

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

**CLASS: BTECH
BRANCH: CSE**

**SEMESTER : VII
SESSION : MO/2025**

SUBJECT: CS439, PARALLEL COMPUTING

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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		CO	BL
Q.1(a)	Describe parallel random access machine (PRAM) model of computation using CREW, CRCW, and PRIORITY approaches.	[5] 3	3
Q.1(b)	Define the term parallel processing. Differentiate between pipelining and data parallelism with suitable example.	[5] 2	2
Q.2(a)	Write PRAM algorithm to find pre-order traversal of following data set: A, C, B, D, E, F, H, G, J, I	[5] 2	3
Q.2(b)	Describe the Mesh network, and 8-processor De-Brujn network with suitable example. Provide the advantages and disadvantages of each of these networks.	[5] 2	2
Q.3(a)	Describe the static scheduling strategies used for Uniform Memory Access (UMA) multiprocessors. Compare cyclic and block scheduling techniques with respect to load balancing and memory locality.	[5] 3	3
Q.3(b)	Differentiate between process-based and thread-based parallel programming models. Discuss the advantages and limitations of each model with suitable examples.	[5] 3	2
Q.4(a)	Derive the time complexity of sequential matrix multiplication. Then explain how parallelization can reduce computation time and what factors limit ideal speedup.	[5] 3	4
Q.4(b)	Describe in detail how a 2D processor array can be used for parallel matrix addition. Explain the data flow pattern and communication between processors.	[5] 3	3
Q.5(a)	Explain how Gaussian Elimination can be parallelized on a multiprocessor system. Discuss data dependencies, synchronization requirements, and potential bottlenecks in achieving high efficiency.	[5] 2	3
Q.5(b)	Compare Enumeration Sort, Odd-Even Transposition Sort, Bitonic Merge Sort, and Parallel QuickSort. Discuss the time complexity, processor utilization, and communication overhead of each, highlighting which is best suited for different types of parallel architectures.	[5] 3	4

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