MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

V SEMESTER B.TECH. AIML

End semester Exam

SUBJECT: PARALLEL COMPUTER ARCHITECTURE AND PROGRAMMING
(CSE 3174)

Time: 2:30 to 5:30 Date: 06-12-2023 MAX.MARKS:50

Note:

1. Missing data may be assumed suitably.

Q.No	Questions	Marks	CO /CLO	AHEP LO	Blooms Taxonomy level
1A	Solve the given scenario considering data parallelism. Let 2000 candidates appear for an examination. There are 5 questions in each answer script and one teacher will evaluate every question in 10 minutes. Let time to create one subset of job is 2 minutes. If books are distributed equally to 5 teachers and all teachers work simultaneously, then what is the time taken to correct 2000 papers in data parallel processing? Also calculate the speedup and efficiency achieved. What are the advantages of data parallelism?	5	1	1,3	4
1B	Explain array processor with neat diagram. Mention which Flynn's classification it belongs to and also draw the architecture of that classification.	3	1	1,3	2
1C	Discuss bench marking a parallel program performance with the help of MPI code snippet.	2	2	3	2
2A	Design an OpenCL kernel that takes a string ***S*** and an integer variable ***Count***. The resultant string ***RS*** is generated by producing ***S*** string in parallel ***Count*** number of times as shown below. Each thread is responsible for producing string S once. Eg : Input String ***S***: PcAp ***Count*** : 3 Output String ***RS*** : PcApPcApPcAp Write all the statements in the host that are associated with buffer for the above kernel. What is the global work size for the above kernel? Assume the *context, command_queue* objects are already created.	5	3	1,5	6
2B	Discuss the architecture of a modern GPU with diagram.	3	3	1,5	2

2C	Discuss **Context** with respect to OpenCL programming by mentioning its task.	2	3	1,5	2
3A	Design a CUDA program that takes an input string PCAP and coverts it into P**C**CAAA**PPPP** in parallel using four threads. write host and kernel code	5	4	2,3	6
3B	Solve the following scenario with respect to OpenCL. A programmer wants to write an OpenCL program and he/she is **unaware** of the platforms available in the system. Help him/her to write all the OpenCL API calls with their arguments before the command queue creation in the host side.	3	3	1,5	4
3C	Discuss the OpenCL specification models.	2	3	1,5	2
4A	Design a CUDA kernel that implements tiled matrix multiplication. How many phases it will take for the kernel if width of the matrix is 32 and tile width is 8?	5	5	2,3,5	6
4B	Illustrate how data is transferred from host to device in CUDA.	3	4	2,3	3
4C	Compute the number of multiplication operations in a 1D convolution operation if array size is 15 and convolution mask size is 5. How many additions will be performed?	2	5	2,3,5	4
5A	Design a CUDA kernel code for performing the merge sort. Write all the device functions required for the kernel	5	5	2,3,5	6
5B	Illustrate how CNN is designed as matrix multiplication	3	5	2,3,5	3
5C	Compare different CUDA memory types	2	4	2,3,5	4

Abbreviations:

M – Marks

CO/CLO– Course Outcome (NBA)/Course Learning Outcome (IET).

CLO – Course Learning Outcome as per AHEP 4

BT - Blooms Taxonomy Level