GUJARAT TECHNOLOGICAL UNIVERSITY
Syllabus for Master of Computer Applications, 3rd Semester
Subject Name: Open Stack Technology
Subject Code: 639405

With effective from academic year 2020-21

1. Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	-	2	4	70	30	30	20	150

2. Course Outcomes:

Course Outcome Component	Course Outcome (Learner will be able to)
Virtualization	• Learner can get a brief idea about what is virtualization and various concepts of virtualization
OpenStack Concepts	• Learner will get to learn all the necessary concepts of OpenStack and OpenStack components
OpenStack Deployment	• Learner will get to learn basics of DevOps, and will learn the deployment of OpenStack
OpenStack Cluster and Compute	• Learner will get to learn about the concepts of cluster and would learn how to compute in OpenStack
Operating the OpenStack Infrastructure	• Learner will learn types of storages in OpenStack and various types of network deployment and would learn to operate the OpenStack Infrastructure

3. Course Duration: The course duration is of **40 sessions of 60 minutes each.**

4. Course Contents:

Module No:	Contents	No. of Sessions	70 Marks (External Evaluation)
I	• **Introduction** Introduction to Linux, Linux Commands, Virtualization Techniques, Various types of virtualization, Introduction to Cloud Computer, Characteristic of cloud computing, cloud computing models : Service Model and Deployment Model, Privacy and Security in Cloud Storage Services, What is Hypervisor, Xen, ESXi, Hyper-V, Understanding Docker	5	10
II	• **Basics of OpenStack** Introduction to OpenStack and It's component, Other cloud frameworks, Comparing it to AWS and Rackspace Cloud, Creating a safe environment, Access Control, The CIA Model, Understanding Data Center Security from Cloud Perspective, Understanding Server Security from Cloud Perspective, Nova-Compute Service, Nova-API, Nova-Compute, Nova-Network, Nova-Scheduler, Nova-Conductor, Storages in Openstack	6	15
III	• **OpenStack Deployment**	9	15

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	Understanding DevOps and OpenStack deployment, Working with the infrastructure deployment code, Integrating OpenStack into infrastructure code, Choosing the automation tool : Introducing Ansible, Ansible Modules, Ansible Variables, Ansible Inventory, Ansible Roles, Ansible Playbooks, Ansible for OpenStack, The development and production environments, Preparing the infrastructure code environment : Preparing the development Setup, Configuring the setup, Building the development setup		
IV	• **OpenStack Cluster and Compute** Understanding clustering : Asymmetric clustering, symmetric clustering, The cloud controllers:The keystone service, the nova-conductor service, the nova-scheduler service, The API services, The network service, Cloud Controller Clustering : Deployment with Openstack Ansible, Bringing up the controller nodes, The Compute Service Components, Deciding on the hypervisor, Segregating the compute cloud, Overcommitment considerations, Storing instances alternatives, Understanding instance booting, Planning for service recovery	10	15
V	• **Operating the OpenStack Infrastructure** Understanding the storage types, Deploying Swift service, Using block storage service: Cinder, Understanding Architecture of Neutron, Implementing Virtual Networks, Connecting Virtual Networks with routers, Implementing network security in OpenStack, Operating the OpenStack tenancy, Orchestration in OpenStack, Telemetry in OpenStack, Installing Telemetry, Arming OpenStack Monitoring	10	15

5. **Pedagogy:**
   • ICT enabled Classroom teaching
   • Case study
   • Practical / live assignment
   • Interactive class room discussions

6. **Evaluation:**
   Students shall be evaluated on the following components:

A	**Internal Evaluation**	**(Total - 20 Marks)**
	• Continuous Evaluation Component	10 marks
	• Class Presence & Participation	10 marks
B	**Mid-Semester examination**	**(30 Marks)**
C	**End –Semester Examination(Theory)**	**(70 Marks)**
D	**End –Semester Examination(Practical/Viva)**	**(30 Marks)**

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7. **Reference Books:**

No.	Author	Name of the Book	Publisher
1	Chandan Dutta Chowdhury and Omar Khedher	Mastering OpenStack	PacktPub
2	Kevin Jackson	OpenStack Cloud Computing Cookbook	PacktPub
3	Alessandro Locati Fabio	Openstack Cloud Security	PacktPub
4	John R. Vacca	Cloud Computing Security	CRC Press
5	Ronald L. Krutz, Russel Dean vines	Cloud Security: A comprehensive guide to secure cloud computing	Wiley

8. **Sample Practical List**

Sr. No.	Practical Description
1	Creating a sandbox environment with VirtualBox
2	Installing Openstack Compute Packages : Nova-Compute, Nova-Scheduler, Nova-API, Nova-Network, Nova-Common, Nova-Cert
3	Installing Other Openstack Compute Packages : Glance, Rabbitmq-server, mysql-server, ntp, dnsmasq
4	Configure mysql-server for OpenStack Compute
5	Configure Nova Services for OpenStack Compute
6	Creating Cloud Admin Account and Project
7	Installing euca2ools for Openstack compute command line management
8	Uploading Sample Machine Image to OpenStack and Launching Cloud Instance
9	Creating and Modifying user accounts, Managing Security Groups
10	Creating Custom Windows and CentOS Images for OpenStack
11	Installing OpenStack Identity Service, Configuring User Roles, Creating Tenants and Adding Users
12	Creating Openstack Storage sandbox environment, Installing Openstack Storage Services
13	Configuring Openstack Storage Service, Configuring Replication, Configuring Storage Proxy Server
14	Configuring Account Server, Configuring Container Server, Configuring Object Server