## Distributed Systems

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| **Course Code:** | 20CS4703B | **Year:** | IV | **Semester:** | I |
| **Course Category:** | PEC | **Branch:** | CSE | **Course Type:** | Theory |
| **Credits:** | 3 | **L-T-P:** | 3-0-0 | **Prerequisites:** | Data Structures, Operating Systems , Computer Networks |
| **Continuous Internal Evaluation:** | 30 | **Semester End Evaluation:** | 70 | **Total Marks:** | 100 |

| **Course Outcomes** | | |
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| Upon successful completion of the course, the student will be able to | | |
| **CO1** | Understand the fundamental concepts of distributed systems. | L2 |
| **CO2** | Apply the principles of system models and characteristics of file systems to design distributed systems. | L3 |
| **CO3** | Apply node level operating system facilities and networking protocols in distributed systems. | L3 |
| **CO4** | Analyze the principles and techniques behind the design of distributed systems. | L4 |

**Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)**

| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | | | | | | | | | | | | 3 | 3 |
| **CO2** | 3 | | | | | | | | 3 | 3 | | | 3 | 3 |
| **CO3** | 3 | | | | | | | | 3 | 3 | | | 3 | 3 |
| **CO4** | | 3 | | | | | | | 3 | 3 | | | 3 | 3 |

| Syllabus | | |
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| **Unit No.** | **CONTENTS** | **Mapped CO** |
| **I** | Characterization of Distribution Systems – Introduction, Examples of distributed systems, Trends in distributed systems, Challenges, Case study: The World Wide Web. | **CO1, CO2** |
| **II** | System Models – Introduction, Physical models, Architecture models, Fundamental models | **CO1, CO2, CO4** |
| **III** | Networking and Internetworking – Introduction, Types of networks, Network principles, Internet protocols. Inter-process communication – Introduction, Case Study: MPI.<br>Remote Invocation – Introduction, Request reply protocols, Remote procedure calls, Remote method invocation. | **CO1, CO3, CO4** |
| **IV** | Operating System Support – Introduction, The operating system layer, process and threads, virtualization at the operating system level.<br>Transaction and Concurrency Control – Introduction, Transaction, Nested Transaction, Locks, and Optimistic concurrency control. | **CO1, CO3, CO4** |
| **V** | Distributed File Systems – Introduction, Characteristics of file systems, File service architecture, Distributed file system requirements, File service architecture. | **CO1, CO2, CO4** |

| **Learning Resources** |
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| **Text Books** |
| 1. Distributed Systems: Concepts and Design, George Coulouris, Jean Dollimore, Tim Kindberg, and Gordon Blair, Fifth Edition, 2017, Pearson |
| **References Text Book** |
| 1. Distributed Systems: Principles and Paradigms, Andrew S. Tannenbaum and Maarten Van Steen, 2016, Pearson<br>2. Advanced Concepts in Operating Systems, M. Singhal and N. G. Shivaratri, 2001, McGraw-Hill |
| **e-Resources and other Digital Material** |
| 1. https://www.classcentral.com/tag/distributed-systems<br>2. https://youtu.be/cQP8WApzIQQ<br>3. https://onlinecourses.nptel.ac.in/noc21_cs87/preview<br>4. https://online.stanford.edu/courses/cs244b-distributed-systems |