Q.P. Code : 735400

(3 Hours) | Total Marks : 80

N.B. : (1) Question No. **1** is **Compulsory**
(2) Attempt any **three** questions out of remaining **five** questions.
(3) Assume suitable data wherever required but justify the same.
(4) Assumption made should be clearly stated.

1. (a) Explain Data Flow computers with example. 5
   (b) What is the basic task of scheduler? Define i) Latency, ii) Initiation 5
       Rate, iii) Stage Utilization and iv) Forbidden Latency.
   (c) What are the different models of middleware? 5
   (d) What are the issues in designing a distributed system? 5

2. (a) A machine is run on many applications and the instruction mix is 10
       collected. Loads/Store are 10%, Integer add/sub 15%, FP add/sub
       50%, FP multiply divide 5% and others 5% and branches 15%. The
       clock cycles consumed by these instructions are: Loads 2, Integer add/
       sub 1, FP add/sub 5, FP multiply/divide 20, others 1. Find which
       component of the architecture requires enhancement first. After
       incorporating the enhancement which makes clock cycles requirements
       as 2. Find the overall Speedup?
   (b) What is SIMD Architecture? Explain with example SIMD Mesh 10
       Connected Architecture.

3. (a) What is an interlock? Explain the following three different classes of 10
       hazards :
       (i) Control Hazards
       (ii) Resource hazards
       (iii) Operand hazards
   (b) Explain a pipelined multiplication using Digit Products of Fixed Point 10
       Multiplication Pipeline.

4. (a) Explain the difference between Data Centric and Client Centric 10
       Consistency Models. Explain one model of each.
   (b) Explain stream oriented communication with suitable example 10

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5. (a) Explain the distributed algorithms for Mutual Exclusion? What are the advantages and disadvantages of it over centralized algorithms? **10**

(b) Write a Suzuki-Kasami's Broardcast Algorithm. Explain with example. **10**

6. (a) Compare Load sharing to task assignment and Load balancing strategies for scheduling processes in a distributed system. **10**

(b) What are the desirable features of good distributed file systems? Explain file sharing semantic of it. **10**

Q.P. Code : 735403

(3 Hours)   Total Marks : 80

Note :1) Q.No.1 is compulsory
    2) Attempt any three out of remaining five questions.
    3) Assume suitable data wherever required with justification.

1. (a) Explain with example Amdahl's law for measuring speed up performance of   5
        parallel systems.
   (b) Define various pipeline performance measures.   5
   (c) State the goals of distributed system.   5
   (d) State the desirable features of global scheduling algorithm   5

2. (a) Write a note on Pipeline Hazards.   10
   (b) Explain in brief any three classification of parallel Architecture.   10

3. (a) Write a note on Election algorithm.   10
   (b) Explain the concept of Remote Procedure Call   10

4. (a) Give one example that can be solved effectively with an SIMD architecture.   10
   (b) Explain in brief the software concept of distributed systems.   10

5. (a) Explain the need of client centric consistency models as compared to data   10
        centric consistency model. Explain any two client centric consistency model.
   (b) Explain Load balancing approach in distributed system.   10

6. Write short notes on (Any two):-   20
   (i) Andrew file system (AFS).
   (ii) Raymond's Tree based algorithm.
   (iii) Code Migration

Duration: 3 Hours   **|Total Marks -80|**

N.B.   (i) **Q. No. 1** is compulsory

      (ii) Attempt any **three** questions out of the remaining **five** questions

1 (a)   What are the common issues with which the designer of a heterogeneous distributed system must deal?   05

  (b)   State and prove Amdahl's Law to compute speedup of parallel computers. From experiment it was verified that 70% of execution time was spent on parallel execution. What is the maximum speedup that can be obtained with 16 processors?   05

  (c)   Explain the concept of Processing Element in SIMD architecture.   05

  (d)   Explain stream oriented communication with an example.   05

2 (a)   Discuss Raymond's Tree based algorithm of token based distributed mutual exclusion.   10

  (b)   How pipeline hazards are classified? Discuss data hazard in detail and list the techniques used to eliminate data hazard.   10

3 (a)   Discuss and differentiate various client-centric consistency models.   10

