



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 8 Examination in Engineering: July 2022

Module Number: EE8203

Module Name: Design and Management of Data Networks

[Three Hours]

[Answer all five questions, each question carries 10 marks]

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- Q1 a) State the main objective behind the concept of Intelligent Information Network (IIN). Explain how the three phases of IIN achieve this objective? [1.5 Marks]
- b) List the main layers of a Service Oriented Network Architecture (SONA) and explain their functionalities. [1.5 Marks]
- c) Assessing the scope of a network design is a vital component in the PPDIIOO process. In some cases, the design could impact a single function of the network while in other cases the whole network could be affected. Explain how you justify the above claim with examples for both scenarios mentioned above. [1.5 Marks]
- d) Briefly explain the iterative process that needs to be followed to identify the customer requirements. [1.5 Marks]
- e) Answer the following questions based on the distribution layer of the hierarchical network model.
- i) State two main roles expected from the distribution layer. [1.0 Mark]
- ii) Briefly explain the following functions performed at the distribution layer. [3.0 Marks]
- 1) Route Redistribution
 - 2) Route Summarization
 - 3) Route Filtering
- Q2 a) Assume that you are assigned with the task of designing the LAN network for a particular organization that deals with different type of applications and located over a wide geographic area.
- i) Explain how you would perform the *network application consideration* analysis when designing a network considering the four main application types in a network? [2.0 Marks]

ii) Briefly explain the two design parameters that would be highly influenced by the *environmental considerations* of your design?

[2.0 Marks]

b) State one main advantage and disadvantage of using Baseband transmission for Ethernet.

[1.0 Mark]

c) i) State the purpose of calculating the path delay value (PDV) in a network path.

[1.0 Mark]

ii) When multiple paths are available, the PDV is calculated for the worst-case scenario. Explain the rationale behind this.

[1.0 Mark]

d) i) One of the main goals of WAN design is to optimize the link performance in terms of Offered traffic, Link utilization, and Response time. Explain why it's challenging for the designer to balance these above parameters considering the end user and network management perspectives.

[1.5 Marks]

ii) Briefly explain the main working concepts behind Overlay VPN and Virtual Private Dial-up Networks.

[1.5 Marks]

Q3 a) Using the network address 192.168.10.0/24, design a Variable Length Subnet Mask (VLSM) solution to accommodate host requirements of all the segments shown in Figure Q3a. Note that the router interfaces are included in the given host numbers.

[4.0 Marks]

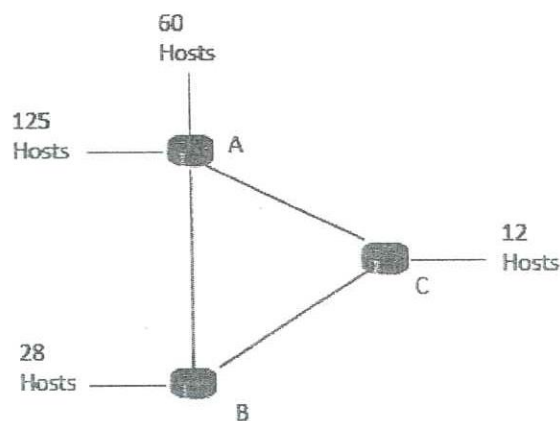


Figure Q3a

b) Refer to the network represented in Figure Q3b and determine the summarized routes from Router C to Router A and Router A to Router E.

[2.0 Marks]

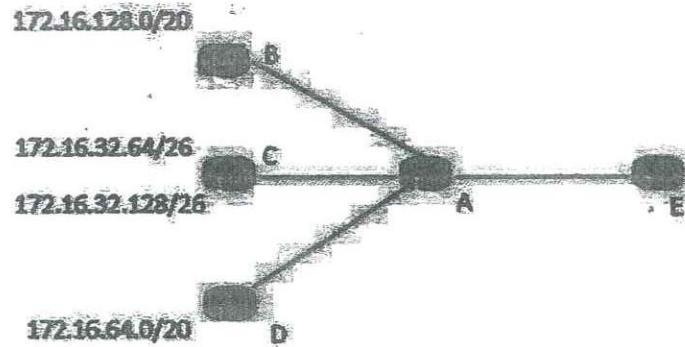


Figure Q3b

- c) i) Explain how the Link State protocols achieve faster convergence and how the convergence time impact the performance of a routing protocol?

[2.0 Marks]

- ii) You are assigned to deploy a Link State routing protocol in a network that spans over a large geographic area with higher number of routers. Explain a strategy that you would take to limit the resource utilization of the routers in the network and reduce the flooding of control messages when implementing the Link State protocol?

[2.0 Marks]

- Q4 a) Briefly explain the importance of network management by referring to the five key areas of network management.

[2.5 Marks]

- b) Briefly explain the following entities related to Simple Network Management Protocol (SNMP).

[1.0 Mark]

- i) Manager
- ii) Management Information Base

- c) List the five message types of SNMP version 1. State the entity which initiates these messages and the purpose of sending them.

[2.5 marks]

- d) State two main limitations of command line (CLI) based network monitoring approaches. Explain how SNMP overcomes these limitations.

[1.0 Mark]

- e) Briefly describe two benefits and two limitations of using SNMP for network monitoring.

[2.0 Marks]

f) Explain the purpose of using two TCP connections in File Transfer Protocol (FTP).
[1.0 Mark]

Q5 a) i) State the relationship between a process and a socket.
[1.0 Mark]

ii) State the two main identifiers used to identify a process within a host.
[1.0 Mark]

iii) Explain the difference between connection oriented demultiplexing in TCP and connectionless demultiplexing in UDP, mentioning the parameters which are required for successful demultiplexing process of an arriving packet at each case.
[2.0 Marks]

iv) Explain the difference between Flow control and Congestion control in TCP.
[2.0 Marks]

b) i) State two differences between stream sockets and datagram sockets.
[1.0 Mark]

ii) Explain the main steps and the relevant functions required from a server side to establish and continue a socket communication with a client.
[3.0 Marks]