INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

INFORMATION TECHNOLOGY

COURSE DESCRIPTION FORM

Course Title	Cloud Computing			
Course Code	A60519			
Regulation	R15-JNTUH			
Course Structure	Lectures	Tutorials	Practical	Credits
	4	-	-	4
Course Coordinator	Dr. A Praveen, Associate Professor			

I.   COURSE OVERVIEW:

Cloud Computing is a large-scale distributed computing paradigm which has become a driving force for information technology over the past several years. The exponential growth data size in scientific instrumentation/simulation and social media has triggered the wider use of cloud computing services. We will explore solutions and learn design principles for building large network-based systems to support both compute and data intensive computing across geographically distributed infrastructure.

II.   PREREQUISITES:

Level	Credits	Periods / Week	Prerequisites
UG	4	6	Computer Networks, DBMS

III.   COURSE ASSESSMENT METHODS:

Session Marks	University End Exam Marks	Total Marks
Mid Semester Test	75	100
There shall be two midterm examinations. Each midterm examination consists of subjective type and objective type tests.		
The subjective test is for 10 marks of 60 minutes duration.		
Subjective test of shall contain 4 questions; the student has to answer 2 questions, each carrying 5 marks.		
The objective type test is for 10 marks of 20 minutes duration. It consists of 10 Multiple choice and 10 objective type questions, the student has to answer all the questions and each carries half mark.		
First midterm examination shall be conducted for the $2^{1/2}$ units of syllabus and second midterm examination shall be conducted for the remaining portion.		
Assignment		
Five marks are earmarked for assignments.		
There shall be two assignments in every theory course. Marks shall be awarded considering the average of two assignments in each course.		

IV.   EVALUATION SCHEME:

S. No	Component	Duration	Marks
1	I Mid Examination	80 minutes	20
2	I Assignment	-	5
3	II Mid Examination	80 minutes	20
4	II Assignment	-	5
5	External Examination	3 hours	75

V.   COURSE OBJECTIVES:
At the end of the course, the students will be able to:

I.   Understand the fundamental concepts in the area of cloud computing.
II.   Analyze and understand the importance of various applications of cloud computing.
III. Gain knowledge in the broad perceptive of cloud architecture and model.
IV.   Understand the concept of virtualization and design of cloud services.
V.   Familiar with the lead players in a cloud and demonstrate the basic design the trusted cloud computing system.
VI.   Understand the features of Cloud Simulator and different cloud programming techniques or model as per need.

VI.   COURSE OUTCOMES:
Upon successful completion of this course students will be able to:
1. Define cloud computing and related concepts
2. Understand the key dimensions of the challenges of Cloud Computing
3. Understand the assessment of the economics , financial, and technological implications for selecting cloud computing for an organization
4. Describe the benefits of cloud computing
5. Understand the challenges of cloud computing
6. Understand how cloud components fit together
7. Determine the suitability of in-house v/s hosted solutions
8. Understanding the systems, protocols and mechanisms to support cloud computing
9. Develop applications for cloud computing
10. Understanding the hardware necessary for cloud computing

VII   HOW PROGRAM OUTCOMES ARE ASSESSED

	Program Outcomes	Level	Proficiency assessed by
PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	S	Assignment, Exercises
PO2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	S	Exercises
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	H	Exercises
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	N	-----------

PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	N	-----------
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	N	------------
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	N	------------
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	S	Seminars, Discussions
PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	N	--------------
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	N	---------------
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	H	Exercises, Discussions
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	N	------------------

N - None   **S - Supportive**   **H - Highly Related**

VIII   HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

	Program Specific Outcomes	Level	Proficiency assessed by
PSO1	**Professional Skills:** The ability to research, understand and implement computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient analysis and design of computer-based systems of varying complexity.	H	Lectures, Assignments
PSO2	**Software Engineering practices:** The ability to apply standard practices and strategies in software service management using open-ended programming environments with agility to deliver a quality service for business success.	S	Projects
PSO3	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, environments, and platforms in creating innovative career paths, to be an entrepreneur, and a zest for higher studies.	H	Guest Lectures

N - None   **S - Supportive**   **H - Highly Related**

UNIT I
System Modeling, Clustering And Virtualization: distributed system models and enabling technologies, computer clusters for scalable parallel computing, virtual machines and virtualization of clusters and data centers.

