Lecture 08 tutorial: Backbone Networks

During tutorials prepare a short report of your activities and show it to your tutor.

Study the following **questions** and verify the correctness of the **answers** if given.
Be aware that the exam question might be directly related to the tutorial questions.

Additional Instructions: Where a **group number** is indicated, please discuss this particular question with other members of your group, prepare a short written answer and email this to your tutor before the end of the day (you may wish to verify the correctness of your answer first). This will be used to produce a set of sample answers for the class for study purposes. ***Note***: You should work through <u>all</u> questions, either during tutorial or else later for revision, not just ones assigned to your group. Try to complete **Questions 11-14** individually.

Group 4

Question 1.
What are the three technology/design layers important in backbone design?

Group 5

Question 2.
Explain how routed backbones work.

Group 6

Question 3.
Where are routed backbones most commonly used?

Group 7

Question 4.
Explain how switched backbones work.

Group 8

Question 5.
a) Why are switched backbone networks most commonly used?
b) What are the main limitations of switched backbone networks?

Group 9

Question 6.
Explain how single-switch VLANs work.

<mark>Group 10</mark>

Question 7.
    Explain how multi-switch VLANs work.

<mark>Group 1</mark>

Question 8.
    a) In what way do VLAN switches act like Network Layer devices and how do they achieve this?
    b) Explain how a Multi-switch VLAN-based Backbone Network extends this analogy further.

<mark>Group 2</mark>

Question 9.
    What is IEEE 802.1q?

<mark>Group 3</mark>

Question 10.
  How do VLAN switches create their forwarding tables?
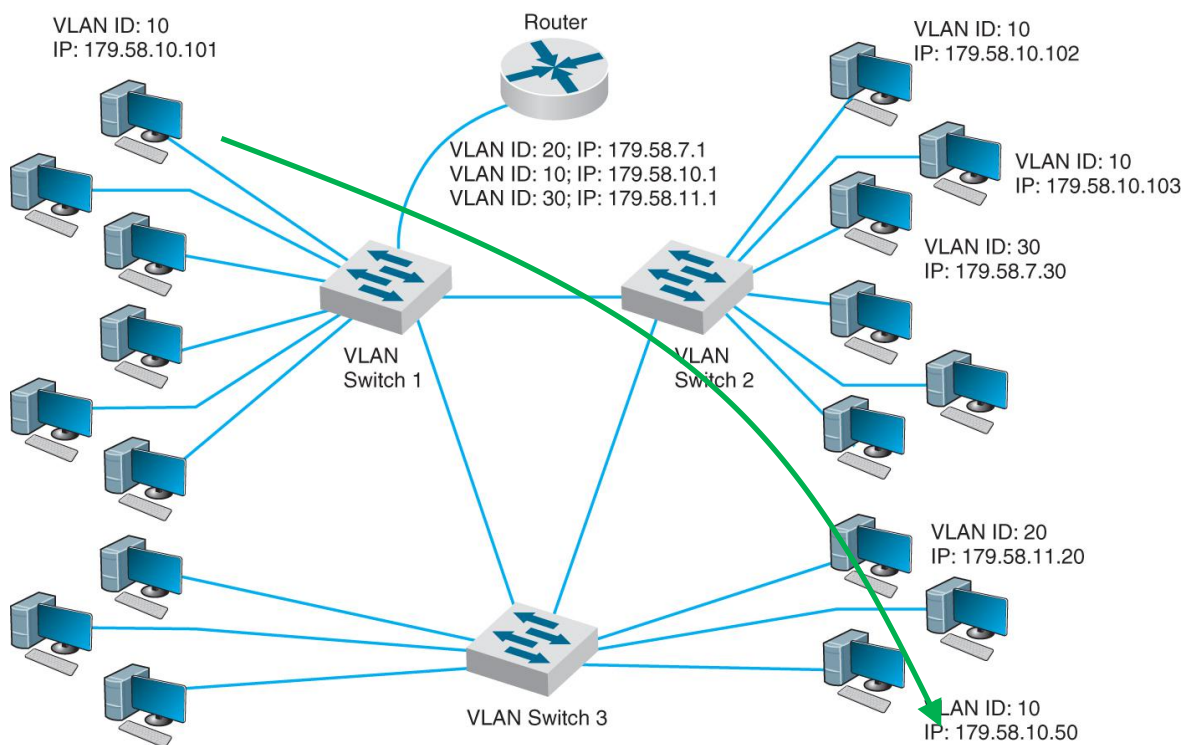
<mark>ALL</mark>

Question 11.
    Explain how broadcast messages like ARP are processed in a VLAN

<mark>ALL</mark>

Question 12.
    Consider an example of a multi-switch Virtual Local Area Network (VLAN) presented below.

- Assume that a computer with an IP address **179.58.10.101** (switch 1) sends a packet to a computer with an IP address **179.58.10.50** (switch 3).

- Assume that the **179.58.10.101** PC has just been switched on and does not now any MAC addresses.

  a) Give a step by step explanation of the flow of packets/Ethernet frames and
  b) draw the related IP/Eth/1Q packets (add MAC addresses to the involved devices)

Question 13. .
Consider the example of a routed network as in slide 29
Rearrange and draw the network using three VLAN switches as in slide 23 and similar.

Question 14. .
For the modified VLAN based network from Question 13 **consider and draw the flow of packets** as in three cases presented in **Lecture 6, slides 10 to 16,** namely:

- Case 1a: Known Address, Same Subnet (e.g. Client 2 to web server B)
- Case 1b: HTTP response to client
- Case 2: Known Address, Different Subnet (e.g. Client 1 to web server B)
- Case 3: Different Subnets, Unknown Addresses (e.g. Client 1 to web server B)