MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL

(A constituent institution of MAHE, Manipal)

VI SEMESTER B.TECH COMPUTER SCIENCE & ENGG.
MAKEUP EXAMINATIONS, JUN 2018
SUBJECT : PARALLEL COMPUTER ARCHITECTURE AND PROGRAMMING(CSE 3202)
REVISED CREDIT SYSTEM
DATE: 18-06-2018

TIME:03 HOURS   MAX.MARKS : 50

Instructions to Candidates:

- Answer **ALL** questions.

- Missing data, if any, may be suitably assumed.

1A. Explain the reasons for performance gap between CPUs and GPUs. Show the gap with a diagram.   **3M**

1B. Explain Graphics pipeline with a diagram.   **3M**

1C. Explain the following MPI functions with syntax and example.   **4M**

   i. MPI_Reduce
   ii. MPI_Scatter
   iii. MPI_AllGather
   iv. MPI_Scan

2A. Write an MPI parallel program to calculate the value of PI. Assuming correct value of PI as $\frac{22}{7}$, determine the error in calculation.   **4M**

2B. Explain the various models in OpenCL specification with a corresponding function for each.   **4M**

2C. Explain events in OpenCL with an example. List any two function calls when events are generated.   **2M**

3A. Explain Very Large Instruction Word(VLIW) architecture with an example.   **3M**

3B. Write an OpenCL kernel for sorting a set of n strings of equal length using selection sort. Write the index space size and work group size for this program.   **4M**

3C. Write an OpenCL kernel for multiplying two matrices A and B of size M×N and N×P. Each row of A has to be multiplied by a separate work item.   **3M**

4A. Write an OpenCL kernel for generating the following pyramid. Accept the number of rows from the user. Assume number of rows less than or equal to 5. Each row of output should be generated entirely by a separate work item. **3M**

```
            1
          2 3 2
        3 4 5 4 3
      4 5 6 7 6 5 4
    5 6 7 8 9 8 7 6 5
```

4B. Explain cudaMemcpy() and cudaMalloc() functions. **4M**

4C. Consider an array of 100 integer elements. A Stencil program will find the sum of three previous elements, current element and next three elements at each location of the array. If there are no previous elements or next elements, then it can be assumed as zero. Write a CUDA program for calculating stencil sum. **3M**

5A. Explain CUDA device memory model with a diagram. **4M**

5B. What are the differences between PVM and MPI? Explain the architecture of PVM with a diagram. **3M**

5C. Explain any four PVM functions with syntax. **3M**

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