

## CMU-CS 252

### Introduction to Network & Telecommunications Technology

#### Part I: Multiple Choice

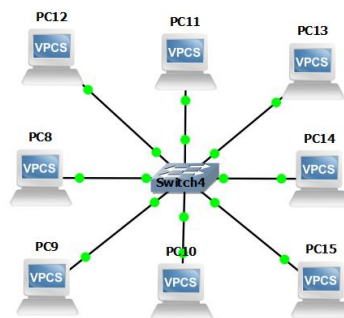
**1. (0.2 point)**

Which layer of the OSI model is responsible for data encryption?

- A. Presentation
- B. Session
- C. Network
- D. Data Link

**2. (0.2 point)**

You have been hired by a company that uses a topology shown below. In looking at the physical layout of your network, which of the following types of topologies is being used?



- A. Bus
- B. Star
- C. Mesh
- D. Ring

**3. (0.2 point)**

You are designing a 1000Base-T network. In creating this network, what distance limitation will you be facing when installing the cabling?

- A. 100 m
- B. 185 m
- C. 500 m
- D. 2 km

**4. (0.2 point)**

Which service listed below is used to resolve IP addresses and domain names?

- A. DNS
- B. DHCP

C. ARP

D. TCP

**5. (0.2 point)**

Identify the class of IP Address for the following IP address 114.101.101.101?

A. Class A

B. Class B

C. Class C

D. Class D

**6. (0.2 point)**

Which example is a network adapter loopback address?

A. 255.0.0.1

B. 192.0.0.1

C. 127.10.20.30

D. 10.0.0.1

**7. (0.2 point)**

Which example below is the default subnet mask of Class B (IP Version 4)?

A. 255.255.255.224

B. 255.255.255.0

C. 255.255.0.0

D. 255.0.0.0

**8. (0.2 point)**

Your network has 10 computers that are networked together using a star topology. Which of the following is a possible point of failure for this topology, which could bring down the entire network?

A. Cable

B. Network card

C. T-Connector

D. Hub

**9. (0.2 point)**

The network layer protocol of the internet is:

A. ethernet

B. internet protocol

C. hypertext transfer protocol

D. user datagram protocol

**10. (0.2 point)**

You are the network administrator of a 10BaseT network. On the weekend, when a few people are working, you run 110 m of cable to a new server that is being used as a file server. The cable is installed in a new section of the building, where no cabling currently exists. When you attempt to access files on the server, they are experiencing errors and corrupt data. Which of the following is most likely the cause of this problem?

- A. Bandwidth
- B. Attenuation
- C. Crosstalk from a neighboring cable
- D. CSMA/CD issues

**11. (0.2 point)**

You are designing a new network and are concerned about interference from other wires. Which of the following is most susceptible to transmission errors due to crosstalk?

- A. Coaxial
- B. UTP
- C. STP
- D. Fiber optic

**12. (0.2 point)**

You are designing a new network for a grocery store. Cabling will have to run along the ceiling, where there are a significant number of florescent lights. You are concerned about interference from these lights. Which of the following cable types could be used, which would not be susceptible to this type of interference?

- A. Coaxial
- B. UTP
- C. STP
- D. Fiber optic

**13. (0.2 point)**

A new technician for 123 Corp plans out the maximum length of a Gigabit Ethernet segment using MMF optic cable. What is the correct distance? (Choose only one)

- A. 100m
- B. 125m
- C. 550m
- D. 10km

**14. (0.2 point)**

For which type of connection should a straight-through cable be used?

- A. switch to switch
- B. switch to hub
- C. switch to router
- D. router to PC

**15. (0.2 point)**

What are the first 24 bits in a MAC address called?

- A. NIC
- B. BIA
- C. OUI
- D. VAI

**16. (0.2 point)**

Fast Ethernet has a data rate of \_\_\_\_\_Mbps.

- A. 10
- B. 100
- C. 1000
- D. 10000

**17. (0.2 point)**

IEEE has defined the specifications for a wireless LAN, called\_\_\_\_\_, which covers the physical and data link layers.

- A. IEEE 802.3
- B. IEEE 802.5
- C. IEEE 802.11
- D. IEEE 802.12

**18. (0.2 point)**

Which transmission media has the highest transmission speed in a network?

