

Internal Assessment Test 2 – NOV. 2020

Sub:	Storage Area Networks				Sub Code:	17CS754	Branch:	ISE		
Date:	07 -11 -20	Duration:	90 min's	Max Marks:	50	Sem / Sec:	VII			OBE
<u>Answer any THREE FULL Questions from Part A and Part B is mandatory</u>								MARKS	CO	RBT
1. (a)	<p>Mention the topologies of iSCSI connectivity. Briefly explain them with diagrams.</p> <ul style="list-style-type: none"> List of two topologies Explanation of each topology https://www.youtube.com/watch?v=dH0yz-Osy54 <p>3 Diagrams</p> <p>Answer: Two topologies of iSCSI implementations are native and bridged. 1. Native topology does not have FC components. The initiators may be either directly attached to targets or connected through the IP network. 2. Bridged topology enables the coexistence of FC with IP by providing iSCSI-to-FC bridging functionality. For example, the initiators can exist in an IP environment while the storage remains in an FC environment. Native iSCSI Connectivity FC components are not required for iSCSI connectivity if an iSCSI-enabled array is deployed. In the array has one or more iSCSI ports configured with an IP address and is connected to a standard Ethernet switch. After an initiator is logged on to the network, it can access the available LUNs on the storage array. A single array port can service multiple hosts. initiators as long as the array port can handle the amount of storage traffic that the hosts generate.</p>						[07]	CO 2	L2	
(b)	<p>Explain iSCSI protocol stack with diagram</p> <p>iSCSI Protocol Stack displays a model of the iSCSI protocol layers and depicts the encapsulation order of the SCSI commands for their delivery through a physical carrier. SCSI is the command protocol that works at the application layer of the Open System Interconnection (OSI) model. The initiators and targets use SCSI commands and responses to talk to each other. The SCSI command descriptor blocks, data, and status messages are encapsulated into TCP/IP and transmitted across the network between the initiators and targets. iSCSI is the session-layer protocol that initiates a reliable session between devices that recognize SCSI commands and TCP/IP. The iSCSI session-layer interface is responsible for handling login, authentication, target discovery, and session management. TCP is used with iSCSI at the transport layer to provide reliable transmission. TCP controls message flow, windowing, error recovery, and retransmission. It relies upon the network layer of the OSI model to provide global addressing and connectivity. The Layer 2 protocols at the data link layer of this model enable node-to-node communication through a physical network.</p>						[03]	CO 2	L2	
2.	<p>Explain with neat diagram BC Planning Life Cycle.</p> <p>Business continuity (BC) is an integrated and enterprise-wide process that includes all activities (internal and external to IT) that a business must perform to mitigate the impact of planned and unplanned downtime. BC entails preparing for, responding to, and recovering from a system outage that adversely affects business operations. It involves proactive measures, such as business impact analysis, risk assessments, BC technology solutions deployment (backup and replication), and reactive measures, such as disaster recovery and restart, to be invoked in the event of a failure. The goal of a BC solution is to ensure the “information availability” required to conduct vital business operations. BC</p>						[10]	CO 3	L2	

	Terminology • Disaster recovery: This is the coordinated process of restoring systems, data, and the infrastructure required to support ongoing business operations after a disaster occurs. It is the process of restoring a previous copy of the data and applying logs or other necessary processes to that copy to bring it to a known point of consistency. After all recovery efforts are completed, the data is validated to ensure that it is correct.			
3. (a)	<p>What is Business Continuity? Explain BC Terminology in detail</p> <p>BC Terminology • Disaster recovery: This is the coordinated process of restoring systems, data, and the infrastructure required to support ongoing business operations after a disaster occurs. It is the process of restoring a previous copy of the data and applying logs or other necessary processes to that copy to bring it to a known point of consistency. After all recovery efforts are completed, the data is validated to ensure that it is correct. • Disaster restart: This is the process of restarting business operations with mirrored consistent copies of data and applications. • Recovery-Point Objective (RPO): This is the point in time to which systems and data must be recovered after an outage. It defines the amount of data loss that a business can endure. A large RPO signifies high tolerance to information loss in a business. Based on the RPO, organizations plan for the frequency with which a backup or replica must be made. For example, if the RPO is 6 hours, backups or replicas must be made at least once in 6 hours. Figure 9-3 (a) shows various RPOs and their corresponding ideal recovery strategies. An organization can plan for an appropriate BC technology solution on the basis of the RPO it sets. For example: • RPO of 24 hours: Backups are created at an offsite tape library every midnight. The corresponding recovery strategy is to restore data from the set of last backup tapes. • RPO of 1 hour: Shipping database logs to the remote site every hour. The corresponding recovery strategy is to recover the database to the point of the last log shipment. • RPO in the order of minutes: Mirroring data asynchronously to a remote site • Near zero RPO: Mirroring data synchronously to a remote site • Recovery-Time Objective (RTO): The time within which systems and applications must be recovered after an outage. It defines the amount of downtime that a business can endure and survive. Businesses can optimize disaster recovery plans after defining the RTO for a given system. For example, if the RTO is 2 hours, it requires disk-based backup because it enables a faster restore than a tape backup. However, for an RTO of 1 week, tape backup will likely meet the requirements. Some examples of RTOs and the recovery strategies to ensure data availability are listed here (refer to Figure 9-3 [b]): • RTO of 72 hours: Restore from tapes available at a cold site. • RTO of 12 hours: Restore from tapes available at a hot site. • RTO of few hours: Use of data vault at a hot site [10] CO2 L2 • RTO of a few seconds: Cluster production servers with bidirectional mirroring, enabling the applications to run at both sites simultaneously. • Data vault: A repository at a remote site where data can be periodically • or continuously copied (either to tape drives or disks) so that there is • always a copy at another site n Hot site: A site where an enterprise’s operations can be moved in the event of disaster. It is a site with the required hardware, operating system, application, and network support to perform business operations, where the equipment is available and running at all times. • Cold site: A site where an enterprise’s operations can be moved in the event of disaster, with minimum IT infrastructure and environmental facilities in place, but not activated • Server Clustering: A group of servers and other necessary resources coupled to operate as a single system. Clusters can ensure high availability and load balancing. Typically, in failover clusters, one server runs an application and updates the data, and another server is kept as standby to take over completely, as required. In more sophisticated clusters, multiple servers may access data, and typically one server is kept as standby. Server clustering provides load balancing by distributing the application</p>	[05]	CO 3	L2
(b)	<p>Describe Failure Analysis in BC(any two).</p> <p>A single point of failure refers to the failure of a component that can terminate The availability of the entire system or IT service. Figure 9-5 depicts a system</p>	[05]	CO 3	L2