  (b)   Illustrate the parallel Algorithm for matrix multiplication and compare the performance of this algorithm with sequential matrix multiplication algorithm.   10

4 (a)   Describe code migration issues in detail.   10

  (b)   What is a logic clock? Why are logic clocks required in distributed systems? How does Lamport synchronize logical clocks? Which events are said to be concurrent in Lamport timestamps.   10

5 (a)   What is the requirement of Election algorithm in Distributed Systems? Describe any one Election algorithm in detail with an example.   10

  (b)   Define a Remote Procedure Call. Explain the working of RPC in detail   10

6 (a)   Describe File-Cashing schemes.   10

  (b)   Differentiate between Job scheduling and load balancing. Discuss the issues in designing Load Balancing Algorithm.   10

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Q.P. Code: 25653

Duration: 3 Hours   **[Total Marks -80]**

N.B.   (i) **Q. No. 1** is compulsory

         (ii) Attempt any **three** questions out of the remaining **five** questions

1 (a)   How Pipeline Architecture is different from Array Processor architecture   05

   (b)   Explain the various types of Parallel Programming Models?   05

   (c)   Explain a method of Dynamic Instruction scheduling for minimizing hazards.   05

   (d)   Explain Dataflow Computer with examples.   05

2 (a)   Explain different types of pipeline Hazards and the techniques used to eliminate   10
            those hazards.

   (b)   Describe Architectural Model of Distributed System with neat diagram.   10

3 (a)   Discuss in detail the various performance metrics in parallel computing.   10

   (b)   Explain Lamport's Distributed Mutual Algorithm.   10

4 (a)   Explain Matrix Multiplication on SIMD.   10

   (b)   Discuss File caching for Distributed Algorithm.   10

5 (a)   Compare and contrast Task Assignment, Load Balancing and Load Sharing   10
            approaches

   (b)   Explain call Semantics of RPC.   10

6 (a)   Describe any one Election algorithm in detail with an example.   10

   (b)   Explain File Accessing Models.   10

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Q. P. Code: 35833

3Hrs **80 Marks**

Note: 1) Question no 1 is compulsory

2) Solve any three from remaining

Q1 a) Explain Flynn's classification scheme (05)

   b) Explain Data mapping and memory in array processor (05)

   c) Explain desirable features of global scheduling algorithm (05)

   d) Explain Berkeley physical clock algorithm (05)

Q2 a) Explain different types of Hazards in Parallel System (10)

   b) Explain Ricart-Agrawala algorithm for Mutual Exclusion (10)

Q3 a) Give an example that can be solved effectively with SIMD architecture (10)

   b) What are the different Architectural Model of Distributed System?

   Explain with suitable diagram (10)

Q4 a) Explain Hadoop Distributed File System (HDFS). (10)

   b) Explain Software models supported by the distributed system (10)

Q5 a) What is Remote Procedure Call? Explain the working of RPC in detail. (10)

   b) What are different data centric consistency model? (10)

Q6 a) Explain different load estimation policies and process transfer policies used by

   Load balancing algorithm (10)

   b) Explain Bully Election Algorithm (10)

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(3 hrs)

Marks: 80

N.B. (1) Question one is Compulsory.

(2) Attempt any 3 questions out of the rest.

(3) Assume suitable data if required.

Q1.	a.	What are various system models of distributed system?	(05)
	b.	Prove that a k-stage linear pipeline can be at-most k times faster than that of a non-pipelined serial processor.	(05)
	c.	Compare parallel and distributed Systems by giving real time examples for each	(05)
	d.	The time required to execute a task with single processor is 1200ms and with 8 processors it takes 200ms. Find the efficiency of parallel computing.	(05)
Q2.	a.	Illustrate 4-stage pipeline architecture.	(10)
	b.	Differentiate between Message oriented & Stream oriented communications	(10)
Q3.	a.	Describe any one method of Logical Clock synchronization with the help of an example.	(10)
	b.	Illustrate the parallel algorithm for sorting numbers in ascending order with an example and analyze the performance of this algorithm in terms of parallel run time and communication cost.	(10)
Q4.	a.	What is the need for process migration and explain the role of resource to process and process to resource binding in process migration.	(10)
	b.	Illustrate the implementation details of pipelined floating-point adder.	(10)
Q5.	a.	Discuss and differentiate various client-centric consistency models by providing suitable example application scenarios.	(10)
	b.	Discuss Ricart-Agrawala's algorithm and Justify how this algorithm optimized the message overhead in achieving mutual exclusion.	(10)
Q6.		Write a short note on any two	(20)
	a.	File cashing schemes	
	b.	An architecture of Information System	
	c.	Load balancing techniques	