- A. coaxial cable
- B. twisted pair cable
- C. Optical fiber
- D. electrical cable

**19. (0.2 point)**

Which of these is not a guided medium?

- A. Fiber optical cable
- B. Coaxial cable
- C. Wireless LAN
- D. Copper wire

**20. (0.2 point)**

You are a network technician assigned to install a new network hub. Which layer of the OSI model does a standard hub operate at? Select only one answer.

- A. Physical layer
- B. Data link layer
- C. Network layer
- D. Transport layer

**21. (0.2 point)**

You are a network technician assigned to install a new NIC on a PC. Which layer of the OSI model does a NIC operate at?

- A. Physical layer
- B. Data link layer
- C. Network layer
- D. Transport layer

**22. (0.2 point)**

What is the unique physical address that is found on all NICs called?

- A. DNS address
- B. NAT address
- C. IP address
- D. MAC address

**23. (0.2 point)**

From the list of choices, which of the following media access methods is used for an IEEE 802.5 network?

- A. Direct Sequence
- B. Token passing
- C. CSMA/CD
- D. CSMA/CA

**24. (0.2 point)**

POP3 is identified by which TCP/IP port number?

- A. UDP Port 21
- B. TCP Port 23
- C. UDP Port 25
- D. TCP Port 110

**25. (0.2 point)**

You are a network administrator looking to implement technology into a company. You are told you need to build a network using the IEEE 802.11 standard. From the list below, the IEEE 802.11 standard maps to which of the following? Select only one answer.

- A. Token Ring
- B. Wired Ethernet
- C. Metropolitan Area Network (MAN)
- D. Wireless in Infrastructure mode

**26. (0.2 point)**

When a host transmits data across a network to another host, which process does the data go through?

- A. standardization
- B. conversion
- C. encapsulation
- D. synchronization

**27. (0.2 point)**

Two sub-layers of the OSI Data Link layer are which of the following?

- A. Logical Link Control, Data Link Control
- B. Media Access Control, Physical Layer Control
- C. Logical Link Control, Media Access Control
- D. Data Link Control, Physical Layer Control

**28. (0.2 point)**

The network layer concerns with

- A. bits
- B. frames
- C. packets
- D. segment

**29. (0.2 point)**

Which one of the following is NOT a function of the network layer?

- A. routing
- B. inter-networking
- C. Congestion control
- D. best path

**30. (0.2 point)**

Your company uses UTP cable for all of its network connections including workstations and servers. The users have reported problems connecting to one of the most important servers on the network and you have been called in to look at it, due to a possible physical security breach by a former employee. While examining the server, you find that a small battery-powered motor has been placed and is running next to the server's network connection. What is causing the network problem?

- A. Electromagnetic interference
- B. Static electricity
- C. Transceivers
- D. Unknown, but the motor is probably unrelated

**31. (0.2 point)**

Your network uses vampire taps and AUI connectors to access data from the network cable. Which of the following cabling types is being used?

- A. Thinnet
- B. Thicknet
- C. STP
- D. Fiber optic

**32. (0.2 point)**

You are designing a 10Base2 network. In creating this network, what distance limitation will you be facing when installing the cabling?

- A. 100m
- B. 185m
- C. 200m
- D. 2km

**33. (0.2 point)**

Your network uses 100BaseFX so that data can be transferred at higher speeds and up to distances of 400 m. During transmission, data can travel in both directions, but only in one direction at a given time. Which of the following transmission methods is used?

- A. Simplex
- B. FireWire
- C. Half-Duplex
- D. Full Duplex

**34. (0.2 point)**

You are the network engineer assigned to implement a new 100 Mbps network connection. You need to select the correct cabling, as well as the correct standard. From the selections below, choose which 100 Mbps networking standard makes use of only two pairs of a Category 5 UTP cable.

- A. 10BaseT
- B. 100BaseFL
- C. 100BaseTX
- D. 100BroadT4

**35. (0.2 point)**

\_\_\_\_\_ uses thick coaxial cable.