	<p>setup in which an application, running on a VM, provides an interface to the client and performs I/O operations. The client is connected to the server through an IP network, and the server is connected to the storage array through an FC connection. In a setup in which each component must function as required to ensure data availability, the failure of a single physical or virtual component causes the unavailability of an application. This failure results in disruption of business operations. For example, failure of a hypervisor can affect all the running VMs and the virtual network, which are hosted on it. In the setup shown in Figure 9-5, several single points of failure can be identified. A VM, a hypervisor, an HBA/NIC on the server, the physical server, the IP network, the FC switch, the storage array ports, or even the storage array could be a potential single point of failure.</p>			
4. (a)	<p>What is FCoE? List the FCoE enabling technologies</p> <p>Conventional Ethernet is lossy in nature, which means that frames might be dropped or lost during transmission. Converged Enhanced Ethernet (CEE), or lossless Ethernet, provides a new specification to the existing Ethernet standard that eliminates the lossy nature of Ethernet. This makes 10 Gb Ethernet a viable storage networking option, similar to FC. Lossless Ethernet requires certain functionalities. These functionalities are defined and maintained by the data center bridging (DCB) task group, which is a part of the IEEE 802.1 working group, and they are:</p> <ul style="list-style-type: none"> • Priority-based flow control • Enhanced transmission selection • Congestion Notification • Data center bridging exchange protocol. 	[04]	CO 2	L1
(b)	<p>Explain the components of FCoE with neat diagram.</p> <p>A CNA provides the functionality of both a standard NIC and an FC HBA in a single adapter and consolidates both types of traffic. CNA eliminates the need to deploy separate adapters and cables for FC and Ethernet communications, thereby reducing the required number of server slots and switch ports. CNA offloads the FCoE protocol processing task from the server, thereby freeing the server CPU resources for application processing. As shown in Figure 6-14, a CNA contains separate modules for 10 Gigabit Ethernet, Fibre Channel, and FCoE Application Specific Integrated Circuits (ASICs). The FCoE ASIC encapsulates FC frames into Ethernet frames. One end of this ASIC is connected to 10GbE and FC ASICs for server connectivity, while the other end provides a 10GbE interface to connect to an FCoE switch.</p>	[06]	CO 2	L2
	PART B			
1.	<p>To increase the distance of fiber you will use</p> <p>A. HBA B. FC switch C. Repeaters D. Media Interface Adapters</p>	[1]	CO 2	L2
2.	<p>In FC, which of the following are analogous to IP address in data networks?</p> <p>Question Type</p> <p>A. Node WWN B. Port WWN C. Fabric address D. Well known addresses</p>	[1]	CO 2	L2
3.	<p>Who determines the WWN of FC end point</p> <p>A. Vendor B. Fabric controller C. Node/Loop ports participating in the FC connection D. None of the mentioned</p>	[1]	CO 2	L2
4.	<p>Which of the following uniquely identifies an upper layer protocol command within a FC system?</p> <p>A. Originator exchange id B. Originator exchange id and source id C. Receiver exchange id D. Originator exchange id, Receiver exchange id and source id</p>	[1]	CO 2	L2
5.	<p>iSCSI is mapping of</p> <p>A. SCSI over TCP/IP B. IP over SCSI</p>	[1]	CO 2	L2

