GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH: CYBER SECURITY (59)
SUBJECT NAME-DATA CENTER MANAGEMENT
SUBJECT CODE- 2725907
SEMESTER-II

Type of course: Master of Engineering (Cyber Security)

Prerequisite: Basic knowledge of Cloud Computing and Computer Networks

Rationale: This course aims to provide guidance to oversee the operational and technical issues within a data center or server room. It covers environmental control, physical security, hardware server operations and management of the services and applications used for data processing.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
				Theory Marks		Practical Marks				
L	T	P	C	ESE (E)	PA (M)	ESE (V)		PA (I)		
						ESE	OEP	PA	RP	
03	00	02	04	70	30	20	10	10	10	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Journey to the Cloud:** Definition of Cloud Computing, Characteristics of Cloud computing as per NIST, Cloud Models – Private, Public and Hybrid; Steps involved in transitioning from Classic data center to Cloud computing environment.	**5**	10
2	**Data Center Challenges:** Reducing data center footprint through server, desktop, network Virtualization and cloud computing, environmental impact and power requirements by driving server consolidation.	**5**	10
3	**Evolution of Data Centre :** The evolution of computing infrastructures and architectures from stand-alone servers to rack optimized blade servers and unified computing systems (UCS).	**5**	10
4	**Enterprise-level Virtualization:** Provision, monitoring and management of a virtual datacenter and multiple enterprise-level virtual servers and virtual machines through software management interfaces.	**8**	15
5	**Networking and Storage in Enterprise Virtualized Environments**: Connectivity to storage area and IP networks from within virtualized environments using industry standard protocols.	**5**	10
6	**Virtual Machines & Access Control:** Virtual machine deployment, modification, management. monitoring and migration methodologies.	**8**	**15**

7	**Resource Monitoring:** Physical and virtual machine memory, CPU management and abstraction techniques using a hypervisor.	**5**	**10**
8	**Virtual Machine Data Protection:** Backup and recovery of virtual machines using data recovery techniques	**5**	**10**
9	**Scalability:** Scalability features within Enterprise virtualized environments using advanced management applications that enable clustering, distributed network switches for clustering, network and storage expansion; High Availability: Virtualization high availability and redundancy techniques.	**5**	**10**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	**U Level**	**A Level**	**N Level**	**E Level**
10	18	18	18	06

Legends: R : Remembrance ; U = Understanding; A = Application; N = Analyze; E = Evaluation and above Levels (Revised Bloom's Taxonomy)

Reference Books:

- Mickey Iqbal 2010, IT Virtualization Best Practices: A Lean, Green Virtualized Data Center Approach, MC Press
- Mike Laverick, VMware vSphere 4 Implementation,2010
- Jason W. McCarty, Scott Lowe, Matthew K. Johnson, VMware vSphere 4 Administration Instant Reference,2009.
- Brian Perry, Chris Huss, Jeantet Fields, VCP VMware Certified Professional on vSphere 4 Study Guide,2010
- Jason Kappel, Anthony Velte, Toby Velte, Microsoft Virtualization with Hyper-V: Manage Your Datacenter with Hyper-V, Virtual PC, Virtual Server, and Application Virtualization,2009.
- Anthony T., Velte, "Cloud Computing: A Practical Approach", Tata McGraw Hill Education Pvt. Ltd., 2009, ISBN: 0070683514
- Halper Fern, Kaufman Marcia, Bloor Robin, Hurwit Judith, "Cloud Computing for Dummies", Wiley India Pvt. Ltd., 2009, ISBN: 8126524871

Course Outcome:

After learning the course, the student will be able:

1. To understand the concept of cloud computing and its characteristics.
2. To specify the need of transition from classic data center to virtual data center.
3. Manage Server Systems and Data Centre Infrastructure Management
4. Utilize the Storage, Bandwidth, Efficiency of systems and other resources for Data centre.
5. Monitoring the Networks and Resources.
6. Planning for Flexible resource allocation.

List of Experiments:

1. Monitoring the cluster using Nagios/Ganglia tools.

2. Resource allocation to clients on Cloud/cluster.

3. Implementation of Para-Virtualization using VM Ware‘s Workstation/ Oracle‘s Virtual Box and Guest O.S.

4. Implementation of SOAP Web services in C#/JAVA Applications.

5. Case Study: PAAS (Facebook, Google App Engine)

6. Case Study: Amazon Web Services.

7. Using Vsphere install 3 linux machine and access it through other machine.

8. How to secure Nginx server using fail2ban on centos 7. So up to now , we secure the webserver by using https and fail2ban. Now we have to host some websites on the server on Nginx and we have to secure it. So install Moodle and orange HRM (You can take any website like Edx) in one machine and secure it by fail2ban and https. After that, you have to take back up(Data and Database) of both websites. And restore it in another machine to make the replica of web server.

Major Equipments:

- Linux (Kali/Fedora/cent os 7)
- Network Simulators
- VMWare Workstation
- ESXI Server
- Router
- Switch
- Moodle
- Nginx
- Fail2ban