

## M.Sc. Computer Science Syllabus First Year (2018-23)

### Distributed Database Concepts

Semester I	Subject Code: MS11803	Lectures: 60
<b>Objectives:</b>		
<p>The syllabus aims in equipping students with,</p> <ul style="list-style-type: none"> <li>To understand the principles and foundations of distributed databases.</li> <li>This course addresses architecture, design issues, integrity, query processing and optimization, transactions, and concurrency control &amp; distributed transaction reliability.</li> </ul>		
<b>Unit 1: Introduction</b>		<b>06</b>
<b>Ch 1. Distributed databases: An overview</b>		<b>2</b>
<ul style="list-style-type: none"> <li>Features of distributed Vs centralized databases</li> <li>Why DDB? DDBMS</li> <li>Promises / problem areas in implementing a DDB</li> </ul>		
<b>Ch 2. DDBMS Architecture</b>		<b>4</b>
<ul style="list-style-type: none"> <li>DBMS Standardization</li> <li>Architectural models for DDBMS</li> <li>DDBMS architecture</li> <li>Distributed catalog management</li> </ul>		
<b>Unit 2: Distributed database design</b>		<b>10</b>
<b>Ch 3. Distributed database design</b>		<b>10</b>
<ul style="list-style-type: none"> <li>Alternative design strategies</li> <li>Distributed design issues</li> <li>Concepts of join graphs</li> <li>Fragmentation and allocation</li> </ul>		

BOS Members :

Dr. Reena Bharati (Subject Expert)

Dr. Manisha Bharambe (Subject Expert)

Dr. Jyoti Yadav (Subject Expert)

Mr. Vishal Salke (Industry Expert)

Ms. Amruta Nambiar (Alumni)

Prof. Ashwini Kulkarni (Chairman and Internal Faculty)

Prof. Shubhangi Jagtap (Internal Faculty)



Handwritten signatures and initials in blue ink, including 'Salke', 'Nambiar', 'Shubhangi', and 'Jagtap'.

<b>Unit 3: Distributed Query Processing</b>	6
<b>Ch 4. Overview of Query processing</b>	4
<ul style="list-style-type: none"> <li>Query processing problems</li> <li>Objectives of query processing</li> <li>Complexity of relational algebra operators</li> <li>Characterization of query processors</li> <li>Layers of query processing</li> </ul>	2
<b>Ch 5. Query decomposition &amp; data localization</b>	
<ul style="list-style-type: none"> <li>Query decomposition</li> <li>Localization of distributed data</li> </ul>	
<b>Unit 4: Optimization of distributed queries</b>	14
<b>Ch 6. Optimization of distributed queries</b>	12
<ul style="list-style-type: none"> <li>Query optimization</li> <li>Centralized query optimization Join ordering in fragment queries</li> <li>Distributed query optimization algorithms (R, R*, Ingres algorithm)</li> </ul>	
<b>Ch 7. Management of distributed transactions</b>	2
<ul style="list-style-type: none"> <li>Framework for transaction management</li> <li>Supporting atomicity of distributed transactions</li> <li>Concurrency control of distributed transactions</li> <li>Architectural aspects of distributed transactions</li> </ul>	

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 Reena Bharati  
 Manisha Bharambe  
 Jyoti Yadav  
 Vishal Salke  
 Amruta Nambiar  
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 Shubhangi Jagtap



<b>Unit 5: Distributed Transaction Processing</b>	<b>12</b>
<b>Ch 8. Concurrency control</b> <ul style="list-style-type: none"> <li>• Foundations of distributed concurrency control</li> <li>• Lock management in distributed database, distributed 2PL</li> <li>• Distributed deadlocks</li> <li>• Concurrency control based on timestamps</li> <li>• Optimistic methods for distributed concurrency control</li> </ul>	<b>6</b>
<b>Ch 9. Distributed DBMS reliability</b> <ul style="list-style-type: none"> <li>• Reliability concepts &amp; measures</li> <li>• Failures &amp; fault tolerance in distributed systems</li> <li>• Failures in DDBMS</li> <li>• Local reliability protocols</li> <li>• Distributed reliability protocols</li> <li>• Dealing with site failures</li> <li>• Network partitioning</li> </ul>	<b>6</b>

**\*Contact hours – 12 hours**

#### Reference Books:

1. M. Tamer Ozsu and Patrick Valduriez, *Principles of Distributed Database Systems*, 2nd Edition Publishers: Pearson Education Asia ISBN: 81-7808-375-2
2. Stefano Ceri and Giuseppe Pelagatti, *Distributed Database; Principles & Systems* Publications: McGraw-Hill International Editions ISBN: 0-07-010829-3
3. Raghuramakrishnan and Johannes, *Database systems* (2nd edition)

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