Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech(CSE)/SEM-7/CS-704C/2010-11

2010-11

PARALLEL PROGRAMMING

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 × 1 = 10

   i) Amdahl's law is about

      a) lower limit on speed up

      b) upper limit on speed up

      c) uncertainty limit on speed up

      d) none of these.

   ii) Super computer can solve

      a) all high computation problems in a very high speed

      b) all NP complete problems in polynomial time

      c) all NP hard problems in polynomial time

      d) all of these.

iii) Which of the following is not a synchronizing technique ?

a) Barrier b) Exclude directive

c) Spin lock d) Critical directive.

iv) Which of the following is a language that supports parallel programming ?

a) C++ b) C#

c) C* d) None of these.

v) Most effective Gaussian elimination algorithm can be computed in a SIMD machine with n processing element in ..... time complexity.

a) $O(n^3)$ b) $O(n^2 \log n)$

c) $O(n^2)$ d) $O(n \log n)$.

vi) Matrix multiplication in hyper cube network takes time of

a) $O(n^2)$ b) $O(n \log n)$

c) $O(n)$ d) $O(\log n)$.

vii) Pipelining is an example of

a) data parallelism b) fixed stage parallelism

c) control parallelism d) no parallelism.

viii) Which of the following is true data dependency ?

a) Loop carried dependency

b) Forward dependency

c) Backward dependency

d) All of these.

ix) Which of the following is a cost optimal algorithmn ?

a) Biotonic sort in n processor

b) Matrix multiplication in hypercube

c) Matrix multiplication in 2d mesh

d) None of these.

x) Which of the PRAM algorithm can be modified to traverse a tree ?

a) Sum b) Vector multiplication

c) Suffix sum d) Prefix sum.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Explain block matrix multiplication with an example.

3. What is cost of an algorithm ? State Brent's law.

4. What is loop carried dependency ? Explain with example.

5. Compare data parallelism and pipelining.

6. Explain the cache coherence problem.

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. Write a PRAM algorithm to solve the graph colouring problem. Explain with an example.

8. Write a parallel algorithm to solve Gaussian elimination. Calculate time complexity, speed up and the cost of the algorithm. 9 + 6

9. Draw and describe the hypertree structure for SIMD interconnection network. What is degree and bisection width of this network ?

   What is a better interconnection network in respect of degree, diameter and bisection width ? Explain. 5 + 4 + 6

10. Write a parallel algorithm to sort an array using odd even transposition sort. Explain with example. What kind of interconnection network would give you best result for this algorithm ? 7 + 7 + 1

11. Write short notes on any *three* of the following : 3 × 5

    a) Load balancing

    b) PRAM computational model

    c) Barrier synchronization

    d) Data flow dependency

    e) Fortran 90.