CBCS SCHEME

Modified.

USN | | | | | | | | | | |

17CS754

Seventh Semester B.E. Degree Examination, Jan./Feb. 2021
Storage Area Networks

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Explain the key characteristics of Data centre with neat diagram. **(08 Marks)**
b. Explain the core elements of Data center. **(04 Marks)**
c. Discuss the process of mapping user files to disk storage with neat diagram. **(08 Marks)**

OR

2 a. Describe the concept of Mirroring and Parity. **(04 Marks)**
b. What is RAID? Explain the RAID levels with reference to nested RAID, RAID 3 and RAID 5 with neat diagram. **(08 Marks)**
c. Discuss the components of an intelligent storage system with neat diagram. **(08 Marks)**

Module-2

3 a. List and explain different Fibre channel connectivity options with neat diagram. **(08 Marks)**
b. Define FCOE. Explain components of an FCOE network. **(08 Marks)**
c. Define Zoning. Explain types of Zoning. **(04 Marks)**

OR

4 a. Discuss components of NAS with neat diagram. **(06 Marks)**
b. List and explain benefits of NAS. **(06 Marks)**
c. Explain object storage and Retrival in OSD with diagram. **(08 Marks)**

Module-3

5 a. Define Business Continuity. Explain BC terminology in detail. **(06 Marks)**
b. Discuss different Backup Topologies. **(08 Marks)**
c. Explain the concept of Backup in virtualized Environments. **(06 Marks)**

OR

6 a. Explain local Replication technology using Host based methods. **(08 Marks)**
b. Discuss synchronous + Asynchronous and Synchronous + Disk Buffered of three site replication. **(06 Marks)**
c. Explain the concept of Remote replication and migration in a Virtualized Environment. **(06 Marks)**

Module-4

7 a. Define Cloud Computing. List and explain the essential characteristics of cloud computing. **(08 Marks)**
b. List the cloud service models and discuss any two of them. **(08 Marks)**
c. List and explain benefits of cloud computing. **(04 Marks)**

OR

8	a.	Explain Cloud Deployment models in detail.	**(10 Marks)**
	b.	Explain Cloud Computing infrastructure in detail.	**(10 Marks)**

Module-5

9	a.	List and explain the different types of security threats.	**(06 Marks)**
	b.	Discus IPSAN CHAP protocol with neat diagram.	**(06 Marks)**
	c.	Discuss security solutions for FC-SAN and NAS.	**(08 Marks)**

OR

10	a.	List and describe storage infrastructure management activities.	**(04 Marks)**
	b.	Explain Information lifecycle management with proper example.	**(08 Marks)**
		Discuss two methods of storage tiering.	**(08 Marks)**

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Re: Sir, regarding Modification of scheme and solutions

"Ravishankar K C" <kcrshankar@gmail.com>

February 22, 2021 9:13 PM

To: boe@vtu.ac.in

Dear sir
Schemes of 17CS753,17CS754 and 17IS753 have been approved.

Thanks and Regards
Dr KCR

Dr K C Ravishankar
Principal GEC Hassan
Chairman, BOE CS/IS
Sent from my iPhone

> On 22-Feb-2021, at 2:33 PM, boe@vtu.ac.in wrote:
>
> <17CS753.pdf>
> <17CS754.pdf>
> <17IS753.pdf>