- A. 10Base5
- B. 10Base2
- C. 10BaseT
- D. 10BaseF

**36. (0.2 point)**

Gigabit Ethernet has a data rate of \_\_\_\_\_ Mbps.

- A. 10
- B. 100
- C. 1000
- D. 10000

**37. (0.2 point)**

In IEEE 802.11, the access method used in the DCF sub-layer is\_\_\_\_\_

- A. ALOHA
- B. CSMA/CD
- C. CSMA/CA
- D. Token Passing

**38. (0.2 point)**

A Bluetooth network is called a\_\_\_\_\_

- A. piconet
- B. scatternet
- C. bluenet
- D. none of the above

**39. (0.2 point)**

Which OSI model layer is responsible for frame sequencing?



- A. The physical layer
- B. The transport layer
- C. The data link layer
- D. The application layer

**40. (0.2 point)**

You are a network technician assigned to install a new network switch. Which layer of the OSI model does a standard switch (or bridge) operate at? Select only one answer.

- A. Physical layer
- B. Data link layer
- C. Network layer
- D. Transport layer

**41. (0.2 point)**

You are a network technician assigned to install a new network Router. Which layer of the OSI model does a standard router operate at?

- A. Physical layer
- B. Data link layer
- C. Network layer
- D. Transport layer

**42. (0.2 point)**

Which of the following is a valid MAC address?

- A. 00:05:J6:0D:91:K1
- B. 10.0.0.1-255.255.255.0
- C. 00:05:J6:0D:91:B1
- D. 00:D0:A0:5C:C1:B5

**43. (0.2 point)**

You are the system administrator for a small company that runs two Windows servers (Windows Server 2016) and two Linux servers (SUSE Linux). You need to lock down the connections to the switch via port security; this essentially means you will need to retrieve the MAC addresses on the systems. MAC addresses are found on the Linux server by issuing which command?

- A. ipconfig /a
- B. ifconfig /a
- C. winipcfg /a
- D. ifconfig -a

**44. (0.2 point)**

Standards for CSMA/CD are specified by which IEEE 802 sublayer?

- A. 802.1
- B. 802.3
- C. 802.4
- D. 802.5

**45. (0.2 point)**

From the choices listed, which of the following protocols represents e-mail protocols?

- A. POP3
- B. SMCP
- C. IMAP5
- D. Telnet

**46. (0.2 point)**

When discussing the OSI model and the TCP/IP model, which layer of the OSI model handles what you would find in the Application layer of the TCP/IP model?

- A. Application, Presentation, and Session
- B. Presentation, Session, and Transport
- C. Network, Data Link, and Physical
- D. Session, Transport, and Network

**46. (0.2 point)**

Match the following:

- ~A. Repeaters    ~1. Data Link Layer
- ~B. Bridges      ~2. Network Layer
- ~C. Routers      ~3. Physical Layer
- A. ~ A vs 2; B vs 3, C vs 1
- B. ~A vs 3; B vs 1; C vs 2
- C. ~A vs 3; B vs 2; C vs 1
- D. ~A vs 1; B vs 2; C vs 3

**47. (0.2 point)**

The center connection point of a star network is a \_\_\_\_\_

- A. Repeater
- B. Bridge
- C. Router
- D. Switch/Hub

**47. (0.2 point)**

A two-way nonsimultaneous connection is an example of \_\_\_\_\_

- A. Simplex
- B. Half Duplex
- C. Full Duplex

D. Multiplexing

**48. (0.2 point)**

Does a typical star topology use which type of media to connect between nodes and the center connection point (switch/hub)?

A. FDDI

B. Coaxial Cable

C. Fiber optic

D. UTP – CAT 5

**49. (0.2 point)**

Which device is the best choice for routing?

A. Router

B. Gateway

C. Hub

D. Switch

**50. (0.2 point)**

Which service listed below is used for dynamic IP address allocation?

A. DNS

B. DHCP

C. ARP

D. TCP

## Part II. Short Answer

### 1. (0.500 Point)

What is encapsulation?

### 2. (0.500 Point)

Which layer is responsible for creating, managing, and terminating sessions between applications?

### 3. (0.500 Point)

Which layer defines how data is formatted, presented, encoded, and converted for use on the network?

