

Time: 2:30 Hours

Marks :75

Q.1 Attempt any 3

15

- A. Suppose we are comparing implementations of insertion sort and merge sort on the same machine. For inputs of size  $n$ , insertion sort runs in  $8n^2$  steps, while merge sort runs in  $64n \lg n$  steps. For which values of  $n$  does insertion sort beat merge sort?
- B. Explain the concept of divide and conquer.
- C. Describe the concept of randomized algorithm. Write down algorithm for the same.
- D. Explain the Strassen's algorithm for matrix multiplication.
- E. Explain The hiring problem.

Q 2 Attempt any 3

15

- A. Write a short note on Rod Cutting.
- B. State and explain the Elements of the greedy strategy.
- C. Write a short note on Huffman codes.
- D. Explain the Bellman-Ford algorithm.
- E. Write a short note on Dijkstra's algorithm.

Q .3 Attempt any 3

15

- A. Write a short note on Elementary number-theoretic notions.
- B. Explain the Chinese remainder theorem.
- C. Explain Polynomial time and Polynomial-time verification.
- D. Write a short note on NP-completeness and reducibility.
- E. Explain The vertex-cover problem

Q .4 Attempt any 3

15

- A. Write a short note on purpose and products of research.
- B. What do you mean by plagiarism and What research ethics should be followed by researcher?
- C. How to write a research paper?
- D. Explain the steps in research process.
- E. Write a short note on Internet Research.

Q.5 Attempt any 3

15

- A. Explain insertion sort.
- B. Explain Indicator Random variables.
- C. Explain Algorithms of Kruskal and Prim.
- D. Explain Breadth-first search Algorithms.
- E. Write a short note on Research.

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