

FR. Conceicao Rodrigues College Of Engineering
 Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50
 Department of Computer Engineering

B.E. (IT) (semester VIII) (2018-2019)
 Course Outcomes & Assessment Plan

Subject: **Storage Network Management and Retrieval**

Course ID: BEITC801

Syllabus:

Sr. No.	Module	Detailed Content	Hours
1	NEED FOR STORAGE NETWORK	INTRODUCTION:- Limitations of traditional server STORAGE centric architecture,. Storage centric architecture and its NETWORK advantages. BASICS OF STORAGE NETWORK:- Intelligent Storage Systems (ISS), Data protection (RAID implementation methods).RAID arrays ,Components,RAID technologies, RAID levels, RAID impact on disk,performance & RAID comparison.	10
2	STORAGE NETWORK ARCHITECTURE	SCSI, SAN: FC SAN FC Protocol Stack, IP Storage,Infiniband, Virtual Interfaces	08
3	ADVANCED STORAGE TECHNOLOGY	NETWORK ATTACHED STORAGE (NAS):- Local File systems, Network File systems and file servers, Shared Disk File systems: Case study, Comparison:NAS, FC SAN and iSCSI SAN. STORAGE VIRTUALIZATION:- Virtualization in I/O path, Limitations and requirements, Definition of Storage Virtualization, Storage virtualization on Block and file level, Storage virtualization on various levels of Storage network, Symmetric and Asymmetric Virtualization.	14
4	STORAGE NETWORK	BC Terminology, BC Planning Lifecycle,	06

	BACKUP AND RECOVERY	General Conditions for Backup, Recovery Considerations, Network Backup Services Performance Bottlenecks of Network Backup, Backup Clients, Backup file systems, Backup Databases, Next Generation Backup.	
5	INFORMATION RETRIEVAL IN STORAGE NETWORK	Overview, Abstraction , Information System, Measures, from Data to Wisdom, Document and Query Form, Query structures, The matching process, Text analysis: Indexing, Matrix representation, Term extraction, Term association, , Stemming , Multilingual retrieval systems	10

Course Objectives:

- a. Study and evaluate the need for Storage networking, current storage technologies: SAN, NAS, IP storage etc., which will bridge the gap between the emerging trends in industry and academics.
- b. Understanding and building Storage networks and its backup and recovery techniques.
- c. Study the information retrieval system as per different application in storage networks.

Course Outcomes:

Students will be able to

Sr.No.	Course Outcome Statement
1	Evaluate storage architectures such as SAN, NAS, IPSAN
2	Select appropriate backup and recovery mechanism
3	Identify different storage virtualization technologies
4	Define information retrieval in storage network

Mapping of CO and PO/PSO

CO-PO and CO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1		3		2								2	3
2			2	3	2								2	3
3				2	3									3
4			3	2	2								1	2

CO Assessment Tools:

	Direct Methods								Indirect Methods
	Test 1	Assig 1	Lab Work	Test 2	Assig 2	Proj / PPT	University Theory Exam	University Practical Exam	Course Exit Survey
CO 1	20%	20%	10%			20%	15%	15%	100%
CO 2			20%	20%		20%	20%	20%	100%
CO 3				10%	30%	20%	20%	20%	100%
CO 4			30%	20%		10%	20%	20%	100%

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Lecture Plan:

Subject: Storage Network Management and Retrieval(**BEITC801**)Credits-5

2.1 Lesson Plan

No of classes available:	40	No of Classes taken:	44	
Sr. No.	Topic Planned	Planned Date	Actual Date	Delivery Mechanisms
1	INTRODUCTION:- Limitations of traditional server centric architecture,.	2/1	2/1	Chalk and board
2	Storage centric architecture and its advantages.	3/1	3/1	Chalk and board
3	BASICS OF STORAGE NETWORK	4/01	4/01	Chalk and board
4	Intelligent Storage Systems (ISS)	4/01	4/01	Chalk and board
5	Data protection (RAID implementation methods).	8/01	8/01	Chalk and board
6	RAID arrays ,Components,	9/01	9/01	Chalk and board
7	RAID technologies,	10/01	10/01	Chalk and board
8	RAID levels	11/01	11/01	Chalk and board
9	RAID impact on disk, performance	15/01	15/01	Chalk and board
10	RAID comparison	16/01	16/01	Chalk and board
11	SCSI	17/01	17/01	Chalk and board
12	FC SAN	22/01	22/01	Chalk and board
13	FC Protocol Stack	23/01	23/01	Chalk and board
14	IP Storage	23/01	23/01	Chalk and board
15	Infiniband	24/01	24/01	Chalk and board
16	Virtual Interfaces	25/01	25/01	Chalk and board
17	NETWORK ATTACHED STORAGE (NAS):-	29/1	29/1	Chalk and board
18	Local File systems, Network File systems and file servers,	30/1	30/1	Chalk and board

