Time: 3 hours **Max. Marks: 80**

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N.B.: (1) Question No.1 is compulsory

(2) Attempt any three questions from remaining five questions.

Q1.		**Attempt any four of the following: (5 marks each)**	**20**
	(a)	Define distributed systems. Discuss their goals and challenges.	**5**
	(b)	Explain the client-server model in distributed systems.	**5**
	(c)	What is middleware? Discuss the services offered by middleware.	**5**
	(d)	Differentiate between physical clocks and logical clocks.	**5**
	(e)	What is process migration? Explain its significance in distributed systems.	**5**
Q2.	**(a)**	Explain the working of Remote Procedure Call (RPC) with a diagram.	**10**
	(b)	Discuss the role of group communication in distributed systems.	**10**
Q3.	**(a)**	Explain Lamport's logical clock algorithm with an example.	**10**
	(b)	Describe the Ricart-Agrawala algorithm for distributed mutual exclusion.	**10**
Q4.	**(a)**	Discuss the task assignment approach in global scheduling algorithms.	**10**
	(b)	Explain the concept of load balancing and load sharing in distributed systems.	**10**
Q5.	**(a)**	What is replication? Discuss data-centric consistency models.	**10**
	(b)	Explain the concept of fault tolerance and process resilience in distributed systems.	**10**
Q6.	**(a)**	Discuss the architecture and features of the Hadoop Distributed File System (HDFS).	**10**
	(b)	Explain the file-caching schemes used in distributed file systems.	**10**

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