### 4. (0.500 Point)

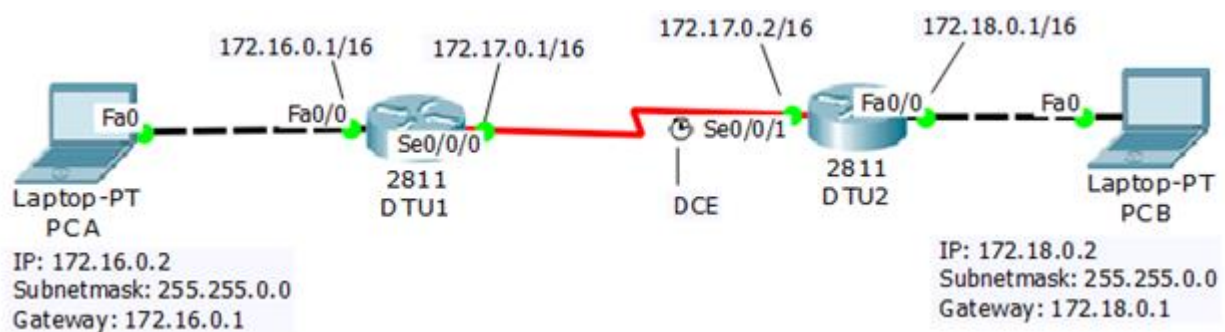
What is the difference between the OSI model and the TCP/IP model?

### 5. (0.500 Point)

You are creating a DHCP scope for your 192.168.1.32/28 subnet. The subnet consists of Windows 7, Windows 8, and Windows 10 computers. You have two UNIX computers on this subnet that will be assigned the two highest available static IP addresses. The subnet's default gateway will be assigned the lowest available IP address on the subnet. Which scope should you create on your DHCP server?

### 6. (0.500 Point)

Refer to the exhibit.



[http://hfs2.duytan.edu.vn/ndJK184IUkdfn23df675/TestBank/210619\\_lab-5.2-static-route\\_4925\\_C3612\\_013159.png](http://hfs2.duytan.edu.vn/ndJK184IUkdfn23df675/TestBank/210619_lab-5.2-static-route_4925_C3612_013159.png)

Write commands to configure IP on the interface Fa0/0 of router DTU1.

### 7. (0.500 Point)

Compare and contrast copper wire, glass fiber, and satellite transmission media.

### 8. (0.500 Point)

Computer networks are typically classified according to what? What are the types of computer networks?

### 9. (0.500 Point)

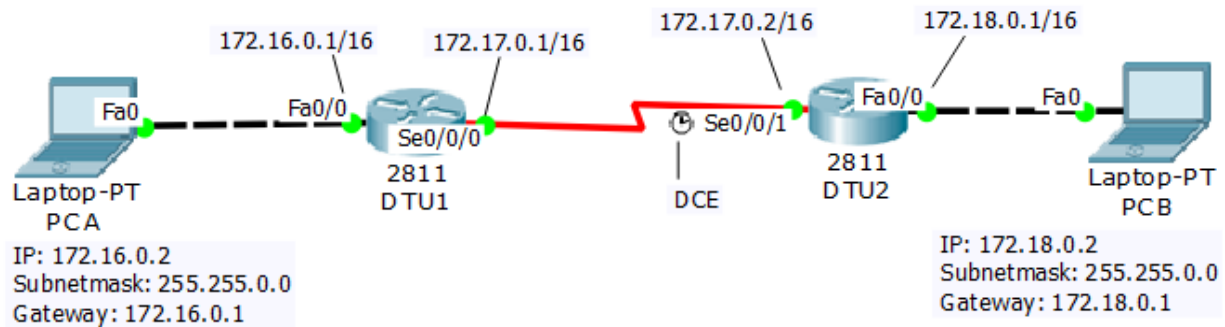
What is the difference between a connection-oriented network and a connectionless network?

### 10. (0.500 Point)

What are the two kinds of twisted-pair cable? Which is preferred? Why?

### 11. (0.500 Point)

Refer to the exhibit.



