Midterm exam
Course IT3080 Computer Networks
Semester 20202
Duration 60'
Computer is used uniquely for reading the exam statement.
Internet is NOT allowed.
Documents on paper are allowed.

Full name:
Student ID:

Question 1 (1 pt).

Map following protocols, mechanisms to corresponding layers of TCP/IP model:

- CSMA
- Manchester
- Ethernet
- HTTP
- UCP
- IP
- ICMP
- OSPF

Question 2 (1 pt)

Let's generate an IP address from your student ID by inserting a "dot" after each two digits. For example, if your student ID is 12345678 then the IP address is 12.34.56.78.

a) What is IP address generated?

b) If netmask of this IP address is 27, what is the address of the network this address belongs to? Explain how did you find it.

Question 3 (2 pt). Data packets of length L=100 bytes each are sent over a channel of 100kbps. The propagation delay from the source to the destination (or in the reversed direction) is 20ms. Data are transmitted using Sliding windows flow control mechanism.
a) The channel utilization efficiency is defined as the ratio between time spent for transmitting data at the source and the channel occupation time. What is the channel utilization efficiency function? Explain how you arrive to this function.
b) What should be the window size so that the channel utilization efficiency is 50%?

Question 4 (2 pt) An administrator is given a space of IP addresses corresponding to the network 192.168.4.0 /24, he has to form N subnetworks from this space. N is a parameter that is calculated as:
N= the last digit of your student number **mod** 5 + 2.
Example, if your student ID is 20183346 then N= 6 mod 5 + 2 = 1+2 =3.
Explain how to form subnetworks and:

a. value of N.
b. Network address of each subnet? The netmask for each subnet? Explain.
c. The maximum number of hosts allowable in each subnetwork? Explain.

Question 5 (3 pt)

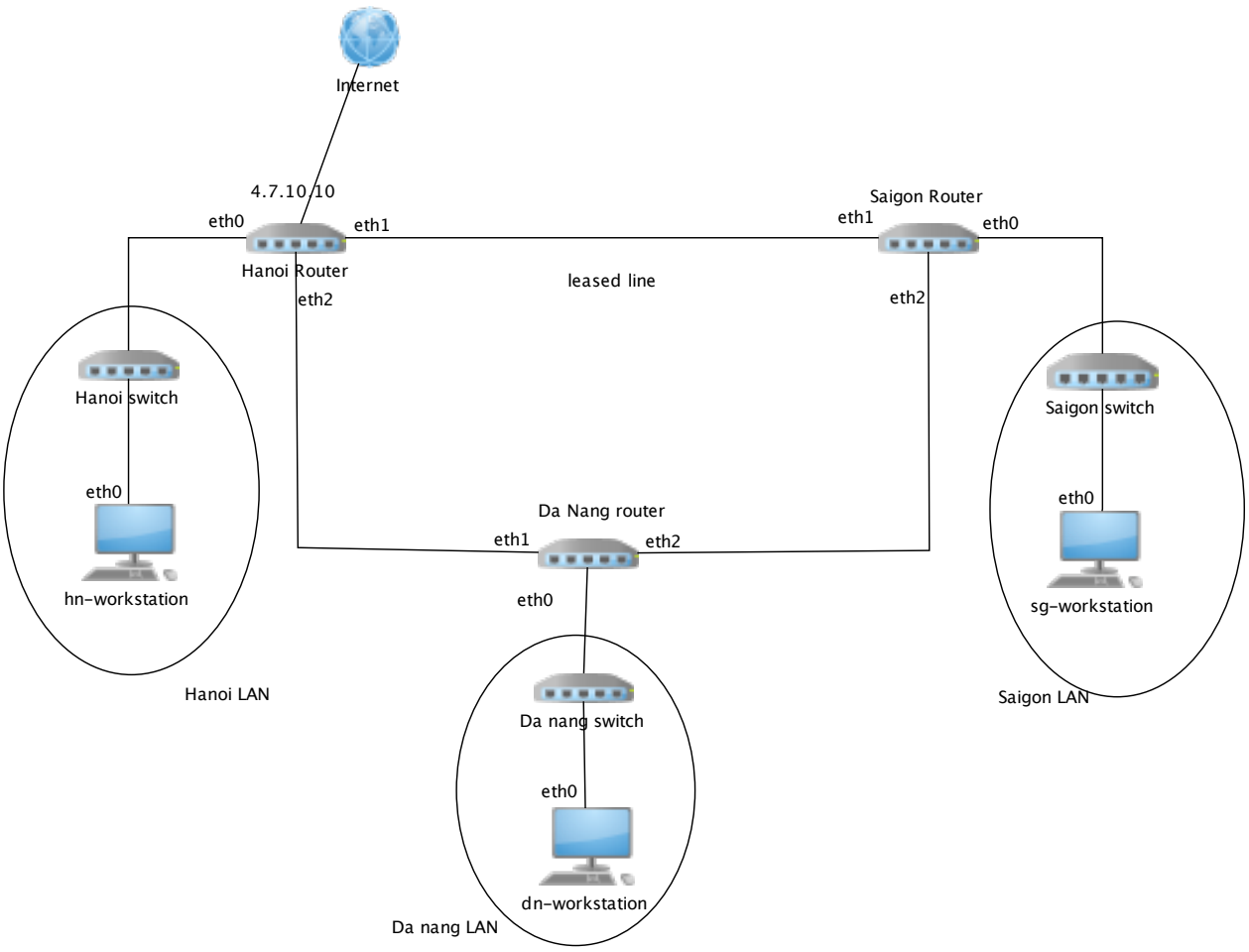
A compagy has three LANs for its three branchs in Saigon, Da Nang and Hanoi, see figure below. Each LAN contains fews stations but the figure shows only three of them: hn-workstation in Hanoi, and sg-workstation in Saigon and dn-workstation in Danang. The three LANs are connected to each other by routers named Hanoi router, Saigon router and Danang router. Let help the network administrator of the campany to assign IP addresses to network interfaces of routers and stations, then statically define the routing tables for each router:

a) Assign IP addresses and network masks for all interfaces listed in the below table. You should remember that, interfaces of the same link should be assigned IP addresses belonging to the same subnetwork.

Station/Router	Interface	IP address/netmask
Hn-workstation	Eth0	
Sg-workstation	Eth0	
Dn-workstation	Eth0	
Hanoi router	Eth0	
	Eth1	
	Eth2	
Saigon router	Eth0	
	Eth1	
	Eth2	
Danang router	Eth0	
	Eth1	
	Eth2	

b) What is the network address of Hanoi LAN? Saigon LAN? and Danang LAN?

c) What should be the routing table of routers Hanoi, Saigon and Danang so that computers in all LAN can communicate with eachother and with the Internet.



Question 6 (1 pt): Why does UDP exist? Would it not have been enough to just let user processes encapsulate data directly in IP packets?