A

CSE421 / EEE465 : Computer Networks
Answer **ANY FIVE** of the following **SIX** questions. (**Pages: 3**)
Figures in the right margin indicate marks.

Name:	ID:	Section:

Q 1. a) **CO1**   A network engineer uses the **"ipconfig"** command to visualize the current IP network   **3+ 3**
configuration. From the displayed output, he notes down the following information:

```
IPv4 Address : 17.50.96.81
Subnet Mask : 255.255.128.0
```

He also identifies that the default-gateway of the network is the second usable host IP address
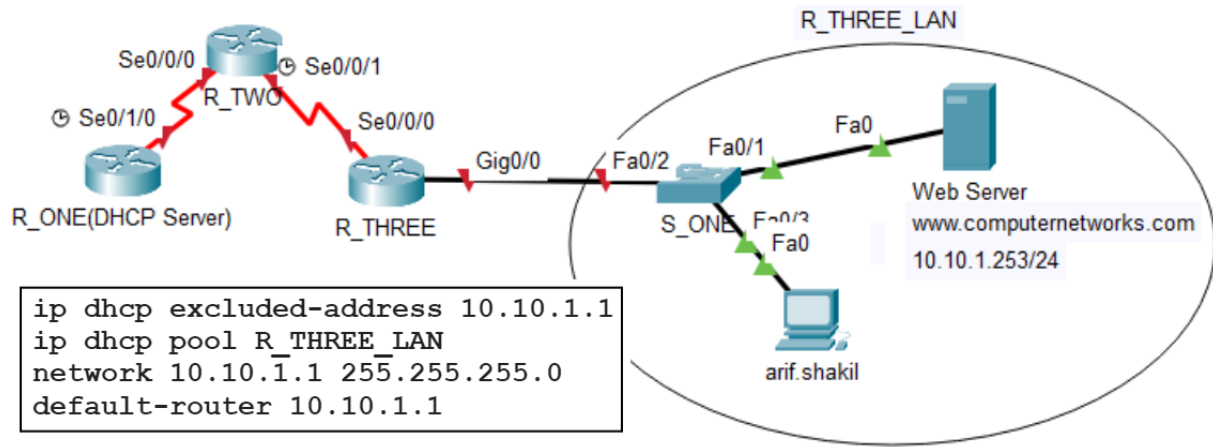of the network.
From the above scenario, **determine** the following (show necessary calculations):
   I.   The broadcast address
   II.   IP address of the default-gateway

b) Using the network address found in **1(a)**, efficiently **calculate** the sub-network addresses of   **14**
all the networks in the following topology. Show necessary calculations.
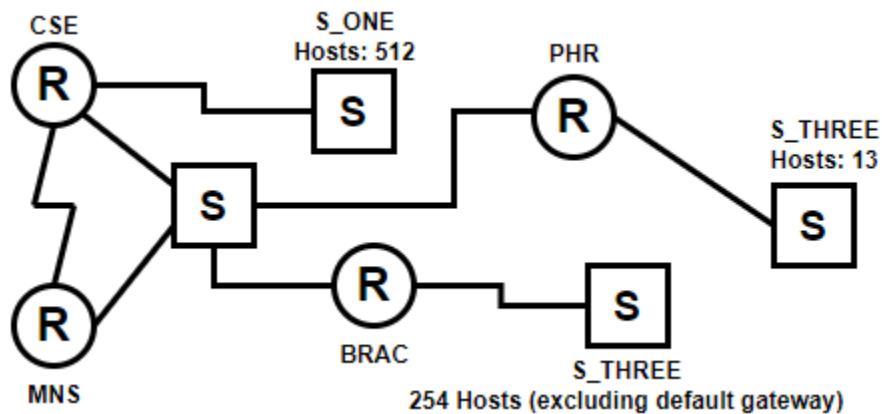

