



SILIGURI INSTITUTE OF TECHNOLOGY
COMPUTER SCIENCE & ENGINEERING



COURSE FILE

1ST SEM, 4TH YEAR, 2023

PAPER NAME : Cloud Computing

PAPER CODE : PEC-CS701B

Course File

Course Title/Code: **Cloud Computing / PEC-CS701B**

Semester:- **1st** Year:- **4th** Group:- **A & B**

Name of the Faculty: **Prof. Jayashree Singha**

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Class Schedule:

Day	Monday [L]	Tuesday [L]	Wednesday [L]	Thursday [L]	Friday [L]
Timing(A)	–	11.40AM - 12.30PM	–	10:50 AM - 11:40 AM	11.40AM - 12.30PM

Course Objective:

- To understand the basics of Cloud Computing.
- To provide graduate students with the comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications.
- To understand the movement from a traditional network infrastructure to a Cloud solution.
- Completing a Business case for going to the Cloud.

COURSE OUTCOMES (COs):

CO No	Course Outcome (CO)	Blooms Taxonomy Level (BTL)	Target %
PEC CS701B.1	Gain insight about basic technology behind the Cloud	1	60% Marks
PEC CS701B.2	Compare the advantages and disadvantages of various cloud computing platforms.	2	60% Marks
PEC CS701B.3	Understand the cloud infrastructure.	2	60% Marks
PEC CS701B.4	Comprehend the cloud computing services and applications.	1	60% Marks

PROGRAM OUTCOMES(POs):

PO Number	Description
1. Engineering Knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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.
8. Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. 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.
11.	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

PO Number	Description
Project management and finance	in multidisciplinary environments.
12. Lifelong learning	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.

Mapping of Course Outcomes and Program Outcomes: (Sample Attached)

Course Outcomes	Program Outcomes (PO's)												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
PEC CS701B.1	2	1	1	-	-	-	-	-	-	-	-	-	-	2
PEC CS701B.2	2	3	3	2	-	-	-	-	3	1	-	-	1	2
PEC CS701B.3	2	3	3	2	-	-	-	-	3	1	-	-	1	3
PEC CS701B.4	2	3	3	2	-	-	-	-	3	1	-	-	1	3
PCC CS 302	2	3	3	2	-	-	-	-	3	1	-	-	1	3

1 = courses in which the student will be exposed to a topic

2 = courses in which students will gain competency in that area

3 = courses in which students will master that skill

SYLLABUS:

Cloud Computing

Code: PEC-CS701B

Definition of Cloud Computing and its Basics (Lectures): 9L

Defining a Cloud, Cloud Types – NIST model, Cloud Cubemodel, Deployment models (Public, Private, Hybrid and Community Clouds), Service Platform as a Service, Software as a Service with examples of services/ service providers, models – Infrastructure as a Service, Cloud Reference model, Characteristics of Cloud Computing – a shift in paradigm Benefits and advantages of Cloud Computing, A brief introduction on Composability, Infrastructure, Platforms, Virtual Appliances, Communication Protocols, Applications, Connecting to the Cloud by Clients, IaaS – Basic concept, Workload, partitioning of virtual private server instances, Pods, aggregations,

silos PaaS – Basic concept, tools and development environment with examples SaaS - Basic concept and characteristics, Open SaaS and SOA, examples of SaaS platform Identity as a Service (IDaaS) Compliance as a Service (CaaS).

Use of Platforms in Cloud Computing: 12L

Concepts of Abstraction and Virtualization Virtualization technologies : Types of virtualization (access, application, CPU, storage), Mobility patterns (P2V, V2V, V2P, P2P, D2C, C2C, C2D, D2D) Load Balancing and Virtualization: Basic Concepts, Network resources for load balancing, Advanced load balancing (including Application Delivery Controller and Application Delivery Network), Mention of The Google Cloud as an example of use of load balancing Hypervisors: Virtual machine technology and types, VMware vSphere Machine Imaging (including mention of Open Virtualization Format – OVF) Porting of applications in the Cloud: The simple Cloud API and AppZero Virtual Application appliance, Concepts of Platform as a Service, Definition of services, Distinction between SaaS and PaaS (knowledge of Salesforce.com and Force.com), Application development Use of PaaS Application frameworks, Discussion of Google Applications Portfolio – Indexed search, Dark Web, Aggregation and disintermediation, Productivity applications and service, Adwords, Google Analytics, Google Translate, a brief discussion on Google Toolkit (including introduction of Google APIs in brief), major features of Google App Engine service Windows Azure platform: Microsoft’s approach, architecture, and main elements, overview of Windows Azure AppFabric, Content Delivery Network, SQL Azure, and Windows Live services.

Cloud Infrastructure: 7L

Cloud Management: An overview of the features of network management systems and a brief introduction of related products from large cloud vendors, Monitoring of an entire cloud computing deployment stack – an overview with mention of some products, Lifecycle management of cloud services (six stages of lifecycle). Concepts of Cloud Security: Cloud security concerns, Security boundary, Security service boundary Overview of security mapping Security of data: Brokered cloud storage access, Storage location and tenancy, encryption, and auditing and compliance Identity management (awareness of Identity protocol standards).