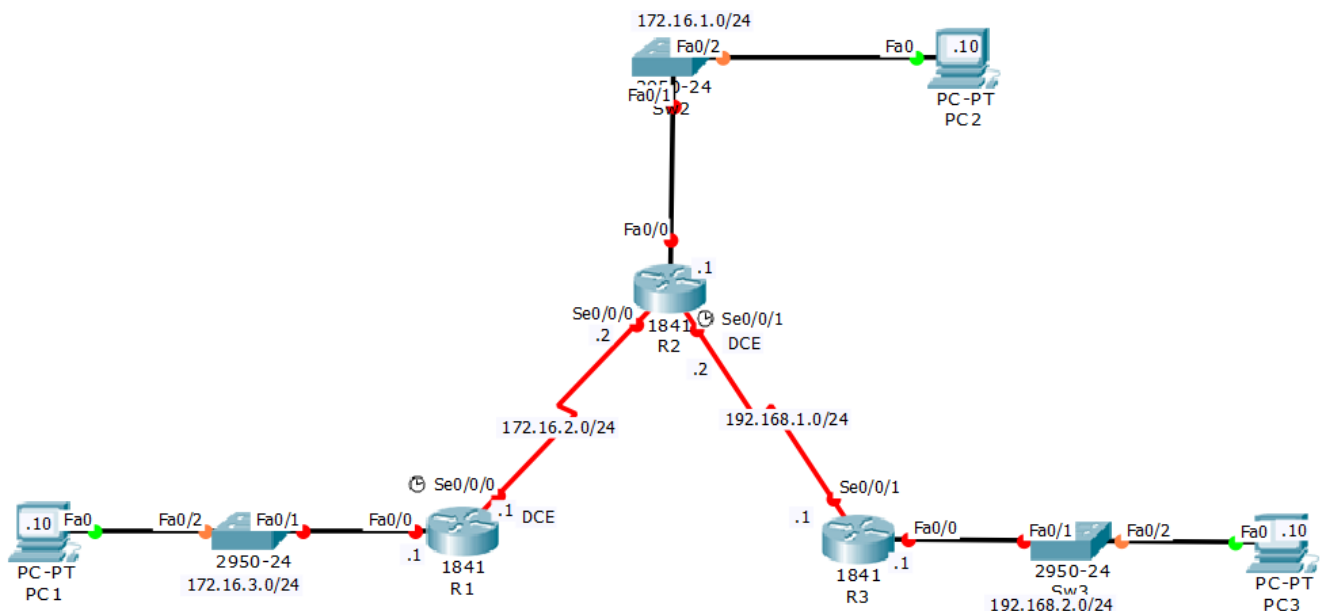
[http://hfs2.duytan.edu.vn/ndJK184IUkdfn23df675/TestBank/210619\\_lab-5.2-static-route\\_4925\\_C3612\\_013159.png](http://hfs2.duytan.edu.vn/ndJK184IUkdfn23df675/TestBank/210619_lab-5.2-static-route_4925_C3612_013159.png)

Router DTU1 needs to connect to PCB. What is the static route configuration on Router DTU1?

### 12. (0.500 Point)

Refer to the exhibit.

[http://hfs2.duytan.edu.vn/ndJK184IUkdfn23df675/TestBank/210619\\_bkt-1\\_4925\\_862ED\\_015137.png](http://hfs2.duytan.edu.vn/ndJK184IUkdfn23df675/TestBank/210619_bkt-1_4925_862ED_015137.png)



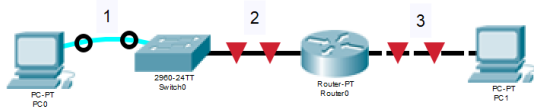
What is the default route configuration on Router R1?

### 13. (0.500 Point)

List ten devices that can be considered end devices and intermediary devices on a network (list five for each type).

**14. (0.500 Point)**

Refer to the exhibit. The PC is connected to the console port of the switch. All the other connections are made through FastEthernet links. Which types of cables are 1, 2, and 3?



**15. (0.500 Point)**

List the layers of the OSI model from top to bottom, and the layers of the TCP/IP model from bottom to top.

**16. (0.500 Point)**

What four protocols are needed for communication between a web server and a web client?

**17. (0.500 Point)**

What will happen if the default gateway address is incorrectly configured on a host?

