



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 8 Examination in Engineering: November 2017

Module Number: EE 8211

Module Name: Design and Management of Data Networks

[Three Hours]

[Answer all questions, each question carries 10 marks]

Q1 a) Match each Local Area Network (LAN) device type with an appropriate description.

- | | |
|--------------------|---|
| i) Hub | A) Legacy device that connects two data link layer segments |
| ii) Bridge | B) Network layer device that forwards packets to the serial interfaces of a Wide Area Network (WAN) |
| iii) Switch | C) High-speed device that forwards frames between two or more data link layer segments |
| iv) Layer 3 switch | D) High-speed device that separate broadcast domain of the link layer. |
| v) Router | E) Device that amplifies the signal among connected segments |

[2.5 Marks]

b) You are asked to connect a building access switch to a distribution switch. The cable distance is 135 m. Which type of cable do you select? Explain the reasons for the selection.

[2.5 Marks]

c) An enterprise network is designed for multiple buildings to support multiple departments. Client access servers are located locally and other buildings. The company security assessment has identified policies which need to be implemented. What measures would you take regarding the security of the enterprise?

[2.5 Marks]

d) A campus network of four buildings has performance problems for the 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]

Q2 a) What are the three main steps in Prepare, Plan, Design, Implement, Operate and Optimize (PPDIOO) design methodology?

[2.0 Marks]

b) From topics, existing wiring, existing network circuit bandwidth, improving the LAN's scalability and adding redundancy, which are considered as

- technical constraints?
- technical goals?

[2.0 Marks]

c) While performing a network audit, it revealed that a Frame Relay WAN segment runs at a sustained rate of 75 percent from 9.00a.m. to 5.00p.m. Therefore it was recommended to change the WAN technology to latest one, to increase the bandwidth or to deny Voice over IP (VoIP) calls from 9.00a.m. to 5.00p.m. Which option do you select? Give reasons for your selection.

[2.0 Marks]

d) What is the sequence of stages of the top-down design? Use an example to illustrate those stages.

[2.0 Marks]

e) Secure transactions are emphasized throughout the initial requirements of a credit card company network design. Redundant links are also required to reduce network outages. What is the order of importance of the network for IP addressing design, physical topology design, security design and network modular design of the top-down approach?

[2.0 Marks]

Q3 a) Which enterprise campus sub-module is used to connect to the enterprise edge module?

[2.0 Marks]

b) List four benefits of the hierarchical network design.

[2.0 Marks]

c) Answer the following questions using Figure Q3 (c).

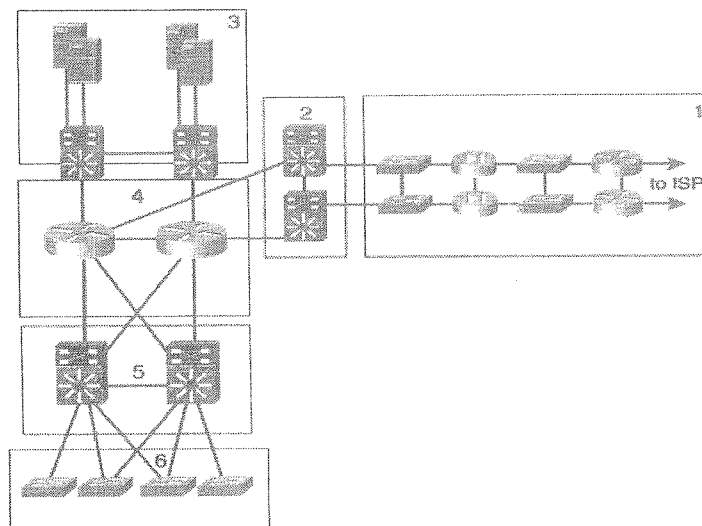


Figure Q3 (c)

- i) Which block does represent the campus core layer?
- ii) Which block does represent the enterprise edge distribution?
- iii) Which block does represent the campus data center?