Concepts of Services and Applications: 8L

Service Oriented Architecture: Basic concepts of message-based transactions, Protocol stack for an SOA architecture, Event-driven SOA, Enterprise Service Bus, Service catalogs, Applications in the Cloud: Concepts of cloud transactions, functionality mapping, attributes, System abstraction and Cloud Bursting, Applications and Cloud APIs Cloud-based Storage: Cloud storage definition – Manned and Unmanned Webmail Services: Cloud mail services including Google Gmail, Mail2Web, Windows Live Hotmail, Yahoo mail, concepts of Syndication services.

TEXT BOOKS:

1. Cloud Computing Bible by Barrie Sosinsky, Wiley India Pvt. Ltd, 2013
2. Mastering Cloud Computing by Rajkumar Buyya, Christian Vecchiola, S. Thamarai

REFERENCE BOOKS:

1. Selvi, McGraw Hill Education (India) Private Limited, 2013
2. Cloud computing: A practical approach, Anthony T. Velte, Tata Mcgraw-Hill
3. Cloud Computing, Miller, Pearson
4. Building applications in cloud: Concept, Patterns and Projects, Moyer, Pearson



COURSE DELIVERY PLAN:

Week	Sess. No.	CO	Topic (s)	Book No [CH No][Page No]	Teaching-Learning Methods	Planned Date	Execution Date
1	1	1	Defining a Cloud, Cloud Types – NIST model, Cloud Cube model	Hand out/ Lecture Notes	T: Chalk & Talk L: Observes understands	15.7.23	1.8.23
2	2	1	Deployment models (Public , Private, Hybrid and Community Clouds), Service models – Platform as a Service, Software as a Service with examples of services/ service providers, Infrastructure as a Service,	Cloud Computing A practical approach [Ch 3] [Pg 37-42]	T: Chalk & Talk L: Observes understands T:Questioning /Discussion L: Answering questions, Participates	19.7.23	1.8.23
	3	1	Cloud Reference model, Characteristics of Cloud Computing – a shift in paradigm Benefits and advantages of Cloud Computing,	Mastering Cloud Computing [Ch 1] [Pg 1.1-1.10]	T: Chalk & Talk L: Observes understands	20.7.23	3.8.23
	4	1	A brief introduction on Composability, Infrastructure, Platforms, Virtual Appliances, Communication Protocols, Applications,	Hand out/ Lecture Notes	T: Lecturing L: Observes understands	22.7.23	3.8.23
3	5	1	Connecting to the Cloud by Clients, IaaS – Basic concept, Workload, partitioning of virtual private server instances, Pods, aggregations, silos	Mastering Cloud Computing [Ch 4] [Pg 4.4-4.5] Cloud Computing A practical approach [Ch 16] [Pg 204-205]	T: Chalk & Talk L: Observes understands	26.7.23	4.8.23
	6	1	PaaS – Basic concept, tools and development	Mastering Cloud Computing [Ch 4] [Pg 4.6-4.8]	T: Lecturing L: Observes understands Video synthesis	27.7.23	4.8.23

			environment with examples	Cloud Computing A practical approach [Ch 16] [Pg 198-203]			
	7	1	SaaS - Basic concept and characteristics, Open SaaS and SOA, examples of SaaS	Mastering Cloud Computing [Ch 4] [Pg 4.9-4.11] Cloud Computing A practical approach [Ch 16] [Pg 195-198]	T: Lecturing L: Observes understands Video synthesis	29.7.23	4.8.23
4	8	1	Identity as a Service (IDaaS)	Hand out/ Lecture Notes	T: Questioning /Discussion, L: PBL	2.8.23	8.8.23
	9	1	Compliance as a Service (CaaS).	Hand out/ Lecture Notes	T: demonstration, L: Practice by doing	3.8.23	8.8.23
	10	2	Concepts of Abstraction and Virtualization Virtualization technologies : Types of virtualization (access, application, CPU, storage),	Mastering Cloud Computing [Ch 3] [Pg 3.1-3.30] Cloud Computing A practical approach [Ch 8] [Pg 99-116]	T: demonstration, L: Practice by doing	5.8.23	8.8.23
5	11	2	Mobility patterns (P2V, V2V, V2P, P2P, D2C, C2C, C2D, D2D)	Hand out/ Lecture Notes	T: demonstration, L: Practice by doing, Quiz	9.8.23	10.8.23
	12	22	Load Balancing and Virtualization: Basic Concepts, Network resources for load balancing, Advanced load balancing (including Application Delivery Controller and Application Delivery Network),	Cloud Computing A practical approach [Ch 10] [Pg 130-134]	T: Chalk & Talk L: Observes understands	10.8.23	10.8.23
	13	2	Mention of The Google Cloud as an example of use of load balancing	Hand out/ Lecture Notes	T: Chalk & Talk L: Observes understands, Problem solving	12.8.23	10.8.23
6	14	2	Hypervisors: Virtual machine technology and types,	Mastering Cloud Computing [Ch 3] [Pg 3.31]	T: Chalk & Talk L: Observes understands	17.8.23	11.8.23
	15	2	VMware vSphere Machine Imaging (including mention of Open Virtualization Format - OVF), Porting of applications in the Cloud:	Hand out/ Lecture Notes	T: Chalk & Talk L: Observes understands	19.8.23	11.8.23

