RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 1/3

Branch	COMPUTER SCIENCE AND ENGINEERING	Semester	FIFTH

Course Code		Course Name	CLOUD COMPUTING

		(Hrs)	(Marks)
Course Outcome 1	**EXPLAIN THE FUNDAMENTALS OF CLOUD COMPUTING**	**20**	**20**
Learning Outcome 1	**Explain the basics and technological importance of Cloud Computing.**	**10**	**ET(10)**
Contents	• Introduction to cloud computing, history of cloud computing, advantage and disadvantages of cloud computing, challenges of cloud computing, applications of cloud computing. • Computing models: desktop computing, client-server computing, cluster computing, grid Computing, cloud computing. • Cloud layered architecture.		
Method of Assessment	**END TERM THEORY EXAMINATION**		
Learning Outcome 2	**Identify the various attributes, elements and actors of cloud computing**	**10**	**PT(10)**

Contents	• Cloud attributes: elasticity, multi-tenancy, pay per uses, scalability, self-provisioning of resources, geographical freedom. • Cloud elements: client/user (mobile, stationary, thin, and thick), data centre, manager, hosts, and distributed server. • Actors of cloud: cloud service provider, cloud broker, client/cloud user.		
Method of Assessment	**INTERNAL THEORY EXAMINATION / PROGRESSIVE TEST(PT)**		
Course Outcome 2	**EXPLAIN THE CONCEPT OF CLOUD DEPLOYMENT MODEL**	**15**	**20**
Learning Outcome 3	**Discuss concept, characteristics and challenges of public & private cloud.**	**8**	**ET(10)**
Contents	• Public Cloud: characteristics, suitability, issues with public cloud, advantages and disadvantages. • Private Cloud: characteristics, suitability, on-premise private cloud, issues with on-premise private cloud, outsourced private cloud, issues with outsourced private cloud, advantages and disadvantages.		
Method of Assessment	**END TERM THEORY EXAMINATION**		
Learning Outcome 4	**Discuss concept, characteristics and challenges of community & hybrid cloud.**	**7**	**ET(10)**

Contents	• Community Cloud: characteristics, suitability, On-Premise Community Cloud, issues with On-Premise Community Cloud. Outsourced Community Cloud, issues of Outsourced Community Cloud, advantages and disadvantages. • Hybrid Cloud: characteristics, suitability, issues with hybrid cloud, advantages, disadvantages, differentiate among public, private, community and hybrid cloud.		
Method of Assessment	**END TERM THEORY EXAMINATION**		
Course Outcome 3	**INTERPRATE VARIOUS CLOUD SERVICE MODELS.**	**15**	**20**
Learning Outcome 5	**Define concept, characteristics, and benefits of Infrastructure as a Service (IaaS) & Platform as a Service (PaaS)**	**8**	**ET(10)**
Contents	• Cloud Service models: Introduction, Infrastructure as a Service (Iaas): characteristics, suitability, IaaS providers, pros and cons of IaaS. • Platform as a Service (PaaS): Characteristics, suitability, PaaS providers, pros and cons of PaaS.		
Method of Assessment	**END TERM THEORY EXAMINATION**		
Learning Outcome 6	**Define concept, characteristics, and benefits of Software as a Service (SaaS).**	**7**	**TW(10)**
Contents	Software as a Service (SaaS): characteristics, suitability, pros and cons of SaaS, SaaS providers, differentiate between IaaS, PaaS, and SaaS.		
Method of Assessment	**INTERNAL QUIZ / ASSINGMENT**		

Course Outcome 4	**DISCUSS THE ROLE OF VIRTUALIZATION AND LOAD BALANCING IN CLOUD COMPUTING.**	**20**	**20**
Learning Outcome 7	**Explain the importance of virtualization in Cloud Computing.**	**10**	**PT2(10)**
Contents	• Virtualization: Introduction, Types of Virtualization: Full virtualization, Para Virtualization, Hardware assisted Virtualization. • Areas of virtualization in cloud: Server, Network, Storage Virtualization. • Virtualization Architecture: Hosted Architecture, Bare metal architecture, Service level Agreement (SLA), Quality of Services (QoS), Virtual Machine, VM Migration.		
Method of Assessment	**INTERNAL THEORY EXAMINATION / PROGRESSIVE TEST(PT)**		
Learning Outcome 8	**Explain load balancing and it's types.**	**10**	**ET(10)**
Contents	• Load balancing: Introduction, Types of load balancing: Static load balancing (Deterministic, Probabilistic), Dynamic load balancing (Centralised, Distributed). • Power Consumption issues in cloud computing, Server Consolidation.		
Method of Assessment	**END TERM THEORY EXAMINATION**		
Course Outcome 5	**EXPLAIN THE BASIC CONCEPTS OF CLOUD SECURITY.**	**20**	**20**