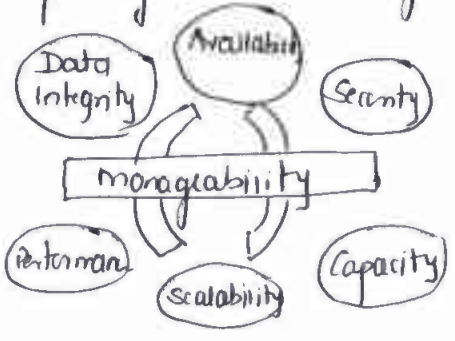
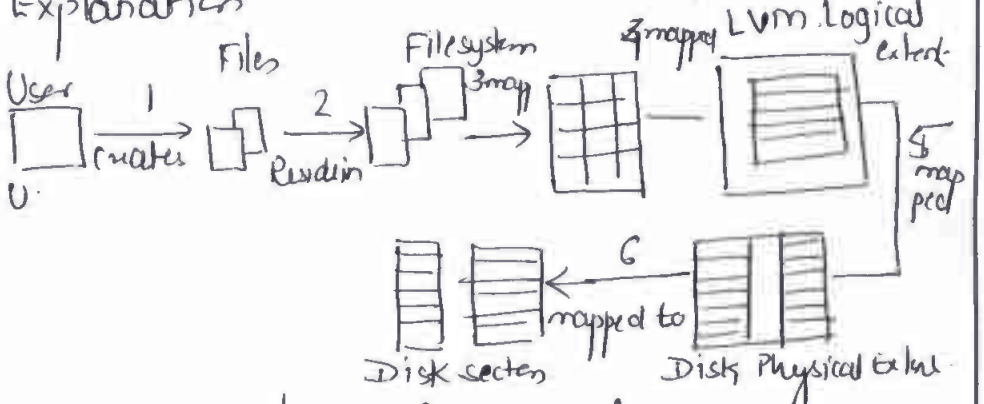
"APPROVED"
Registrar (Evaluation)
Visvesvaraya Technological University
BELAGAVI - 590018

Visvesvaraya Technological University
Belagavi, Karnataka – 590 018.

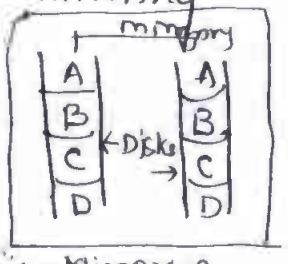
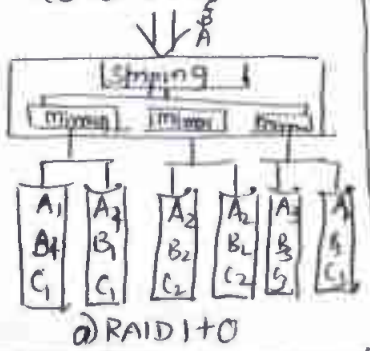
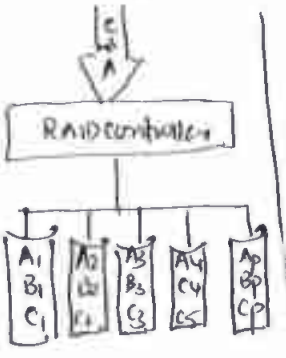
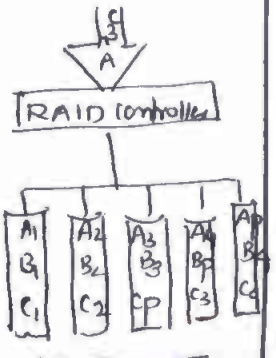
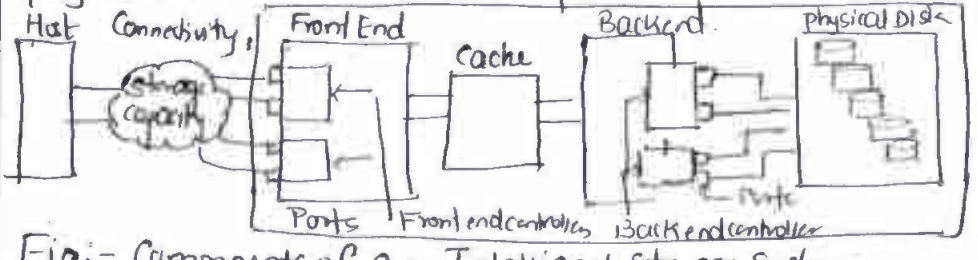
Scheme & Solutions