Q 2. a) **CO2**   Refer to figure below (start of next page). Router **R_ONE** is configured as the DHCP Server   **6+**
for the **R_THREE_LAN**. The default gateway of **R_THREE_LAN** is **10.10.1.1**. The   **2+**
network engineer has configured the server by the following set of commands shown beside   **2**
the figure. However, the users face several problems, although DHCP service is enabled in the
R_ONE router.
   I.   **Identify** two problems in the DHCP Server configuration and provide their solutions.
   II.   **Determine** where to set up the DHCP Relay. Mention the specific router name and the
         interface.
   III. If there had been a WAN link between **R_ONE** and **R_THREE**, then **determine** if the
         set-up interface is any different from Q2.a.II. **Explain** your reasoning.

R_THREE_LAN

```
ip dhcp excluded-address 10.10.1.1
ip dhcp pool R_THREE_LAN
network 10.10.1.1 255.255.255.0
default-router 10.10.1.1
```

b) Suppose the packet size of the last fragment (8th fragment) is **230 bytes**, including **22 bytes** of header. Also, this packet has an offset value of **182**. [First byte number starts from **0**]. All fragments have the same size.

4+
4+
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    I.   **Identify** the original intact packet size

    II.   **Identify** the MTU of the network and the 6th fragment's fragment offset.

    III.   **What's** the MF value of the 6th fragment?

Q 3. a)
CO3

Refer to the following network topology and current routing distances of each router. The network finds the shortest path by updating its routing table at regular intervals, gradually.
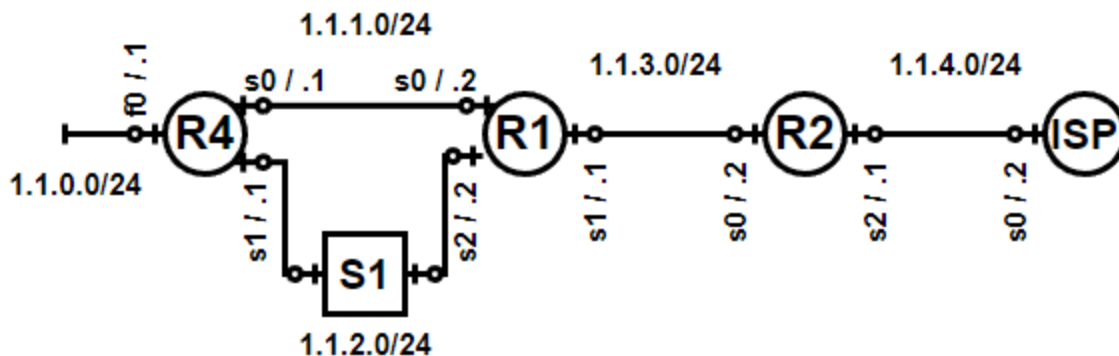
2+
8
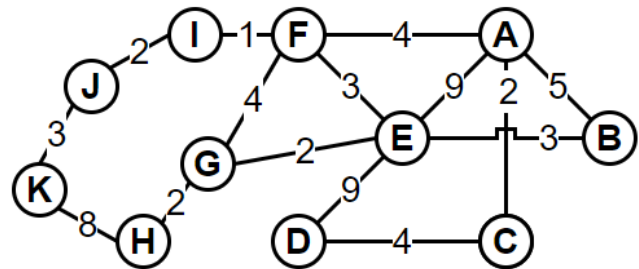
	A	B	C	D	E	F	G	H	I	J	K
A	0	5	2	inf	9	4	inf	inf	inf	inf	inf
B	5	0	inf	inf	3	inf	inf	inf	inf	inf	inf
C	2	inf	0	4	inf	inf	inf	inf	inf	inf	inf
D	inf	inf	4	0	9	inf	inf	inf	inf	inf	inf
E	9	3	inf	9	0	3	2	inf	inf	inf	inf
F	4	inf	inf	inf	3	0	4	inf	1	inf	inf
G	inf	inf	inf	inf	2	4	0	2	inf	inf	inf
H	inf	inf	inf	inf	inf	inf	2	0	inf	inf	8
I	inf	inf	inf	inf	inf	1	inf	inf	0	2	inf
J	inf	inf	inf	inf	inf	inf	inf	inf	2	0	3
K	inf	inf	inf	inf	inf	inf	inf	8	inf	3	0

    I.   **Determine** the name of the algorithm the above topology is using

    II.   Assuming Node E is not sending any updates to A, **show** the updated table of A after one iteration. Show your work.

b) Link state requires keeping track of its neighbors, **examine** why?

