| Course code | Course Name | L-T-P -Credits | Year of Introduction |
|---|---|---|---|
| CS468 | CLOUD COMPUTING | 3-0-0-3 | 2016 |

**Course Objectives:**

- To impart the fundamentals of virtualization techniques.
- To introduce concepts and security issues of cloud paradigm.
- To introduce cloud computing based programming techniques and cloud services.

**Syllabus:**

Introduction to Virtualization – Introduction to Cloud Computing , Cloud Architecture and Resource Management ,Cloud Programming ,Security in the Cloud , Using Cloud Services.

**Expected Outcome:**

The Student will be able to :

i. identify the significance of implementing virtualization techniques.
ii. interpret the various cloud computing models and services
iii. compare the various public cloud platforms and software environments.
iv. apply appropriate cloud programming methods to solve big data problems.
v. appreciate the need of security mechanisms in cloud
vi. illustrate the use of various cloud services available online.

**Text Book:**

- Kai Hwang , Geoffrey C Fox, Jack J Dongarra : "Distributed and Cloud Computing – From Parallel Processing to the Internet of Things" , Morgan Kaufmann Publishers – 2012.

**References:**


1. Alex Amies, Harm Sluiman, Qiang Guo Tong and Guo Ning Liu: Developing and Hosting Applications on the cloud, IBM Press, 2012.
2. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud (Theory in Practice)", O'Reilly Publications, 2009.
3. Haley Beard, "Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing – applications and Data Centers in the Cloud with SLAs", Emereo Pty Limited, July 2008
4. James E. Smith and Ravi Nair: Virtual Machines: Versatile Platforms for Systems and Processes, Morgan Kaufmann, ELSEVIER Publication, 2006.
5. John W Rittinghouse and James F Ransome , "Cloud Computing: Implementation – Management – and Security", CRC Press, 2010.
6. Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Pearson Education, 2009.
7. Richard N. Katz, "The Tower and The Cloud", Higher Education in the Age of Cloud Computing, 2008.
8. Toby Velte, Anthony Velte and Robert Elsenpeter: "Cloud Computing – A Practical Approach", TMH, 2009.

| Course Plan | | | |
|---|---|---|---|
| **Module** | **Contents** | **Hours** | **End Sem. Exam Marks** |
| **I** | **INTRODUCTION TO VIRTUALIZATION**<br>Virtual Machines and Virtualization Middleware – Data Center Virtualization for Cloud Computing – Implementation Levels of Virtualization – Virtualization Structures/Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices | 7 | 15% |
| **II** | **INTRODUCTION TO CLOUD COMPUTING**<br>System Models for Distributed and Cloud Computing – Software Environments for Distributed Systems and Clouds – Cloud Computing and Service Models – Public – Private – Hybrid Clouds – Infrastructure-as-a-Service (IaaS) – Platform-as-a-Service (PaaS) - Software-as-a-Service (SaaS)-Different Service Providers | 8 | 15% |
| **FIRST INTERNAL EXAMINATION** | | | |
| **III** | **CLOUD ARCHITECTURE AND RESOURCE MANAGEMENT**<br>Architectural Design of Compute and Storage Clouds –<br>Public Cloud Platforms: GAE – AWS – Azure-<br>Emerging Cloud Software Environments – Eucalyptus- Nimbus – Open Stack – Extended Cloud Computing Services – Resource Provisioning and Platform Deployment – Virtual Machine Creation and Management. | 8 | 15% |
| **IV** | **CLOUD PROGRAMMING**<br>Parallel Computing and Programming Paradigms – Map Reduce – Twister – Iterative Map Reduce – Hadoop Library from Apache – Pig Latin High Level Languages- Mapping Applications to Parallel and Distributed Systems – Programming the Google App Engine – Google File System (GFS) – Big Table – Google's NOSQL System | 7 | 15% |
| **SECOND INTERNAL EXAMINATION** | | | |
| **V** | **SECURITY IN THE CLOUD**<br>Security Overview – Cloud Security Challenges – Security -as-a-Service – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security. | 6 | 20% |
| **VI** | **USING CLOUD SERVICES :**<br>Email Communications – Collaborating on To-Do Lists –Contact Lists – Cloud Computing for the Community- Collaborating on Calendars – Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Project Management -Word Processing – Databases . | 6 | 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.