Signature of Scrutinizer

Subject Title : Storage Area Network **Subject Code :** 17CS754

Question Number	Solution	Marks Allocated
Q1 a.	Key characteristics of a Data center are, Availability, Security, Scalability, Performance, Data Integrity Capacity and Manageability. Explanation + Diagram 	6+2 ~~7++~~ =8
b.	Core elements of a Data center are Application DBMS, Host, Network and storage Explanation	4
c.	 Diagram + steps of process of mapping user files to disk storage subsystem.	4+4 =8

Subject Title : Storage Area Network Subject Code : 17CS754

Question Number	Solution	Marks Allocated
Q2 a.	Definition ~~Definition~~ → Mirroring is a technique whereby same data is stored on two different disk drives. Working + Diagram fig mirroring. Definition → Parity is a method to protect striped data from disk drive failure without the cost of mirroring.  fig - Mirroring  fig Parity RAID.	2+2 =4.
Q2 b)	Definition of RAID → multiple drives, RAID Technique. RAID levels → RAID 0, 1, Nested RAID 3, 4, 5, 6. Explanation of RAID — Nested RAID, RAID 3 & 5 Nested RAID 1+0.  a) RAID 1+0  Fig RAID 3  Fig RAID 5 fig Nested RAID	2+2+2+2 =8
Q2 c)	Components of an Intelligent storage System. Consist of 4 key components : Front end, Cache, Backend. physical Disks → Detailed Explanation of each  Fig:- Components of an Intelligent Storage System	2+2+2+2 =8

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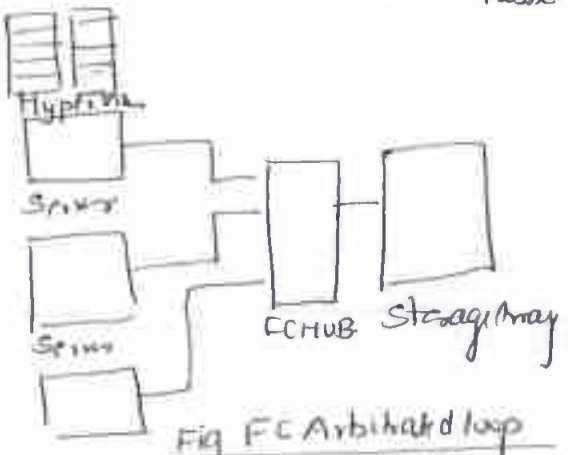
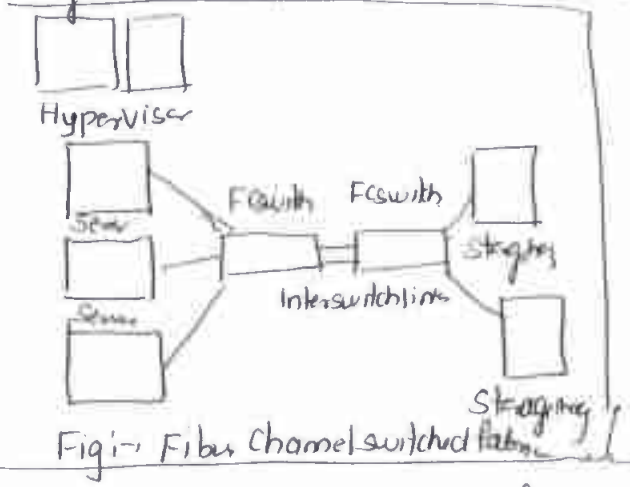
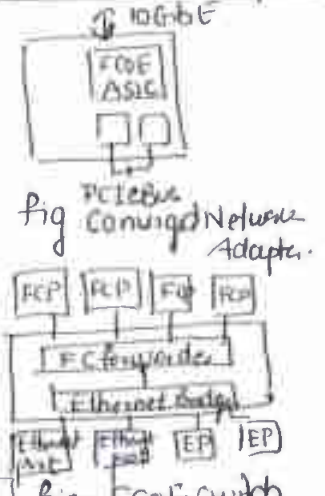
Question Number	Solution	Marks Allocated
Q3 a.	Point to point, Fibre channel Arbitrated loop, Fibre Channel Switched Fabric Explanation of point to point, Fibre channel AL, FC Switched Fabric  Fig Point to Point  Fig FC Arbitrated loop  Fig:- Fibre Channel switched fabric  Fig PCIe Bus Converged Network Adapter. Fig- FCoE switch	2+2+2 +2 (Diagram) = 8
Q3b	Definition of FCOE → consolidation of LAN & SAN Components of an FCOE network → Converged Network Adapter Cables, FCoE switches → Explanation and Diagram.	2+2+2+2 = 8
Q3c.	Definition of Zoning → FC switch Function, nodes, Types of Zoning → Port Zoning, WWN Zoning, mixed zoning	1+3 =4
Q4 a.	Components of NAS → CPU & memory, NIC, optimized OS, NFS, CIFS, physical disk resources.  Fig Components of NAS	Explan(4) Diagram (2) 4+2 =6