UNIT II
Foundations: introduction to cloud computing, migrating into cloud, enriching the integration of service paradigm for cloud era, the enterprise cloud computing paradigm

UNIT III
Infra Structure As Service (IAAS)& Platform And Software Service(PAAS/SAAS): Virtual machine provisioning and migration services, on the management of virtual machines for cloud infrastructure, enhancing cloud computing environments using a cluster as service, secure distributed data storage in cloud computing
Aneka, comet cloud, T-systems, work flow engine for clouds, understanding scientific applications for cloud environments

UNIT IV
Monitoring, Management And Applications : An Architecture for federated cloud computing ,SLA management in cloud computing, performance prediction for HPC on clouds, best practices in Architecting cloud applications in the AWS cloud, building content delivery networks using clouds, resource cloud mashups.

UNIT V
Governance and case studies: organizational readiness and change management in cloud age, data security in cloud, legal issues in cloud computing, achieving production readiness for cloud services.

Text Books
1. Cloud computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M.Goscinski,wiley,2011
2. Distributed and Cloud Computing , Kai Hwang, Geofferyu C.Fox, Jack J.dongarra, Elsevier, 2012

References
1. Cloud Computing :A practical approach, Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, Tata McGraw Hill,2011
2. Enterprise Cloud Computing, Gautam Shroff, Cambridge University press,2010
3. Cloud Computing: Implementation ,Management and Security, John W .Ritting house ,James F. Ransome ,CRC press,rp2012
4. Cloud Applications Architectures: Building Applications and Infrastructure in the Cloud, George Reese ,O Reilly,SPD,rp2011
5. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance,im Mather, Subra Kumaraswamy,Shahed Latif,O reilly,SPD,rp2011

X   COURSE PLAN:

The course plan is meant as a guideline. There may probably be changes.

Lecture No.	Learning Objectives	Topics to be covered	Reference
1-2	To Understand The Different Types Of Systems ,System Models	System Modeling, Clusters and Virtualization	T2:10-58
3			
4-5			
6			
8			
17	To Understand Different Types Of Clusters', Different Types Of Clusters'	Computer Clusters	T2:68-168
18			
19			
20			
21			
22	To Define The Definition Of Scalable Computing And Virtualization, Virtual Machines	Scalable Parallel Computing	T2:174-286
23		Computer Clusters For Scalable Parallel Computing	
24		Virtual Machines And Virtualization Of Clusters And Data Centers	
25			
26			
27	To Understand What Is Cloud And Able To Define Cloud And Its Uses	The Enterprise Cloud Computing Paradigm	T1:97-158
37			
40	To Understand The Infrastructure Of Cloud And We Are Accessing That From Cloud	Infrastructure As A Service(IaaS)&Platform And Software As A Service(PaaS/SaaS)	T1:126-130
43-44		Basics Of Infrastructure As A Service(IaaS)&Platform And Software As A Service(PaaS/SaaS):	T1:140-144
45		Virtual Machines Provisioning And Migration Services	T1:145-154
46	To Manage The Device Which Are Virtualized	On The Management Of Virtual Machines For Cloud Infrastructures,	T1:152-185
48	To Understand The Data Storage In Cloud	Enhancing Cloud Computing Environments Using A Cluster As A Service ,	T1:193-212
49		Secure Distributed Data Storage In Cloud Computing.	T1:221-242
50		Aneka, Comet Cloud, T-Systems,	T1:252-298
41	To Understand The Applications Of Cloud And Monitoring And Management Of Cloud Applications	Understanding Scientific Applications For Cloud Environments.	T1:345-385
52		Monitoring, Management Applications: An Architecture For Federated Cloud Computing	T1:393-410
53-54		Sla Management In Cloud Computing, Resource Cloud Mashups	T1:413-429
55		Performance Prediction For Hpc On Cloud	T1:437-445
56		Best Practices In Architecting Cloud Applications In The Aws Cloud,	T1:459-542
57		Governance And Case Studies	T1:551-567
58		Organizational Readiness And Change Management In The Cloud Age,	T1:567-572
59		Data Security In The Cloud,	T1:573-588
60		Achieving Production Readiness For Cloud Services	T1:593-612

XI MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Objectives	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I		S	H								H		S		
II		S	H								S			S	
III			H								S				S
IV		S	S											S	
V							S				S				S
VI			S				S				H		H	S	

S =Supportive   H = Highly Related

XII MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF THE PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1		S								S			S		
2			S							S				S	
3		S								S				S	
4		H					H							S	
5										S					S
6			H											S	
7										S			S		
8										H					H
9							S			S			H		
10			H											H	

Prepared by: **Dr. A Praveen, Associate Professor**

HOD, INFORMATION TECHNOLOGY