**18. (0.500 Point)**

Match the function to the name of the application.

- |         |  |
|---------|--|
| a. DHCP | 1. allows viewing of messages on email clients |
| b. DNS  | 2. displays web pages                          |
| c. IMAP | 3. sends email messages                        |
| d. HTTP | 4. dynamically assigns IP address to clients   |
| e. SMTP | 5. maps URLs to numerical addresses            |

**19. (0.500 Point)**

What are the three methods used to control data flow at Layer 4?

**20. (0.500 Point)**

What is data referred to at each OSI layer?

## Part III. Short Essay

### 1. . (3.000 Points)

**Given Network Address: 10.0.0.0/18 , let's identify:**

- a) Address class and default subnet mask:
- b) Number of bits borrowed and custom subnet mask:
- c) Total number of subnets and total number of host addresses per subnet:

### 2. . (3.000 Points)

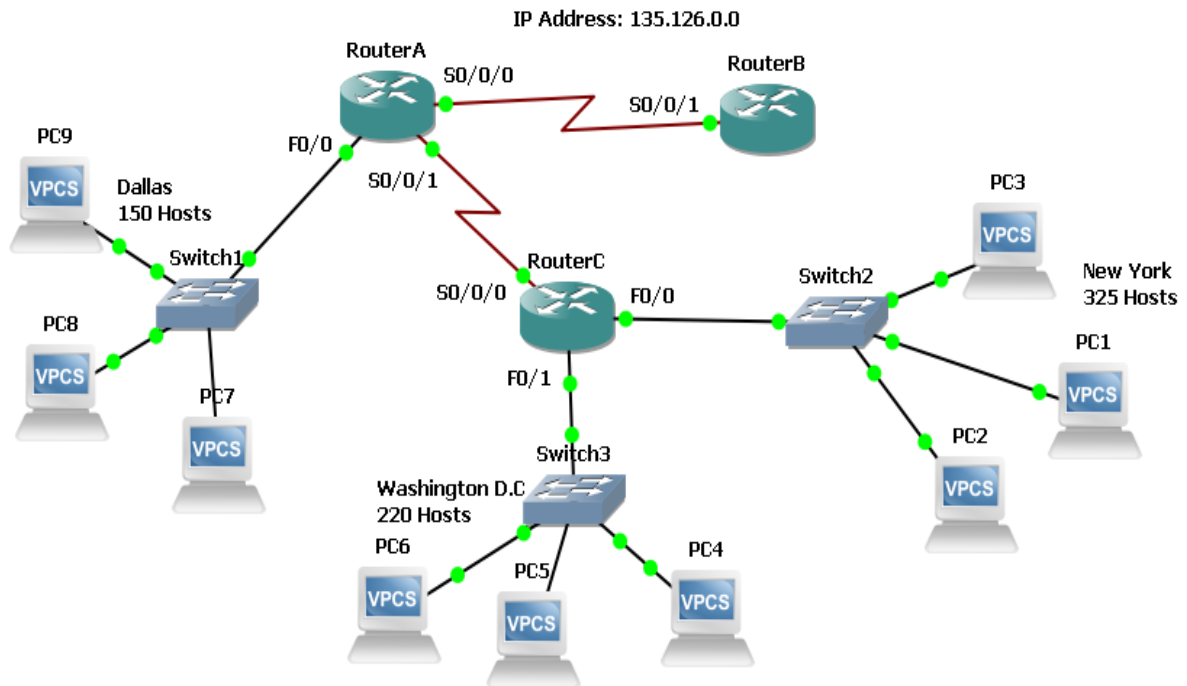
**Given Network Address: 192.150.1.0 . We need 4 subnets with at least 20 host addresses per subnet. Let's identify:**

- a) Number of bits borrowed (n):
- b) Custom subnet mask:
- c) Total number of host addresses per subnet
- d) Subnets range

ID	Sub-network Address	Host Addresses Range	Sub-broadcast Address	Use Yes/No
0				
1				
2				
3				
4				
5				

### 3. (3.000 Points)

Refer to the exhibit. Design a network addressing scheme that will supply the minimum number of subnets and allow enough subnets and hosts for 70% growth in all areas. Circle each subnet on the graphic and fill in the blanks below.



