Question 1 (Compulsory) **[40 Marks]**

Write notes on any ***five*** of the following topics: **(8 Marks each)**

a) Default Gateway

b) TCP Flow Control

c) Bandwidth versus Throughput

d) MAC Address versus IP Address

e) CSMA/CD

f) Routers

g) UDP.

Question 2 **[30 Marks]**

a) Choose ***two*** Application Layer protocols from the following list and discuss their function:

- DHCP
- DNS
- FTP
- Telnet
- HTTP.

(12 Marks)

b) Discuss the role of the Transport layer of the OSI model.

(10 Marks)

c) A network administrator is trying to decide between copper cabling and fiber-optic cabling. Compare and contrast the two types of cables.

(8 Marks)

Question 3 **[30 Marks]**

a) A small organisation, shown in **Figure 1**, has been allocated the following IP address:
192.16.21.0 / 24

Create a ***basic*** subnetting scheme that will address the needs of this network. Please recreate **Table 1** in your answer booklet and fill in your addressing scheme.

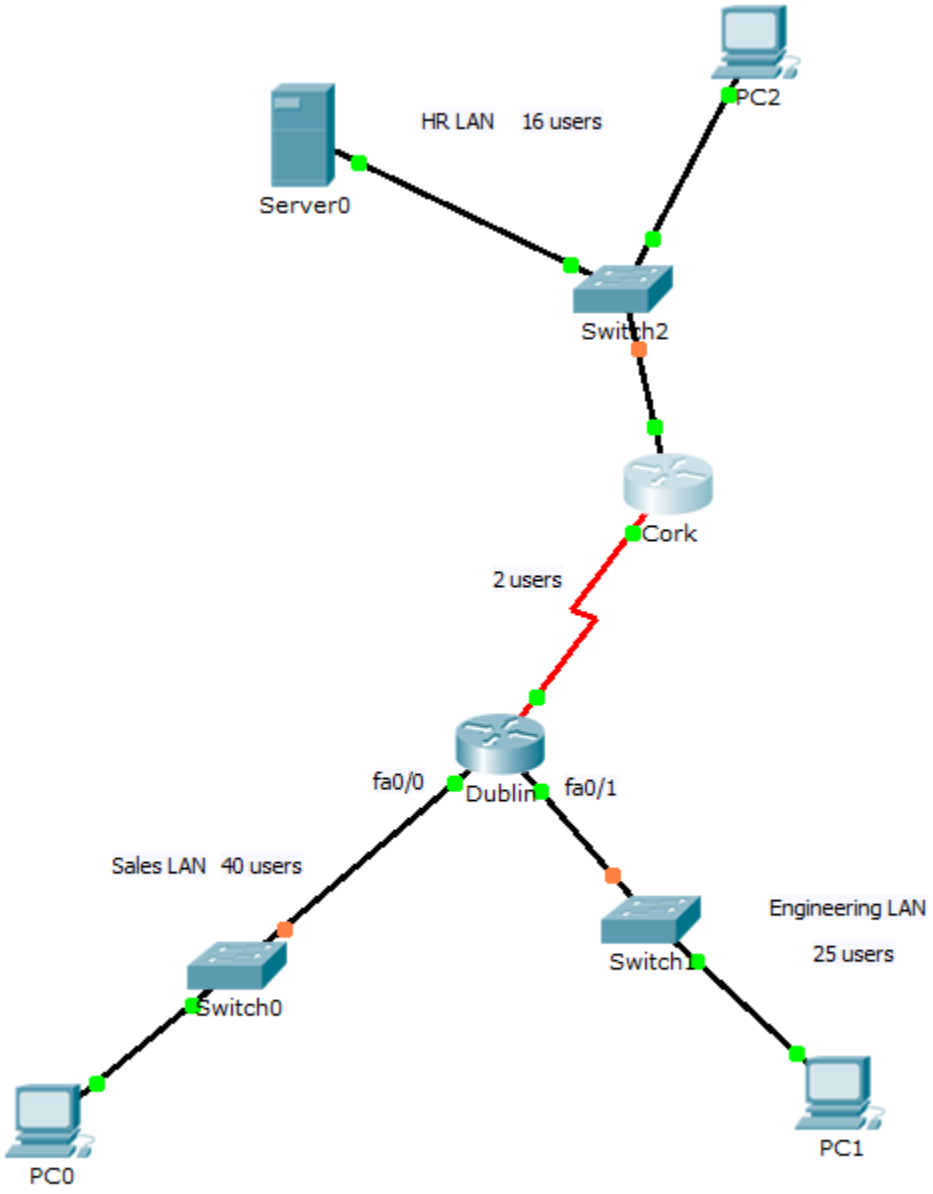

Figure 1

Subnet Number	Subnet Address	Host Range	Broadcast Address
0			
1			
2			
3			

Table 1

(16 Marks)

b) Subnet number 0 has been allocated to the Sales LAN, and the following commands have been issued on the Dublin router.

