

# MID TERM-2 EXAMINATION

Sem: 2<sup>nd</sup> (B.Tech.)

Course Name: Signals and Systems

Course Code: EC0101

Time: 1  $\frac{1}{2}$  Hours

Date: 12/05/2023

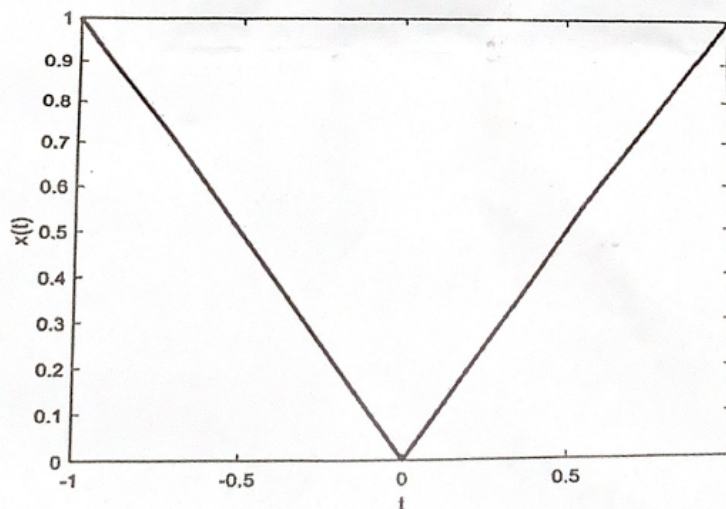
Max. Marks: 20

Name: ..... Roll no.: .....

Instruction:

- A. All questions are compulsory
- B. Each question carries equal marks.
- C. If required, consider the necessary assumptions.
- D. Try to write the answer of a question in one place.
- E. Calculator is allowed.

Q. No	Description of Questions	Marks
1.	a) Given the Fourier coefficients of a periodic signal $x(t) \rightarrow a_k$ . Determine the Fourier coefficients of $x(\alpha t + \beta)$ where $\alpha$ and $\beta$ are positive real numbers? b) Given one period of the periodic signal $x(t)$	2



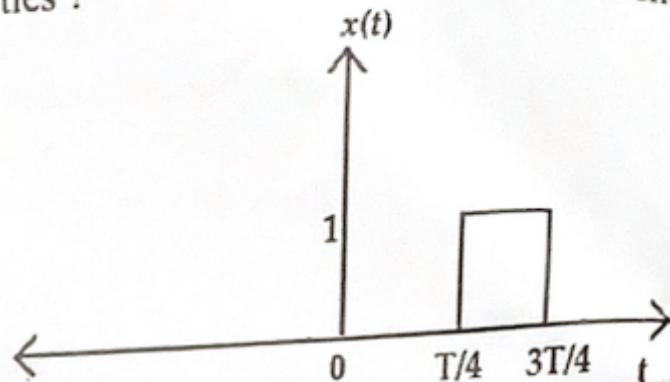
assume the time period  $T = 2$ , determine the complex Fourier coefficients  $a_k$ .  
Discuss about the nature of the Fourier coefficients for different  $k$  ?

2. a) Find the Fourier series coefficients of a periodic signal,

$$x(t) = \begin{cases} 0 & ; -\frac{5}{2} \leq t \leq 0 \\ 5t & ; 0 \leq t \leq \frac{5}{2} \end{cases} \text{ with period, } T_0 = 5.$$

Also, write the corresponding trigonometric Fourier series ?

- b) Determine the Fourier transform of the signal,  $x(t)$  which is shown in figure below using Fourier properties ?



3. a) State and prove Parseval's theorem using Fourier transform? 3  
b) Find out inverse Fourier transform of the frequency domain signal provided as 2.5

$$X(j\omega) = \frac{1}{(a + j\omega)^2}$$

2.5

using Fourier properties?

4. a) The Fourier-transform of an impulse response of a LTI system is given by

$$H(\omega) = \frac{10}{j\omega + 10}. \text{ Determine the response of the system for the input } x(t) = \cos(4\pi t)?$$

2.5

- b) Determine the Hilbert transform of the signal  $x(t) = e^{j\omega_0 t}$  ?

2.5