5

c) Distance vector algorithm might not reflect the real shortest path, explain.

5

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Q 4. a)
CO4

1.1.1.0/24

f0 /.1

s0 /.1   s0 /.2

R4   **R1**   **R2**   **ISP**

1.1.3.0/24   1.1.4.0/24

1.1.0.0/24

s1 /.1   s2 /.2   s1 /.1   s0 /.2   s2 /.1   s0 /.2

S1

1.1.2.0/24

4+
4

Command: ip route _____

I.   **Construct** a directly attached route for the R4 LAN on R1 with the AD of 5.
II. **Construct** a backup route for the above route.
Note: "s0 /.1" where s0 is the interface number and .1 is the host part of the IP address.

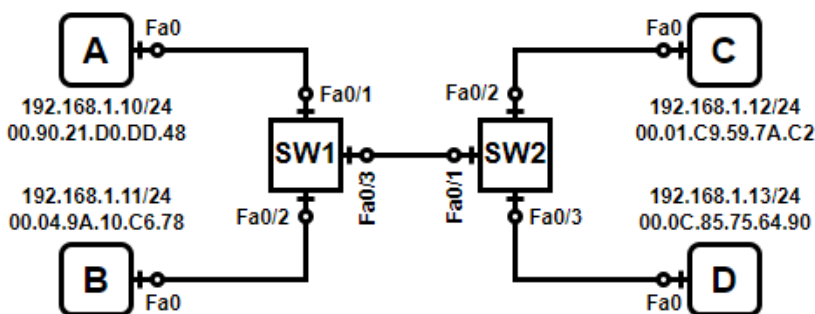**b) What** happens when a router does not have a static default route?   4

c) Given the following entry in the routing table of a router: 4
        `S 10.0.0.1 [50/0] via 17.69.66.2`   +
        What's the significance of '0' in [50/0] ? **Interpret** why is the other value 50 instead of 1?   4

Q 5. a) **Write** how IPv6 anycast addresses differ from multicast addresses. **Give an example** of how   3+
CO3 anycast address helps in networking.   3

b) IPv6 headers do not carry fragment information compared to IPv4 headers. But a packet   4
        might require fragmentation if the MTU is smaller than the packet size. **Explain** how this is   +
        handled in routers that are using IPv6. **Determine** the role of ICMPv6 here, if any.   3

c) **Explain** why SLAAC is a stateless process. **Write** briefly how SLAAC functions in an IPv6   4
        network setup.   +3

Q 6. a) IP addresses are hierarchical, and MAC addresses are flat, **explain**. **State** in which layer they   4
CO4 are used and why.   +3

b) The MAC address table of
        switches SW1and SW2
        contains information of
        host D. Now **host A** sends
        an **ARP** request to **host D**.
        Explain what will the two
        switches do with this ARP
        request. **State** if there are any
        changes in the MAC address
        tables of both switches.

A Fa0

192.168.1.10/24
00.90.21.D0.DD.48

Fa0/1   Fa0/2

SW1   **SW2**

192.168.1.11/24
00.04.9A.10.C6.78   Fa0/2   Fa0/3   Fa0/1   Fa0/3

B Fa0

C Fa0

192.168.1.12/24
00.01.C9.59.7A.C2

192.168.1.13/24
00.0C.85.75.64.90

D Fa0

4
+
3

c) There are a total of 8 bytes in the Preamble field of the Ethernet header. **What** does these 8   3
        bytes contain? Determine how does a receiving device know when the preamble ends?   +3

=========================THE END=========================

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