

(Time: 2 Hours)

[Total Marks: 60]

- N. B.: (1) All questions are compulsory.
(2) Figures to the right indicate marks.
(3) Illustration, In-depth answers and diagrams will be appreciated
(4) Mixing of sub-questions is not allowed.
(5) Each question carries 6 marks

Q.1 Attempt any two of the following:

12

- a) How is a sorting problem defined? Mention any four problems solved by algorithms.
- b) Explain Insertion sort algorithm. Give the worst case and average case analysis of insertion sort algorithm.
- c) Discuss the maximum subarray problem in brief.
- d) Develop a randomized algorithm for the hiring problem.

Q.2 Attempt any two of the following:

12

- a) Describe rod cutting problem with recursive top-down implementation
- b) Write a short note on the Longest Common Subsequence
- c) What are greedy algorithms? How to construct a Huffman code?
- d) How does Dijkstra's algorithm help in solving the single source shortest path problem? Explain the algorithm.

Q.3 Attempt any two of the following:

12

- a) Illustrate with an example the Chinese remainder theorem.
- b) How to find the power of an element? Explain the Euler theorem and Fermat theorem.
- c) Mention the key concepts in showing a problem to be NP-complete.
- d) Explain in brief the travelling salesman problem.

Q.4 Attempt any two of the following:

12

- a) Explain the six P's of research in brief.
- b) State and briefly explain the types of quantitative data.
- c) Discuss the role of ethics in research.
- d) Explain the importance of internet in research.

Q.5 Attempt any two of the following:

12

- a) Explain the Strassen's algorithm for matrix multiplication.
- b) State and explain the applications of dynamic programming.
- c) What is the RSA public-key cryptosystem? Explain in brief.
- d) How to conduct a Literature review?