[3.0 Marks]

- d) For an IP telephony network, in which sub module or layer are the
- i) IP phones located?
 - ii) call manager servers located?

[3.0 Marks]

Q4 a) Briefly explain the following terms that relates the routing process of a network.

- i) Count to infinity
- ii) Hold-down timer

[1.0 Mark]

- b) Perform Dijkstra's algorithm to find the shortest path from node A to all other nodes in the network shown in Figure Q4 (b). Give a table that shows the results of each step.

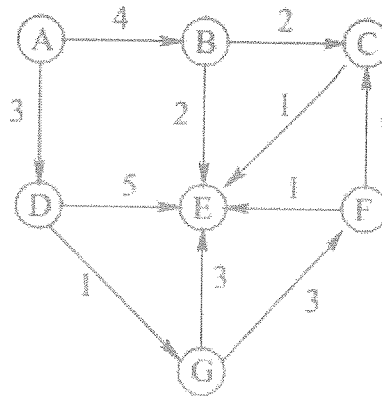


Figure Q4 (b)

[3.0 Marks]

- c) Name one advantage of Dijkstra's algorithm over Bellman-Ford's algorithm and one advantage of Bellman-Ford's algorithm over Dijkstra's algorithm.

[1.0 Mark]

- d) The Company VWX has the network shown in Figure Q4 (d). The main site has three LANs, with 100, 29, and 60 hosts. The remote site has two LANs, each with 100 hosts. The network uses private addresses. The Internet service provider assigns 210.200.200.8/26 for the VWX company network.

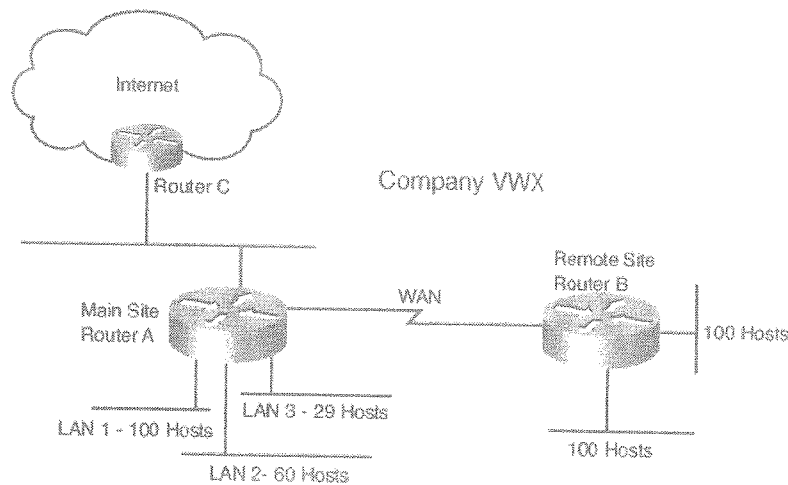


Figure Q4 (d)

- The remote site uses the network prefix 192.168.10.0/24. Which subnets and masks do you use for LANs at the remote site?
- The main site uses the network prefix 192.168.15.0/24. Which subnets and masks do you use to provide sufficient addresses for LAN 1, LAN 2 and LAN 3 at the main site?
- Which networks does Router C announce for the Internet router of the Internet service provider?

[5.0 Marks]

- Q5
- a) Name and briefly explain five components of the network management architecture. [2.0 Marks]
 - b) What are the similarities and the differences between the Trap message in Simple Network Management Protocol (SNMP) version 1 and the InformRequest message in SNMP version 2? [2.0 Marks]
 - c) Suppose that you are asked to use a new type of router for your network. What should you do to ensure that the SNMP traps received from these devices are correctly interpreted by your Network Management System (NMS)? [2.0 Marks]
 - d) Explain how the Peer to Peer (P2P) file sharing process takes less time to share a file compared to the client-server file sharing process for equal number of users. [2.0 Marks]
 - e) In the process communication, we use IP addresses and port numbers for addressing. Briefly explain the use of these two addressing methods. [2.0 Marks]