Bachelor of Engineering (Computer Science & Engineering)

Course Code: CS261 **Course Name:** Introduction to Cloud Technology
Credits: 04 **L-T-P:** 3-0-2
Total Contact Hours: 60 Hrs.

Pre-requisite (if any): NA

Course Coordinator: Ms. Ravita Chahar

Course Facilitator (s): Dr. Hakam Singh, Dr. Ramamani Tripathy, Dr. Praveen Kantha,

Dr. Dileep Kumar

Assessment Components:

Evaluation Component	Description	Syllabus Covered (%)	Timeline of Examination
#Component 01*	Sessional Test 01	0-40%	3rd April to 7th April 2023***
	Sessional Test 02	40-80%	24th April to 28th April 2023***
#Component 02**	End Term Examination	100%	26th May to 9th June 2023***
Note: For Assessment Pattern please refer to Annexure I.			

#Mandatory component.
*Out of 02 STs, the system automatically picks the best 01 STs Marks for evaluation of the STs as final marks.
**75% attendance is mandatory to appear in End Term Examination.
*** Tentative Exam Dates

Programme Outcomes (POs):

	At the end of the programme, students will be able to
PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 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.
PO 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.
PO 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.
PO 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.
PO 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.
PO 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.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
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.
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.
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.

Course Learning Outcomes (CLOs):

At the end of the course, students will be able to:

CLO1	Students will be able to understand cloud computing and its application
CLO2	Students will able to launch and configure virtual machine as per need
CLO3	Students will able to use data storage and data analytics in cloud
CLO4	Students will able perform network and content distribution
CLO5	Students will be able to develop solutions through independent and innovative learning.
CL06	Students will able to provide and build cloud solution as required

CLO-POs Mapping:

Course Learning Outcomes	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	H	M	M	M	L	L	M	M	M	L	M	L
2	L	H	M	M	M	M	-	M	M	M	L	M
3	L	H	H	H	L	M	-	-	-	-	-	-
4	-	-	-	L	H	H	M	-	-	-	-	-
5	M	-	M	M	M	M	M	M	L	H	H	H
6	M	M	M	M	M	M	M	L	M	H	H	H

Session-Wise Plan:

Session	Topic	Readings and References	Pedagogy/ Activity Planned	CLO	Mode of Delivery	Link for Online resource
1	Cloud Computing Basics – History of Cloud Computing, Characteristics of Cloud Computing,	R3	Visual Learning and Group Discussion	CLO1	Classroom learning with practical on AWS LMS	L1,L2
2	Need for Cloud computing, Advantages and Possible Disadvantages of cloud computing,	R3	Visual Learning and Group Discussion	CLO1	Classroom learning with practical on AWS LMS	L1,L2
3	Cloud Deployment Models – Public, Private, Hybrid, Community	R3,R1	Visual Learning and Group Discussion	CLO1	Classroom learning with practical on AWS LMS	L1,L2

4	Cloud Service Models: IaaS, PaaS, SaaS,	R3,R1	Visual Learning and Group Discussion	CLO1	Classroom learning with practical on AWS LMS	L1,L2
5	Cloud Scalability	R1, R2	Visual Learning and Group Discussion	CLO1	Classroom learning with practical on AWS LMS	L1,L2
6	Time to Market, Introduction to Amazon Web Services.	R1, R2	Visual Learning and Group Discussion	CLO1	Classroom learning with practical on AWS LMS	L2,L3
7	Introduction to EC2, Instance Types And Uses	R1, R2	Visual Learning and Group Discussion	CLO1	Classroom learning with practical on AWS LMS	L2,L3
8	Auto scaling Instances, Amazon Machine Images (AMI's)	R1, R2	Visual Learning and Group Discussion	CLO2	Classroom learning with practical on AWS LMS	L2,L3
9	Modifying Existing Images	R1, R2	Visual Learning and Group Discussion	CLO2	Classroom learning with practical on AWS LMS	L2,L3
10	Creating New Images of Running Instances	R1, R2	Visual Learning and Group Discussion	CLO2	Classroom learning with practical on AWS LMS	L2,L3
11	Converting An Instance Store AMI To An EBS AMI,	R1, R2	Visual Learning and Group Discussion	CLO2	Classroom learning with practical on AWS LMS	L2,L3
12	Instances Backed By Storage Types	R1, R2	Visual Learning and Group Discussion	CLO2	Classroom learning with practical on AWS LMS	L2,L3

13	Elastic IPs, Elastic Load Balancing	R1, R2	Visual Learning and Group Discussion	CLO3	Classroom learning with practical on AWS LMS	L2,L3
14	Cloud data lifecycle phases, cloud data storage types	R1, R2	Visual Learning and Group Discussion	CLO3	Classroom learning with practical on AWS LMS	L2,L3
15	Amazon Storage, S3 Storage Basics	R1, R2	Visual Learning and Group Discussion	CLO3	Classroom learning with practical on AWS LMS	L2,L3
16	Creating A Web Server Using S3 Endpoints	R1, R2	Visual Learning and Group Discussion	CLO3	Classroom learning with practical on AWS LMS	L2,L3
17	Buckets and Objects	R1, R2	Visual Learning and Group Discussion	CLO3	Classroom learning with practical on AWS LMS	L2,L3
18	Managing Voluminous Information with EBS	R1, R2	Visual Learning and Group Discussion	CLO3	Classroom learning with practical on AWS LMS	L2,L3
19	Glacier Storage Service,	R1, R2	Visual Learning and Group Discussion	CLO3	Classroom learning with practical on AWS LMS	L2,L3
20	Describe Amazon Dynamo	R1, R2	Visual Learning and Group Discussion	CLO4	Classroom learning with practical on AWS LMS	L2,L3
21	Understand key aspects of Amazon RDS	R1, R2	Visual Learning and Group Discussion	CLO4	Classroom learning with practical on AWS LMS	L2,L3

