**Semester : 5** **Year : 2019-20**

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| ***Department:*** *Information Science and Engineering* | ***Course Type: Core*** |
| ***Course Title****:****Distributed systems*** | ***Course Code:17IS52*** |
| ***L-T-P:*** *4-0-0* | ***Credits:*** *04* |
| ***Total Contact Hours:*** *52 hrs* | ***Duration of SEE:*** *3 hrs* |
| ***SEE Marks****: 50* | ***CIE Marks:*** *50* |

**Pre-requisites:**

* Fundamental knowledge of Computer Organization
* Knowledge of Operating System.

**Course Outcomes:**

Students will be able to:

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| **Cos** | **Course Outcome Description** | **Blooms Level** |
| 1 | Understand the goals and challenges of distributed system | L2 |
| 2 | Comprehend the two most prominent remote invocation techniques for communication in distributed systems | L2 |
| 3 | Illustrate the architecture for file systems and describe Google File System | L2 |
| 4 | Analyse how name services are implemented | L4 |
| 5 | Understand the fundamental concepts and algorithms related to monitoring distributed systems as their execution unfolds, and to timing the events that occur in their executions | L2 |
| 6 | Understand the topics and algorithms related to the issue of how  processes coordinate their actions and agree on shared values in distributed systems, despite failures. | L2 |
| 7 | Illustrate the fundamental concepts and algorithms related to distributed transactions | L2 |
| 8 | Describe the architectural components and a system model for services that employ replication | L2 |

**Teaching Methodology:**

* Black Board Teaching / Power Point Presentation
* Programming Assignment
* Case Study

**Assessment Methods:**

* Programming Assignment for 10 Marks
* Case Study for 10 marks, evaluated on the basis of rubrics
* Three internals, 30 Marks each will be conducted and the Average of best of two will be taken.
* Final examination of 100 Marks will be conducted and will be evaluated for 50 Marks.

**Course Outcome to Programme Outcome Mapping:**

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| **Cos** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | **3** |  |  |  |  |  |  |  | **2** | **2** |  | **1** | **3** |  |
| **CO2** | **3** |  |  |  |  |  |  |  | **2** | **2** |  | **1** | **3** |  |
| **CO3** | **3** |  |  |  |  |  |  |  | **2** | **2** |  | **1** | **3** |  |
| **CO4** | **3** | **2** |  |  |  |  |  |  | **2** | **2** |  | **1** | **3** |  |
| **CO5** | **3** |  |  |  |  |  |  |  | **2** | **2** |  | **1** | **3** |  |
| **CO6** | **3** |  |  |  |  |  |  |  | **2** | **2** |  | **1** | **3** |  |
| **CO7** | **3** |  |  |  |  |  |  |  | **2** | **2** |  | **1** | **3** |  |
| **CO8** | **3** |  |  |  |  |  |  |  | **2** | **2** |  | **1** | **3** |  |
| **17IS52** | **3** | **2** |  |  |  |  |  |  | **2** | **2** |  | **2** | **3** |  |

**Course content**

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| **UNIT – I** | **08Hours** |
| CHARACTERIZATION OF DISTRIBUTED SYSTEMS: Introduction, Trends in distributed systems, Focus on resource sharing, Challenges  REMOTE INVOCATION :Introduction , Request-reply protocols , Remote procedure call, Introduction to Remote Method Invocation | |
| **UNIT – II** | **9 Hours** |
| DISTRIBUTED FILE SYSTEMS : Introduction ,File service architecture, The Google File System (GFS)  NAME SERVICES : Introduction ,Name services and the Domain Name System ,Directory services | |
| **UNIT – III** | **11 Hours** |
| TIME AND GLOBAL STATES: Introduction , Clocks, events and process states , Synchronizing physical clocks , Logical time and logical clocks , Global states | |
| **UNIT – IV** | **12Hours** |
| COORDINATION AND AGREEMENT: Introduction, Distributed mutual exclusion, Elections , Coordination and agreement in group communication ,Consensus and related problems | |
| **UNIT – V** | **12Hours** |
| DISTRIBUTED TRANSACTIONS : Introduction ,Flat and nested distributed transactions , Atomic commit protocols , Concurrency control in distributed transactions , Distributed deadlocks , Transaction recovery  REPLICATION : Introduction , System model and the role of group communication , Fault-tolerant services | |

**Text books:**

1. George Coulouris, Jean Dollimore and Tim Kindberg, “Distributed Systems Concepts and Design”, Fifth Edition, Pearson Education, 2012.

**Reference Books:**

1. Distributed systems: Principles and Paradigms: by Andrew S. Tannenbaum, Maarten van Steen. Second edition. PH
2. Distributed Computing Principles, Algorithms & Systems By Ajay D. Kshemkalyani&MukeshSinghal, Cambridge

**Online Materials:**

<https://nptel.ac.in/courses/106106168/>