## Questions

## Point

Custom subnet mask:\_\_\_\_\_

0.25

Minimum number of subnets needed:\_\_\_\_\_

0.25

Extra subnets required for 70% growth: + \_\_\_\_\_

0.25

Total number of subnets needed: = \_\_\_\_\_

0.25

Number of host addresses in the largest subnet group: \_\_\_\_\_

0.25

Number of addresses needed for 70% growth in the largest subnet: + \_\_\_\_\_

0.25

Total number of address needed for the largest subnet: = \_\_\_\_\_

0.25

Start with the first subnet and arrange your sub-networks from the largest group to the smallest.

IP address range for New York: \_\_\_\_\_

0.25

IP address range for Washington D. C.: \_\_\_\_\_

0.25

IP address range for Dallas: \_\_\_\_\_

0.25

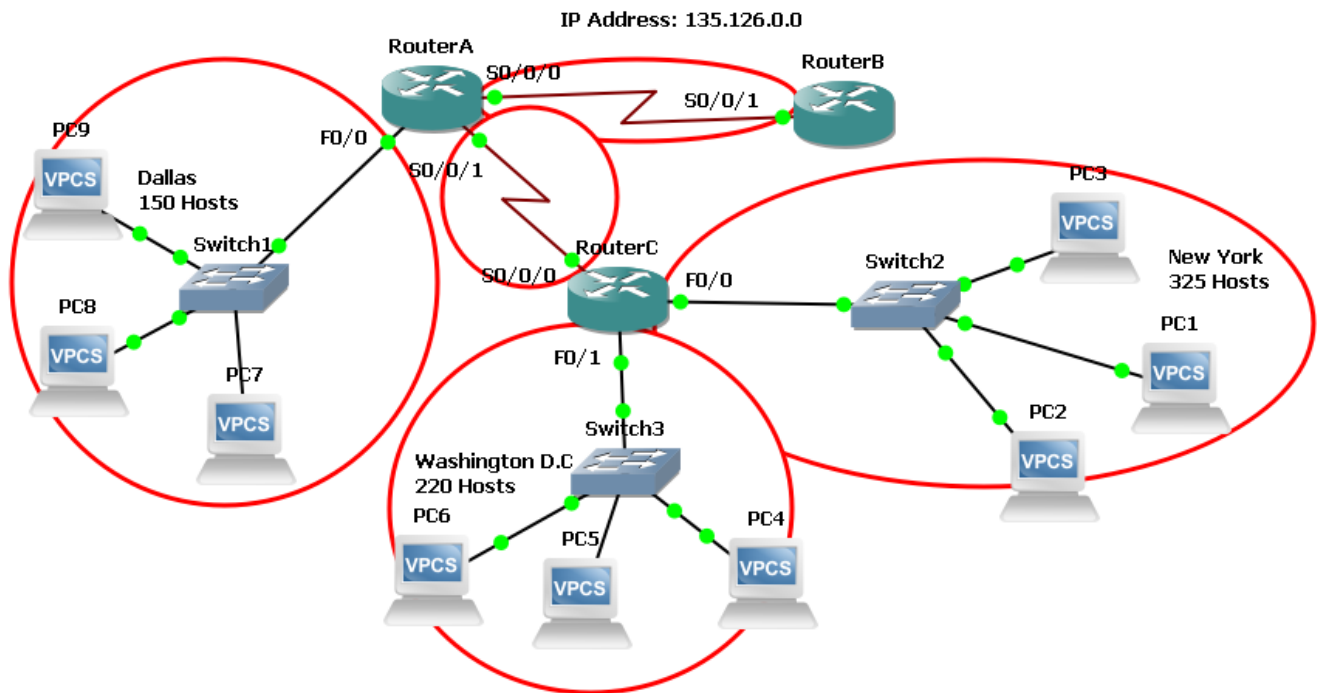
IP address range for Router A to Router B serial connection: \_\_\_\_\_

