



Air University
(Mid-Term Examination: Fall 2024)

Subject: Computer Networks
 Course Code: CS-360
 Class: BS-CYS
 Semester: III
 Section: A&B

Total Marks: 50
 Date:
 Time:
 Duration: 2 Hours
 FM Name: Azhar Ghafoor

HOD Signatures: *[Signature]*

FM Signatures: *[Signature]*

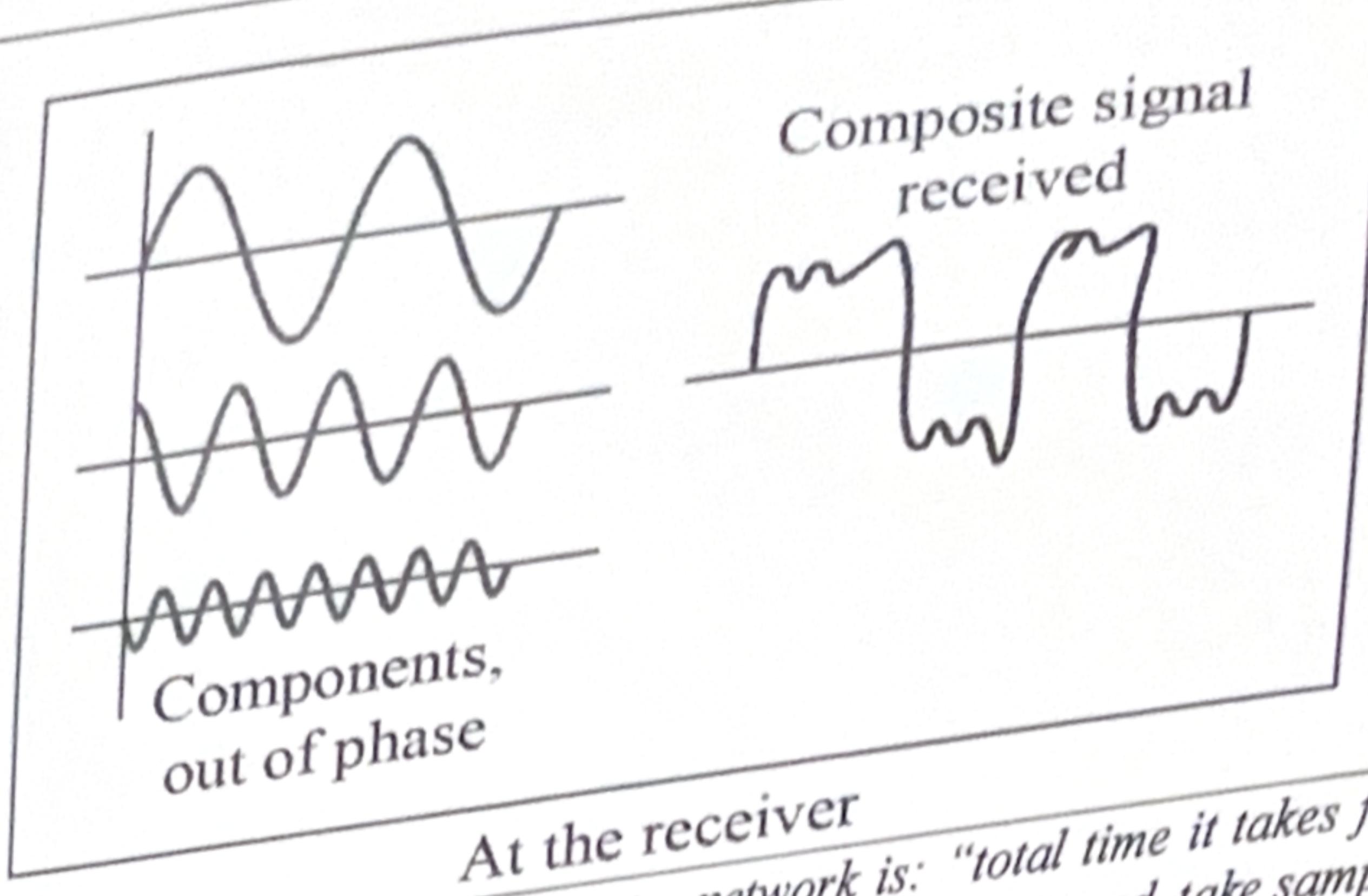
Note:

- All questions must be attempted.
- This examination carries 25% weight towards the final grade.
- Return the question paper with the answer sheet

