Uni. Roll No. ……………..

Program/ Course: B.Tech. (Sem. 5th)
Name of Subject: Design and Analysis of Algorithms
Subject Code: CS-307
Paper ID: A0467

Time Allowed: 3 Hours   **Max. Marks: 60**

NOTE:

1) **Section- A** is **compulsory**
2) Attempt any **four** questions from **Section-B** and any **two** questions from **Section- C**
3) Any missing data may be assumed appropriately

Section- A   **[Marks: 02 each]**

Q1.

   a) Define algorithm.

   b) What is average case and worst case complexity of Quicksort algorithm?

   c) Differentiate greedy and dynamic programming design techniques.

   d) Define Big-omega notation.

   e) What is meant by non-deterministic algorithm?

   f) State principle of optimality.

   g) Define NP- hard problems.

   h) Define time and space complexity.

   i) What are combinatorial algorithms?

   j) State Cook's theorem.

Section- B   **[Marks: 05 each]**

Q2. Discuss merge sort algorithm for sorting and sort the given list using same

   1, 4, 2, 5, 6, 3, 7

Q3. Explain backtracking technique for algorithm design and solve 4-queen problem using the same.

Q4. What is relationship between P, NP, NP-Hard and NP-Complete problems?

Q5. Describe one pattern matching algorithm in detail.

Q6. Discuss prim's algorithm for finding minimum cost spanning tree.

Section- C   **[Marks: 10 each (05 for each sub-part, if any)]**

Q7. Discuss Quicksort algorithm and sort the following list using the same.

21, 45, 67, 34, 12, 69, 76, 26, 47, 32, 45, 87

Q8. Discuss the algorithm for solving Knapsack problem using Dynamic programming and solve the following 0/1 knapsack with capacity 4 using the same:

I = <I1, I2, I3, I4>

W = <1, 2, 3, 4>

V = <20, 60, 10, 15>

Q9. Discuss Approximation algorithms in detail along with their importance. Also discuss various types of approximation algorithms.

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