CBCS SCHEME

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BDS701

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.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.	What is parallel programming? With neat diagram explain the Von Neumann architecture?	06	L2	CO1
	b.	Explain the concept of multicore in shared memory systems. With the help of a neat diagram, explain the UMA and NUMA multicore shard memory systems?	10	L2	CO1
	c.	Differentiate between shared memory and distributed Memory.	04	L2	CO1
		OR			
Q.2	a.	List and explain distributed memory interconnects.	10	L2	CO1
	b.	What is cache coherence? Describe the main approaches used to ensure cache coherence.	10	L2	CO1
		Module – 2			
Q.3	a.	Explain the following terms are : i) Scalability in MIMD systems ii) Taking timings of MIMD program.	10	L2	CO2
	b.	Explain the speedup and efficiency in MIMD system? Calculate the efficiency of parallel program; when P cores = 1, 2, 4, 8, 16 and speed = 1.0, 1.9, 3.6, 6.5, 10.8	10	L2	CO2
		OR			

Q.4	a.	Discuss the difference in how a GPU and a vector processor might execute the following code:
		sum = 0.0 ;
		for (i = 0 ; i < n ; i++)
		{ y[i] t = a * x[i] ;
		sum t = z [i] * z [i] ;
		}
			10	L3	CO2

	b.	Describe the Amdahl's law in parallel programming? And calculate the overall parallel run-time and speed with serial runtime in T_{serial} = 20 seconds, the runtime of the parallelized part will be $0.9 \times T_{serial/p} = 18/p$ and the runtime of the "unparallelized" part will be $0.1 \times T_{serial} = 2$.	10	L3	CO2
		Module – 3			
Q.5	a.	With an example, explain how we can compile and execute the MPI programs? And explain the syntax and example of MPI-send and MPI – receive functions of MPI.	10	L2	CO3
	b.	Describe the trapezoidal rule in MPI and list the four basic steps of parallel program design? And explain any one briefly.	10	L3	CO3

		OR			
Q.6	**a.**	Describe the following terms: i) Communicators ii) MPI _comm _ size iii) MPI_comm _ rank iv) MPI _ init and MPI _ Finalize	**10**	**L2**	**CO3**
	b.	Write a program for MPI trapezoidal rule.	**10**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	How do you compiling and running open MP programs.	**05**	**L2**	**CO3**
	b.	What you mean by schedule clause? With neat diagram explain different scheduling visualization with 4 threads and 32 iterations.	**10**	**L3**	**CO4**
	c.	Describe the reduction clause of open Mp.	**05**	**L2**	**CO4**
		OR			
Q.8	**a.**	Describe the scope of variable in open MP?	**5**	**L2**	**CO4**
	b.	In static schedule, suppose we have 12 iterations 0, 1, ...11 and three threads, determine the iterations assigned to each thread for scheduled (static, 1) schedule (static, 2) and schedule (static, 4). And write the schedule clause.	**10**	**L3**	**CO4**
	c.	Explain the concept of Queues in producers and consumers.	**05**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Write the command to compile and run the CUDA program.	**05**	**L2**	**CO5**
	b.	Explain the threads, blocks and grids of CUDA. And write a CUDA program to print greetings from threads in multiple blocks.	**15**	**L2,3**	**CO5**
		OR			
Q.10	**a.**	Write a CUDA program to add two vectors.	**10**	**L3**	**CO5**
	b.	Explain the tree –structured sum using warp shuffle with an example.	**10**	**L2**	**CO5**

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