

[41/A-42]

SEAT No. _____

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SARDAR PATEL UNIVERSITY
Master of Computer Applications (MCA)
Semester – III External Examinations
PS03CMCA23 – Analysis and Design of Algorithms
11th April, 2019, Thursday

Time: 02:00 p.m. to 05:00 p.m.

Max Marks: 70

Q1. Choose the most appropriate option for each question.

[8]

- i. As per pseudo code convention of algorithms, comment begins with ____
(A) / (C) //
(B) * (D) None of these
- ii. Which of the following can be used with Find operations efficiently?
(A) Merge Rule (C) Collapsing Rule
(B) Search Rule (D) None of these
- iii. The data structure that supports the operation of search min (or max), insert and delete min (or max) is called a _____.
(A) Priority Queue (C) Both (A) & (B)
(B) Heap (D) None of these
- iv. Optimal Storage on Tapes problem fits into _____.
(A) Subset Paradigm (C) Ordering Paradigm
(B) Sorting Paradigm (D) All of these
- v. Tree organizations which are problem instance independent are called _____.
(A) Dynamic trees (C) Both (A) & (B)
(B) Static trees (D) None of these
- vi. _____ is a generated node which is not to be expanded further.
(A) Live node (C) Dead node
(B) E-node (D) None of these
- vii. _____ are those problem states s for which the path from the root to s defines tuple in the solution space.
(A) Solution states (C) Both (A) & (B)
(B) Answer states (D) None of these
- viii. _____ are rules that do not restrict each x_i to take on values only from a given set.
(A) Implicit constraints (C) Both (A) & (B)
(B) Explicit constraints (D) None of these

Q2. Answer the following questions (Any Seven):

[14]

- a. Compare Heapify and Insert.
- b. What is time complexity?
- c. Prove: $3n + 2 = \Theta(n)$
- d. What is main idea of greedy methods?
- e. What is Knapsack problem?

①

(P.T.O.)

- f. Explain principal of optimality with an example.
- g. Define: Sum of subset. Give an example
- h. What is Optimal binary Search Tree?
- i. Explain Hamiltonian cycle.

Q3. Answer the following questions:

- a. Explain the term algorithm. write a note on recursive algorithms. [6]
- b. Explain the concept of trees. Explain the method of representing binary tree as an array. [6]

OR

- b. Write Heapify algorithm. [6]

Q4. Answer the following questions:

- a. Explain the measures on the basis of which one can decide which object to be selected next in knapsack problem. [6]
- b. Discuss the Prim's method for finding the minimum cost spanning tree. Also show proper example. [6]

OR

- b. Explain single source shortest path problem by giving suitable example. [6]

Q5. Answer the following questions:

- a. Write algorithm of graph coloring problem. Explain it taking suitable example. [6]
- b. Write algorithm of n-queens problem. Explain it taking suitable example. [6]

OR

- b. Write an algorithm of multistage graph problem (Forward approach). Explain it taking suitable example. [6]

Q6. Answer the following questions:

- a. Explain Least Cost search in detail taking suitable examples. [6]
- b. Explain the 15-puzzle problem taking example of BFS approach. [6]

OR

- b. Consider the travelling salesperson instance defined by the following cost matrix: [6]

$$\begin{pmatrix} \infty & 5 & 1 \\ 8 & \infty & 2 \\ 9 & 1 & \infty \end{pmatrix}$$

- (i) Obtain the reduced cost matrix.
- (ii) Generate its state space tree using Least Cost Branch-and-Bound.

