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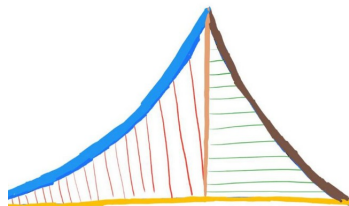
# SIGNAL PROCESSING

## Through GATE

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**EE1205-TA Group**

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# Contents

Introduction	iii
<b>1 Harmonics</b>	<b>1</b>
<b>2 Filters</b>	<b>3</b>
<b>3 Z-transform</b>	<b>5</b>
<b>4 Systems</b>	<b>7</b>
<b>5 Sequences</b>	<b>9</b>
<b>6 Sampling</b>	<b>11</b>
<b>7 Contour Integration</b>	<b>13</b>
<b>8 Laplace Transform</b>	<b>15</b>
<b>9 Fourier transform</b>	<b>19</b>



# Introduction

This book provides solutions to signal processing problems in GATE.



## Chapter 1

# Harmonics

### 1.1





## Chapter 2

2.1

## Chapter 3

# Z-transform



# Chapter 4

## Systems

4.1



## Chapter 5

5.1



## Chapter 6

# Sampling

6.1



## Chapter 7

# Contour Integration

7.1



## Chapter 8

# Laplace Transform

8.1 A process described by the transfer function

$$G_p(s) = \frac{(10s + 1)}{(5s + 1)}$$

is forced by a unit step input at time  $t = 0$ . The output value immediately after the unit step input (at  $t = 0^+$ ) is ? (Gate 2022 CH 34)

**Solution:**

Parameters	Description
$X(s)$	Laplace transform of $x(t)$
$Y(s)$	Laplace transform of $y(t)$
$G_p(s) = \frac{Y(s)}{X(s)}$	Transfer function
$x(t) = u(t)$	unit step function

Table 8.1: Given parameters

$$G_p(s) = \frac{Y(s)}{X(s)} = \frac{(10s + 1)}{(5s + 1)} \quad (8.1)$$

$$u(t) \xleftrightarrow{\mathcal{L}} \frac{1}{s} \quad (8.2)$$

From equation (8.2):

$$Y(s) = \frac{(10s + 1)}{s(5s + 1)} \quad (8.3)$$

$$= \frac{1}{s} + \frac{5}{5s + 1} \quad (8.4)$$

Taking inverse laplace transformation,

$$\frac{1}{s} \xleftrightarrow{\mathcal{L}^{-1}} u(t) \quad (8.5)$$

$$\frac{1}{s - c} \xleftrightarrow{\mathcal{L}^{-1}} e^{ct} u(t) \quad (8.6)$$

$$y(t) = \left(1 + e^{\frac{-t}{5}}\right) u(t) \quad (8.7)$$

$$y(0^+) = 2 \quad (8.8)$$

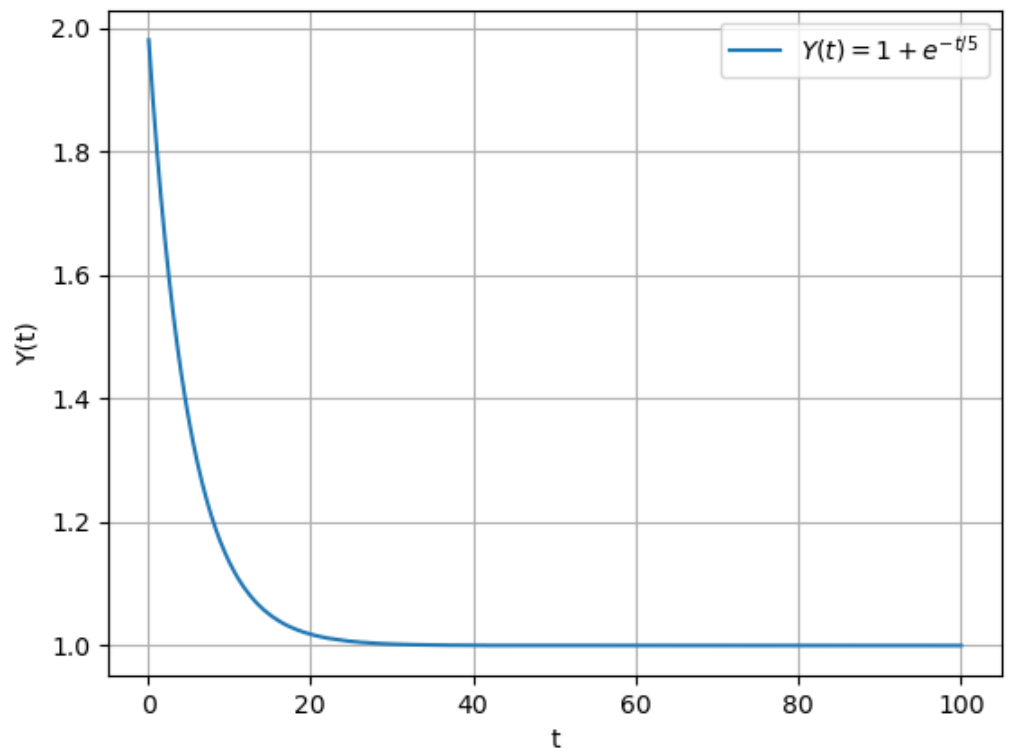


Figure 8.1: Graph of  $y(t)$





## Chapter 9

# Fourier transform

9.1

