Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VI SEMESTER B.TECH (COMPUTER SCIENCE AND ENGINEERING)

MAKEUP EXAMINATIONS, MAY/JUNE 2017

SUBJECT: PARALLEL COMPUTER ARCHITECTURE AND PROGRAMMING [CSE 3202]

REVISED CREDIT SYSTEM

Time: 3 Hours **17-06-2017** MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** questions.
- Missing data, if any, may be suitably assumed.

1A. Explain with the help of diagram CUDA capable GPU Architecture. **3M**

1B. Explain Fixed Function GPU pipeline with help of a diagram. **3M**

1C. List PVM functions for process management. How do you run a PVM application? How do you program an application? **4M**

2A. List and explain different built in MPI reduction operators. **3M**

2B. Write a parallel MPI program using collective communication routine to multiply two 8x8 Matrices. **4M**

2C. With the help of an example program explain how error handling is performed in MPI. **3M**

3A. Write an OpenCL kernel code which converts input matrix A into output matrix B as follows: consider elements of matrix A into 4 equal parts. First part elements should be incremented by 1, Second part elements should be incremented by 2, Third part elements should be incremented by 3 and last part elements should be incremented by 4.

i. Use element number of threads

ii. Use only four threads.

Example: Input : N=4

Matrix A				Matrix B				
3	**8**	2	5	**4**	**9**	4	7	
2	**3**	5	6	**3**	**4**	7	8	
2	4	3	1	5	7	7	5	
3	2	1	5	6	5	5	9	**5M**

3B. What are advantages and disadvantages of simultaneous multithreading? **3M**

3C. Depict different possibilities of the memory, scope and lifetime of a variable declaration in CUDA. **2M**

4A. Write an OpenCL host code starting from creation of device buffer which performs merge sort in parallel. **5M**

4B. Write an OpenCL kernel code which performs merge sort in parallel. **5M**

5A. How do you handle errors in CUDA? How do you find the execution time of kernel in CUDA? Give an example program. **5M**

5B. Write a parallel program in CUDA to multiply two Matrices A and B of dimensions MxN and NxP resulting in Matrix C of dimension MxP. Create M number of threads, and each row of the resultant matrix is to be computed by one thread. **5M**