0.25

IP address range for Router A to Router C serial connection: \_\_\_\_\_

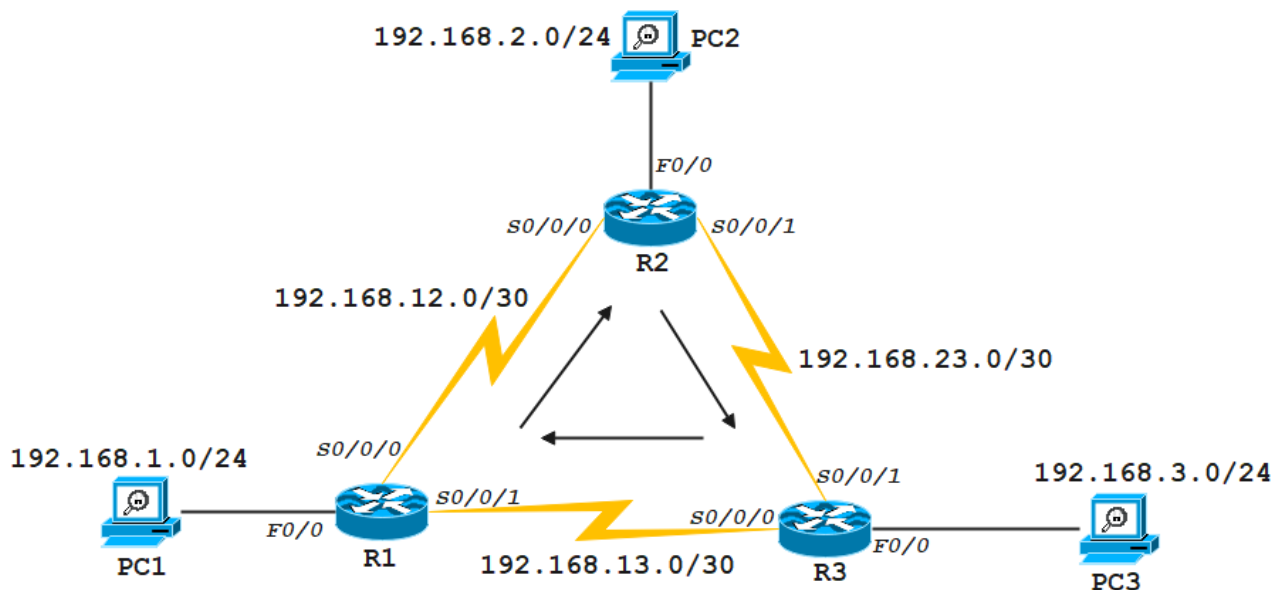
0.25





#### 4. (3.000 Points)

Refer to the exhibit.



- + The connection between router vs router, the router with less than ID will be configured the Start-IP.
- + The connection between router vs PC, the router will be configured the Start-IP, PC will be configured Start-IP + 1.
- + Using static routing with Next-Hop to routing for this diagram. Routes are configured following the arrow in the diagram.

a) Configure IP for PCs (0.5 point)

**Write commands to:**

b) Configure IP for router R1 (0.5 point)

- c) Configure IP for router R2 (0.5 point)
- d) Configure IP for router R3 (0.5 point)
- e) Static routing (1.0 point)

## **5. (3.000 Points)**

A new office building of DTU is being constructed at 03 Quang Trung St. and will be finished this year. The building is planned to install 1,000 devices (hosts) for staff. Currently, DTU uses the 10.10.0.0/16 address space.

- a) How many valid host addresses are available within the DTU network 10.10.0.0/16?
- b) How many bits must the network administrator borrow to provide addresses for the subnet of the new office building without wasting addresses?
- c) What is the subnet mask that should be associated with the newly created subnet?
- d) Assuming that there are two departments (A and B) that will be working in this building (500 hosts for each department). Each department needs a separate LAN. What is the subnet mask that should be associated with the subnet of each department without wasting addresses?
- e) Assuming that 10.10.15.20/XY is one of the valid host addresses of the subnet for department A (Note that XY is the subnet mask from question d). What is the network address and broadcast address of this subnet?
- f) One of the printers of department A is assigned the address 10.10.16.20/XY. No one in department A is able to print with this printer. What is the cause of the problem?

**LECTURER**



**ĐẶNG NGỌC CƯỜNG**