| Course code | Course Name | L-T-P – Credits | Year of Introduction |
|---|---|---|---|
| CS407 | DISTRIBUTED COMPUTING | 3-0-0-3 | 2016 |

**Course Objectives:**

- To introduce fundamental principles of distributed systems, technical challenges and key design issues.
- To impart knowledge of the distributed computing models, algorithms and the design of distributed system.

**Syllabus:**

Introduction to distributed computing, Design issues, Distributed Computing Models, System models, Inter-process communication, Distributed file system, Name Service , Distributed mutual exclusion , Distributed system design.

**Expected Outcome**

The Students will be able to :

i. distinguish distributed computing paradigm from other computing paradigms
ii. identify the core concepts of distributed systems
iii. illustrate the mechanisms of inter process communication in distributed system
iv. apply appropriate distributed system principles in ensuring transparency, consistency and fault-tolerance in distributed file system
v. compare the concurrency control mechanisms in distributed transactional environment
vi. outline the need for mutual exclusion and election algorithms in distributed systems

**Text Books:**

1. George Coulouris, Jean Dollimore and Tim Kindberg , Distributed Systems: Concepts and Design, Fifth Edition , Pearson Education, 2011
2. Pradeep K Sinha, Distributed Operating Systems : Concepts and Design, Prentice Hall of India

**References:**

1. A S Tanenbaum and M V Steen , Distributed Systems: Principles and paradigms, Pearson Education, 2007
2. M Solomon and J Krammer, Distributed Systems and Computer Networks, PHI

**Course Plan**

| Module | Contents | Hours | End Sem. Exam Marks |
|---|---|---|---|
| I | Evolution of Distributed Computing -Issues in designing a distributed system- Challenges- Minicomputer model – Workstation model - Workstation-Server model– Processor - pool model - Trends in distributed systems | 7 | 15% |
| II | System models: Physical models - Architectural models - Fundamental models | 6 | 15% |

| FIRST INTERNAL EXAM | | | |
|---|---|---|---|
| **III** | Interprocess communication: characteristics – group communication - Multicast Communication –Remote Procedure call - Network virtualization. Case study : Skype | 7 | 15% |
| **IV** | Distributed file system: File service architecture - Network file system- Andrew file system- Name Service | 7 | 15% |
| **SECOND INTERNAL EXAM** | | | |
| **V** | Transactional concurrency control:- Transactions, Nested transactions-Locks-Optimistic concurrency control | 7 | 20% |
| **VI** | Distributed mutual exclusion – central server algorithm – ring based algorithm- Maekawa's voting algorithm – Election: Ring -based election algorithm – Bully algorithm | 7 | 20% |
| **END SEMESTER EXAM** | | | |

**Question Paper Pattern**

1. There will be ***FOUR*** parts in the question paper – **A, B, C, D**
2. **Part A**
   a. **Total marks : 40**
   b. *TEN* questions, each have **4 marks**, covering **all the SIX modules** (*THREE* questions from **modules I & II**; *THREE* questions from **modules III & IV**; *FOUR* questions from **modules V & VI**).
   *All the TEN* questions have to be answered.
3. **Part B**
   a. **Total marks : 18**
   b. *THREE* questions, each having **9 marks**. One question is from **module I**; one question is from **module II**; one question ***uniformly*** covers **modules I & II**.
   c. ***Any TWO*** questions have to be answered.
   d. Each question can have ***maximum THREE*** subparts.
4. **Part C**
   a. **Total marks : 18**
   b. *THREE* questions, each having **9 marks**. One question is from **module III**; one question is from **module IV**; one question ***uniformly*** covers **modules III & IV**.
   c. ***Any TWO*** questions have to be answered.
   d. Each question can have ***maximum THREE*** subparts.
5. **Part D**
   a. **Total marks : 24**
   b. *THREE* questions, each having **12 marks**. One question is from **module V**; one question is from **module VI**; one question ***uniformly*** covers **modules V & VI**.
   c. ***Any TWO*** questions have to be answered.
   d. Each question can have ***maximum THREE*** subparts.
6. There will be ***AT LEAST*** **50**% analytical/numerical questions in all possible combinations of question choices.