Learning Outcome 9	**Identify core concepts of the network security & the security threats in Cloud Computing.**	**10**	**ET(10)**
Contents	• Fundamentals of network security, Security threats: types of attacks, security services, Encryption, Decryption and Cryptography: Types of Cryptography (public key cryptography & symmetric key cryptography). • Security issues associated with the cloud computing, Security Techniques for Data Protection in Cloud Computing: Authentication, Confidentiality, Access Control, and Authorization in Cloud Computing.		
Method of Assessment	**END TERM THEORY EXAMINATION**		
Learning Outcome10	**List some important cloud computing driven commercial systems and applications**	**10**	**ET(10)**
Contents	Cloud Service Providers and its features: AWS (Amazon Web Services), Microsoft Azure, Oracle cloud, Google Cloud Platform, Rackspace, Cloud Security Alliance (CSA) Stack model.		
Method of Assessment	**END TERM THEORY EXAMINATION**		

REFERENCES-

S No.	**Title and Publication**	**Authors**
1.	Essentials of Cloud Computing, CRC press	K. Chandrasekaran
2.	Handbook of Cloud Computing, Springer	Borko Furht, Armando Escalante (Editor)
3.	Detailed analysis of various load balancing and power reduction methodology in cloud environment, IJARCS	Kamal Narayan Budholia, Satish Pawar

4.	Data Communication and Networking (4th Edition)	Behrouz A. Forouzan

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		C	0	4				1	1	

Course Name	**CLOUD COMPUTING**
CO Description	**EXPLAIN THE FUNDAMENTALS OF CLOUD COMPUTING.**
LO Description	**Explain the fundamentals and technological aspects of Cloud Computing.**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Introduction to cloud computing, history of cloud computing, advantage and disadvantages of cloud computing, challenges of cloud computing, applications of cloud computing. • Computing models: desktop computing, client-server computing, cluster computing, grid Computing, cloud computing. • Cloud layered architecture.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	10	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**END TERM THEORY EXAMINATION**	Student will be asked to define cloud computing fundamentals, explain computing models.	**10**	**Test Paper**	**External**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		C	0	4				1	2	

Course Name	**CLOUD COMPUTING**
CO Description	**EXPLAIN THE FUNDAMENTALS OF CLOUD COMPUTING.**
LO Description	**Identify the various attributes, elements and actors of cloud computing**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Cloud attributes: elasticity, multi-tenancy, pay per uses, scalability, self-provisioning of resources, geographical freedom. • Cloud elements: client/user (mobile, stationary, thin, and thick), data centre, manager, hosts, and distributed server. • Actors of cloud: cloud service provider, cloud broker, client/cloud user.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	10	0	Handouts / Books / E-Contents,	Teacher may use working animation for Searching techniques.

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**INTERNAL THEORY EXAMINATION / PROGRESSIVE TEST(PT)**	Student will be asked to explain cloud elements and cloud attributes	**10**	**Test Paper**	**Internal**
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)					

RGPV (Diploma Wing) Bhopal	**SCHEME FOR LEARNING OUTCOME**	Branch Code			Course Code			CO Code	LO Code	Format No. **4**
		C	0	4				2	3	

Course Name	**CLOUD COMPUTING**
CO Description	**ILLUSTRATE THE CONCEPT OF CLOUD DEPLOYMENT MODEL**
LO Description	**Discuss the concept of public & private cloud, their characteristics and challenges.**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Public Cloud: characteristics, suitability, issues with public cloud, advantages and disadvantages. • Private Cloud: characteristics, suitability, on-premise private cloud, issues with on-premise private cloud, outsourced private	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	8	0	Handouts / Books / E-Contents	NIL

	cloud, issues with outsourced private cloud, advantages and disadvantages.						

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**END TERM THEORY EXAMINATION**	Student will be asked to define public & private cloud.	**10**	**Test Paper**	**External**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

	Branch Code			Course Code			CO Code	LO Code	
RGPV (Diploma Wing) Bhopal	C	0	4				2	4	Format No. **4**
SCHEME FOR LEARNING OUTCOME									

Course Name	**CLOUD COMPUTING**
CO Description	**ILLUSTRATE THE CONCEPT OF CLOUD DEPLOYMENT MODEL**
LO Description	**Discuss the concept of Community & hybrid cloud, their characteristics and challenges.**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Community Cloud: characteristics, suitability, On-Premise Community Cloud,	Traditional Lecture method +	Teacher will explain the contents and	7	0	Handouts / Books / E-Contents	NIL

	issues with On-Premise Community Cloud. Outsourced Community Cloud, issues of Outsourced Community Cloud, advantages and disadvantages. • Hybrid Cloud: characteristics, suitability, issues with hybrid cloud, advantages, disadvantages, differentiate among public, private, community and hybrid cloud.	Handout	provide handout to students.				

