Seat No.: _____ Enrolment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013

Subject code: 2715106 **Date: 08-01-2014**

Subject Name: Parallel Programming

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all question.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right hand indicate the marks.**

Q. No. 1

a. Describe the four phases of microprocessor design which are mainly driven by the internal use of parallelism. [7 Marks]

b. Explain the memory organization of parallel computers with diagram. [7 Marks]

Q. No. 2

a. Describe the four different categories of parallel computers classified by Flynn's taxonomy. [7 Marks]

b. Explain the different architecture of Multi-core processors with diagram. [7 Marks]

OR

b. Expalin Loop level parallelism with for , forall, dopar loops with an example. [7 Marks]

Q. No. 3

a. Consider the following two loops:

```
for (i=0 : n-1)          forall (i=0 : n-1)
a(i) = b(i) +1;          a(i) = b(i) + 1;
c(i) = a(i) +2;          c(i) = a(i) + 2;
d(i) = c(i+1)+1;         d(i) = c(i+1) + 1;
endfor                   endforall
```

Do these loops perform the same computations? Explain your answer. [8 Marks]

b. Explain in detail about parallelization and the steps involved in it with diagram. [6 Marks]

OR

Q. No. 3

a. Describe the four basic types of Parallel Processing Models depending upon their level of abstraction. [8 Marks]

b. Describe the various Explicit and Implicit representation of parallelism. [6 Marks]

Q. No. 4

a. Describe the different types of data dependencies that can exist between the instructions of a program. Illustrate with data dependency graph. [7 Marks]

b. Describe the Grid architecture. [7 Marks]

OR

Q. No. 4

a. Explain the various parallel programming patterns for threads. [7 Marks]

b. Explain parallel vector-matrix multiplication of linear combination. [7 Marks]

Q. No. 5

a. Explain the various synchronization methods used for shared variables. [7 Marks]

b. Derive the formulae for performance of Processors with a Memory Hierarchy. [7 Marks]

OR

Q. No. 5

a. Explain blocking and non-blocking MPI send and receive operations with corresponding functions. [8 Marks]

b. Name the four services that must be running on Head Node before you can go for installation of compute nodes in ROCKS. [6 Marks]

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