Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER-1 (NEW) EXAMINATION – WINTER 2016

Subject Code: 3715106 **Date:07/01/2017**

Subject Name: Parallel Programming

Time: 2:30 pm to 5:00 pm **Total Marks: 70**

Instructions:

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

Q.1 (a) **07**

(i) Suppose a parallel version of a sequential program with time complexity $\theta(n^2)$,where n is the size of the dataset. Assume the time needed to input the dataset and output the result is (1800+n) μsec. This constitutes the sequential portion of the program. The computational portion of the program can be executed in parallel; it has execution time $(n^2/100)$ μsec. What is the maximum speedup achievable by this parallel program on a problem of size 10000? **04**

(ii) What is the limitation of Amdahl's law? **03**

(b) What is race condition? Explain with example. **07**

Q.2 (a) **07**

(i) How granularity of parallelism is determined? Which kind of granularity is used in following? **04**

a. Hardware platforms with low latency
b. Platforms that implement higher latency communication
c. Message passing programs

(ii) What kind of synchronization is found in shared memory programs? **03**

(b) Explain Bit level parallelism. **07**

OR

(b) **07**

```
for i←0 to 99 do
 a[i]←b[i]+c[i]
endfor
```

What kind of parallelism can be followed with above loop? Also explain other types of parallelism.

Q.3 (a) Describe the classes of parallel computers. **07**

(b) Show the architecture of centralized multiprocessor. What is symmetric multiprocessor? **07**

OR

Q.3 (a) What is cluster computing? How parallel computing is done in cluster computing? **07**

(b) What is Distributed computing? Justify "Distributed computing involves parallel computing". **07**

Q.4 (a) **07**

(i) What are the benefits of multiple computers/processors? Justify "Internet and world wide web has spawned a new area for parallel computers" **04**

(ii) For what purpose efficiency is measured? How efficiency is measured? **03**

(b) What is massive parallel processing? **07**

OR

Q.4 **(a)** **07**

(i) Explain Gustafson's law. **04**

(ii) Explain the speed up factor. **03**

(b) Define dependence. Explain three kinds of Data Dependence. **07**

Q.5 **(a)** Describe a parallel computation whose speed up does not increase with increasing problem size. **07**

(b) What are the performance matrix in case of parallel computing? **07**

OR

Q.5 **(a)** Describe how the pair wise summation computation can be changed to find the maximum element of an array? **07**

Pairwise sum:

1. t[0] = x[0] + x[1];
2. t[1] = x[2] + x[3];
3. t[2] = x[4] + x[5];
4. t[3] = x[6] + x[7];
5. t[4] = t[0] + t[1];
6. t[5] = t[2] + t[3];
7. sum=t[4]+t[5];

(b) Explain the interconnection networks. **07**

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