



SRI KRISHNA INSTITUTE OF TECHNOLOGY

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#29, Chimney Hills, Hesaraghatta Main Road, Chikkabanavara Post, Bangalore- 560090

Department of Computer Science and Engineering

Subject Name: Parallel Computing

SEM : 7

Faculty : Latha A

Subject Code: BCS702

DIV : A & B

Question Bank

Module-1 : Introduction to parallel programming

SL#	Question	CO	Level	Marks
1.	Define parallel programming . How does it differ from serial programming? Or Discuss the Motivating factors for Parallelism	CO1	L2	10
2.	What is the role of an interconnection network in parallel systems? With neat diagram explain the classification of interconnection networks.	CO1	L2	6
3.	Explain briefly about different classification of parallel computers according to Flynn's taxonomy. Or Distinguish between SIMD and MIMD	CO1	L3	5
4.	Discuss about different communication operations	CO1	L2	10
5.	Differentiate between shared memory MIMD and distributed memory MIMD systems with diagram	CO1	L2	5
6.	Define vector processors . List any two features. Explain the working of a SIMD system with an example of vector addition.	CO1	L2	12
7.	With an example explain What is strided memory access . Describe the role of shaders in GPU parallelism. Why are GPUs suited for large-scale data processing?	CO1	L2	5
8.	Why are GPUs considered a blend of SIMD and MIMD ?	CO1	L3	10
9.	Define UMA and NUMA systems.	CO1	L2	8
10.	Define latency and bandwidth in interconnects. Explain the concept of bisection width and bisection bandwidth with an example.	CO1	L2	10
11.	What is cache coherence ? Differentiate between snooping-based and directory-based cache coherence.	CO1	L2	10
11.	What is false sharing ? Explain briefly with an example	CO1	L2	10
12.	Define message passing . Mention two important MPI functions. Discuss how One-sided communication is better than MPI	CO1	L2	10

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13.	What is meant by an embarrassingly parallel problem ? Give an example.	CO1	L2	10
14.	Differentiate between dynamic threads and static threads .	CO1	L2	10
15.	What is a mutex ? How does it prevent race conditions?	CO1	L2	10
16.	What is meant by nondeterminism in MIMD programs?	CO1	L2	10
17.	Define race condition . Why does it occur? Explain race conditions in shared-memory programming. Write code to demonstrate how mutex avoids them.	CO1	L2	10
18.	What is the SPMD model?	CO1	L2	5
19.	Compare bus-based and crossbar-based interconnects and Describe ring and toroidal mesh topologies	CO1	L2	10
20.	What are the challenges in parallelizing a serial program ? Discuss with examples.	CO1	L2	8
21.	Discuss about Partitioned global address space languages	CO1	L2	5

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Module-2 GPU programming, Programming hybrid systems, MIMD systems, GPUs, Performance

SL#	Question	CO	Level	Marks
1.	Why do GPU programs require both host (CPU) code and device (GPU) code? Describe how memory transfers between CPU and GPU affect program performance.	CO2	L2	10
2.	Explain why branching within SIMD groups leads to poor efficiency.	CO2	L2	6
3.	Differentiate between global memory and processor-local memory in GPUs.	CO2	L3	6
4.	What role does the GPU hardware scheduler play in hiding memory latency?	CO2	L3	8
5.	Why is stdout output from GPU threads considered nondeterministic?	CO2	L2	5
6.	Why is efficiency ($E = S/p$) not a common performance metric for GPUs? How does Amdahl's Law apply to GPU programs where part of the code still runs on the CPU?	CO2	L3	10
7.	Discuss the similarities and differences between MIMD scalability and GPU scalability .	CO2	L3	8
8.	Why is wall clock time preferred over CPU time in performance measurement of GPU programs?	CO2	L2	6
9.	Consider a GPU program where 10% of the execution is serial (on CPU) and the rest is parallelizable. (a) According to Amdahl's Law, what is the maximum speedup possible? (b) If the serial time is 5 seconds and the parallel portion takes 20 seconds serially, how long will it take on 40 GPU cores?	CO2	L3	8
10.	A GPU program shows the following times: Serial runtime on CPU: 100 ms , GPU kernel runtime: 8 ms and Memory transfer (CPU ↔ GPU): 12 ms . Calculate the overall speedup compared to CPU-only execution.	CO2	L3	8
11.	A parallel program has Tserial = 24 ms , p = 8 , Tparallel = 4 ms . (a) Calculate speedup (S). (b) Calculate efficiency (E). (c) How much of the time is spent on parallel overhead?	CO2	L2	8

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12.	Discuss in detail how heterogeneous programming is implemented in GPU programming, with emphasis on the roles of CPU and GPU.	CO2	L3	9
13.	Describe the challenges of I/O handling in parallel and GPU programming.	CO2	L3	7
14.	What is the need of measuring scalability in the MIMD system? Explain strong scalability and weak scalability with examples, and state which one applies more naturally to GPU workloads.	CO2	L3	9
15.	Explain in brief about Hybrid Programming Model.	CO2	L2	8
16.	List and explain performance metrics for parallel systems with examples to each			
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Module-3 Distributed memory programming with MPI

SL#	Question	CO	Level	Marks
1.	Differentiate between Shared memory model and Distributed Memory model with an illustration	CO3	L2	8
2.	Explain Distributed Memory System with a neat diagram.	CO3	L2	6
3.	Define MPI and explain about its communicators	CO3	L2	6
4.	Explain about MPI_Send() and MPI_Receive() communication functions.	CO3	L2	5
5.		CO3	L2	5
6.		CO3	L3	14
7.		CO3	L3	12
8.		CO3	L2	3
9.		CO3	L3	10
10.		CO3	L3	12
11		CO3	L2	10
12		CO3	L2	6
13		CO3	L2	10
14		CO3	L2	10

Module-4 Shared-memory programming with OpenMP

SL#	Question	CO	Level	Marks
1.		CO4	L2	10
2.		CO4	L2	10
3.		CO4	L2	10
4.		CO4	L2	10
5.		CO4	L2	10

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6.		CO4	L3	10
7.		CO4	L3	12
8.		CO4	L2	10

Module-5 GPU programming with CUDA

SL#	Question	CO	Level	Marks
1.		CO5	L2	10
2.		CO5	L2	10
3.		CO5	L2	10
4.		CO5	L2	10
5.		CO5	L2	10
6.		CO5	L3	14
7.		CO5	L3	12