



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 8 Examination in Engineering: December 2018

Module Number: EE 8211

Module Name: Design and Management of Data Networks

[Three Hours]

[Answer all questions, each question carries 10 marks]

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- Q1 a) State what a Routing Protocol is and list three Dynamic Routing Protocols. [2.0 Marks]
- b) Explain the difference between a Routing Protocol and a Routed Protocol. [2.0 Marks]
- c) Discuss about Link State Routing Algorithm with its disadvantages and advantages. [2.0 Marks]
- d) Explain the function of a Proxy Server. [2.0 Marks]
- e) ABC is a medium level Internet cafe. All their PCs are connected with the Internet and their main function is to offer Internet access to the customers. There is a Mail Server and a Web Server, both hosted internally. Explain how to enable the security for the network and servers. [2.0 Marks]
- Q2 a) Briefly explain the term "Access Control Lists (ACL)". [1.5 Marks]
- b) Explain what "Private Address Range" is in IPv4 addresses and list the private address range of each IP class. [2.0 Marks]
- c) A campus network of four buildings has problems for the performance of network. Each building contains 400 to 600 devices, all in one Internet Protocol (IP) subnet. The buildings are connected in a star configuration centered with building 1 using gigabit ethernet multimode fiber links. All servers are located in building 1. What is your recommendation to improve the performance of the network? [2.5 Marks]
- d) ABC is a small business company with three departments. There is an Internet Leased Line (ILL) to connect the company Local Area Network (LAN) with the Internet. IT head has requested from you as a newly recruited engineer to do a proper design for the company. The following information is provided.
- Each department has at least 50 PCs.
 - 203.115.12.0/30 is the network address of the ILL Wide Area Network (WAN) link and 203.115.12.1/30 is the company side IP.
- i) Design the LAN based on the provided Information. (You need to explain how PCs are connected to the LAN and how to increase the security among departments. A proper IP-plan needs to be defined and the Virtual Local Area Network (VLAN) information needs to be listed.)

- ii) All PCs need to connect to the Internet. Explain how you manage this using diagrams. You are required to explain the following important aspects.
- How does the ILL connect with LAN?
 - What additional equipment are required doing this?
 - Which kind of Network Address Translation (NAT) configuration does best suit the requirements?

[4.0 Marks]

- Q3 a) Explain the term "Server Virtualization" and explain how virtualization has improved the reliability.

[2.0 Marks]

- b) Briefly explain the following related to Network Virtualization.

- i) Network Function Virtualization (NFV)
- ii) Software Defined Network (SDN)
- iii) Storage Area Network (SAN)

[3.0 Marks]

- c) Briefly explain the function of an Intrusion Prevention System (IPS) and an Intrusion Detection System (IDS) in local networks.

[2.0 Marks]

- d) ABC Company maintains many dedicated servers for their internal requirements as follows.

- Three dedicated servers as File Servers.
- One dedicated server for active Web Server and one dedicated server for back-up Web Server.
- One dedicated server for active Mail Server and one dedicated server for back-up Mail Server.
- There are two servers to implement a Customer Relationship Management (CRM) system.
- Almost all their dedicated servers have reached End of Life (EoL) and company should think of a server repurchase.

You are recruited as an expert and asked to give a solution to ABC Company. The company management needs to reduce the operational and capital expenditures while increasing the reliability, availability and security. Explain the best solution.

[3.0 Marks]

- Q4 a) Explain the importance of configuring VLANs in an enterprise network.

[1.5 Marks]

- b) Explain the importance of VLAN Trunking and port aggregation using diagrams.

[1.5 Marks]

- c) XYZ Company spreads over many buildings and its departments spread over all the buildings.
- In the first floor, 30 PCs for IT, 20 PCs for HR, 10 PCs for Finance and 20 PCs for Sales.
 - In the second floor 10 PCs for IT, 2 PCs for HR, 2 PCs for Finance and 15 PCs for Sales.
 - In the third floor, 3 PCs for HR, 10 PCs for Finance and 5 PCs for Sales.

Propose a suitable LAN design for above requirements. Use diagrams to support your proposal.

[3.0 Marks]

- d) Explain the importance of configuring the port security on multilayer switches. [2.0 Marks]
- e) "A switch can perform filtering and forwarding decisions". Explain that statement using diagrams. [2.0 Marks]

[2.0 Marks]

- Q5 a) Explain what Network Security is and explain the importance of having it in the enterprise networks.

[2.0 Marks]

- b) Explain the following terms used in Network Security.

- i) Vulnerability
- ii) Threat
- iii) Attack

[3.0 Marks]

- c) Explain what Distributed Denial-of-Service (DDoS) attack is and explain how to avoid that.

[2.0 Marks]

- d) Explain the difference between a Virus and a Worm.

[1.0 Mark]

- e) List the element of a Network Management Model (NMM).

[2.0 Marks]