National University of Computer and Emerging Sciences

Lahore Campus

Signals and Systems (EE2008)

Sessional-2 Exam

Total Time (Hrs.): 1
Total Marks: 30
Total Questions: 3

Date: April 10, 2025

Course Instructor(s)

Dr. S.M. Sajid, Khalid Ijaz

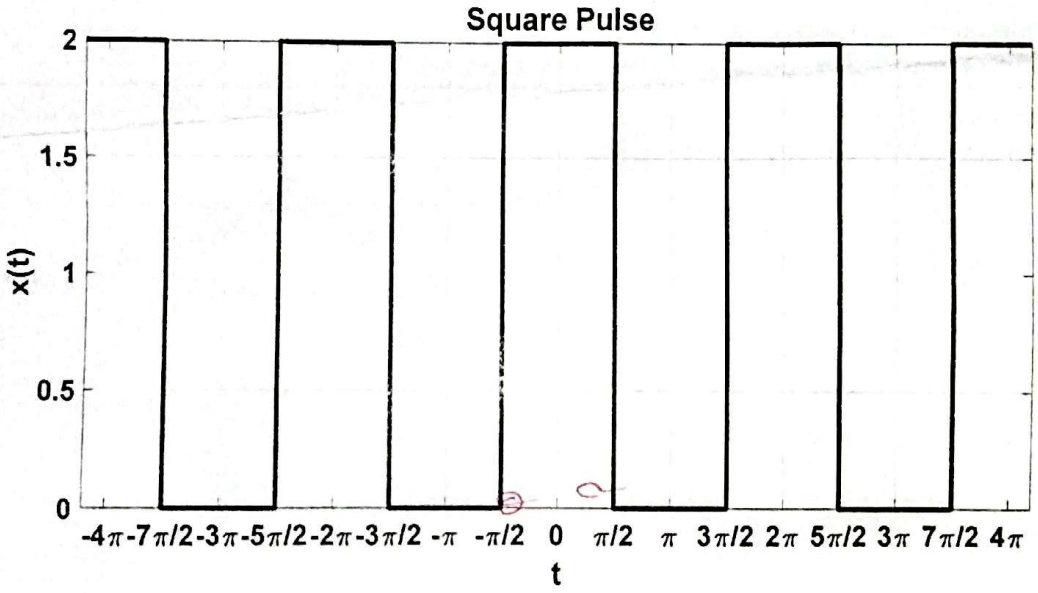
Roll No _____ Section _____ Student Signature _____

Do not write below this line

Attempt all the questions.

CLO 3: Analyze signals using Fourier series representation.

Q1: **Analyze** the coefficients of the compact trigonometric Fourier series for the given square-pulse periodic signal shown below and sketch its amplitude and phase spectra. [10 marks]



$a_n = \frac{4}{\pi}\left(\frac{\sin(n\pi)}{n}\right)$

. sin → cos

. cos → -sin

. sin → -cos

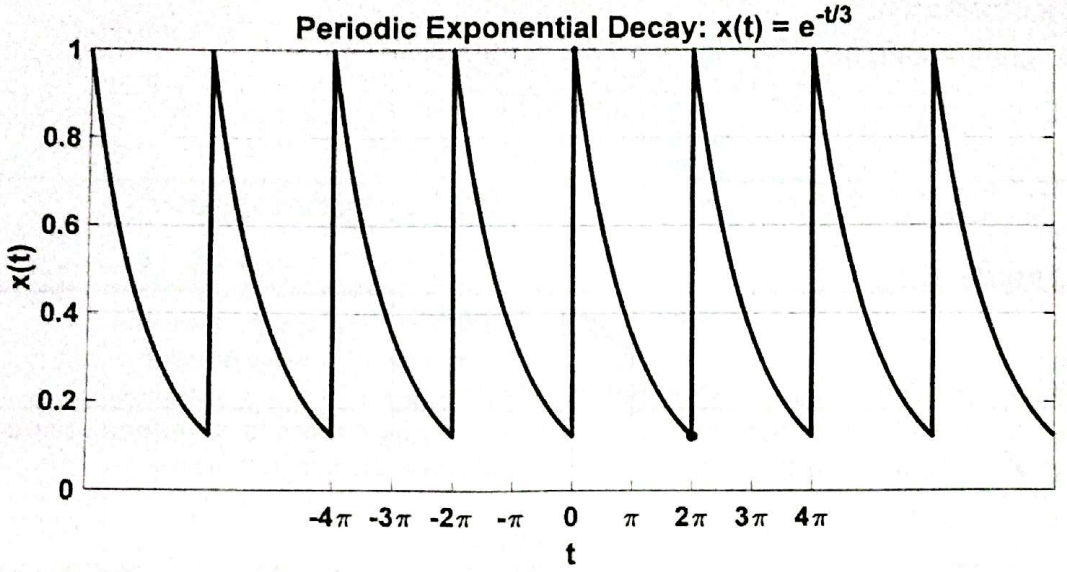
. $\int \cos \rightarrow \int \sin dt$

$\frac{\pi}{2} - \left(\frac{-\pi}{2}\right)$

$\frac{2\pi}{x} = \pi$

CLO 3: Analyze signals using Fourier series representation.

Q2: **Analyze** the coefficients of the exponential Fourier series for the given exponential signal shown below. [15 marks]



CLO 4: Analyze signals using Fourier transform and its properties.

Q3: **Analyze** the Fourier transform of the everlasting sinusoid **cos $\omega_0 t$**. Sketch the signal cos $\omega_0 t$ in the time domain and also plot its Fourier Spectra. [5 marks]

$\frac{1}{2}\left[e^{j\omega_0 t} + e^{-j\omega_0 t} \right]$

$2\pi\,\delta(\omega-\omega_0)$ $\qquad$ $2\pi\,(\omega+\omega_0)$