

# GUJARAT TECHNOLOGICAL UNIVERSITY

## COMPUTER ENGINEERING (SYSTEMS & NETWORK SECURITY)(56) STORAGE AREA NETWORK SUBJECT CODE: 2745602 M.E. 4<sup>TH</sup> SEMESTER

**Type of course:** Major Elective - V

**Prerequisite:** Programming, Databases, Preliminary knowledge of network and different storage media

### Rationale:

The course aims to provide an understanding concepts of the storage area network. It provides different benefits of SAN & Data Center Evolution. It also provides the student the understanding of SAN application, Storage Backup methods, clusters and fibre media communication.

### Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		Theory Marks		Practical Marks				
				ESE (E)	PA (M)	ESE (V)		PA (I)		
					ESE	OEP	PA	RP		
3	2#	0	4	70	30	30	0	10	10	150

### Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction to SAN What is Storage Area Network? Why connect Storage to a network, Radical Changes in Information Storage and Processing, A couple of closing classifications.	3	10
2	Benefits of SAN SAN paradigm shift, Properties of SAN, Enterprise Information Processing models, Various ways that SAN paradigm makes changes to the Information Processing.	4	10
3	Data Center Evolution History, Online Transaction processing, The Standardization of Software, The PC and Client Server Processing, Specialized Servers, Global Enterprises and the Need for Global Data, External Storage Subsystems.	4	15
4	Applications for SAN Back up, Highly Available Data, Disaster Recoverability, Clusters. Data Replication.	3	10
5	SAN network architecture and Network Storage Systems Basic SAN Model, NAS Appliance, Enterprise NAS Devices, In-Band SAN Appliance, Out-of-Band SAN Appliance.	3	10
6	The Aspects of Storage and Network in Storage Networking Challenges for Network Storage, The Cost of Online Storage, Disk Aggregation and Virtualization, Disk Aggregation by Striping , Server-	5	15

	Based and Controller-Based Striping, Keeping SAN Storage Up and Working, RAID, Introduction to Fiber Channel, Emerging SAN Interconnect Technologies.		
7	Software for Storage Networking Software for SANs, Shared Access Data Managers, Computer System I/O Performance, Volumes: Resilience, Performance, and Flexibility, File Systems and Application Performance, Various types of data Replications, Clusters, Cluster Data Models, Disaster Recovery and Global Clusters.	5	10
8	Enterprise Backup software for SAN Backup Management for SANs, Enterprise Data Protection, Enterprise Backup Architecture, Enterprise Backup Policies, LAN-free and Server less Backup.	5	10
9	Adoption and Management of SAN Why Adopt Storage Networking?, Developing a SAN Deployment Strategy, Steps to Successful SAN Deployment, Critical Success Factors, SAN Management, SAN Management and Online Storage Cost.	5	10

### Reference Books:

1. Storage Area Network Essentials: A Complete Guide to Understanding and Implementing SANs, by Richard Barker, Paul Massiglia, Wiley 2001
2. Storage Networks: The Complete Reference – Robert Spalding, Tata McGraw Hill, 2003.
3. Using SANs and NAS by W. Curtis Preston, Mike Loukides

### Course Outcome:

After learning the course the students should be able:

1. Student will be enabled to learn basics of Storage area networks and will be able to learn types of storage media. Student will also learn various Cluster network models and various storage backup technologies.

### List of Tutorials:

### Case Study:

1. Various SAN components.
2. SAN deployed at CISCO International.
3. NAS (Network Attached Storage).
4. Comparison of Fiber Channel and NAS.

**Major Equipment:** Desktop, Laptop.

**Review Presentation (RP):** The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.