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**END TERM THEORY EXAMINATION**	Student will be asked to differentiate among public, private, community and hybrid cloud	**10**	**Test Paper**	**External**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	**SCHEME FOR LEARNING OUTCOME**	Branch Code			Course Code			CO Code	LO Code	Format No. **4**
		C	0	4				3	5	

Course Name	**CLOUD COMPUTING**
CO Description	**EXPLAIN THE CONCEPTS, CHARACTERISTICS, AND BENEFITS OF CLOUD SERVICE MODELS**
LO Description	**Define the concepts, characteristics, and benefits of Infrastructure as a Service (IaaS) & Platform as a Service (PaaS)**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Cloud Service models: Introduction, Infrastructure as a Service (Iaas): characteristics, suitability, IaaS providers, pros and cons of IaaS. • Platform as a Service (PaaS): Characteristics, suitability, PaaS providers, pros and cons of PaaS.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	8	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**END TERM THEORY EXAMINATION**	Student will be asked to describe IaaS & PaaS.	**10**	**Test Paper**	**External**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	**SCHEME FOR LEARNING OUTCOME**	Branch Code			Course Code			CO Code	LO Code	Format No. **4**
		C	0	4				3	6	

Course Name	**CLOUD COMPUTING**
CO Description	**EXPLAIN THE CONCEPTS, CHARACTERISTICS, AND BENEFITS OF CLOUD SERVICE MODELS**
LO Description	**Define the concepts, characteristics, and benefits of Software as a Service (SaaS).**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks

		Learning Method					
1	• Software as a Service (SaaS): characteristics, suitability, pros and cons of SaaS, SaaS providers, differentiate between IaaS, PaaS, and SaaS.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	7	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**INTERNAL QUIZ / ASSINGMENT**	Student will be asked to differentiate between IaaS, PaaS, and SaaS.	**10**	**Quiz / Assignments**	**Internal**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	**SCHEME FOR LEARNING OUTCOME**	Branch Code			Course Code			CO Code	LO Code	Format No. **4**
		C	0	4				4	7	

Course Name	**CLOUD COMPUTING**
CO Description	**DESCRIBE IMPORTANCE OF VIRTUALIZATION IN CLOUD COMPUTING AND LOAD BALANCING**
LO Description	**Know the importance of virtualization in Cloud Computing.**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Virtualization: Introduction, Types of Virtualization: Full virtualization, Para Virtualization, Hardware assisted Virtualization. • Areas of virtualization in cloud: Server, Network, Storage Virtualization. • Virtualization Architecture: Hosted Architecture, Bare metal architecture, Service level Agreement (SLA), Quality of Services (QoS), Virtual Machine, VM Migration.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	10	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**INTERNAL THEORY EXAMINATION / PROGRESSIVE TEST(PT)**	Student will be asked to explain Virtualization	**10**	**Test Paper**	**Internal**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		C	0	4				4	8	
Course Name	**CLOUD COMPUTING**									

CO Description	DESCRIBE IMPORTANCE OF VIRTUALIZATION IN CLOUD COMPUTING AND LOAD BALANCING
LO Description	Explain load balancing and its types.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Load balancing: Introduction, Types of load balancing: Static load balancing (Deterministic, Probabilistic), Dynamic load balancing (Centralised, Distributed). • Power Consumption issues in cloud computing, Server Consolidation.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	10	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	END TERM THEORY EXAMINATION	Student will be asked to explain Load balancing	10	Test Paper	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		C	0	4				5	9	

Course Name	CLOUD COMPUTING

CO Description	EXPLAIN THE BASIC CONCEPTS OF CLOUD SECURITY.
LO Description	Identify the core concepts of the networking security & the security threat in Cloud Computing.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Fundamentals of network security, Security threats: types of attacks, security services, Encryption, Decryption and Cryptography: Types of Cryptography (public key cryptography & symmetric key cryptography). • Security issues associated with the cloud computing, Security Techniques for Data Protection in Cloud Computing: Authentication, Confidentiality, Access Control, and Authorization in Cloud Computing.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	10	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**END TERM THEORY EXAMINATION**	Student will be asked to describe fundamentals network security and security issues associated with cloud computing.	**10**	**Test Paper**	**External**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		C	0	4				5	10	

Course Name	**CLOUD COMPUTING**
CO Description	**EXPLAIN THE BASIC CONCEPTS OF CLOUD SECURITY.**
LO Description	**Explore some important cloud computing driven commercial systems and applications.**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract./ Tut. Hrs	LRs Required	Remarks
1	• Cloud Service Providers and its features: AWS (Amazon Web Services), Microsoft Azure, Oracle cloud, Google Cloud Platform, Rackspace, Cloud Security Alliance (CSA) Stack model.	Traditional Lecture method + Handout	Teacher will explain the contents and provide handout to students.	10	0	Handouts / Books / E-Contents	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	**END TERM THEORY EXAMINATION**	Student will be asked to enlist Cloud Service Providers and its features.	**10**	**Test Paper**	**External**

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)