			The simple Cloud API and AppZero Virtual Application appliance,				
7	16	2	Concepts of Platform as a Service, Definition of services, Distinction between SaaS and PaaS (knowledge of Salesforce.com and Force.com),	Mastering Cloud Computing [Ch 1 [Pg 1.19] Cloud Computing A practical approach [Ch 32] [Pg 348]	T: Lecturing L: Observes understands	23.8.23	11.8.23
	17	2	Application development Use of PaaS Application frameworks, Discussion of Google Applications Portfolio - Indexed search,	Hand out/ Lecture Notes	T: Chalk & Talk L: Observes understands	24.8.23	7.9.23
	18	2	Dark Web, Aggregation and disintermediation, Productivity applications and service, Adwords,	do	T: Chalk & Talk L: Observes understands	26.8.23	7.9.23
8	19	2	Google Analytics, Google Translate, a brief discussion on Google Toolkit (including introduction of Google APIs in brief), major features of Google App Engine service.,	Cloud Computing A practical approach [Ch 30] [Pg 329-334]	T: Lecturing L: Observes understands	30.8.23	7.9.23
	20	2	Windows Azure platform: Microsoft's approach, architecture, and main elements, overview of Windows Azure AppFabric,	Cloud Computing A practical approach [Ch 29] [Pg 323-334]	T: Lecturing L: Problem based learning	31.8.23	8.9.23
	21	2	Content Delivery Network, SQL Azure, and Windows Live services.	Hand out/ Lecture Notes	T: Lecturing L: Problem based learning	2.9.23	8.9.23
9	22	3	Cloud Management: An overview of the features of network management systems and a brief introduction of related products from large cloud vendors,	Cloud Computing A practical approach [Ch 10] [Pg 133-135]	T: Lecturing L: Observes understands	7.9.23	13.9.23

	23	3	Monitoring of an entire cloud computing deployment stack – an overview with mention of some products,	Hand out/ Lecture Notes	T: Chalk & Talk L: Observes understands	9.9.23	13.9.23
10	24	3	Lifecycle management of cloud services (six stages of lifecycle).	Cloud Computing A practical approach [Ch 5] [Pg 60-64]	T: Chalk & Talk L: Observes understands	13.9.23	13.9.23
	25	3	Concepts of Cloud Security: Cloud security concerns, Security boundary, Security service boundary	Cloud Computing A practical approach [Ch 18,19] [Pg 223-242]	T: Chalk & Talk L: Observes understands	14.9.23	14.9.23
	26	3	Overview of security mapping	Cloud Computing A practical approach [Ch 18,19] [Pg 223-242]	T: Chalk & Talk L: Observes understands	16.9.23	14.9.23
11	27	3	Security of data: Brokered cloud storage access, Storage location and tenancy, encryption, and auditing and compliance	Cloud Computing A practical approach [Ch 19,20] [Pg 237-242, 245-249]	T: Chalk & Talk L: Observes understands	20.9.23	15.9.23
	28	3	Identity management (awareness of Identity protocol standards).	Hand out/ Lecture Notes	T: Chalk & Talk L: Observes understands	21.9.23	15.9.23
	29	4	Service Oriented Architecture: Basic concepts of message-based transactions,	Cloud Computing A practical approach [Ch 21] [Pg 257-263]	T: Chalk & Talk L: Observes understands	23.9.23	19.9.23
12	30	4	Protocol stack for an SOA architecture, Event-driven SOA,	Cloud Computing A practical approach [Ch 22] [Pg 273-277]	T: Chalk & Talk L: Observes understands, QUIZ	27.9.23	19.9.23
	31	4	Enterprise Service Bus, Service catalogs,	Hand out/ Lecture Notes	T: Lecturing L: Observes understands	28.9.23	21.9.23
	32	4	Applications in the Cloud: Concepts of cloud transactions, functionality mapping, attributes,	Cloud Computing A practical approach [Ch 22] [Pg 273-277]	T: Lecturing L: Observes understands	30.9.23	22.9.27
13	33	4	System abstraction and Cloud Bursting, Applications and Cloud APIs	Hand out/ Lecture Notes	T: Lecturing L: Observes understands	11.10.23	27.9.23
	34	4	Cloud-based Storage: Cloud storage definition – Manned and Unmanned	Cloud Computing A practical approach [Ch 12] [Pg 150-156] Hand out/ Lecture Notes	T: Chalk & Talk L: Observes understands	12.10.23	3.11.23

	35	4	Webmail Services: Cloud mail services including Google Gmail, Mail2Web, Windows Live Hotmail, Yahoo mail,	Hand out/ Lecture Notes	T: Explain Monitoring L: Participates	14.10.23	7.11.23
14	36	4	Concepts of Syndication services.	Hand out/ Lecture Notes	T: Chalk & Talk L: Observes, understands	18.10.23	7.11.23

LIST OF TUTORIALS: OPTIONAL

Tutorial session no	Topics	CO-Mapping
	NA	

COURSE TIME TABLE

Lecture			Practical
Tuesday 11:40 AM TO 12:30 PM	Wednesday 12:30 PM TO 1:20 PM	Friday 11:40 AM TO 12:30 PM	NA

SESSION WISE TEACHING – LEARNING PLAN

Course Title : Cloud Computing
Course Code : PEC-CS701B
L-T-P-S Structure : 3-0-0-0
Credits : 3
Course Coordinator : Mrs. Jayashree Singha

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Session No. 01

Session Outcome:

1. Learner will get to learn the concepts of cloud models.

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
20	Defining a Cloud, Cloud Types - NIST model, Cloud Cube model	1	Chalk & talk	Statement-opinion summary -
20	Deployment models (Public , Private, Hybrid and Community Clouds), Service Platform as a Service, Software as a Service with examples of services/ service providers,	1	Chalk & talk	Interactive lecture
10	models - Infrastructure as a Service,	1	Chalk & talk	Statement-opinion summary -
5	Summary and Conclusion	--	NA	

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Session No. 02

Session Outcome:

1. Learner will get to learn the characteristics and benefits of cloud computing.
2. Learner will get to learn the concepts of cloud models.

