00113

Sri Lanka Institute of Information Technology

B. Sc. Special Honours Degree in Information Technology

Final Examination
Year 2, Semester II

EC244 - Data Communications & Computer Networks II

Duration: 3 Hours

October 2015

Instructions to Candidates:

- This paper has 5 Questions.
- Total marks 100.
- This paper contains 9 pages including the cover page.
- Refer Annex 1 for additional information

Question 1 IP ADDRESSING **[15 Marks]**

1. Compare and contrast the **two** versions of IP addresses. (3 Marks)

2. What are the main components of **Classful** and **Classless IP Addresses**? (2 Marks)

3. State the usages of following special IP address types. (4 Marks)

   a. Loopback address

   b. Limited broadcast address

   c. Direct broadcast address

   d. Specific host of this network address

4. a. Clearly explain how routers compute the network address of the destination device by analyzing IP address and the subnet mask. (2 Marks)

   b. Find the sub network address for a device with 182.56.55.205 with the subnet mask 255.255.248.0 (2 Marks)

5. Write the subnet mask for the following sub-networks.

   a. A Class B network with 5 sub-networks (1 Mark)

   b. A Class C network with 30 hosts in each sub-network (1 Mark)

Question 2 ROUTING **[20 Marks]**

1. Draw the network topology diagram by using file1, file2 and file3.Your diagram should include all the interfaces, network addresses, IP addresses with subnet mask (by / notation) by analyzing the given configuration files. (10 Marks)

File 1

```
COLOMBO#show  running-config

Current configuration : 783 bytes
hostname COLOMBO
!
interface FastEthernet0/0
 ip address 192.168.100.2 255.255.255.192
  speed auto
!
interface FastEthernet1/0
 no ip address
shutdown
!
interface Serial2/0
 ip address 10.0.0.10 255.255.255.252
 clock rate 64000
!
interface Serial3/0
 ip address 10.0.0.1 255.255.255.252
 clock rate 64000
!
interface FastEthernet4/0
 no ip address
 shutdown
!
interface FastEthernet5/0
 no ip address
 shutdown
!
router rip
 version 2
 network 10.0.0.0
 network 192.168.100.0
 no auto-summary
!
ip classless
!
end


COLOMBO#
```

File 2

```
GAMPAHA#show  running-config
Building configuration...

Current configuration : 731 bytes
!
version 12.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname GAMPAHA
!
spanning-tree mode pvst
!
interface FastEthernet0/0
 ip address 192.168.100.129 255.255.255.192
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/0/0
 ip address 10.0.0.9 255.255.255.252
!
interface Serial0/0/1
 ip address 10.0.0.6 255.255.255.252
 clock rate 64000
!
interface Vlan1
 no ip address
 shutdown
!
router rip
 version 2
 network 10.0.0.0
 network 192.168.100.0
 no auto-summary
!
ip classless
!
end

GAMPAHA#
```

File 3

```
KALUTHARA#show running-config
Building configuration...

Current configuration : 714 bytes
!
hostname KALUTHARA
!
interface FastEthernet0/0
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface FastEthernet0/1
 ip address 192.168.100.65 255.255.255.192
 duplex auto
 speed auto
!
interface Serial0/1/0
 ip address 10.0.0.2 255.255.255.252
!
interface Serial0/1/1
 ip address 10.0.0.5 255.255.255.252
!
interface Vlan1
 no ip address
 shutdown
!
router rip
 version 2
 network 10.0.0.0
 network 192.168.100.0
 no auto-summary
!
ip classless
!
end

KALUTHARA#
```

2. Explain **two** types of problems occurred in RIP and the solutions for those problems. (2 Marks)

3. Explain the **three** types of records of a routing table entries. (3 Marks)

4. Draw the final routing tables for the given routers in part1, after the network is converged. (3 Marks)

5. Write the following command in the valid format and explain the usage of it.

   ip route 156.45.86.64 10.0.0.5 255.255.255.192 (2 Marks)

Question 3 TCP/IP **[20 Marks]**

1. **IP packet** with the following IP header needs to be forwarded to Data Link Layer which uses Ethernet protocol.