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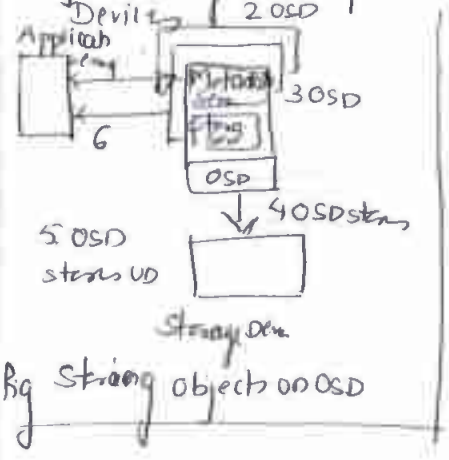
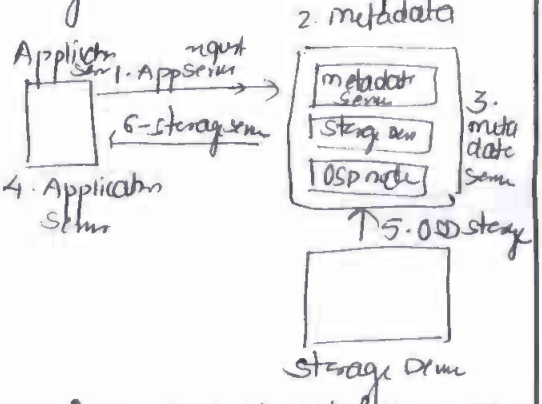
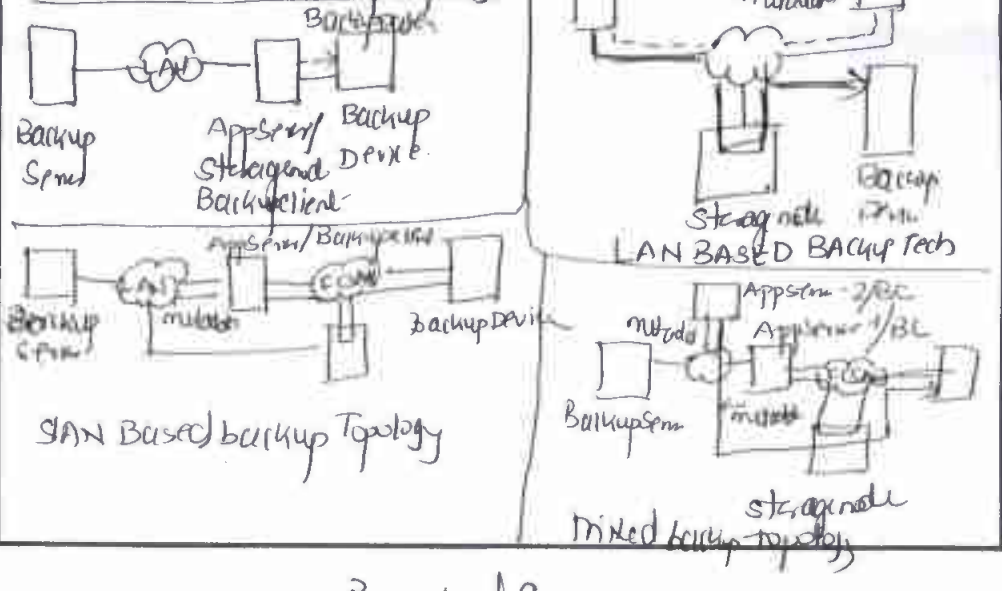
Question Number	Solution	Marks Allocated
Q4 b	Benefits of NAS → Comprehensive access to information, Improved efficiency, Improved flexibility, Centralized storage, Simplified management, Scalability, High Availability, Security, Low cost, Ease of Deployment.	6
Q4 c.	Object Storage is → 2 parts Storage & Retrival – Explanation  Fig Storing objects on OSD  fig Object retrival from an OSD system	4+4
	Module 3	
Q5 a.	Business Continuity (BC) is an integrated & enterprise wide process that includes all activities that business must perform. BC terminology → Disaster recovery, Disaster restart, RPO, RTO. Data vaults, Hot site, cold site, server clustering	1+5 = 6
b.	Backup Topologies – Direct Attached, LAN based, SAN, mixed Explanation + Diagram. 	2+2+2+2 = 8.