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
5	Record of Attendance	--	NA	
30	Cloud Reference model, Characteristics of Cloud Computing - a shift in paradigm Benefits and advantages of Cloud Computing,	2	Chalk & talk	Statement-opinion summary -
10	examples	2	Chalk & talk	Interactive lecture
5	Summary and Conclusion	--	NA	

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Session No. 03

Session Outcome:

1. Learner will get to learn the concepts of Cluster Analysis.

Time (Min)	Topic	BTL	Teaching Learning Method	Active learning method
5	Record of Attendance	--	NA	
20	A brief introduction on Composability, Infrastructure, Platforms,	2	Chalk & talk	Statement-opinion - summary
20	Virtual Appliances, Communication Protocols, Applications,	2	Chalk & talk	Interactive lecture, Discussion
5	Summary and Conclusion	--	NA	

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Session No. 04

Session Outcome:

- Learner will get to learn the concepts of Deployment models and service models.

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
20	Connecting to the Cloud by Clients, IaaS – Basic concept, Workload, partitioning of virtual private server instances, Pods, aggregations, silos	1	Chalk & talk	Statement-opinion - summary
20	Deployment models (Public , Private, Hybrid and Community Clouds), Service Platform as a Service, Software as a Service with examples of services/ service providers,	1	PPT, Chalk & talk	Discussion and Interaction
10	models – Infrastructure as a Service,	1	Chalk & talk	Statement-opinion - summary
5	Summary and Conclusion	--	NA	

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Session No. 05

Session Outcome:

- Learner will get to learn the requirement of the concepts of PaaS.

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
5	Record of Attendance	--	NA	
30	PaaS – Basic concept, tools and development environment with examples	2	Chalk & talk	Statement-opinion - summary
10	examples	2	Chalk & talk	Interactive lecture
5	Summary and Conclusion	--	NA	

Session No. 06

Session Outcome:

- Learner will get to learn the concepts SaaS.

Time (Min)	Topic	BTL	Teaching Learning Method	Active learning method
5	Record of Attendance	--	NA	
20	SaaS - Basic concept and characteristics, Open SaaS and SOA	2	Chalk & talk	Statement-opinion - summary
20	examples of SaaS	2	Chalk & talk	Interactive lecture, Discussion
5	Summary and Conclusion	--	NA	

Session No. 07

Session Outcome:

- Learner will get to learn the concepts of IDaaS, CaaS and IaaS.

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	

20	Identity as a Service (IDaaS)	1	Chalk talk &	Statement-opinion summary -
20	Compliance as a Service (CaaS).	1	Chalk talk &	Interactive lecture
10	models – Infrastructure as a Service,	1	Chalk talk &	Statement-opinion summary -
5	Summary and Conclusion	--	NA	

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Session No. 08

Session Outcome:

- Learner will get to learn the requirement of the concepts of Abstraction and Virtualization technologies.

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
5	Record of Attendance	--	NA	
30	Concepts of Abstraction and Virtualization technologies : Types of virtualization (access, application, CPU, storage),	2	Chalk talk &	Statement-opinion summary -
10	examples	2	Chalk talk &	Interactive lecture
5	Summary and Conclusion	--	NA	

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Session No. 09

Session Outcome:

- Learner will get to learn the concepts different Mobility patterns.

Time (Min)	Topic	BTL	Teaching Learning Method	Active learning method
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5	Record of Attendance	--	NA	
20	Mobility patterns (P2V, V2V, V2P, P2P, D2C, C2C, C2D, D2D)	2	Chalk & talk	Statement-opinion summary -
20	examples	3	Chalk & talk	Interactive lecture, Discussion
5	Summary and Conclusion	--	NA	

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Session No. 10

Session Outcome:

1. Learner will get to learn the concepts of Load Balancing and Virtualization

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
15	Load Balancing and Virtualization: Basic Concepts,	2	Chalk & talk	Statement-opinion summary -
10	Network resources for load balancing,	2	Chalk & talk	Interactive lecture
15	Advanced load balancing (including Application Delivery Controller and Application Delivery Network),	2	Chalk & talk	Statement-opinion summary -
5	Summary and Conclusion	--	NA	

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Session No. 11

Session Outcome:

1. Learner will get to learn about google cloud

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
25	Mention of The Google Cloud	3	Chalk & talk	Statement-opinion - summary
15	an example of use of load balancing	3	Chalk & talk	Interactive lecture
5	Summary and Conclusion	--	NA	

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Session No. 12

Session Outcome:

1. Learner will get to learn the concepts of Hypervisor

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
15	Hypervisors concept	2	Chalk & talk	Statement-opinion - summary
10	Virtual machine technology	2	Chalk & talk	Statement-opinion - summary
15	Type1 & type 2 hypervisor	3	Chalk & talk	Statement-opinion - summary
5	Summary and Conclusion	--	NA	

Session No. 13

Session Outcome:

1. Learner will get to learn the concepts of Machine Imaging

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
15	VMware vSphere Machine Imaging	1	Chalk & talk	Statement-opinion summary -
10	Mention of Open Virtualization Format – OVF	1	Chalk & talk	Statement-opinion summary -
15	Porting of applications in the Cloud: The simple Cloud API and AppZero Virtual Application appliance	1	Chalk & talk	Statement-opinion summary -
5	Summary and Conclusion	--	NA	

Session No. 14

Session Outcome:

1. Learner will get to learn and compare the concepts of PaaS and SaaS

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
10	Concepts of Platform as a Service, Definition of services,	2	Chalk & talk	Statement-opinion summary -
15	Distinction between SaaS and PaaS	3	Chalk & talk	Interactive lecture

15	Example of Salesforce.com and Force.com	3	Chalk & talk	Statement-opinion summary -
5	Summary and Conclusion	--	NA	

Session No. 15

Session Outcome:

1. Learner will get to learn the Use of PaaS

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
10	Application development Use of PaaS	3	Chalk & talk	Statement-opinion summary -
15	Application frameworks,	2	Chalk & talk	Statement-opinion summary -
15	Discussion of Google Applications Portfolio – Indexed search	2	Chalk & talk	Interactive lecture
5	Summary and Conclusion	--	NA	

Session No. 16

Session Outcome:

1. Learner will get to learn the concepts of Dark web, Aggregation and disintermediation

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	

10	Dark Web	3	Chalk & talk	Interactive lecture
20	Aggregation and disintermediation, Productivity applications and service,	2	Chalk & talk	Statement-opinion - summary
10	Adwords	2	Chalk & talk	Statement-opinion - summary
5	Summary and Conclusion	--	NA	

Session No. 17

Session Outcome:

1. Learner will get to learn about the Google App Engine

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
20	Google Analytics, Google Translate,	3	Chalk & talk	Interactive lecture
10	a brief discussion on Google Toolkit (including introduction of Google APIs in brief),	2	Chalk & talk	Interactive lecture
10	Major features of Google App Engine service.	2	Chalk & talk	Statement-opinion - summary
5	Summary and Conclusion	--	NA	

Session No. 18

Session Outcome:

1. Learner will get to learn about the Google App Engine



Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
20	Google Analytics, Google Translate,	3	Chalk & talk	Interactive lecture
10	a brief discussion on Google Toolkit (including introduction of Google APIs in brief),	2	Chalk & talk	Interactive lecture
10	Major features of Google App Engine service.	2	Chalk & talk	Statement-opinion summary -
5	Summary and Conclusion	--	NA	

Session No. 19

Session Outcome:

1. Learner will get to learn about the Windows Azure

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
10	Windows Azure platform: Microsoft's approach,	3	Chalk & talk	Statement-opinion summary -
20	Windows Azure architecture, and main elements,	2	Chalk & talk	Statement-opinion summary -
10	overview of Windows Azure AppFabric	2	Chalk & talk	Statement-opinion summary -
5	Summary and Conclusion	--	NA	

Session No. 20

Session Outcome:

1. Learner will get to learn about the SQL Azure, and Windows Live services.

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
15	Content Delivery Network	3	Chalk & talk	Statement-opinion summary -
15	SQL Azure	2	Chalk & talk	Statement-opinion summary -
10	Windows Live services	2	Chalk & talk	Statement-opinion summary -
5	Summary and Conclusion	--	NA	

Session No. 21

Session Outcome:

1. Learner will get to learn about the cloud network management systems.
2. Learner will get to learn about the cloud products and vendors

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
20	Cloud Management: An overview of the features of network management systems	3	Chalk & talk	Statement-opinion summary -

20	a brief introduction of related products from large cloud vendors,	2	Chalk & talk	Statement-opinion summary -
5	Summary and Conclusion	--	NA	

Session No. 22

Session Outcome:

1. Learner will get to learn about the cloud deployment stack and products

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
20	Monitoring of an entire cloud computing deployment stack – an overview	2	Chalk & talk	Statement-opinion summary -
20	mention of some cloud based products	2	Chalk & talk	Interactive lecture
5	Summary and Conclusion	--	NA	

Session No. 23

Session Outcome:

1. Learner will get to learn about the Lifecycle management of cloud services

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
30	Lifecycle management of cloud services (six stages of lifecycle).	2	Chalk & talk	Statement-opinion summary -

10	examples	2	Chalk & talk	Interactive lecture
5	Summary and Conclusion	--	NA	

Session No. 24

Session Outcome:

1. Learner will get to learn about the Cloud Security.

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
20	Concepts of Cloud Security: Cloud security concerns,	2	Chalk & talk	Statement-opinion - summary
20	Security boundary, Security service boundary	2	Chalk & talk	Statement-opinion - summary
5	Summary and Conclusion	--	NA	

Session No. 25

Session Outcome:

1. Learner will get to learn about the Cloud Security mapping.
2. Learner will get to learn about the Brokered cloud storage access

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
15	Overview of security mapping	2	Chalk & talk	Statement-opinion summary -
25	Brokered cloud storage access	2	Chalk & talk	Statement-opinion summary -
5	Summary and Conclusion	--	NA	

Session No. 26

Session Outcome:

1. Learner will get to learn about the Cloud Storage location and tenancy,
2. Learner will get to learn about the encryption, and auditing and compliance in cloud computing environment