   ←

   4500 0FA0 0A00 0000 C806 0000 A00B 0032 C414 1D50

   a. How many fragments will be created? (2 Marks)

   b. Clearly show the fragmentation process by using a diagram by indicating the size of data in each fragment. (4 Marks)

   c. State the IP header dump of the last fragment in hexadecimal. (3 Marks)

2. The following is a dump of **TCP header** in hexadecimal format.

   ←

   AF08 0017 0000 00A5 0000 0A01 8012 0800 0000 0000

   a. Write the destination port number and its service. (1 Mark)

   b. State the type of the source port. (1 Mark)

   c. Write the type of the TCP segment. (1 Mark)

   d. Calculate the header size and the window size. (1 Mark)

   e. Explain the effect of URG and PSH control fields if they are set to '1'. (2 Marks)

   f. The following is an invalid TCP header dump. Highlight and correct error/s in the header.

   ←

   AF08 0017 0000 00A5 0000 0A01 8000 0800 0000 00A2 (2 Marks)

3. TCP sends a segment at 7:34:23. It receives the acknowledgement at 7:34:29. What is the new RTT value, if the previous RTT was 5s? (3 Marks)

Question 4 SWITCHING and VLANS **[20 Marks]**

1. Compare **two** differences between Bridging and Switching. (1 Marks)

2. Explain **two** MAC Address table updating methods. (3 Marks)

3. The Figure 1 given below shows, the LAN topology of a small company. Write necessary switch configurations to satisfy the given requirements in part a and b.

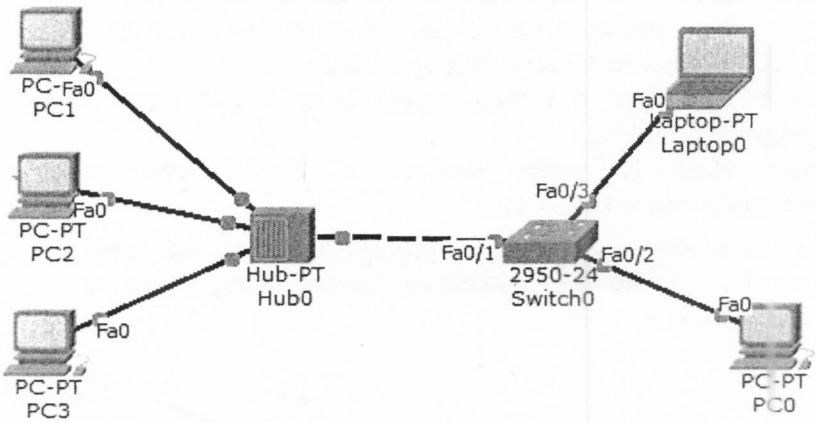

Figure 1

a. Only PC1, PC2 and PC3 should be able to communicate with the other PCs in the network. (4 Marks)

b. If any other device tries to access the switch, the port must shutdown and only the administrator must manually activate the interface. (1 Mark)

c. State the command used to obtain the MAC address of a PC. (1 Mark)

d. MAC addresses of PC0, PC1, PC2, PC3 and Laptop0 are MAC_PC0, MAC_PC1, MAC_PC2, MAC_PC3 and MAC_Laptop0 respectively.

