53 (CS 714) PRCO

**2013**

(December)

# PARALLEL COMPUTING

Paper : CS 714

*Full Marks : 100*

Time : Three hours

***The figures in the margin indicate full marks
for the questions.***

*Answer any five questions.*

1. *(a)* With diagram discuss about Flynn's classification. 15

   *(b)* Derive Amdhal's law for parallel computing. 5

2. *(a)* Write CREW PRAM algorithm for performing prefix sums. 10

   *(b)* Apply prefix sum algorithm for the following array

   | 2 | 4 | 6 | 1 | 7 | 3 | 9 | 11 |
   |---|---|---|---|---|---|---|----|

   State the complexity of the prefix sum algorithm. 10

3. *(a)* Write PRAM algorithm for merging two sorted arrays of $n/2$ elements into a single sorted array of $n$ elements.      10

   *(b)* Apply your merging algorithm for the following two arrays and store the result in an array $C$.

   A (first Array)          B (second Array)

   | 1 | 3 | 5 |      | 2 | 4 | 6 |

                                                    10

4. *(a)* Define diameter and bisection width of a network.      5

   *(b)* Draw the diagram of a 2D mesh network without wraparound and find the diameter and bisection width of that network.   5+5

   *(c)* Briefly discuss on shuffle-exchange network.
                                                    5

5. *(a)* Define the terms

      *(i)* embedding of a graph

      *(ii)* dialation

      *(iii)* load                    1+2+2

(b) With a diagram prove that a complete binary tree of height greater than 4 cannot be embedded in a 2D mesh without increasing the dialation beyond 1. Discuss about the mathematical proof for the above problem.

7+3

(c) Show the mapping of a binomial tree into 2D mesh.

5

6. (a) Briefly discuss about the different load balancing algorithms.

10

(b) With an example discuss about bitonic merge sort using shuffle exchange network.

10

7. Briefly discuss on :

10+10

(a) parallel quicksort with example

(b) parallel BFS and parallel DFS with example.

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