SEMESTER 5

STORAGE TECHNOLOGIES

Course Code	PEAIT523	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs 30 Mns
Prerequisites (if any)	NIL	Course Type	Theory

Course Objectives:

- To master the core architectures, networking technologies, and virtualization paradigms of modern storage systems
- To enable the design of secure, resilient, and optimized data storage and business continuity solutions

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Storage Systems** Introduction to Information Storage, Overview, Storage, Processing, Networking, Digital data and its types, Information storage, Key characteristics of data center and Evolution of computing platforms. Third Platform Technologies: Cloud computing and its essential characteristics, Cloud services and cloud deployment models, Big data analytics. Data Center Environment: Building blocks of a data center.	9
2	**Intelligent Storage Systems and RAID** Components of an intelligent storage system, Components, addressing, and performance of hard disk drives and solid-state drives, RAID, Types of intelligent storage systems, Scale-up and scale- out storage Architecture.	9
3	**Storage Networking Technologies and Virtualization** Fiber Channel SAN , Software-defined networking, FC SAN components and architecture, FC SAN topologies, link aggregation, and zoning, Virtualization in FC SAN environment.Internet Protocol SAN: iSCSI protocol, network components, and connectivity, Link aggregation, switch aggregation and VLAN, FCIP protocol, connectivity, and configuration.Fibre Channel over Ethernet SAN: Components of FCoE SAN, FCoE SAN connectivity, FCoE architecture.	9
4	**Backup, Archive and Replication Securing Storage Infrastructure** Introduction to Business Continuity, Backup architecture, Backup targets and methods, Cloud-based and mobile device backup, Data archive, Uses of replication and its characteristics, Compute-based, storage-based, and network-based replication. Information security goals, Storage security domains, Threats to a storage infrastructure, Security controls to protect a storage infrastructure.	11

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Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course, students should be able to:

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Course Outcome		Bloom's Knowledge Level (KL)
CO1	Demonstrate the fundamentals of information storage management and various models of Cloud infrastructure services and deployment	K2
CO2	Illustrate the usage of advanced intelligent storage systems and RAID	K2
CO3	Interpret various storage networking architectures - SAN, including storage subsystems and virtualization	K2
CO4	Examine the different roles in providing disaster recovery and remote replication technologies	K3
CO5	Infer the security needs and security measures to be employed in information storage management	K2

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	3	3	-	-	-	1	1	1	3
CO2	3	1	2	3	3	-	-	-	3	2	3	2
CO3	1	1	3	2	2	-	-	-	3	1	1	2
CO4	3	2	1	2	2	-	-	-	1	1	3	1
CO5	1	3	2	1	2	-	-	-	1	2	3	1

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Information Storage and Management	G. Somasundaram Alok Shrivastava	EMC Corporation, Wiley Publications	1/e, 2009
2	Introduction to Storage Area Networks	Jon Tate, Pall Beck, Hector Hugo Ibarra, Shanmuganathan Kumaravel and Libor Miklas	IBM - Redbooks	9/e, 2017
3	Storage Networks Explained	Wolfgang Mueller-Friedt, Rainer Wolafka, Nils Haustein, Ulf Troppens,Rainer Erkens	Wiley Publications	2/e, 2009

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Storage Technologies	Tammayi R. Nagale , Dr. Anand Khandare	Technical publications	1/e, 2024

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Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://archive.nptel.ac.in/courses/106/108/106108058/
2	http://digimat.in/nptel/courses/video/106108058/L13.html