

[4]

- ii. Explain Cloud Computing Architecture. Brief the services provided by cloud? 3
- iii. Explain various cloud service provider's service architecture and compare them. 5
- OR iv. Write short notes on the following: 5
- (a) Cloud security and integration
- (b) Types of Cloud

Total No. of Questions: 6

Total No. of Printed Pages:4

Enrollment No.....



Faculty of Engineering
End Sem (Odd) Examination Dec-2019
IT3EL03 Information Storage and Management
Programme: B.Tech. Branch/Specialisation: IT

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- Q.1 i. Which of the following statements about various hard disks is wrong? 1
- (a) SATA Disks support faster transfer rates and have support for hot swapping
- (b) USB Hard disks store data on flash memory
- (c) ATA hard disks cannot be connected externally to computer
- (d) None of these
- ii. Using file access protocols, data residing on which of the following can be accessed: 1
- (a) Local disk (b) Remote disk
- (c) Both (a) and (b) (d) Neither (a) nor (b)
- iii. Which of the following RAID levels guarantees double disk failure protection? 1
- (a) Raid 5 (b) Raid 6 (c) Raid 0+1 (d) Raid 0+5
- iv. When one disk fails in a RAID 5 array with a hot spare, which one of the following statements is true? 1
- (a) No IO can continue
- (b) Reads continue from hot spare, but writes fail
- (c) Both reads and writes can continue
- (d) Array must be shut down immediately for replacing the failed disk
- v. Which of the following is not true about JBOD? 1
- (a) JBOD can combine hard disks of different sizes into a single unit without loss of any capacity
- (b) If a drive in a JBOD set dies then it may be easier to recover the files on the other Drives
- (c) JBOD supports data redundancy
- (d) JBOD doesn't has any storage controller intelligence

P.T.O.

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- vi. Which three statements describe differences between Storage Area Network (SAN) and Network Attached Storage (NAS) solutions? Choose three. **1**
- I. SAN is generally more expensive but provides higher performance
 - II. NAS uses TCP/IP for communication between hosts and the NAS server
 - III. NAS requires additional hardware on a host: a host bus adapter for connectivity
 - IV. SAN uses proprietary protocols for communication between hosts and the SAN fabric
- (a) I, II, III (b) I, II, IV (c) II, III, IV (d) None of these
- vii. What is one significant advantage of Virtualization in data centers **1**
- (a) Can manage the Data center with Zero Manpower
 - (b) Mirroring for Disaster Recovery
 - (c) Eliminate the need of physical devices for the Data center
 - (d) None of these
- viii. This consists of the precautions taken so that the effects of a disaster will be minimized. **1**
- (a) Data retrieval (b) Disaster recovery
 - (c) Archive (d) Replication
- ix. _____ refers to the location and management of the cloud's infrastructure. **1**
- (a) Service (b) Deployment
 - (c) Application (d) None of these
- x. The _____ model originally did not require a cloud to use virtualization to pool resources. **1**
- (a) NEFT (b) NIST (c) NIT (d) All of these
- Q.2 i. What do you mean by data categorization? **2**
- ii. What are the advantages of a virtualized data center over a classic data center? **3**
- iii. What is the procedure to implement Information Life Cycle Management? How Information Life Cycle support changes in the value of information over time? **5**
- OR iv. An application specifies a requirement of 200 GB to host a database and other files. It also specifies that the storage environment should

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- support 5,000 IOPS during its peak workloads. The disks available for configuration provide 66 GB of usable capacity, and the manufacturer specifies that they can support a maximum of 140 IOPS. The application is response time-sensitive, and disk utilization beyond 60 percent does not meet the response time requirements. Compute and explain the theoretical basis for the minimum number of disks that should be configured to meet the requirements of the application.
- Q.3 i. What is the need of nested RAID? **2**
- ii. Explain the process of data recovery in case of a drive failure in RAID 5. **3**
- iii. Explain major components of storage system environment. **5**
- OR iv. An application has 1,000 heavy users at a peak of 2 IOPS each and 2,000 typical users at a peak of 1 IOPS each. It is estimated that the application also experiences an overhead of 20 percent for other workloads. The read/write ratio for the application is 2:1. Calculate RAID corrected IOPS for RAID 1/0, RAID 5, and RAID 6. **5**
- Q.4 i. What is soft zoning and hard zoning? **2**
- ii. Explain how the performance of NAS can be affected if the TCP window size at the sender and receiver are not synchronized. **3**
- iii. Discuss the roles of the name server and fabric controller in an FC-switched fabric **5**
- OR iv. Explain situation where unified storage is a suitable option for a data center? Justify your answer with earlier available options of storage. **5**
- Q.5 i. Explain SNMP? **2**
- ii. Explain the key management metrics. **3**
- iii. Describe the benefits of using a virtual tape library over a physical tape library. **5**
- OR iv. What is the purpose of performing operation backup, disaster recovery and archiving? Explain in detail. **5**
- Q.6 i. Define the term Cloud Vocabulary. **2**

P.T.O.

