Lesson Plan

L No	Topics	Course Outcome Addressed
1	INTRODUCTION TO PARALLEL ARCHITECTURES: Introduction to Parallel processing, Parallel Computer Structures: Pipeline Computers	CO1
2	Array Computers, Multiprocessor Systems	CO1
3	Tutorial 1 on Parallel Computer Structures	CO1
4	Architectural Classification Schemes: Multiplicity of Instruction-Data streams	CO1
5	Introduction, GPUs as parallel computers, Architecture of a modern GPU, Need for parallelism, Parallel programming languages and models	CO1
6	Tutorial 2 on GPU Architecture	CO1
7	MESSAGE PASSING PROGRAMMING: Introduction, Message passing model, MPI basic data types and functions	CO2
8	Point-to-point communication- MPI_Send, MPI_Recv, MPI_Ssend, MPI_Bsend	CO2
9	Tutorial 3 on MPI programs using point to point communication	CO2
10	Collective communication- MPI_Bcast, MPI_Scatter, MPI_Gather, MPI_Reduce, MPI_Allgather, MPI_Alltoall, MPI_Scan	CO2
11	Benchmarking parallel performance, MPI error handling functions	CO2
12	Tutorial 4 MPI programs using Collective communication	CO2
13	OpenCL ARCHITECTURE : Introduction, OpenCL standard, OpenCL specification, Kernels and openCL execution model, Platform and Devices	CO3
14	Execution Environment- Context, Command Queues, Buffers	CO3
15	Tutorial 5 on OpenCL functions for vector-vector addition	CO3
16	Program Object and Kernel Object, Program layout, Memory model, Writing Kernels	CO3
17	OpenCL PROGRAMMING : OpenCL APIs, OpenCL program for Selection Sorting	CO3
18	Tutorial 6 on OpenCL programs for string handling	CO3
19	INTRODUCTION TO CUDA AND COMPUTATIONAL PATTERNS: Introduction, Data Parallelism, CUDA Program Structure	CO4
20	Device memories and Data transfer	CO4
21	Tutorial 7 on CUDA programs : Vector-Vector Addition	CO4
22	Kernel functions and Threads, Runtime APIs	CO4
23	Atomic and Arithmetic functions, Error Handling	CO4
24	Tutorial 8 on CUDA programs 1D Sequential and Parallel Convolution, 2D Convolution	CO4
25	Matrix-Matrix Multiplication	CO4
26	CUDA THREADS AND MEMORY ORGANIZATION: Introduction, CUDA Thread Organization	CO5
27	CUDA Thread Organization	CO5
28	Tutorial 9 on CUDA programs :Sequential Sparse – Matrix vector multiplication, Parallel SPVM using CSR	CO5
29	Synchronization and transparent scalability, strategy for reducing global memory traffic	CO5

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30	Tutorial 10 on CUDA programs on parallel scan algorithm	CO5
31	Constant Memory and caching	CO5
32	Tiled 1D Convolution with halo elements	CO5
33	Tutorial 11 on CUDA programs using constant memory and Tiled 1D convolution	CO5
34	A tiled matrix-matrix multiplication kernel	CO5
35	Parallel image processing concepts	CO5
36	Tutorial 12 on CUDA programs on parallel image processing	CO5