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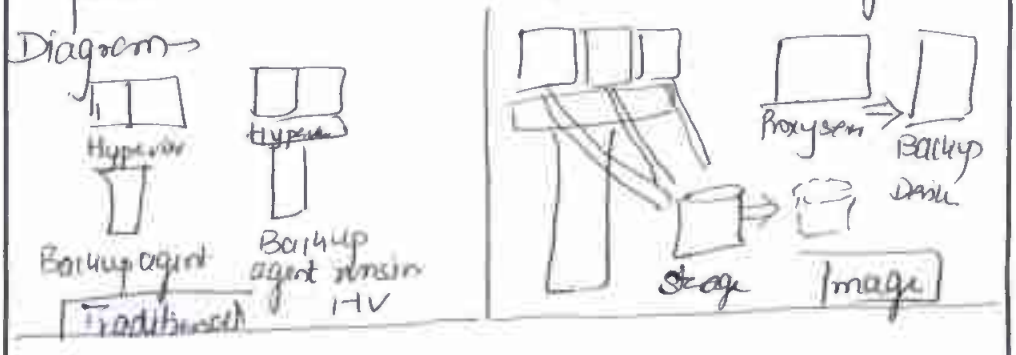
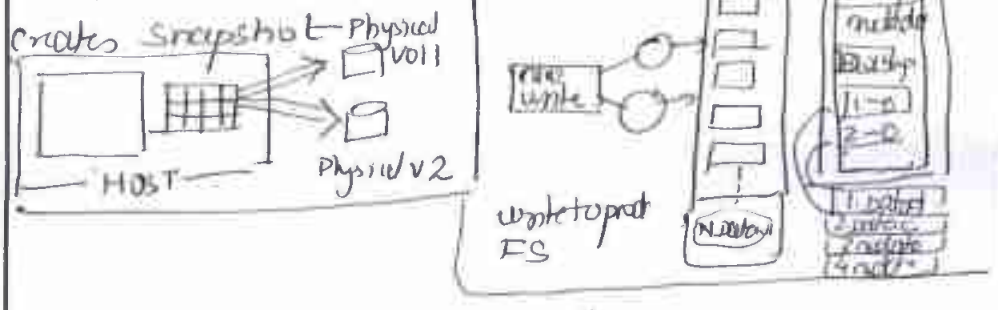
Question Number	Solution	Marks Allocated
Q5 c)	Defination → Virtual machine data to prevent it's loss, corruption due to human or technical errors. Traditional backup app. & Image based backup Explanation of both backup technique [Traditional Image based. Diagram → 	3+3 =6
Q6 a)	Local replication Technologies like Host-based, storage array based & network based replications. Host based Local replication → LVM Based, Filesystem snapshot LVM Based replication → LVM for creating & controlling 3 components - physical volume, volume groups, logical vol Adv & Limitations Filesystem Snapshot → pointer based replication, either FS or LVM. It uses copy on First write (COFW) creates Snapshot 	2+3+3 =8
b)	Three-site replication – Defination. Technique → cascade/multihop → Synch+Asynch Synch + Disk Buffered - Explanation of Synch+Asynch, Synch+Disk Buff and Diagram	3+3 =6

