average time complexities of Merge sorting technique.

7+8=15

3. (a) Write the algorithm to compute 0/1 Knapsack problem using dynamic programming and explain it.

(b) What is the time complexity of the following function fun()? Explain

```
int fun(int n) {
  for (int i = 1; i <= n; i++) {
    for (int j = 1; j < n; j+= i) {
      Sum = Sum +i*j;
    }
  }
  return(Sum);
}
```

8+7=15

4. (a) Show the result of running Quick sorting technique on the sequence 38, 27, 43, 3, 9, 82, 10, 42.

(b) How Quick sort is different from Selection sort?
State Quick sorts best and worst case complexities. 8+(5+2)=15

5. (a) What is travelling sales man problem? Explain.

(b) Explain the divide and conquer strategy with an example.

(c) State n-queens problem and explain 8-queens problem using backtracking.
3+4+8=15

6. (a) Determine the number of passes required to search the element 44 in the following list of elements :

5, 12, 17, 23, 38, 44, 77, 84, 90

(b) Write the binary search algorithm and state its best, worst and average case time complexity. 7+8=15

7. (a) Write with an example of Prim's algorithm.

(b) Discuss the Dijkstra's single source shortest path algorithm and show the time complexity of this algorithm. 7+8=15

[***Internal Assessment*** : **30**]

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