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
10	Storage location and tenancy,	2	Chalk & talk	Statement-opinion summary -
15	encryption	2	Chalk & talk	Statement-opinion summary -
15	auditing and compliance	2	Chalk & talk	Statement-opinion summary -
5	Summary and Conclusion	--	NA	

Session No. 27

Session Outcome:

1. Learner will get to learn about the Identity management in cloud computing environment

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
15	Identity management	2	Chalk & talk	Statement-opinion summary -
25	Awareness of Identity protocol standards	2	Chalk & talk	Statement-opinion summary -
5	Summary and Conclusion	--	NA	

Session No. 28

Session Outcome:

1. Learner will get to learn about the Service Oriented Architecture
2. Learner will get to learn about the Basic concepts of message-based transactions

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
20	Service Oriented Architecture	2	Ppt, Chalk & talk	Presentation, Statement-opinion summary -
20	Basic concepts of message-based transactions	2	Chalk & talk	Statement-opinion summary -
5	Summary and Conclusion	--	NA	

Session No. 29

Session Outcome:

1. Learner will get to learn about the Protocol stack for an SOA architecture
2. Learner will get to learn about the concepts of event-driven SOA

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
25	Protocol stack for an SOA architecture	2	Ppt, Chalk & talk	Presentation, Statement-opinion summary -
15	Event-driven SOA	2	Chalk & talk	Statement-opinion summary -
5	Summary and Conclusion	--	NA	

Session No. 30

Session Outcome:

1. Learner will get to learn about the Enterprise Service Bus and Service catalogs

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
20	Enterprise Service Bus	2	Chalk & talk	Statement-opinion summary -
20	Service catalogs	2	Chalk & talk	Statement-opinion summary -
5	Summary and Conclusion	--	NA	

Session No. 31

Session Outcome:

1. Learner will get to learn about the various applications in the cloud

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
20	Applications in the Cloud: Concepts of cloud transactions,	2	Chalk & talk	Statement-opinion - summary
20	functionality mapping, attributes	2	Chalk & talk	Statement-opinion - summary
5	Summary and Conclusion	--	NA	

Session No. 32

Session Outcome:

1. Learner will get to learn about the System abstraction and Cloud Bursting and its applications

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
20	System abstraction and Cloud Bursting	2	Chalk & talk	Statement-opinion - summary
20	Applications and Cloud APIs	2	Chalk & talk	Statement-opinion - summary
5	Summary and Conclusion	--	NA	

Session No. 33

Session Outcome:

- Learner will get to learn about the concepts of Cloud-based Storage

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
15	Cloud-based Storage: Cloud storage definition – Manned and Unmanned	2	Chalk & talk	Statement-opinion summary -
25	Manned and Unmanned cloud storage	2	PPT, Chalk & talk	Presentation, Statement-opinion summary -
5	Summary and Conclusion	--	NA	

Session No. 34

Session Outcome:

- Learner will get to learn about the various Cloud mail services

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
20	Webmail Services: Cloud mail services including Google Gmail,	2	Chalk & talk, & interaction	Interactive
20	Mail2Web, Windows Live Hotmail, Yahoo mail,	2	Chalk & talk & interaction	Interactive
5	Summary and Conclusion	--	NA	

Session No. 35

Session Outcome:

1. Learner will get to learn about the concepts of Syndication services

Time(Min)	Topic	BTL	Teaching Learning Method	Active learning method
05	Record of Attendance	--	NA	
20	Concepts of Syndication services.	2	Chalk & talk	Statement-opinion summary
20	Question answer discussion		Interaction	Interactive
5	Summary and Conclusion	--	NA	

WEEKLY HOMEWORK ASSIGNMENTS/ PROBLEM SETS/OPEN ENDED PROBLEM-SOLVING EXERCISES etc.

Week	Assignment/Quiz	Topic	Details	CO
2	Assignment 1	Cloud computing basics	<ol style="list-style-type: none">What is Cloud Computing?Describe NIST cloud model and cloud cube model with figure.Discuss about hybrid and community clouds.	CO1
5	Assignment 2	Cloud Virtualization	<ol style="list-style-type: none">What is hypervisors?Explain Type 1 and Type 2 hypervisors with diagram.Differentiate between paravirtualization, and full virtualization with suitable diagram.	CO2

10	Assignment 3	Cloud Security	a. Discuss about different concepts of Cloud Security	C03
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REMEDIAL CLASSES:

SL	TOPIC	DATE
1		
2		
3		
4		

DELIVERY DETAILS OF CONTENT BEYOND SYLLABUS:

Content beyond syllabus covered (if any) should be delivered to all students that would be planned, and schedule notified accordingly.

S.No	Advanced Topics, Additional Reading, Research papers and any	CO	POs & PSOs	ALM	References/MOOCs
1					
2					
3					
4					

EVALUATION: AS PER MAKAUT GUIDELINES

Schedule for Continuous Assessment (CA):

CA	Assessment By	Schedule
CA-I	Presentation, Quiz, Group Discussion	As per Academic Calendar
CA-II	Report writing	

CA-III	Class test in pen and paper mode to be conducted at the College Level	
CA-IV	Centralized online test to be arranged by the University	
PCA1	Rubrics based Evaluation and Viva -Voce	
PCA2	Rubrics based Evaluation and Viva -Voce	

