# INFORMATION STORAGE SYSTEMS

## (Professional Elective-IV)/ (Common for CSE & IT)

**Course Code : 15CT1128**

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**Pre-requisites:**

Database Management Systems, Computer Networks.

**Course Outcomes:**

At the end of the Course, the Student will be able to:

**CO 1** Determine storage requirements for a data center.

**CO 2** Compute disk performance of storage arrays.

**CO 3** Design storage solutions based on application needs.

**CO 4** Apply storage connectivity technologies.

**CO 5** Differentiate network-attached and object-based storage.

**UNIT-I** **(10 Lectures)**

**INTRODUCTION TO INFORMATION STORAGE:**

Information Storage, Evolution of Storage Architecture, Data Center Infrastructure, Virtualization and Cloud Computing.

**DATA CENTER ENVIRONMENT-I:**

Application, Database Management System (DBMS), Host (Compute), Connectivity, Storage.

**UNIT-II** **(10 Lectures)**

**DATA CENTER ENVIRONMENT-II:**

Disk Drive Components, Disk Drive Performance, Host Access to Data, Direct-Attached Storage , Storage Design Based on Application Requirements and Disk Performance, Disk Native Command Queuing, Introduction to Flash Drives, Concept in Practice: VMware ESXi.

## UNIT-III (10 Lectures)

### DATA PROTECTION-RAID:

RAID Implementation Methods , RAID Array Components, RAID Techniques , RAID Levels , RAID Impact on Disk Performance, RAID Comparison, Hot Spares.

### INTELLIGENT STORAGE SYSTEMS:

Components of an Intelligent Storage System, Storage Provisioning, Types of Intelligent Storage Systems, Concepts in Practice: EMC Symmetric and VNX.

## UNIT-IV (10 Lectures)

### FIBRE CHANNEL STORAGE AREA NETWORKS:

Fibre Channel: Overview, The SAN and Its Evolution, Components of FC SAN , FC Connectivity, Switched Fabric Ports, Fibre Channel Architecture, Fabric Services , Switched Fabric Login Types, Zoning, FC SAN Topologies, Virtualization in SAN, Concepts in Practice: EMC Connectrix and EMC VPLEX.

IP SAN and FCoE : FCIP, FCoE.

## UNIT-V (10 Lectures)

### NETWORK-ATTACHED STORAGE :

General-Purpose Servers versus NAS Devices, Benefits of NAS, File Systems and Network File Sharing, Components of NAS, NAS I/O Operation, NAS Implementations, NAS File-Sharing Protocols, Factors Affecting NAS Performance, File-Level Virtualization, Concepts in Practice: EMC Isilon and EMC VNX Gateway.

### OBJECT-BASED AND UNIFIED STORAGE:

Object-Based Storage Devices, Content-Addressed Storage, CAS Use Cases, Unified Storage, Concepts in Practice: EMC Atoms, EMC VNX, and EMC Centera.

## TEXT BOOK:

G.Somasundaram, A.Shrivastava, “Information Storage and Management: Storing, Managing and Protecting Digital

Information in Classic, Virtualized and Cloud Environment", 2nd Edition, Wiley publication, 2012.

## REFERENCES:

1. Robert Spalding, "Storage Networks: The Complete Reference", 1stEdition, Tata McGraw Hill/Osborne, 2003.
2. Meeta Gupta, "Storage Area Network Fundamentals", 1stEdition, Pearson Education, 2002.