BE12-R4: INFORMATION STORAGE AND MANAGEMENT

NOTE:

1. **Answer question 1 and any FOUR from questions 2 to 7.**
2. **Parts of the same question should be answered together and in the same sequence.**

Time: 3 Hours   **Total Marks: 100**

1.
a)   What is zoning? Discuss a scenario,
  i)   where soft zoning is preferred over hard zoning.
  ii)   where hard zoning is preferred over soft zoning.
b)   List and explain the considerations for capacity design for both CPU and storage in a NAS environment?
c)   Compared to a standard IP frame, what percentage of reduction can be realized in protocol overhead in an iSCSI configured to use jumbo frames with an MTU value of 9,000 bytes?
d)   Explain how a CAS solution fits into the ILM strategy?
e)   What do VLANs virtualize? Discuss VLAN implementation as a virtualization technology.
f)   How does clustering help to minimize RTO?
g)   What is the purpose of performing operation backup, disaster recovery, and archiving?

                                                                          (7x4)

2.
a)   What is the difference between a restore operation and a resynchronization operation with local replicas? Explain with examples.
b)   Explain the RPO that can be achieved with synchronous, asynchronous, and disk-buffered remote replication?
c)   A large company is considering a storage infrastructure—one that is scalable and provides high availability. More importantly, the company also needs performance for its mission-critical applications. Which storage topology would you recommend (SAN, NAS, IP SAN) and why?

                                                                          (6+6+6)

3.
a)   Which components constitute the disk service time? Which component contributes the largest percentage of the disk service time in a random I/O operation and why?
b)   Discuss the impact of random and sequential I/O in different RAID configurations.
c)   Why is SCSI performance superior to that of IDE/ATA? Explain the reasons from an architectural perspective?

                                                                          (5+6+7)

4.
a)   How flow control works in FC network?
b)   A company is considering implementing storage. They do not have a current storage infrastructure to use, but they have a network that gives them good performance. Discuss whether native or bridged iSCSI should be used and explain your recommendation?

                                                                          (10+8)

5.
a)   The IT department of a department store uses tape to archive data. Explain major points you could provide to persuade the IT department to move to a CAS solution. How would your suggestions impact the IT department?
b)   How can a block-level virtualization implementation be used as a data migration tool? Explain how data migration will be accomplished and discuss the advantages of using this method for storage. Compare this method to traditional migration methods?

                                                                          (9+9)

6.
a)   "Availability is expressed in terms of 9s." Explain the relevance of the use of 9s for availability, using examples?
b)   There are limited backup devices in a file sharing NAS environment. Suggest a suitable backup implementation that will minimize the network traffic, avoid any congestion, and at the same time not impact the production operations. Justify your answer?
c)   Develop a checklist for auditing the security of a storage environment with SAN, NAS, and iSCSI implementations. Explain how will you perform the audit. Assume that you discover at least five security loopholes during the audit process. List them and provide control mechanisms that should be implemented to eliminate them?

(6+6+6)

7.
a)   Discuss the advantage of FC-SW over FC-AL.
b)   The IP bandwidth provided for FCIP connectivity seems to be constrained. Discuss its implications, if the SANs that are merged are fairly large with 500 ports on each side, and the SANs at both ends are constantly reconfigured?
c)   An application specifies a requirement of 200 GB to host a database and other files. It also specifies that the storage environment should support 5,000 IOPS during its peak processing cycle. 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 will not meet the response time requirements of the application. Compute and explain the theoretical basis for the minimum number of disks that should be configured to meet he requirements of the application.

(5+6+7)