# MCA-12/M.Sc.IT-12

## **Design and Analysis of Algorithm**

Master of Computer Application/Master of Science in Information Technology (MCA/M.Sc.IT-11/12/16/17)

Third Semester, Examination, 2018

#### Time : 3 Hours

### Max. Marks: 80

Note: This paper is of eighty (80) marks containing three (03) Sections A, B and C. Learners are required to attempt the questions contained in these Sections according to the detailed instructions given therein.

## Section-A

## (Long Answer Type Questions)

- **Note :** Section 'A' contains five (05) long answer type questions of nineteen (19) marks each. Learners are required to answer *two* (02) questions only.
- 1. Explain 8-Queens Problem.
- 2. Suggest an approximation algorithm for travelling sales person problems using Minimum spanning tree algorithm. Assume that the cost function satisfies the triangle inequality.

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- 3. Write an algorithm for quick sort. Explain with an example and show the analysis for the algorithm.
- 4. Write and explain 0/1 Knapsack problem.
- 5. Write short notes on the following :
  - (a) NP-Hard
  - (b) NP-Complete
  - (c) Big-O Notation
  - (d) Theta Notation

#### Section-B

#### (Short Answer Type Questions)

- **Note :** Section 'B' contains eight (08) short answer type questions of eight (08) marks each. Learners are required to answer *four* (04) questions only.
- 1. Write an algorithm for merge sort.
- 2. Write and explain Cook's theorem.
- 3. Explain a sorting algorithm that use divide and conquer method.
- 4. Write and explain flow shop scheduling.
- 5. Explain any *one* branch and bound technique.
- 6. Write the Kruskal's algorithm for minimum spanning tree.
- 7. Why worst case analysis of algorithms is most important than average case analysis ?
- 8. Explain the characteristics of a problem that can be solved efficiently using dynamic programming technique.

#### Section-C

## (Objective Type Questions)

- **Note :** Section 'C' contains ten (10) objective type questions of one (01) mark each. All the questions of this Section are compulsory.
- 1. Kruskal algorithm is a :
  - (a) Asymptotically loose
  - (b) Same as big oh
  - (c) Asymptotically tight
  - (d) None of these
- 2. We employ dynamic programming approach when :
  - (a) It gives optimal solution
  - (b) The solution has optimal substructure
  - (c) It is faster than Greedy technique
  - (d) The given problem can be reduced to the 3-SAT problem.
- 3. A problem is said to be NP-Complete :
  - (a) If it as 'hard' a any problem in NP
  - (b) A non-polynomial time algorithm has been discovered
  - (c) A polynomial time algorithm can exist but needs a parallel computer
  - (d) There is Greedy solution to the problem
- 4. O-notation provides an asymptotic :
  - (a) upper bound
  - (b) light bound
  - (c) lower bound
  - (d) None of these

- 5. The complexity of Binary search algorithm is :
  - (a) O(n)
  - (b) O(log)
  - (c)  $O(n^2)$
  - (d)  $O(n \log n)$
- 6. Which algorithm has the best worst-case performance ?
  - (a) Quick sort
  - (b) Insertion sort
  - (c) Merge sort
  - (d) Selection sort
  - (e) Bubble sort
- 7. Quick sort is a fastest algorithm.
  - (a) True
  - (b) False
- 8. Time Complexity is related with the storage capacity used by algorithm.
  - (a) True
  - (b) False
- 9. The complexity of merge sort algorithm is :
  - (a) **O**(n)
  - (b)  $O(\log n)$
  - (c)  $O(n^2)$
  - (d)  $O(n \log n)$
- 10. Which of the following case does not exist in complexity theory ?
  - (a) Best case
  - (b) Worst case
  - (c) Average case
  - (d) Null case

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