19	Shared Disk File systems	31/1	1/02	Chalk and board
20	Case study	1/02	7/02	Chalk and board
21	Comparison: NAS, FC SAN and iSCSI SAN.	7/02	8/02	Chalk and board
22	STORAGE VIRTUALIZATION	8/02	8/02	Chalk and board
23	STORAGE VIRTUALIZATION Definition of Storage Virtualization	8/02	12/02	Chalk and board
24	Storage virtualization on Block and file level	12/02	20/02	Chalk and board
25	Storage virtualization on various levels of Storage network,	19/02	26/02	Chalk and board
26	Symmetric and Asymmetric Virtualization.	26/02	28/02	Chalk and board
27	BC Terminology, BC Planning Lifecycle	28/02	28/02	Chalk and board
28	, General Conditions for Backup, Recovery Considerations	1/03	1/03	Chalk and board
29	, Network Backup Services Performance Bottlenecks of Network Backup	1/03	1/03	Chalk and board
30	Backup Clients, Back up file systems	5/03	5/03	Chalk and board
31	Backup Databases, Next Generation Backup	5/03	5/03	Chalk and board
32	IR Overview, Abstraction	5/03	5/03	Chalk and board,
33	Information System,	6/3	6/3	Chalk and board,
34	Measures, from Data to Wisdom	8/3	8/3	Chalk and board,
35	Document and Query Form, Query structures,	13/3	13/3	Chalk and board
36	The matching process	14/3	14/3,19/3	Chalk and board

37	Text analysis:	19/3	20/3	Chalk and board,
38	Indexing, Matrix representation,	20/3	22/3	Chalk and board,
39	Term extraction, Term association,	22/3	26/3	Chalk and board,
40	Stemming , Multilingual retrieval systems	27/3	27/3,28/3 29/3	Chalk and board,

Term Work:

Term work: based on Laboratory Practical's/ Case studies and assignment

1. Term work shall consist of 10 practical implementation, case studies and study of simulators or tools available.
2. Study and implementation of simulation tool Navisphere and Unisphere related to storage network management.
3. Case study on Building and implementing SAN.
4. Study and implementation of any information retrieval tool.

Theory Examination:

- Question paper will comprise of 6 questions, each carrying 20 marks.
- Total 4 questions need to be solved.
- Q.1 will be compulsory, based on entire syllabus where in sub questions of 2 to 3 marks will be asked.
- Remaining question will be randomly selected from all the modules. Weight age of marks should be proportional to number of hours assigned to each module.

Text Books/ Reference Books:

Text Books:

1. ULF Troppen, Rainer Erkens and Wolfgang Muller , “ Storage Networks Explained:Basic and Applications of Fibre Channel SAN, NAS and ISCSI and Infifniband “ ,Wiley

2. EMC Educational Services, “Information Storage and Management”, wiley India

3. R. R. Korfhage, “Information Storage and Retrieval”, Wiley

References:

1. Richard Barker and Paul Massiglia, “ Storage Area Network Essentials: A Complete Guide to Understanding and Implementing SANs” , Wiley.

2. Robert Spalding, “ Storage Networks: The Complete Reference”, Tata McGraw Hill

3. W. Curtis Preston, “Using SANs and NAS”, O’Reilly

List of Experiments:

Expt No.	Name of Experiment
1	Study of Storage devices
2	Study of storage infrastructure at Fr.CRCE
3	Case study on RAID I
4	Case study on RAID II
5	Case study on SAN
6	Case study on Backup and recovery
7	Case study on virtualization
8	Case study on local replication
9	Case study on remote replication
10	Indexing and retrieval using Terrier I
11	Indexing and retrieval using Terrier II