Programme	B.Tech.		
Course Title	SIGNALS AND SYSTEMS	Semester	WINTER SEMESTER 2023 - 24
Faculty Name	Prof. S Edward Jero	Course Code	BECE202L
		Slot	F1+TF1
Time	3 Hours	Class Nbr	CH2023240503143
General Instructions:		Max. Marks	100

General Instructions:
- Write only Register Number in the Question Paper where space is provided (right-side at the top) & d
  not write any other details.

Answer all questions (10 X 10 Marks = 100 Marks)

01. Determine the even and odd parts of the following signal and sketch them neatly. [10
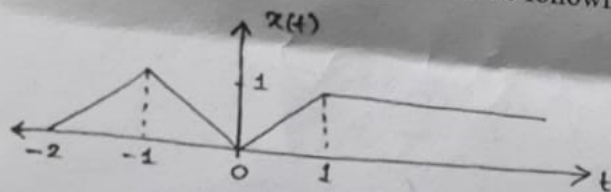
02. (a) Evaluate the convolution integral of the following signals, [5 Marks]
$$x_1(t) = u(t-1) - u(t-3)$$
$$x_2(t) = u(t) - u(t-2)$$

(b) If $x_1(t)$ is treated as the input to an LTI system and $x_2(t)$ is treated as its impulse response, what will be the output of the system? [5 Marks]

03. Derive the Laplace transform using detailed mathematical expressions. Write the relationship between Laplace transform and Fourier Transform using mathematical proofs.

04. Explain pre-envelope and complex envelope of a signal and mention their significance. In this context, explain Hilbert Transform and find out its impulse response.

05. Find out the exponential Fourier Series of the following signal, [1
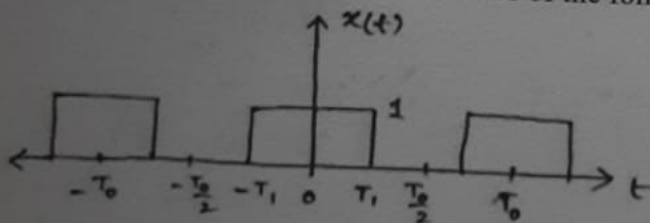
Plot its magnitude and phase responses. Differentiate exponential Fourier series and trigonometric Fourier series with suitable expressions.

6. Findout the Fourier Transform of the following signal, [10]

$$x[n] = 1, \quad |n| \leq N$$
$$= 0, \quad |n| > N$$

07. Find out the frequency response of an LTI system which is described as the following.

$$\frac{d^2 y(t)}{dt^2} + 5\frac{dy(t)}{dt} + 6y(t) = 2x(t)$$

[1

08. Find the initial-value and final value theorem for the following signals. [Each 5 Marks]

a) $X(s) = \frac{1}{s+2}$

b) $X(s) = \frac{s+1}{(s+2)(s+3)}$

[1

09. Find out the Z-Transform of the following two-sided sequence $\{2, -3, 4, -5, 7, 2\}$. Also, find out the corresponding ROC.

[1

0. Find out the signal x[n] whose Z-Transform is given as the following (with ROC:|z|<2),

$$X(z) = \frac{z(z-11)}{(z+3)(z-2)(z+6)}$$

[1

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