Marking Scheme

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- Q.1 i. Which of the following statements about various hard disks is wrong? **1**
 (b) USB Hard disks store data on flash memory
- ii. Using file access protocols, data residing on which of the following can be accessed: **1**
 (b) Remote disk
- iii. Which of the following RAID levels guarantees double disk failure protection? **1**
 (b) Raid 6
- iv. When one disk fails in a RAID 5 array with a hot spare, which one of the following statements is true? **1**
 (c) Both reads and writes can continue
- v. Which of the following is not true about JBOD? **1**
 (c) JBOD supports data redundancy
- vi. Which three statements describe differences between Storage Area Network (SAN) and Network Attached Storage (NAS) solutions? Choose three. **1**
 (b) I, II, IV
- vii. What is one significant advantage of Virtualization in data centers **1**
 (b) Mirroring for Disaster Recovery
- viii. This consists of the precautions taken so that the effects of a disaster will be minimized. **1**
 (b) Disaster recovery
- ix. _____ refers to the location and management of the cloud's infrastructure. **1**
 (b) Deployment
- x. The _____ model originally did not require a cloud to use virtualization to pool resources. **1**
 (b) NIST
- Q.2 i. Meaning of data categorization **2**
- ii. Advantages of a virtualized data center over a classic data center **3**
 At least three advantages 1 mark for each (1 mark * 3)
- iii. Procedure to implement Information Life Cycle Management **5**
 3 marks
 Information Life Cycle support changes in the value of information over time 2 marks
- OR iv. Number of disk required= $\max(\text{size requirement, IOPS requirements})$ **5**

1 mark
 To meet the size requirement = $200 \text{ GB} / 66 \text{ GB} = 4 \text{ disks}$
 2 marks
 To meet the IOPS requirement = $5000 \text{ IOPS} / (140 \times 0.6 \text{ IOPS}) = 60 \text{ disks}$
 $\text{disks} = \max(4, 60) = 60 \text{ disks}$ 2 marks

- Q.3 i. Need of nested RAID **2**
- ii. Process of data recovery in case of a drive failure in RAID 5. **3**
- iii. Major components of storage system environment **5**
 At least five components with diagram
- OR iv. The IOPS requirements are as follows. **5**
 The complete application produces $4000 \times 1.20 = 4800 \text{ IOPS}$.
 1 mark
 This figure is inclusive of the overheads involved in it.
 The ratio 2:1 means that nearly 33.3% are writes and 66.6% are reads. 1 mark
 RAID 1/0 carries a write penalty of 2.
 Hence, the disk load for writes and reads are 1 mark
 $0.66 \times 4800 + 2 \times (0.33 \times 4800) = 6,336 \text{ IOPS}$.
 RAID 5 carries a write penalty of 4. 1 mark
 So, the complete disk load of writes and reads are $0.66 \times 4800 + 4 \times (0.33 \times 4800) = 9,504 \text{ IOPS}$.
 The RAID 6 carries a write penalty of 6. 1 mark
 Hence, the disk load of writes and reads are $0.66 \times 4800 + 6 \times (0.33 \times 4800) = 12,672 \text{ IOPS}$.
- Q.4 i. Soft zoning 1 mark **2**
 Hard zoning 1 mark
- ii. Performance of NAS can be affected if the TCP window size at the sender and receiver are not synchronized. **3**
 Stepwise marking
- iii. Roles of the name server and fabric controller in an FC-switched fabric **5**
- OR iv. Situation where unified storage is a suitable option for a data center **5**
 2 marks
 Justification 3 marks
- Q.5 i. SNMP **2**
- ii. Key management metrics. **3**
- iii. Benefits of using a virtual tape library over a physical tape library **5**

		At least 10 benefits 0.5 mark for each	(0.5 mark * 10)	
OR	iv.	Purpose of performing		5
		Operation backup	1 mark	
		Disaster recovery	2 marks	
		Archiving	2 marks	
Q.6	i.	Cloud Vocabulary.		2
	ii.	Cloud Computing Architecture	1 mark	3
		Services provided by cloud	2 marks	
	iii.	Cloud service provider's service architecture and compare them		5
		At least three architecture		
OR	iv.	Write short notes on the following:		5
		(a) Cloud security and integration	2.5 marks	
		(b) Types of Cloud	2.5 marks	