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(3 hrs)   **Marks: 80**

N.B. (1)   Question one is Compulsory.
      (2)   Attempt any 3 questions out of the remaining.
      (3)   Assume suitable data if required.

Q1. a)   What are various issues of distributed system?   05

     b)   Suppose through experimentation it was verified that 70% of execution was   05
          spent on parallelizable execution. What are the maximum speedup and
          efficiency those can be achieved with 8 processors?

     c)   Justify how Ricart-Agrawala's algorithm optimized the Message overhead in   05
          achieving mutual exclusion.

     d)   Give examples for the following message communication models   05
          • Transient Synchronous
          • Response based synchronous communication
          • Transient asynchronous
          • Persistent Asynchronous
          • Receipt based communications

Q2. a)   Brief the different load estimation policies and process transfer policies used by   10
          Load balancing algorithm.

     b)   Discuss the Structural and Data hazards in Pipeline architecture. Discuss any
          one technique to control / mitigate them in detail.   10

Q3. a)   Design and analyze 3-stage pipeline operations executing the following task: 10
          Xn + Yn * Zn, for n = 1, 2, 3,…, 7.

     b)   Describe any one method of Logical Clock synchronization.   10

Q4   a)   Clearly explain how Monotonic Read consistency model is different from Read   10
          your Write Consistency model. Support your answer with suitable example
          application scenarios where each of them can be distinctly used.

     b)   Discuss the need for process migration and the role of resource to process and   10
          process to resource binding in process migration

Q5   a)   Apply quicksort parallel algorithm for the following example: 10
          16, 08, 33, 45, 25, 19, 53, 06

     b)   Differentiate between Distributed OS, Network OS and Middleware based OS   10

Q6   Write a note on **any two** of the following   20

     a)   Hadoop Distributed File System
     b)   Systolic Architecture
     c)   RPC and RMI

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(3 hrs)   **Marks: 80**

N.B.   (1)   Question one is Compulsory.
       (2)   Attempt any 3 questions out of the remaining.
       (3)   Assume suitable data if required.

Q1. a) What are various issues of distributed system?   05
     b) Suppose through experimentation it was verified that 70% of execution was   05
         spent on parallelizable execution. What are the maximum speedup and
         efficiency those can be achieved with 8 processors?
     c) Justify how Ricart-Agrawala's algorithm optimized the Message overhead in   05
         achieving mutual exclusion.
     d) Give examples for the following message communication models   05
         - Transient Synchronous
         - Response based synchronous communication
         - Transient asynchronous
         - Persistent Asynchronous
         - Receipt based communications

Q2. a) Brief the different load estimation policies and process transfer policies used by   10
         Load balancing algorithm.
     b) Discuss the Structural and Data hazards in Pipeline architecture. Discuss any
         one technique to control / mitigate them in detail.   10

Q3. a) Design and analyze 3-stage pipeline operations executing the following task: 10
         $Xn + Yn * Zn$, for n = 1, 2, 3,…, 7.
     b) Describe any one method of Logical Clock synchronization.   10

Q4   a) Clearly explain how Monotonic Read consistency model is different from Read   10
         your Write Consistency model. Support your answer with suitable example
         application scenarios where each of them can be distinctly used.

     b) Discuss the need for process migration and the role of resource to process and 10
         process to resource binding in process migration

Q5   a) Apply quicksort parallel algorithm for the following example: 10
         16, 08, 33, 45, 25, 19, 53, 06
     b) Differentiate between Distributed OS, Network OS and Middleware based OS   10

Q6   Write a note on **any two** of the following   20

     a) Hadoop Distributed File System
     b) Systolic Architecture
     c) RPC and RMI

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