



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 8 Examination in Engineering: November 2016

Module Number: EE8211

Module Name: Design and Management of Data Networks

[Three Hours]

[Answer all questions, each question carries 10 marks]

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- Q1 a) List the three basic steps of the design methodology. [1.0 Mark]
- b) What are the main sections should be included in a typical final network design document? [1.0 Mark]
- c) Select three correct statements with a top-down design approach.
- i) The design adapts the physical infrastructure to the requirements.
 - ii) The design adapts the requirements to the physical infrastructure.
 - iii) Network devices are chosen after requirement analysis.
 - iv) Network devices are selected first.
 - v) The risk of re-designing the network is high.
 - vi) The risk of re-designing the network is low. [3.0 Marks]
- d) In which layer of the hierarchical model does provide the media translation? [1.0 Mark]
- e) "The auditing process should never require any changes to the network." Explain briefly whether you are agreeing with this statement or not. [2.0 Marks]
- f) Identify the main network parameters that should be considered when evaluating an existing data infrastructure for IP telephony. [2.0 Marks]
- Q2. a) Generally, a network designer does not design the backup links using the same technology or service provider used for the primary link. Explain why [2.0 Marks]
- b) List the typical Wide Area Network (WAN) design objectives. [1.0 Mark]
- c) Compare the differences between an overlay Virtual Private Network (VPN) and peer-to-peer VPN? [2.0 Marks]
- d) Figure Q2 (d) illustrates a network segment that runs on Fast Ethernet. One of the basic Ethernet design rule is that the round trip propagation delay in any collision domain must not exceed 512 bit times.

- i) In which pair of Data Terminal Equipment (DTE) will the worst case round trip delay take place?
[2.0 Marks]
- ii) Using Table Q2 (d), compute the worst case round trip delay in the network segment and state whether this design satisfies the above design rule.
[3.0 Marks]

Table Q2 (d)

Component Type	Round Trip Delay in Bit Times per Meter	Maximum Round Trip Delay in Bit Times
Two TX/FX DTEs	N/A	100
Two T4 DTEs	N/A	138
One T4 DTE and One TX/FX DTE	N/A	127
Category 3 cable	1.14	114 (100m)
Category 4 cable	1.14	114 (100m)
Category 5 cable	1.112	111.2 (100m)
STP cable segment	1.112	111.2 (100m)
Fiber optic cabling	1.0	412 (412m)
Class I repeater	N/A	140
Class II repeater with all TX/FX	N/A	92
Class II repeater with any port T4	N/A	67

