INFORMATION STORAGE SYSTEMS

(Professional Elective-III)/ (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 shall be able to

CO1: Determine storage requirements for a data center.
CO2: Compute disk performance of storage arrays.
CO3: Design storage solutions based on application needs.
CO4: Apply storage connectivity technologies.
CO5: Differentiate network-attached and object-based storage.

UNIT-I **(8-10 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 **(8-10 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 **(8-10 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 **(8-10 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 **(8-10 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 BOOKS:

1. G.Somasundaram, A.Shrivastava, *"EMC Corporation, 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"*, 1st Edition, Tata McGraw Hill/Osborne, 2003.
2. Meeta Gupta, *"Storage Area Network Fundamentals"*, 1st Edition, Pearson Education, 2002.

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