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

CLASS: BE **SEMESTER : VII**
BRANCH: CSE **SESSION : MO/19**

SUBJECT: CS8029 PARALLEL AND DISTRIBUTED SYSTEMS

TIME: 3:00 HOURS **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
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.

Q.1(a)	Why do we need parallel computers?	[2]
Q.1(b)	Briefly discuss different types of parallelism.	[4]
Q.1(c)	Prove that a *K*-stage linear pipeline can be at most *K*-time faster than that of non-pipeline serial processor.	[6]
Q.2(a)	What do you mean by *suffix* sums problem?	[2]
Q.2(b)	Given a COMMON (CRCW) PRAM algorithm with time complexity $O(t(n))$, what is an upper bound on the time complexity of an algorithm to solve the same problem on the CREW model?	[4]
Q.2(c)	Given an array populated with mixed alphabets, propose a PRAM algorithm that would shift all the capital letters in the beginning of the array.	[6]
Q.3(a)	What is *reduction*? How is it analogous to logical OR and AND?	[2]
Q.3(b)	Write a parallel algorithm for reduction of n values on a hypercube SIMD model of computer.	[4]
Q.3(c)	Present an illustration of your algorithm for $n = 16$.	[6]
Q.4(a)	What do you mean by a set of linear equations?	[2]
Q.4(b)	Illustrate how can a system of linear equations can be solved by Gauss Elimination method.	[4]
Q.4(c)	Discuss the parallel version of Gauss Elimination method on MIMD shared memory model computer. Also, analyze the complexity of designed algorithm	[6]
Q.5(a)	What is a distributed system? Give some real-world examples.	[2]
Q.5(b)	List some advantages of distributed systems	[4]
Q.5(c)	Discuss the challenges and the issues in Distributed system.	[6]
Q.6(a)	Differentiate between asynchronous and synchronous systems in distributed environment.	[2]
Q.6(b)	What do you mean Leader election in distributed system? Why Ring-based approach is preferred in electing Leader?	[4]
Q.6(c)	Discuss a Leader Election method in distributed system. Analyze its complexity.	[6]
Q.7(a)	Differentiate between *broadcast* and *convergecast* strategies used in distributed system.	[2]
Q.7(b)	Present the spanning tree-based broadcast algorithm (assuming that root node is specified) in distributed system.	[4]
Q.7(c)	Explain why do we need the concept of *mutual exclusion*. What issue may occur if *mutual exclusion* is addressed ? Discuss the ways to implement mutual exclusion in distributed systems.	[6]

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