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Question Paper Code : 83108

M.E./M.Tech. DEGREE EXAMINATION, JANUARY 2014.

First Semester

Computer Science and Engineering

CP 7102 – ADVANCED DATA STRUCTURES AND ALGORITHMS

(Common to M.E. Software Engineering, M.E. Computer Science and Engineering (with specialization in networks), M.E. Biometrics and cyber security and M.Tech. Information Technology and M.E. Multimedia Technology)

(Regulation 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How to prove the correctness of each step and an algorithm?
2. Write down the recurrence relation for Ackermann's function.
3. What are the ingredients of Optimization problem?
4. Define local and global maximum.
5. What are the classifications made based on reductions?
6. Write down the formal definition of three models of randomized algorithms.
7. What are the properties of mutual exclusion?
8. Mention the drawbacks in Bakery lock algorithm.
9. Classify Synchronization.
10. What are different varieties of pool?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Narrate the steps to develop an iterative algorithm. (8)
(ii) Write a Pre and Post conditions, checklist and recursive algorithm for Towers of Hanoi problem. (2 + 2 + 4)

Or

- (b) (i) Write any sorting algorithm using recursion. Explain with example. (10)
(ii) What is priority Queue? While its advantages. Give an example. (6)

12. (a) Using Breadth First Search and Optimization techniques, solve the shortest path problem. (16)

Or

- (b) Discuss about Primal-Dual Hill climbing method. (16)

13. (a) Explain on how to decrease time and space in dynamic programming problems. (16)

Or

- (b) Discuss the steps needed to prove NP completeness and apply it to the 3 Coloring problem. (16)

14. (a) Write an algorithm for Filter Lock mutual exclusion protocol and show how it achieves mutual exclusion property. (16)

Or

- (b) (i) What is Linearizability? Explain with example. (8)
(ii) Is Java Supports Concurrency, Why or Why not? (8)

15. (a) (i) Would the lazy algorithm still work if we marked a node as removed simply by setting its next field to null? Why or why not? What about the lock-free algorithm? (8)

- (ii) The add() method of the lock-free algorithm never finds a marked node with the same key. Can the algorithm be modified so that it will simply insert its new added object into the existing marked node with same key if such a node exists in the list, thus saving the need to insert a new node? (8)

Or

- (b) (i) What is ABA problem? How it related with memory reclamation, Show the steps in the process of memory reclamation using diagram and algorithm? (2 + 3 + 5)
(ii) Perform push and pop operation in an unbounded lock free stack with the help of code. (6)