CA1, CA2, CA3

SL	ROLL-NAME	CA1	CA2	CA3
1	11900120001 - ASHUTOSH KUMAR	24	24	20
2	11900120002 - PRASHANT KUMAR	23	24	20
3	11900120003 - NIKHIL AGARWAL	24	25	23.5
4	11900120004 - SUVANKAR ROY	22	23	20
5	11900120005 - DEBAJYOTI SARKAR	23	24	19
6	11900120006 - SANJAY KUMAR JAISWAL	24	25	19
7	11900120007 - JESIM ISLAM	23	23	15
8	11900120009 - PRINCE KUMAR PANDIT	22	23	20
9	11900120010 - Anant Bomzan Tamang	24	24	21
10	11900120011 - SURABHI SAHA	24	25	20
11	11900120012 - SOURAV SIKDAR	23	23	16.5
12	11900120013 - SIMRAN KUMARI	23	23	22
13	11900120014 - SHRESTHA DAS	23	24	23
14	11900120015 - SOUVIK GOSWAMI	24	24	19
15	11900120016 - SHARVANU DASGUPTA	24	24	22
16	11900120017 - SANKIB BANIK	23	23	18
17	11900120018 - SATTIK BOSE	23	24	17
18	11900120019 - SOHINI SANYAL	23	23	12
19	11900120020 - PRIYANGSHU SARKAR	24	25	22
20	11900120021 - SAGNIK SAHA	23	24	19
21	11900120022 - ROHAN SHARMA	22	25	22
22	11900120023 - RAJDEEP SAHA	22	15	15.5
23	11900120024 - AMIT KUMAR	24	24	22.5
24	11900120025 - NIKITA KUNDU	24	23	24
25	11900120026 - NEHA DATTA	23	23	23
26	11900120028 - PRITI SAHANI	24	23	23

27	11900120029 - MAYANK SHEKHAR	24	24	20.5
28	11900120030 - MANJEET SHARMA	24	24	22
29	11900120031 - LEEPIKA	23	24	19.5
30	11900120032 - JOY DUTTA	24	24	18.5
31	11900120033 - DIYA SARKAR	24	24	21.5
32	11900120034 - SUBHANGI BANERJEE	23	24	18
33	11900120035 - CHANDAN KUMAR	23	23	19.5
34	11900120036 - SUMIT DHAR	24	25	22.5
35	11900120037 - NIKHIL MURMU	23	23	20
36	11900120038 - SOUMWADEEP GUHA	23	24	22.5
37	11900120040 - GOURAB DEB	23	24	20
38	11900120041 - SUBHADEEP DEY SARKAR	23	23	16.5
39	11900120043 - ARITRA SAHA	23	24	21.5
40	11900120044 - SAJAL SANTRA	24	23	19.5
41	11900120045 - AMAN MATHUR	24	25	21.5
42	11900120046 - SANAJIT BHUNIA	24	24	23
43	11900120047 - ABDUL JAMAL WAHID	22	23	21.5
44	11900120049 - AKASH PANDEY	23	24	23
45	11900120051 - AKASH GHOSH	20	15	22.5
46	11900120052 - SAYONI ROY	23	24	20
47	11900120053 - ROHAN JYOTI BASU	23	24	15
48	11900120054 - RONIT KUMAR	23	23	19
49	11900120055 - SAYANTANI SARKAR	23	23	21.5
50	11900120056 - SAYANTANI DEB	24	25	18
51	11900120057 - SAYAM BISWAS	23	23	22.5
52	11900120058 - SANJOK MANGRATI	23	23	19
53	11900120063 - ASHUTOSH KUMAR SINHA	23	23	14
54	11900120065 - Shiwani Jha	23	23	14
55	11900120066 - Prittha Dutta	23	23	23.5
56	11900120067 - Prasun Roy	24	24	22.5
57	11900120068 - Rajdeep Sarkar	23	24	22.5
58	11900120069 - Parna Das	24	25	22.5
59	11900120070 - Moumita Podder	23	23	18
60	11900120072 - Mehnaz Yeasmin	24	24	20
61	11900120073 - ARNAB SAHA	23	24	22
62	11900120074 - Mayuree Das	23	24	23
63	11900120075 - DEBAJIT SENGUPTA	23	23	10
64	11900120076 - Urjaswee Chatterjee	24	23	22.5
65	11900120077 - Masud Ali	23	23	18.5
66	11900120078 - Trinankur Atarathi	23	23	17.5
67	11900120079 - Kunal Pradhan	23	23	20
68	11900120080 - AISHWARYA DEY	24	24	20
69	11900120081 - Swarna Shikhar Das	23	23	21
70	11900120083 - ALIK SARKAR	23	23	17.5
71	11900120085 - ABHINABA ROY	23	23	20

72	11900120086 - TWINKLE SAHA	23	24	20.5
73	11900120087 - SHREYA ROY	24	24	19
74	11900120089 - Srishti Majumder	24	24	22.5
75	11900121171 - SHAIREE ROY	23	24	23
76	11900121172 - ROHIT DEB	23	23	20
77	11900121173 - PRYAM BISWAS	20	23	18
78	11900121174 - SWARNALI CHAKRABORTY	24	24	22.5
79	11900121175 - MOUMITA DEY	23	23	22.5
80	11900121176 - ARINDAM BHATTACHARJEE	23	23	16.5
81	11900121177 - PRASENJIT SINHA	23	23	17
82	11900121178 - PAYEL SINHA	23	23	10
83	11900121179 - RISHABH SINGH	23	24	19.5
84	11900121180 - UJJWAL ABHISHEK	23	24	14
85	11900121181 - ISHIKA ACHARJEE	23	23	21
86	11900121182 - Rishiraj Sarkar	24	24	21
87	11900121184 - RUDRAJYOTI ROY	23	23	19
88	11900121185 - SUNITA ROUTH	23	23	20
89	11900121186 - SAJIT TAMANG	23	23	23
90	11900121194 - Monali Chaki	24	24	20.5
91	11900121195 - SWEATA GHOSH	23	24	23
92	11900121196 - MANASI DEY	23	24	19
93	11900121197 - NITEN SAPKOTA	23	23	22
94	11900121198 - AMAN GHOSH	23	23	16
95	11900121199 - Saurav Karmakar	24	24	17
96	11900121200 - Sourav Tamang	23	22	16
97	11900121201 - Karnasish Roy	23	24	18
98	11900121202 - Snigdha Das	23	23	18