22	Understand key aspects of Amazon RDS	R1, R2	Visual Learning and Group Discussion	CLO4	Classroom learning with practical on AWS LMS	L2,L3
23	Launch an Amazon RDS instance	R1, R2	Visual Learning and Group Discussion	CLO4	Classroom learning with practical on AWS LMS	L2,L3
24	Working on Amazon RDS instance	R1, R2	Visual Learning and Group Discussion	CLO4	Classroom learning with practical on AWS LMS	L2,L3
25	Introduction to AWS Networking , Setting Up a Security Group	R1, R2	Visual Learning and Group Discussion	CLO4	Classroom learning with practical on AWS LMS	L2,L3
26	Access Control Lists (ACLs), Setting Up VPC And Internet Gateway	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
27	Setting Up A VPN, Setting Up A Customer Gateway For VPN,	R1, R2	Visual Learning and Group Discussion	CLO6 CLO5	Classroom learning with practical on AWS LMS	L2,L3
28	Setting Up Dedicated Hardware	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
29	Route53 for DNS System, Cloud front,	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
30	For VPC Scenario 1:VPC With A Public Subnet Only (Standalone Web)	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3

31	Scenario 2: VPC with Public And Private Subnets (3 Tier App), etc	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
32	Introduction to AWS Security	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
33	Amazon Identity and Access Management (IAM)	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
34	Introduction to containers	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
35	Dockers and Kubernetes	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
36	how to create, execute, change, and deploy containers	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
37	Container management etc.	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
38	Introduction to Elastic Beanstalk	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
39	Deploying Scalable Application On AWS, Selecting And Launching An Application Environment	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3

40	Provisioning Application Resources with Cloud Formation	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
41	Introduction to Cloud Watch, Describe Amazon Cloud Watch metrics and alarms	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
42	AWS Messaging Services(SNS,SQS, SES).	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
43	AWS Directory Service	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
44	AWS Key Management Service	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
45	Securing Data at Rest and In Motion	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
46	Compliance Issues, Privacy and Security	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
47	Economic Cost Model and Leveraging the Cloud	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
48	Cloud computing resources	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3

49	Cloud Dos and Don'ts	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
50	Business continuty technology solutions	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
51	Backup and recovery considerations	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
52	Backup technologies	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
53	Understanding legal challenges involved in Cloud	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
54	Liability, copyright	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
55	Data protection	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
56	IPR, data portability	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
57	Inter-country legal frameworks	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3

58	Budgeting	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
59	Cost management	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3
60	Resource planning etc.	R1, R2	Visual Learning and Group Discussion	CLO5, CLO6	Classroom learning with practical on AWS LMS	L2,L3

Reference Books:

R1: https://docs.aws.amazon.com/
R2: AWS Certified Solutions Architect Study Guide: Associate SAA-C01 Exam 2nd Edition
R3: Cloud Computing: Concepts, Technology & Architecture (The Pearson Service Technology Series from Thomas Erl)

Link of Online Resources:

L1: https://nptel.ac.in/courses/106105167
L2: https://www.awsacademy.com/vforcesite/LMS_Login
L3: https://docs.aws.amazon.com/

Assessment Scheme:

Sr. No.	Assessment Instrument	Formative/ Summative	Frequency	Weightage (%)	CLO
1.	Sessional Tests	Formative	02	40	CLO1-CLO6
2.	End Term Examination	Summative	01	60	CLO1-CLO6
			Total	100	

Proposed Course Evaluation Scheme:

Questions for internal and ETE will be designed to evaluate cognitive skills the various educational levels (Bloom's taxonomy) such as:

Sr. No.	Bloom's category	ST1	ST2	ETE
1.	Remember	10	10	15
2.	Understand	15	15	15
3.	Apply	25	25	30
4.	Analyze	10	10	20
5.	Evaluate	0	0	15
6.	Create	0	0	5

Annexure I: Assessment Pattern

Assessment Component	Description	Assessment Pattern	Duration of Examination
Component 01	Sessional Test 01	1 mark - 20 MCQs 2 marks - 15 questions 5 marks - 2questions	90 Minutes
	Sessional Test 02	1 mark - 20 MCQs 2 marks - 15 questions 5 marks - 2questions	90 Minutes
Component 02	End Term Examination	1 mark - 60 MCQs 2 marks - 15 questions 5 marks - 2 questions	120 Minutes

Approved by:

Designation	Name	Signature
Course Coordinator	Ms. Ravita Chahar	
Program Incharge	Dr. Ashutosh Kumar Dubey/ Ms. Ravita Chahar	
Head of the Department	Dr. Kuldeep Sharma	
Date		