

Name :
Roll No. :
Invigilator's Signature :

CS/B.TECH(CSE)/SEM-7/CS-704C/2011-12

2011

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 : $10 \times 1 = 10$
 - i) NUMA is a kind of
 - a) SISD
 - b) MISD
 - c) SIMD
 - d) MIMD.
 - ii) In which kind of processor architecture degree is fixed ?
 - a) Hypercube
 - b) 2D-mesh
 - c) Pyramid
 - d) Hyper-tree.
 - iii) Matrix multiplication in hypercube network takes time of
 - a) $O(n^2)$
 - b) $O(n \log n)$
 - c) $O(n)$
 - d) $O(\log n)$.
 - iv) Which of the following is not a synchronizing technique ?
 - a) Barrier
 - b) Exclude directive
 - c) Spin lock
 - d) Critical directive.



- v) Omega network is the other name of
- Shuffle-exchange network
 - Butterfly network
 - Hyper-tree network
 - De Bruijn's network.
- vi) Which of the following is a biotonic sequence ?

a)

1	4	3	7	8	3	6	4
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b)

1	2	3	4	5	6	7	8
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c)

3	4	5	6	4	5	4	3
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d)

4	7	1	8	2	6	9	3
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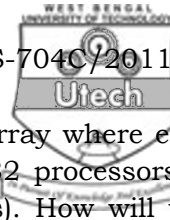
- vii) Which one of the following is a true data dependency ?
- Flow data dependence
 - Anti-data dependence
 - Conditional dependence
 - Output data dependence.

viii)

```
for( i=0; i<100; i++ )
    for( j=0; j<100; j++ )
    {
        a[i][i] = b[i][j];
    }
```

This block has

- good spatial and temporal locality
- good spatial but bad temporal locality
- good temporal but bad spatial locality
- none of these.



- ix) You have a 1024 number of integers' array where each integer occupies two bytes. You have 32 processors in hand each having L2 cache (128 bytes). How will you interleave the array ?
- a) In single integer slices b) In 64 integer slices
c) In 128 integer slices d) In 32 integer slices.
- x) Which of the following statements is true ?
- a) Coarse granularity implies tight coupling.
b) Granularity has no relation with coupling.
c) Fine granularity implies tight coupling.
d) Find granularity implies loose coupling.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Write down the differences between processor array and multiprocessor.
3. State Amdahl's law. Comment on super linear speed up.
4. Why is synchronization required ? What do you mean by barrier synchronization ?
5. What do you mean by cache coherence ? What is false sharing ?
6. What is cost and speed up ? What do you think it more and important factor in Parallel Programming and why ?

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Explain the PRAM model for Parallel Programming.
b) What is the classification of PRAM model ? $9 + 6$
8. Write down the matrix multiplication algorithm in a 2D mesh. Explain with an example. Calculate the time complexity. $8 + 7$



9. Write a PRAM algorithm to calculate prefix sum of n integers. Write down which type of classification you are working with and justify your answer.
10. a) What do you mean by loop carried dependency ?
b) Draw the dependency graph of the following loop :

```
for ( i=0, i<200; i++ )  
    a [i]=a[i]+a[200-i];
```


c) How can the loop carried dependency you found above, be taken care of ?
11. Write short notes on any *three* of the following :
- a) FLYNN's taxonomy
 - b) Biotonic sequence
 - c) Cache coherence management
 - d) Discrete event time simulation
 - e) Superscalar architecture.

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