Slow Learner & Fast Learner identification

NAME WITH ROLL NUMBERS OF STUDENT WHOSE ACADEMIC PERFORMANCE IS NOT SATISFACTORY

Sl.	Name of Student	Roll No.	Remedial measures taken by teacher
1	PAYEL SINHA	11900121178	<ul style="list-style-type: none"> • Additional doubt clearing sessions • Providing extra assignments to students with poor attendance. • Guiding them through previous question papers • Highlighting important and frequently asked questions
2	DEBAJIT SENGUPTA	11900120075	
3			
4			

Syllabus Progress Report

Syllabus Progress Report			
Course Name:	Cloud Computing	Course Code:	PEC-CS701B
Teacher Name:	Jayashree Singha	Teacher Employee Code:	6008
Department Name:	CSE	Semester:	7th
LTP Structure:	3L-0T-0P		
Total No. of classes Allotted:	3L/WEEK		
Total No. of classes conducted:	18		
% of syllabus covered:	85%		
Module No.	Topics Covered	Methodology Used	No. of Lectures conducted
1	Overview, Defining a Cloud, Cloud Types - NIST model, Cloud Cube model, Cloud Reference model,	Chalk-Duster-Board, Google Classroom	1
	Service models, Deployment models , Characteristics of Cloud Computing, Benefits and advantages of Cloud Computing,		1
	A brief introduction on Composability, Infrastructure, Platforms, Virtual Appliances, Communication Protocols, Applications, Connecting to the Cloud by Clients		1
1	IaaS - Basic concept, Workload, partitioning of virtual private server instances, Pods, aggregations, silos	Chalk-Duster-Board, Google Classroom	1
1	PaaS - Basic concept, tools and development environment with examples		1
1	SaaS - Basic concept and characteristics, Open SaaS and SOA, examples of SaaS		1
1	Identity as a Service (IDaaS), Compliance as a Service (CaaS).		1
2	Concepts of Abstraction and Virtualization Virtualization technologies, Types of virtualization, Mobility patterns, Load Balancing and Virtualization, Mention of The Google Cloud as an example		

2	Hypervisors: Virtual machine technology and types,		2
2	VMware vSphere Machine Imaging (including mention of Open Virtualization Format - OVF),		2
3	Cloud Management, Monitoring of an entire cloud computing deployment stack, Lifecycle management of cloud services (six stages of lifecycle). Cloud Security	Chalk-Duster-Board, Google Classroom	3
4	Service Oriented Architecture: message-based transactions, Protocol stack for SOA architecture, Event-driven SOA, Enterprise Service Bus, Service catalogs, Applications in the Cloud	Chalk-Duster-Board, Google Classroom	3
Signature of the Faculty Member			Signature of HOD

ATTENDANCE POLICY

Every student is expected to be responsible for regularity of his/her attendance in class rooms and laboratories, to appear in scheduled tests and examinations and fulfil all other tasks assigned to him/her in every course. For Promotion, a Minimum of 50% of internal marks must be obtained. In every course, student has to maintain a minimum of 75% attendance to be eligible for appearing in Semester end examination of the course, for cases of medical issues and other unavoidable circumstances the students will be condoned if their attendance is between 60% to 75% in every course, subjected to submission of medical certificates, medical case file and other needful documental proof to the concerned departments.

DETENTION POLICY

In any course, a student has to maintain a minimum of 75% attendance and must secure a minimum of 50% marks in In-Semester Examinations to be eligible for appearing to the Semester End Examination, failing to fulfill these conditions will deem such student to have been detained in that course.

PLAGIARISM POLICY

Use of unfair means in any of the evaluation components will be dealt with strictly, and the case will be reported to the examination committee.

COURSE TEAM MEMBERS, CHAMBER CONSULTATION HOURS AND CHAMBER VENUE DETAILS:

Each instructor will specify his / her chamber consultation hours during which the student can contact him / her in his / her chamber for consultation.

S.No.	Name of Faculty	Chamber Consultation Day (s)	Chamber Consultation Timings for each day	Chamber Consultation Room No:	Signature of Course faculty
1	Jayashree Singha	Monday to Friday	4.40 PM -5.30 PM	101	

GENERAL INSTRUCTIONS

Students should come prepared for classes and carry the text book(s) or material(s) as prescribed by the Course Faculty to the class.

NOTICES

All notices will be communicated through the institution email.

All notices concerning the course will be displayed on the respective Notice Boards.

Signature of COURSE COORDINATOR:

HEAD OF DEPARTMENT:

**Approval from: Head of the Institutions
(Sign with Office Seal)**

