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Seventh Semester B.E./B.Tech. Degree Examination, June/July 2026

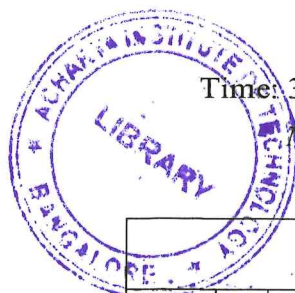
Parallel Programming

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.

2. M : Marks , L: Bloom's level , C: Course outcomes.



Module – 1			M	L	C
Q.1	a.	Define parallel programming and explain the need for parallel computing in modern systems.	6	L1	CO1
	b.	Compare SIMD and MIMD architectures with suitable diagrams.	6	L2	CO1
	c.	Explain interconnection networks and their importance in parallel systems.	8	L3	CO1
OR					
Q.2	a.	Explain hybrid programming models combining MPI and OpenMP.	6	L1	CO1
	b.	Compare shared memory and distributed memory programming models.	6	L2	CO1
	c.	Discuss synchronization and communication issues in parallel systems.	8	L3	CO1
Module – 2					
Q.3	a.	Explain GPU architecture and its role in accelerating computations.	6	L1	CO2
	b.	State and explain Amdahl's law. Calculate speed up when 60% of program is parallelized on 4 processors.	6	L2	CO2
	c.	Discuss Scalability and Performance metrics used in MIMD systems.	8	L3	CO2
OR					
Q.4	a.	Discuss various cache coherence mechanisms used in parallel systems.	6	L1	CO2
	b.	Explain distributed memory programming challenges.	6	L2	CO2
	c.	Describe the differences between GPU and traditional CPU computing.	8	L3	CO2

Module – 3					
Q.5	a.	Write and explain an MPI program to compute area using the trapezoidal rule.	8	L1	CO3
	b.	Explain MPI collective communication functions with examples.	6	L2	CO3
	c.	Discuss MPI derived datatypes and their applications.	6	L3	CO3
OR					
Q.6	a.	Demonstrate an MPI program using MPI_Scatter and MPI_Gather operations.	8	L1	CO3
	b.	Explain MPI_Reduce and MPI_Allreduce with examples.	6	L2	CO3
	c.	Describe performance evaluation parameters for MPI programs.	6	L3	CO3
Module – 4					
Q.7	a.	Illustrate the use of OpenMP directives for parallel loops.	6	L1	CO4
	b.	Explain the role of reduction clause in OpenMP with examples.	6	L2	CO4
	c.	Discuss Cache coherence issues in OpenMp and how false sharing can be avoided.	8	L3	CO4
OR					
Q.8	a.	Explain OpenMP scheduling types with examples.	6	L1	CO4
	b.	Illustrate producer-consumer problem using OpenMP.	6	L2	CO4
	c.	Explain tasking in OpenMP with suitable example.	8	L3	CO4
Module – 5					
Q.9	a.	Explain CUDA thread hierarchy threads, blocks and grids.	6	L1	CO5
	b.	Write a CUDA kernel for vector addition and explain.	6	L2	CO5
	c.	Discuss CUDA trapezoidal rule improvement for performance.	8	L3	CO5
OR					
Q.10	a.	Discuss GPU architectures and Nvidia compute capabilities.	6	L1	CO5
	b.	Explain returning results from CUDA kernels with examples.	6	L2	CO5
	c.	Describe CUDA memory hierarchy and its significance in performance tuning.	8	L3	CO5