	Q. No. 1 (CLO 1)	15 Marks
a	You are asked to design a network that will efficiently distribute video content to multiple users simultaneously. Considering different types of data transmission methods (unicast, multicast, broadcast), which would you choose and why? Explain the challenges and benefits of each method in this scenario.	3
b	A company needs to decide whether to use TCP or UDP for an online gaming service. Analyze the requirements such as data reliability, speed, and network traffic, and justify which protocol is better suited for this application.	3
c	A new startup is creating a smart home system that involves numerous devices communicating within a local network and externally over the internet. Identify how the OSI model can be applied to ensure proper communication between these devices. Explain the role of at least three layers.	3
d	Your organization has experienced frequent network outages due to hardware issues. Based on your knowledge of network reliability, propose measures that can be taken to enhance the reliability of the network, considering both hardware and protocol-level solutions.	3
e	An enterprise is experiencing high latency issues when transferring files over their network. The IT manager suspects inefficient bandwidth utilization. As an expert, analyze the factors affecting bandwidth and suggest practical measures to optimize its utilization.	3
	Q. No. 2 (CLO 2)	20 Marks

Answer both of the following questions.

a	A healthcare organization is transmitting highly sensitive patient data between different departments. Given the requirements of reliability, flow control, and error correction, evaluate how the Transport Layer (TCP) functions can be applied to ensure secure and reliable data delivery. Discuss the role of segmentation, error handling, and flow control in this context.	05
b	Carefully analyze the figure given below, which shows a composite signal received at the receiver and its constituent components. <ul style="list-style-type: none"> • Identify which type of signal impairment is depicted in the figure. • Explain the nature of this impairment and its potential causes. • Describe possible methods or techniques that can be used to mitigate this type of impairment 	03



C

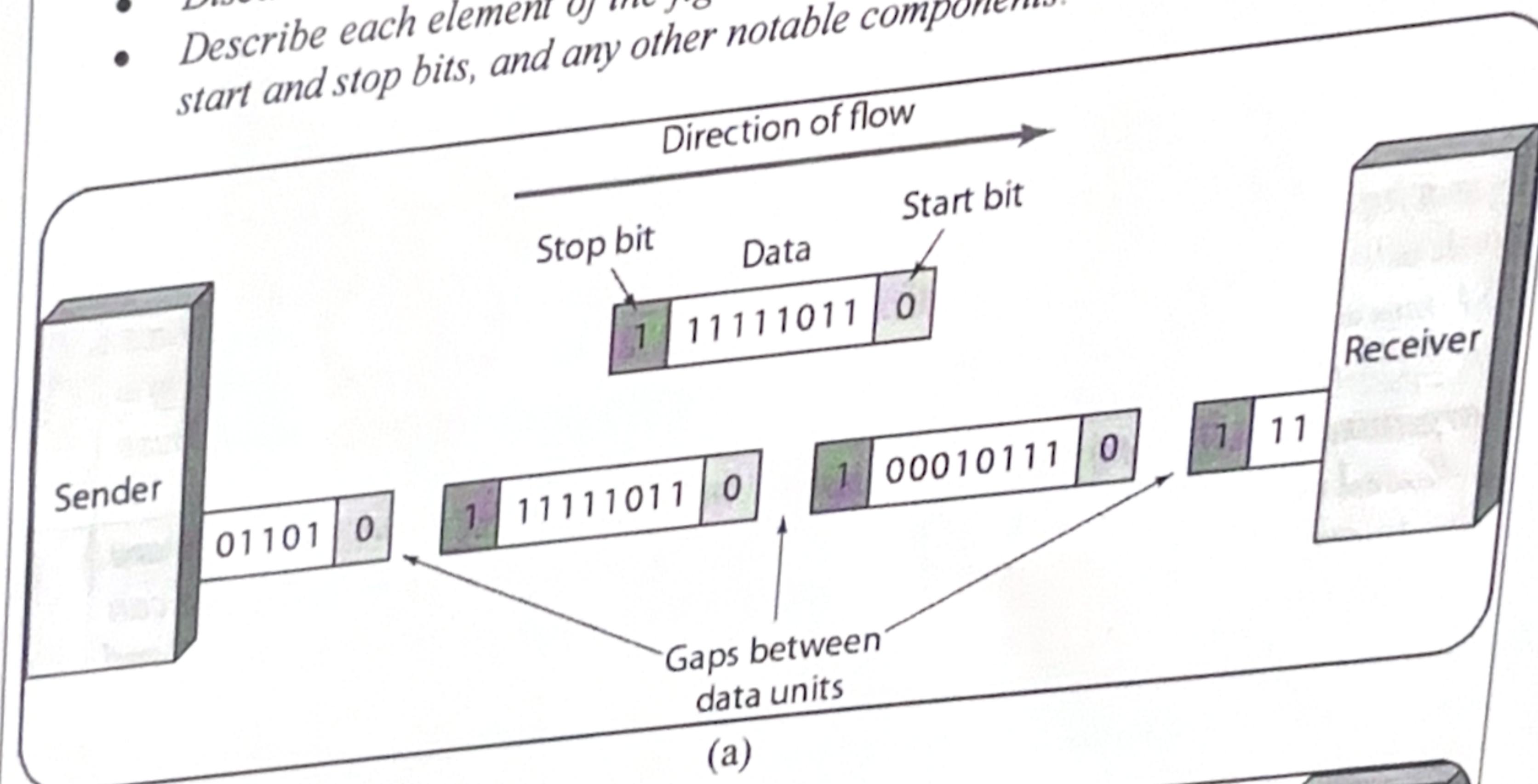
Explain what this phenomenon in a computer network is: "total time it takes for data to travel from source to destination". Describe how this can be measured, take sample values, and show the result with proper units.

