

**Avinashilingam Institute for Home Science and Higher Education for Women
(Deemed to be University), Colmbatore-641 043**

**Master's Degree Examination – November 2018
I Semester**

**Class : I PG
Major : Computer Science**

**Time: 3 hours
Max. Marks: 60**

17MCSC05 - Advanced Data Structures and Analysis of Algorithms

Part A

10 x 1/2 = 5

Choose the correct answer

- Two main measures for the efficiency of algorithms are
 - Time and Space
 - Processor and Memory
 - Complexity and Capacity
 - Data and Space
- Which of the following method is computing total cost of an algorithm in amortized analysis?
 - Accounting Method
 - Aggregate Method
 - Potential Method
 - Latent Method
- If the elements "A", "B", "C" and "D" are placed in a queue and are deleted one at a time, in what order will they be removed?
 - DCBA
 - DCAB
 - ABCD
 - ABDC
- B+ Trees are preferred to binary trees in databases because
 - Disk capacities are greater than memory capacities
 - Disks are more reliable than memory
 - Disk data transfer rates are much less than memory data transfer rates
 - Disk access is much slower than memory access
- A complete graph can have _____.
 - $n^{(n-2)}$ spanning trees
 - n^2 spanning trees
 - $n^{(n+1)}$ spanning trees
 - n^n spanning trees
- In BFS, how many times a node is visited?
 - Once
 - equivalent to number of indegree of the node
 - Twice
 - Thrice
- In a max-heap, element with the greatest key is always in the _____.
 - Leaf node
 - First node of left sub tree
 - Root node
 - First node of right sub tree
- The physical location of a record determined by a formula that transforms a file key into a record location is _____.
 - B-Tree
 - Indexed file
 - Sequential file
 - Hashed file
- In Divide and Conquer process, breaking problem into smaller sub-problems is responsibility of _____.
 - Divide / Break
 - Sorting / Divide
 - Conquer / Solve
 - Merge / Combine
- Assuming $P \neq NP$, which of the following is true?
 - $NP\text{-complete} = NP$
 - $NP\text{-complete} \cap P = \phi$
 - $NP\text{-hard} = NP$
 - $P = NP\text{-complete}$

Part B

5 x 4 = 20

Answer ALL questions

Each answer should not exceed 200 words or one page

- 11.a. Explain in brief the performance analysis of programs.
(Or)
- 11.b. Illustrate the Omega (Ω) and Theta (θ) notations with examples.
- 12.a. Cite with suitable examples the priority queue operations.
(Or)
- 12.b. Comment on AVL trees with examples.
- 13.a. Compose an adjacent list to represent a Graph.
(Or)
- 13.b. Assess the applications of depth-first search.
- 14.a. Write a code in C to implement quick sort.
(Or)
- 14.b. Define file. Describe the direct sequential file organization.
- 15.a. Give an account on dynamic programming.
(Or)
- 15.b. "Class NP has problems with polynomial-time solutions" – Substantiate.

Part C

5 x 7 = 35

Answer ALL questions

Each answer should not exceed 600 words or three pages

- 16.a. Compare and contrast best and worst case complexities.
(Or)
- 16.b. Analyze the control structures of algorithms.
- 17.a. Discuss the various operations performed on stack.
(Or)
- 17.b. Illustrate the traversals on a binary tree with example.
- 18.a. Apply Dijkstra's algorithm to solve shortest path problem.
(Or)
- 18.b. Solve network flow problem using a simple maximum-flow algorithm.
- 19.a. Sort the sequence 4, 3, 2, 10, 12, 1, 5, 6 using insertion sort.
(Or)
- 19.b. Discuss the models of external sorting algorithms.
- 20.a. Write a program to implement file compression using Huffman's algorithm.
(Or)
- 20.b. Describe the models of parallel algorithm.
