COURSE TITLE	**VIRTUALIZATION ESSENTIALS**
COURSE CODE	**05CA0504**
COURSE CREDITS	**4**

Objective:

1 To provide conceptual knowledge about various types of Enterprise Virtualization technologies.

2 To develop skills to configure and manage System Center Virtual Machine Manager (SCVMM).

3 To enable students to configure and administer VMware ESXi for enterprise virtualization solutions.

Course Outcomes: After completion of this course, student will be able to:

1 Apply virtualization concepts and technologies to configure server, storage, and network virtualization environments for practical use cases.

2 Implement and configure virtualization platforms such as Microsoft Hyper-V Server 2016 R2 and VMware vSphere to create, manage, and migrate virtual machines.

3 Analyze virtualization architectures, including clustering, load balancing, and storage solutions (iSCSI, NFS, VMFS), to optimize performance, availability, and resource utilization.

4 Evaluate virtualization strategies and tools for disaster recovery, high availability, and IT operational flexibility to support enterprise infrastructure decisions.

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Introduction to Virtualization** What is Virtualization? Why You Need Virtualization? Understanding Virtualization Technologies: Server Virtualization, Hardware emulation, Storage Virtualization, Network-attached storage, Storage area networks, I/O Virtualization, Network Virtualization, Client Virtualization, Application virtualization, Desktop virtualization Understanding Virtualization Use Cases: Studying Server Consolidation, Development and Test Environments, Quality of Service, Simple failover High availability, Clustering, Data mirroring, Data replication, IT Operational Flexibility, Load balancing, Server pooling, Helping with Disaster Recovery	10

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Contents : Unit	Topics	Contact Hours
2	**Implement and configure Microsoft Hyper-V Server 2016 R2** Introduction to Functions, Installing Hyper-V server, Monitor the performance of a Hyper-V server, use existing virtual machines with Hyper-V server, migrating existing virtual machines to Hyper-V Understand system center Virtual Machine Manager (VMM) features and use VMM to manage virtual machines, Manage a VMM Library, Manage VMM checkpoint, V2V and P2V conversion	10
3	**Introduction to VMware Virtualization** Introduce virtualization, virtual machines, and vSphere components, Explain the concepts of server, network, and storage virtualization, Describe where vSphere fits into the cloud architecture, Introduce ESXi installation, Introduce vCenter Server deployment options, Describe vCenter Server hardware, software, and database requirements, Install vCenter Server (Windows based), Deploy virtual machines using templates and cloning, Modify and manage virtual machines, Create and manage virtual machine snapshots, Perform VMware vSphere® configuring network virtualization using standard switch and DVswitch.	15
4	**Configuring and Managing Virtual Storage** Introduce storage protocols and device names, Configure ESXi with iSCSI and NFS, Create and manage VMware vSphere® VMFS data stores, Introduce VMware vSphere® Storage Appliance	10
Total Hours		**45**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Unit 1** Install and Configure a Hypervisor (VMware ESXi or Microsoft Hyper-V), Deploy VMs with different operating systems and manage resources like CPU, memory, and storage, Migrate multiple workloads into fewer virtual machines to demonstrate server consolidation, Implement Storage Virtualization using iSCSI or NFS, Configure Network Virtualization and Virtual Switches, Set Up and Test Failover Clustering or High Availability, Configure Load Balancing Between Virtual Machines, Install Hyper-V on a Windows Server and enable necessary roles/features for virtualization, Create new VMs, configure resources, and use existing VHD files to run virtual machines, Use Performance Monitor and Resource Monitor tools to evaluate CPU, memory, disk, and network usage, Migrate Existing VMs to Hyper-V, Install and Configure System Center Virtual Machine Manager (VMM), Manage Virtual Machines using VMM (Checkpoint, V2V, P2V), Create and Use VMM Library	15

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
2	**Unit 2** Install and Configure VMware ESXi Host, Install ESXi on a physical server and access it using the vSphere Client, Install and Configure vCenter Server (Windows-based), Create and Deploy Virtual Machines Using Templates and Cloning, Modify and Manage Virtual Machine Hardware Settings, Adjust VM resources such as CPU, RAM, disk size, and network adapters using vCenter, Create and Manage Virtual Machine Snapshots, Configure Standard vSwitch and Distributed vSwitch (DVSwitch), Explore Server, Network, and Storage Virtualization Concepts Using vSphere, Explore various storage protocols (iSCSI, NFS, FC) and understand how storage devices are named and accessed in vSphere, Configure iSCSI Storage for ESXi Hosts, Configure NFS Datastore on ESXi, Create and Manage VMFS Datastores, Explore and Configure VMware vSphere Storage Appliance (VSA)	15
Total Hours		**30**

Textbook :

1 Virtualization: From the Desktop to the Enterprise, Matthew Portnoy, Sybex (Wiley Publishing), 2012

2 VMware ESXi: Planning, Implementation, and Security, David Rule & Steve Jin, Syngress (Elsevier), 2014

References:

1 Virtualization Essentials (2nd Edition), Virtualization Essentials (2nd Edition), Matthew Portnoy, Sybex (Wiley Publishing), 2016

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
10.00	15.00	25.00	25.00	25.00	0.00

Instructional Method:

1 Pratical, PPT

Supplementary Resources:

1 https://www.techtarget.com/searchitoperations/definition/virtualization

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