Unit 5 · How the Internet Works

WORKSHEET

Full marks 35

Name _____ Class _____ Roll no. ____ Date _____ Marks _____ / 35

1 Key words [4]

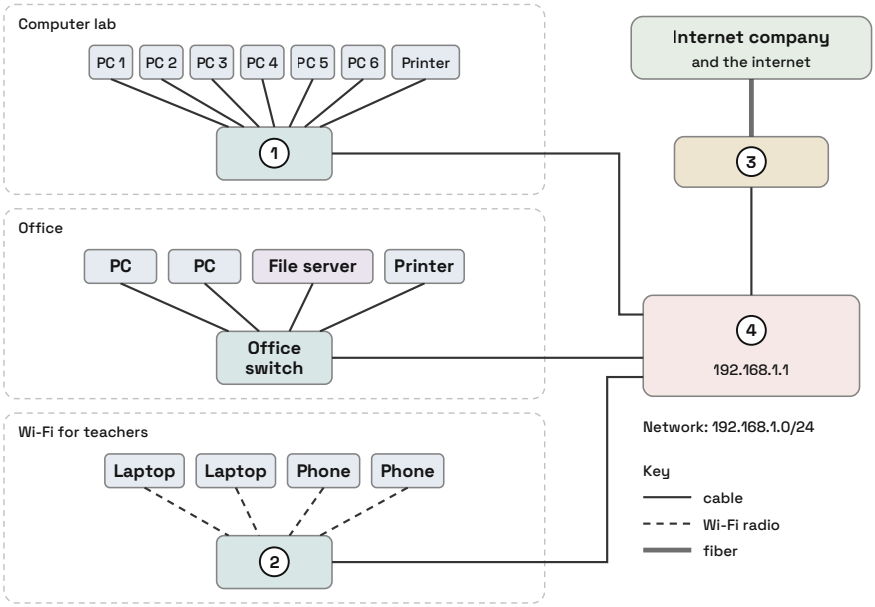
Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

bandwidth	DHCP	DNS	hub	latency	MAC address	NAT	protocol	topology	UDP

The pattern of the links between the devices of a network is its _____. The most data a link can carry each second is its _____, and how long one message takes to arrive is its _____. A set of rules that devices follow to communicate is a _____. A home router gives each device its address by _____, and shares the home's one public address by _____. _____ turns a name such as moecdc.gov.np into an IP address. A switch knows each device by the _____ of its network card.

2 Label the diagram [2]

The diagram shows a small school's network. Write the name of the device in place of 1 to 4. Each carries 0.5 mark.



1. _____ 2. _____

3. _____ 4. _____

3 Multiple choice [5]

Choose the correct option for each of the following questions.

i. Which device joins different networks and passes packets on by their IP address? [1]

a. hub **b.** repeater

c. router **d.** access point

ii. Which topology has every device joined to a central switch? [1]

a. bus **b.** star
c. ring **d.** mesh

iii. How many bits long is an IPv6 address? [1]

a. 32 **b.** 48
c. 64 **d.** 128

iv. Which protocol is used to send email? [1]

a. HTTP **b.** FTP
c. SMTP **d.** DHCP

v. Which of these is a private IP address, used only inside a network? [1]

a. 8.8.8.8 **b.** 203.0.113.25
c. 192.168.0.101 **d.** 103.69.124.8

4 Match the columns [2]

Match each device with its job. One job in the right column is not needed.

Column A		Column B
1. hub	☐	**a.** joins networks and passes packets on by their IP address
2. switch	☐	**b.** turns a name into an IP address
3. router	☐	**c.** repeats every message out of every socket, to every device
4. access point	☐	**d.** sends each message only out of the socket it is for
		e. joins devices to the network by Wi-Fi

5 True or false [3]

Write True or False after each sentence.

i. In a star topology, a broken cable cuts off only one computer. ☐

ii. A walkie-talkie is full duplex. ☐

iii. Network speeds are counted in bits per second, and file sizes in bytes. ☐

iv. TCP is faster than UDP because it doesn't check that each piece arrived. ☐

v. Millions of homes can use the same private address, such as 192.168.1.23, at the same time. ☐

vi. A web page whose address starts with http:// is sent encrypted. ☐

6 Short answers [8]

Write short answers to the following questions.

a. A computer has the IP address 192.168.5.14, the subnet mask 255.255.255.0 and the default gateway 192.168.5.1. [3]

i. What is its network part?
ii. Will a packet to 192.168.5.200 go through the router? Explain.
iii. Will a packet to 192.168.6.14 go through the router? Explain.

b. Shorten the IPv6 address fe80:0000:0000:0000:0202:b3ff:fe1e:8329. [2]

c. Differentiate between TCP and UDP. Which would you use for: i. downloading a file, ii. a live video call? Why? [3]

7 Numerical problems [5]

Solve the following problems. Show your working.

a. A game is 1.5 GB (1 GB = 1,024 × 1,024 × 1,024 bytes; 1 Mb = 1,000,000 bits). The family's plan is 50 Mbps, but a speed test shows a throughput of 20 Mbps. [3]

i. How many megabits is the game?
ii. How long would it take to download at 50 Mbps?
iii. How long does it really take, at 20 Mbps?

Answer: _____

b. Some internet satellites circle the Earth only 550 km up. Radio travels at about 300,000 km/s. At least how long does a message take to go up to such a satellite and down again? At least how long before an answer comes back? **[2]**

Answer: _____

8 Long answer **[4]**

Write a long answer to the following question.

Describe what happens, in order, from the moment you tap a link to https://moecdc.gov.np until the page appears. Which layer does each step belong to?

9 Think **[2]**

Think, then answer.

Rabin joins the lab's six computers in a chain, each computer's second network card to the next one's, with only PC 1 joined to the router. All six reach the internet. Why is this a poor design?

10 Activity: Your own address (not marked)

Type **ipconfig** in a computer's Command Prompt, then **ping** and your default gateway's address.

What to find	What I found
my IPv4 address	
subnet mask	
default gateway	
the network part of my address	
the time a ping to the gateway took	