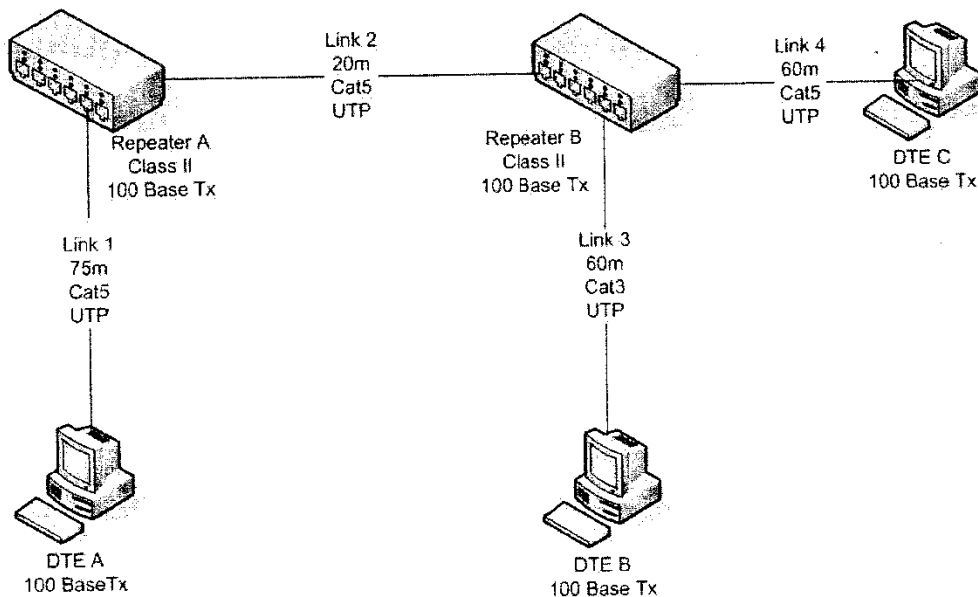


Figure Q2 (d)

- Q3 a) A network interface device has a physical address. Describe why this address is not used on a routed network.
[2.0 Marks]
- b) In which situations would the static routing be preferred over the dynamic routing?
[2.0 Marks]

c) State two benefits of Route Summarization. Compute the best possible summary route for following networks.

- | | |
|-----------------------|------------------------|
| i) 192.168.112.0/24 | v) 192.168.116.0/24 |
| ii) 192.168.113.0/24 | vi) 192.168.117.0/24 |
| iii) 192.168.114.0/24 | vii) 192.168.118.0/24 |
| iv) 192.168.115.0/24 | viii) 192.168.119.0/24 |

[2.0 Marks]

d) Use Dijkstra's algorithm to determine the shortest path from node S to all other nodes in the network shown in Figure Q3 (d). Give a table that shows the results of each step.

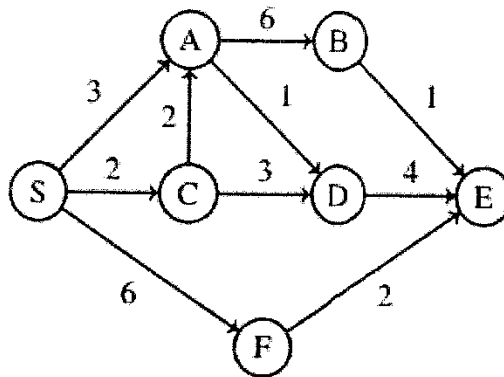


Figure Q3 (d)

[2.0 Marks]

e) Use the distance vector (DV) algorithm based on Bellman-Ford to determine the shortest path from node A to all other nodes in the network shown in Figure Q3 (e). Show how Node A updates its DV when each node provides an update.

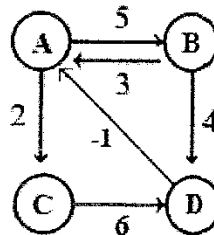


Figure Q3 (e)

[2.0 Marks]

Q4 a) Name and briefly explain five components of the network management architecture.

[1.0 Mark]

b) Differentiate Simple Network Management Protocol version 1 (SNMPv1), SNMPv2 and SNMPv3.

[2.0 Marks]

c) Write the two alert messages generated by SNMP agents?

[2.0 Marks]

d) You are asked to deploy a new type of router on your network. What should you do to ensure that the SNMP traps received from this device is correctly interpreted by your network management system (NMS)?

[3.0 Marks]

- e) State the types of File Transfer Protocol (FTP) connections. Briefly explain the purpose of these types with the aid of relevant diagrams.

[2.0 Marks]

- Q5 a) "The application layer is where network applications and their application-layer protocols reside." Name two application layer protocols.

[2.0 Marks]

- b) A network application consists of pairs of processes that send messages to each other in a network.

i) Name the two processes.

ii) In a Peer-to-Peer (P2P) file-sharing system, how do you identify these two processes?

[2.0 Marks]

- c) Explain how the P2P file sharing process requires less time to share a file compared to the client-server file sharing process with an equal number of users.

[2.0 Marks]

- d) Which command is used to get the list of open sockets on a host/computer?

[2.0 Marks]

- e) In the process communication, we use IP address and port number for addressing. Briefly explain the purpose of using these two parameters.

[2.0 Marks]