Dublin(config)#interface fa0/0

Dublin(config-if)#ip address 192.16.21.1 255.255.255.192

Dublin(config-if)#no shutdown.

I. Explain the purpose of each command *[6 marks]*

II. Suggest an appropriate IP Address, Subnet Mask and Default gateway for PC0? *[3 marks]*

(9 Marks)

c) What is the purpose of the ARP protocol? How does it work?

(5 Marks)

Question 4 **[30 Marks]**

a) **Figure 2** shows a network topology with addressing information for the router interfaces and the PCs.

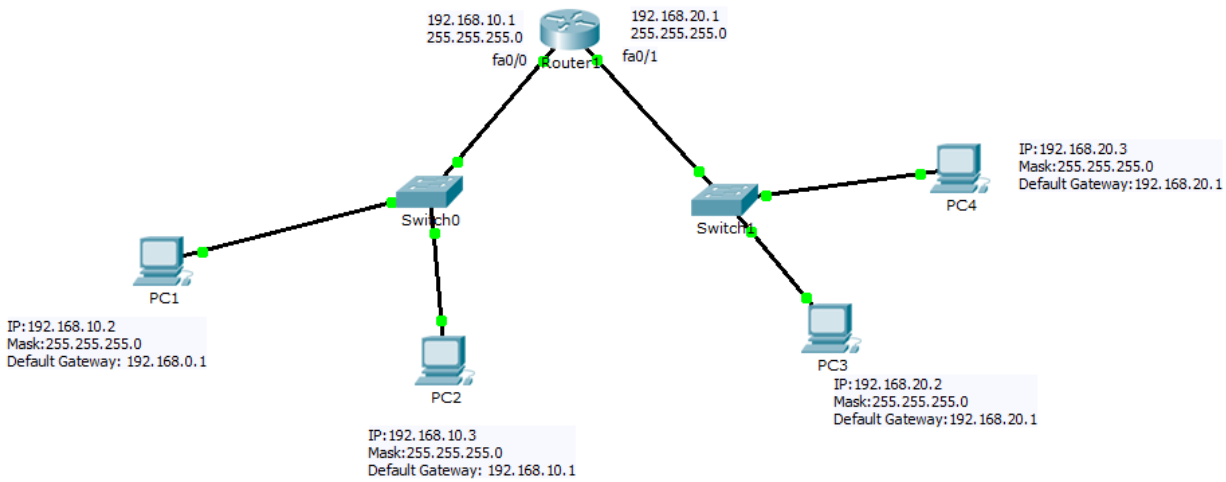

Figure 2

I. Based on the diagram should a 'ping' from PC1 to PC2 be successful? Explain your answer. *[3 marks]*

II. Based on the diagram should a 'ping' from PC1 to PC3 be successful? Explain your answer. *[3 marks]*

(6 Marks)

b) Here is the output from the 'show ip route' command on Router1.

Router1#show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
<some output has been omitted>

Gateway of last resort is not set

C 192.168.10.0/24 is directly connected, FastEthernet0/0
C 192.168.20.0/24 is directly connected, FastEthernet0/1

Use this output to help answer the following questions.

I. The ‘C’ at the beginning of each entry indicates that the network is directly connected. Would an administrator have to enter directly connected networks into the routing table? Explain your answer. *[5 marks]*

II. Explain in detail what the ‘/24’ on each entry indicates? *[4 marks]*

III. Router1 has been connected to a new additional switch, on a third router interface, fa0/2.

The following commands have been entered on Router1.

```
Router1(config)#int fa0/2
Router1(config-if)#ip address 192.16.16.1 255.255.255.0
Router1(config-if)#no shutdown
```

Will these commands have any impact on the routing table? Explain your answer. *[3 marks]*

(12 Marks)

c) How is the MAC address table in a switch populated?

(6 Marks)

d) At the Physical layer, Ethernet can be deployed in a bus topology or a star topology. What are the advantages of moving from a bus topology to a star topology using switches?

(6 Marks)