Write the output of the following command. (4 Marks)
Switch0#show mac-address-table

4. a. What is known as VLAN trunking? (1 Mark)

b. Name the Cisco Proprietary and IEEE defined VLAN trunking protocols respectively. (1 Mark)

c. Describe the mode of the ports of a switch in the following connections.
   i. Switch to a Router
   ii. Switch to an End Device (3 Marks)
   iii. Between 2 Switches

Question 5 STP & ACL **[25 Marks]**

1. Write **three** features of named ACLs. (3 Marks)

2. As the network administrator of a company you are requested to apply access privileges for end user devices according to the following requirements.

   a. Host A can use web service in LAN2.
   b. Host X can use ftp service in LAN2.
   c. Host A and Host X cannot use any other services in LAN2.
   d. All the other devices in LAN1 can communicate with LAN2 and LAN3 (other than previously specified).
   e. Host Y and Host Z cannot access Host P and Host Q respectively in LAN2.
   f. Except Host X, other devices of LAN3 can do communications with LAN1. (9 Marks)

   Write the command with the router prompt to create and apply access control lists in the most suitable routers and to apply them to the relevant interfaces. (4 Marks)

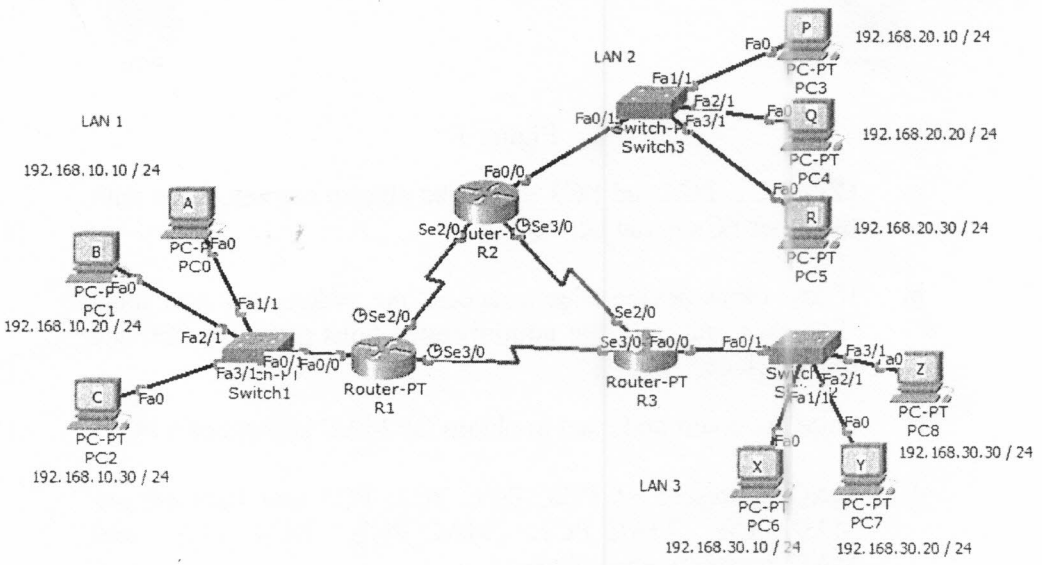

Figure 2

3. Write the wild card mask for the following situations.

   a. To filter first 60 IP addresses destined to 172.16.20.0 network. (3 Marks)
   b. To filter all the devices in 192.168.210.12 network (2 Marks)

4. Write the contents of Bridge Protocol Data Unit used in the Spanning Tree Protocol. (2 Marks)

5. Explain the functionality of Intrusion Detection Systems. (2 Marks)

Annex 1

Format of the IP header

VER 4 bits	HLEN 4 bits	Service type 8 bits	Total length 16 bits
Identification 16 bits		Flags 3 bits	Fragmentation offset 13 bits
Time to live 8 bits		Protocol 8 bits	Header checksum 16 bits
Source IP Address			
Destination IP Address			
Option			

Format of the TCP header

Source port address 16 bits								Destination port address 16 bits
Sequence number 32 bits								
Acknowledgment number 32 bits								
HLEN 4 bits	Reserved 6 bits	URG	ACK	PSH	RST	SYN	FIN	Window size 16 bits
Checksum 16 bits								Urgent pointer 16 bits
Options and Padding								