	C. FC over IP D. None of the mentioned			
6.	Disk controller driver in DAS architecture is replaced in SAN either with —— A. FC Protocol B. iSCSI C. TCP/IP stack D. Any one of the mentioned	[1]	CO 2	L2
7.	What will be used by SAN to provide connectivity between hosts and storage? A. FC B. iSCSI C. FC or iSCSI D. SCSI	[1]	CO 2	L2
8.	Which of the following is false? A. All storage devices talk using SCSI commands and responses B. SCSI is manufacturer independent C. SCSI command is independent of underlying transports like iSCSI, FCP, etc. D. None of the above	[1]	CO 2	L2
9.	Which of the following statement is false? A. iSCSI is limited to local LAN B. iSCSI can run both on 1GB and 10GB networks C. iSCSI requires Fibre Channel HBA on the host D. iSCSI requires network card on the host	[1]	CO 2	L2
10.	Which of the following is not true of iSCSI names? A. iSCSI names are associated with iSCSI nodes(targets and initiators). B. iSCSI names are associated with n/w adapter cards C. iSCSI names are world wide unique. D. iSCSI names are permanent.	[1]	CO 2	L2
11.	DAS,OSD stands for A. Direct attached Storage, Object based Storage Device B. Direct arranged Storage, Object based Stored Device C. None of the above	[1]	CO 2	L2
12.	This is the practice of collecting computer files that have been packaged together for _____ to transport to some other location, for saving away from the computer so that more hard disks can be made available, or for some other purpose. A.restore B.business C. backup D.none of the above	[1]	CO 3	L2
13.	Virtual SAN is also called ----- A.Visual SAN B. virtual fabric C.None of the above	[1]	CO 2	L2
14.	In FC, which of the following are analogous to IP address in data networks? A. Node WWN B. Port WWN C. Fabric address D. Well known addresses	[1]	CO 2	L2
15.	Who determines the WWN of FC end point A. Vendor B. Fabric controller C. Node/Loop ports participating in the FC connection D. None of the mentioned	[1]	CO 2	L2
16.	A NAS solution is most appropriate for what type of data environment a) Secured Access b) Shared access c) Remote access d) Parallel access	[1]	CO 2	L2
17.	Which of the following statement is true? a) iSCSI can be implemented in software b) iSCSI can be implemented in hardware c) System can boot from iSCSI disk over network d) All of the mentioned	[1]	CO 2	L2

18.	NFS & CIFS are a) Filesystems b) Operating systems c) Transport protocols d) File access protocols	[1]	CO 2	L2
19.	What components on SAN can be virtualized a) Disk b) Tape Drive c) Tape Library d) All of the mentioned	[1]	CO 2	L2

CO PO Mapping

Course Outcomes		Modu les cover ed	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S 1	P S 2	P S 3	P S 4
CO1	Identify key challenges in managing information and analyze different storage networking technologies and virtualization	1	2	2	-	-	-	-	-	-	-	-	-	1	-	-	1	-
CO2	Explain components and the implementation of NAS, IPSAN, FcoE, iSCSI, FCIP	2	2	2	-	-	-	-	-	-	-	-	-	1	-	-	1	-
CO3	Describe CAS architecture and types of backup, Archive and Replication	2,3	2	2	-	-	-	-	-	-	-	-	-	1	-	-	1	-
CO4	Explain cloud computing and identify different storage virtualization technologies	4	2	2	-	-	-	-	-	-	-	-	-	1	-	-	1	-
CO5	Describe securing and storage infrastructure and management activities, monitoring the data centers.	5	2	2	-	-	-	-	-	-	-	-	-	1	-	-	1	-

COGNITIVE LEVEL	REVISED BLOOMS TAXONOMY KEYWORDS
L1	List, define, tell, describe, identify, show, label, collect, examine, tabulate, quote, name, who, when, where, etc.
L2	summarize, describe, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss, extend
L3	Apply, demonstrate, calculate, complete, illustrate, show, solve, examine, modify, relate, change, classify, experiment, discover.
L4	Analyze, separate, order, explain, connect, classify, arrange, divide, compare, select, explain,

	infer.
L5	Assess, decide, rank, grade, test, measure, recommend, convince, select, judge, explain, discriminate, support, conclude, compare, summarize.

PROGRAM OUTCOMES (PO), PROGRAM SPECIFIC OUTCOMES (PSO)				CORRELATION LEVELS	
PO1	Engineering knowledge	PO7	Environment and sustainability	0	No Correlation
PO2	Problem analysis	PO8	Ethics	1	Slight/Low
PO3	Design/development of solutions	PO9	Individual and team work	2	Moderate/ Medium
PO4	Conduct investigations of complex problems	PO10	Communication	3	Substantial/ High
PO5	Modern tool usage	PO11	Project management and finance		
PO6	The Engineer and society	PO12	Life-long learning		
PSO1	Develop applications using different stacks of web and programming technologies				
PSO2	Design and develop secure, parallel, distributed, networked, and digital systems				
PSO3	Apply software engineering methods to design, develop, test and manage software systems.				
PSO4	Develop intelligent applications for business and industry				