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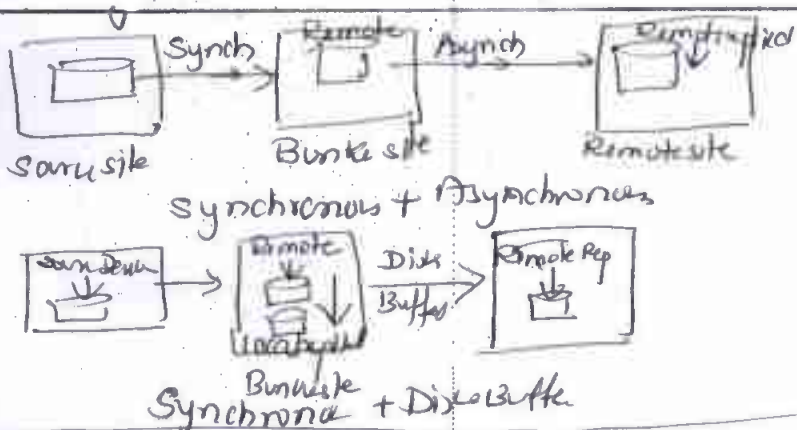
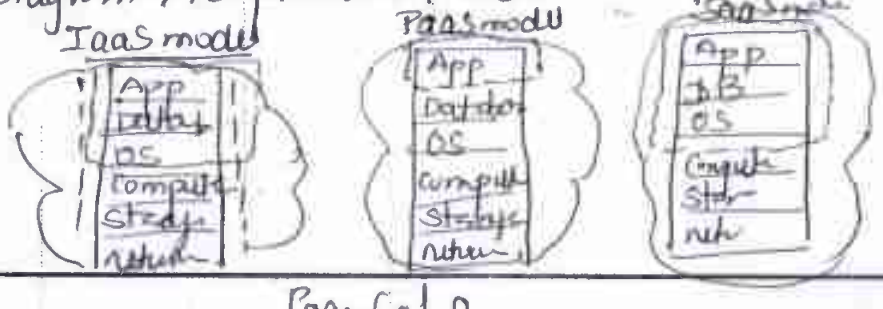
Question Number	Solution	Marks Allocated
Q6 b		
c.	Discuss Virtualized environment Files residing on Storage array at primary site 2 techniques → Hypervisor to Hypervisor VM migration and array to array VM migration → Explanation 	3+3 = 6
Q7 a]	Defination of Cloud Computing → enabling ubiquitous, convenient, on-demand network characteristics → ① on demand self service ② Broad network access ③ Resource pooling ④ Rapid Elasticity ⑤ Network Service → Explanation	2+6 = 8
b]	Cloud service models → Infrastructure as a Service (IaaS), platform as a service, software as a service (SaaS) Diagram + Explanation + List 	2+2+2 +2 = 8