Carefully analyze the two distinct figures given below.

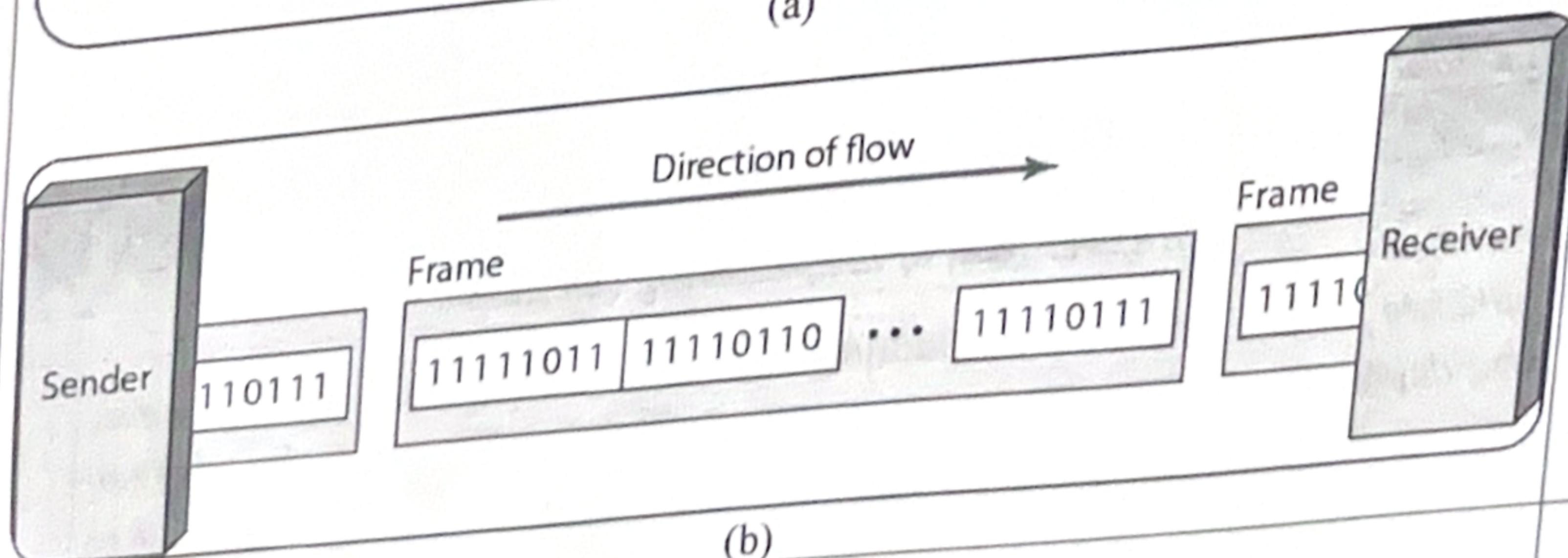
04

- Identify the transmission modes represented in each figure.
- Explain the characteristics and functionalities of these transmission modes.
- Discuss the main differences between the two transmission modes shown.
- Describe each element of the figures, including the sender, receiver, frames, bits, start and stop bits, and any other notable components.

d



08



15 Marks

Q. No. 3 (CLO 3)

Scenario: Security Assessment for TechCorp's Web Application

TechCorp, a data management company, has hired your penetration testing team to evaluate the security of their newly developed web application. Your primary focus is the login mechanism and database security.

<p>A</p> <p>Consider a scenario where a company uses email services to communicate both internally and externally. Design a diagram showing the interaction between different email components, such as the Mail User Agent (MUA), Mail Transfer Agent (MTA), and Mail Delivery Agent (MDA). Explain how the protocols SMTP, POP3, and IMAP are used in this communication flow. Discuss the challenges faced when handling large volumes of emails, such as spam filtering, and describe how different agents (MTA, MDA) handle these challenges.</p>	<p>B</p> <p>You have been tasked with ensuring that a video conferencing application runs smoothly over a network. Considering the functions of the Transport Layer, specifically focusing on TCP and UDP, design a flow diagram that shows how data is transmitted from sender to receiver. Analyze the trade-offs between using TCP and UDP for video conferencing, particularly focusing on factors like reliability, latency, and data ordering. Justify which protocol is better suited for this scenario and explain how flow control and congestion control mechanisms impact the quality of service.</p>
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***** End of Question Paper *****