

Exercises Sheet #1 : Introduction to Communication Networks

Communication Networks
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Exercise 1: Basic Concepts

Q1.SHORT ANSWER QUESTIONS

- 1) Define the term "**Communication Network**" in your own words.
- 2) List and briefly explain the **three main components** of a communication network.
- 3) What is the difference between a **Local Area Network (LAN)** and a **Wide Area Network (WAN)**? Provide one example of a **LAN** and one example of a **WAN** that you encounter in daily life.
- 4) Explain the role of a **router** in a communication network.

Q2. LONG ANSWER QUESTIONS:

- 1) Write down the advantages of computer network.
- 2) Explain client server architecture.
- 3) Explain any three network topologies.
- 4) Explain the difference between wired and wireless medium.

Exercise 2: Network Types and Topologies

1. Identify the type of network (LAN, WAN, MAN, PAN) for the following scenarios:
 - a. A network connecting computers in a single building.
 - b. A network connecting two offices in different cities.
 - c. A Bluetooth connection between a smartphone and a headset.
 - d. A network covering an entire city.
2. Draw and label the following network topologies:
 - a. Star topology
 - b. Bus topology
 - c. Ring topology
3. Compare the advantages and disadvantages of **star topology** and **bus topology**.

Exercise 3: Network Components

1. Identify the following devices and explain their roles in a network:
 - a. **Router**
 - b. **Switch**
 - c. **Modem**
 - d. **Access Point**
2. Which device would you use to connect two computers in the same room? Why?

Exercise #4 : Quiz

- 1) In which type of network topology is every device connected to every other device in the network, which provides multiple paths for data transmission?

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- A. Bus C. Star
B. Ring D. Mesh
- 2) To connect two or more heterogeneous networks (from different technologies), we use :
A. Hub C. Router
B. Switch D. Modem
- 3) Which kind of device connects to a computer with a telephone line allowing modulation and demodulation of incoming and outgoing data ?
A. Network Interface Card (NIC) C. The modem
B. The router D. The switch
- 4) Which kind of devices allow to a host (computer) to connect physically with an external network ?
A. A router C. NIC (Network Interface Card)
B. CDROM D. A modem
- 5) Determine the topology that allows to connect between 4 hubs with central hub and connect between 4 hosts and every hub.
A. Bus topology C. Star topology
B. Ring topology D. Extended star topology.
- 6) Which of the following protocols are examples of TCP/IP transport layer protocols (Choose two answers.)
A. Ethernet C. IP E. SMTP
B. HTTP D. UDP F. TCP
- 7) Which of the following protocols are examples of TCP/IP data link layer protocols? (Choose two answers.)
A. Ethernet C. IP E. SMTP
B. HTTP D. UDP F. PPP
- 8) The process of HTTP asking TCP to send some data and making sure that it is received correctly is an example of what?
A. Same-layer interaction C. OSI model
B. Adjacent-layer interaction D. All of these answers are correct.
- 9) Which OSI layer defines the functions of logical network-wide addressing and routing?
A. Layer 1
B. Layer 2
C. Layer 3
D. Layer 4
E. Layer 5, 6, or 7
- 10) Which OSI layer defines the standards for cabling and connectors?
A. Layer 1
B. Layer 2
C. Layer 3
D. Layer 4
E. Layer 5, 6, or 7

Exercise #5 (Optional):

Answer the following questions:

- 1) Give 2 examples of stacks of network protocols.

- 2) Describe the name of the transfer units of every layer in the OSI model.
- 3) What is the role of a repeater?
- 4) What is the difference between a switch and a router.
- 5) Which OSI layer is responsible of the following :
 - a. Guarantees the connectivity and selects a route to send information (packet).
 - b. Ensure the reliability of end-to-end information flow, provide mechanisms for establishing, maintaining and closing virtual circuits as well as detecting route failures, resuming and controlling information flow.
 - c. Controlling and correcting data errors.
- 6) Which layer introduce logical addressing?
- 7) Which layer introduce physical addressing?
- 8) Identify the OSI layer implementing the following concepts: IPv4, Hub, Switch, RJ45, UDP, WEB, OSPF, SNMP.

Exercise 6: Practical Application

- 1) Imagine you are setting up a small office network. List the hardware and software components you would need.
- 2) Imagine you are at home and want to connect your laptop, smartphone, and printer to the internet.
 - a. What devices would you need to set up this network?
 - b. Draw a simple diagram of how these devices would be connected.
- 3) What do you think is the most important component of a communication network? Justify your answer.