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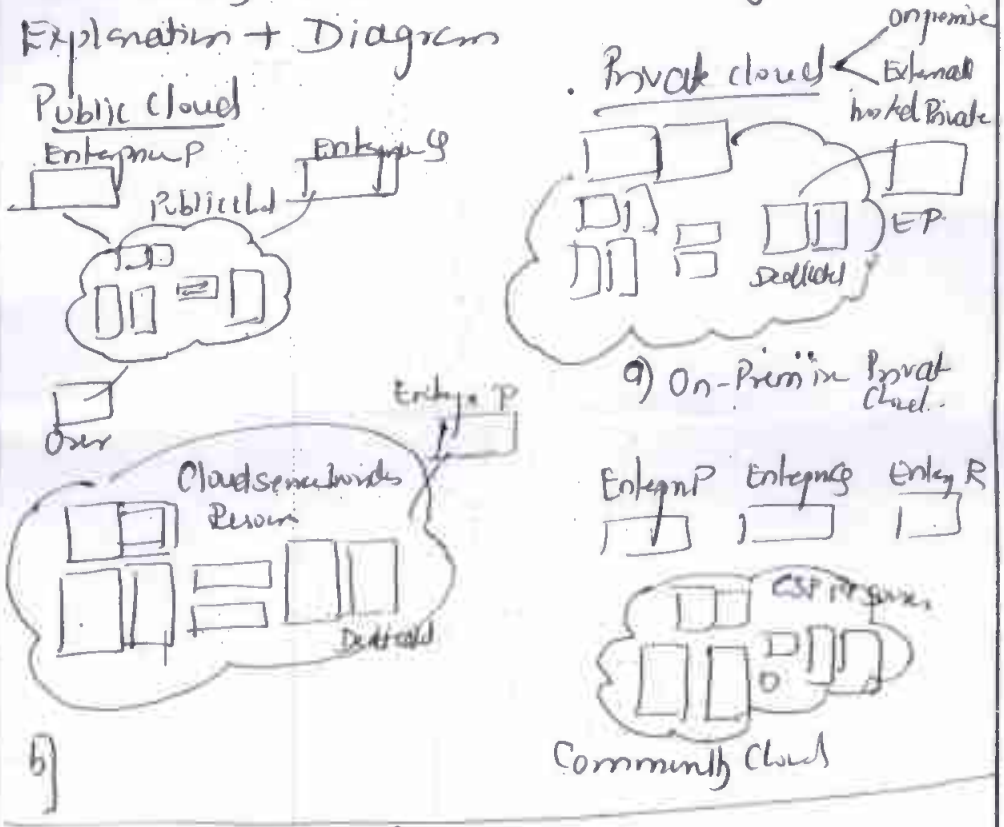
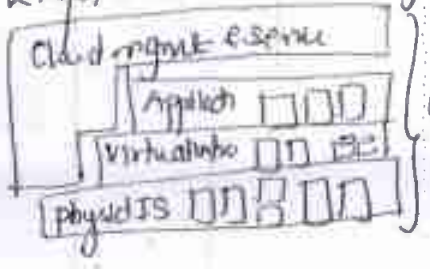
Question Number	Solution	Marks Allocated
Q8 a]	Public cloud, Private cloud, Community cloud Explanation + Diagram 	1+3+3+3 = 10
b]	Cloud Computing infrastructure Physical Infrastructure, Application & platform software Virtual infrastructure - Cloud mgmt & service creation Tools Explanation + Diagram  cloud infrastructure layer Diagram	2+2+2 +2+2 = 10
Q9 a]	List → Assets, Threats, Vulnerability Assets → hardware, software, other infrastructure, security methods Threats → Passive, Active Vulnerability → Defense in depth, Attack surface, Attack vector, Weakness factor	

