INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

CLOUD AND GRID COMPUTING							
VI Semester: IT							
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**	

Course Code	Category	L	T	P	C	CIA	SEE	Total
AITD17	**Elective**	3	0	0	3	40	60	100

Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil	Total Classes: 48

Prerequisite: Operating System, Data Base Management System, Computer Networks

I. COURSE OVERVIEW:

This Course emphasizes on transformation of the IT industry with high elastic scalability (EC) in the delivery of enterprise applications and capabilities across the various cloud service models. This course covers the concepts of cloud infrastructures, Grid Architecture, virtualization, programming models, cloud resource scheduling and management, grid service models, and cloud and grid security.

II. COURSES OBJECTIVES:
The students will try to learn
I.   How Grid computing helps in solving large scale scientific problems.
II.   The concept of virtualization that is fundamental to cloud computing.
III. How to program the grid and the cloud.
IV. The security issues in the grid and the cloud environment.

III.COURSE OUTCOMES:
At the end of the course students should be able to

CO1   Apply grid computing techniques to solve large scale.
CO2   Identify the different types of Grid services.
CO3   Apply the concept of virtualization.
CO4   Make use of the grid and cloud tool kits.
CO5   Outline system security issues and vulnerabilities for reducing system-specific attacks under a virtualization environment.
CO6   Apply the security models in the grid and the cloud environment.

MODULE I: INTRODUCTION

Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network-based systems – clusters of cooperative computers - Grid computing Infrastructures – cloud computing - service oriented architecture – Introduction to Grid Architecture and standards – Elements of Grid – Overview of Grid Architecture.

MODULE II: GRID SERVICES

Introduction to Open Grid Services Architecture (OGSA) – Motivation – Functionality Requirements – Practical & Detailed view of OGSA/OGSI – Data intensive grid service models – OGSA services.

MODULE III VIRTUALIZATION

Cloud deployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software - Pros and Cons of cloud computing – Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data center automation.

MODULE IV PROGRAMMING MODEL

Open-source grid middleware packages – Globus Toolkit (GT4) Architecture, Configuration – Usage of Globus – Main components and Programming model - Introduction to Hadoop Framework - MapReduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.

MODULE V SECURITY

Trust models for Grid security environment – Authentication and Authorization methods – Grid security infrastructure – Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the
cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud.

IV. TEXT BOOKS:

1. Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, "Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet", First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.

VI. REFERENCE BOOKS:

1. Jason Venner, "Pro Hadoop- Build Scalable, Distributed Applications in the Cloud", A Press, 2009
2. Tom White, "Hadoop The Definitive Guide", First Edition. O'Reilly, 2009
3. Bart Jacob (Editor), "Introduction to Grid Computing", IBM Red Books, Vervante, 2005
4. Ian Foster, Carl Kesselman, "The Grid: Blueprint for a New Computing Infrastructure", 2nd Edition, Morgan Kaufmann

VII. ELECTRONICS RESOURCES:

1. https://www.redbooks.ibm.com/redbooks/pdfs/sg246778.pdf
2. https://freecomputerbooks.com/Grid-Computing-Technology-and-Applications.html

VIII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Tech-talk topics
4. Open-ended experiments
5. Definitions and terminology
6. Assignments

7. Model question paper – I
8. Model question paper – II
9. Lecture notes
10. PowerPoint presentation
11. 11.E-Learning Readiness Videos (ELRV)