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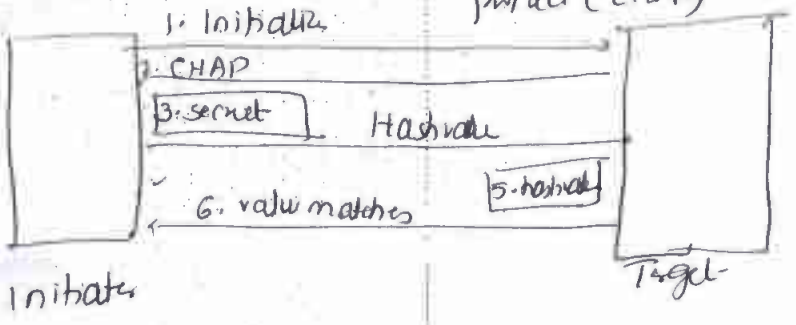
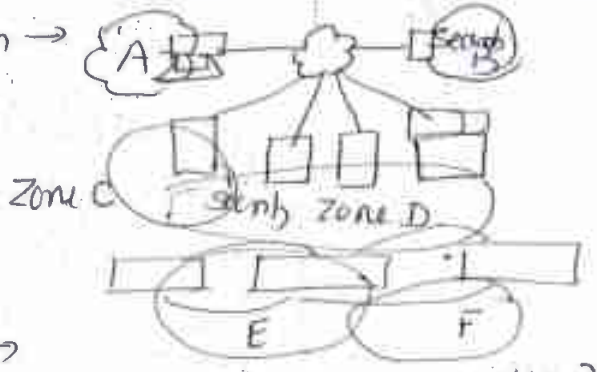
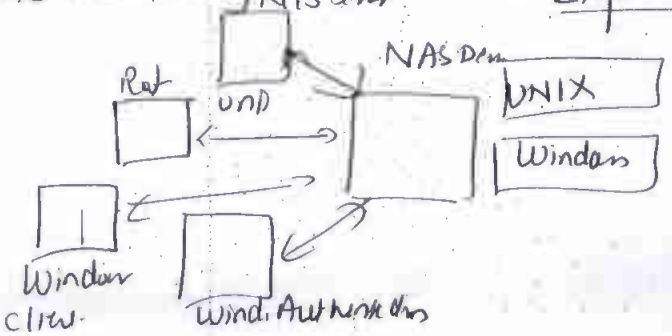
Question Number	Solution	Marks Allocated
Q9 b.	IPSAN – uses CHAP – Challenge Handshake Authentication Protocol (CHAP)  Explanation + Diagram	4+2 =6
c]	FCSAN + NAS FCSAN — Diagram, FCSAN security Approach Diagram →  NAS → Explanation → NAS File sharing, UNIX Permissions NAS File sharing  Explanation + Diagram	4+4
Q10 a]	Storage Infrastructure management activities → Availability management - Capacity management Performance management Security management -	4

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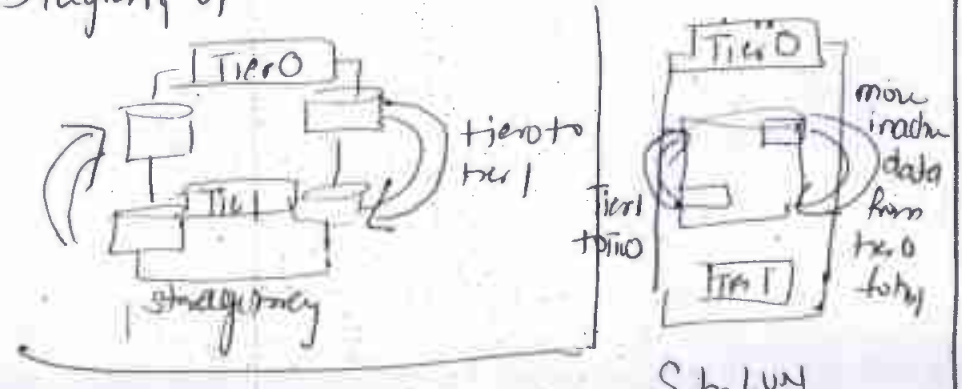
Question Number	Solution	Marks Allocated
Q10 b]	ILM – Information lifecycle management Exploiting, Increasing, changing value of info. example of sales order application. challenges → Lower Total cost of ownership simplified mgmt, maintaining compliance, optimized utilization	2+6 = 8
c]	Storage Tiering Discuss Storage Tiering concepts & Manual and Automated storage tiering methods to be discussed. 2 Data movements → Intra Array & Inter Array Explanation of LUN & SUB-LUN. Diagram of LUN & SUB-LUN.  LUN Tiering Sub LUN	4+4 = 8

— X —

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Registrar (Evaluation)
Visvesvaraya Technological University
BELAGAVI - 590018