

**VIT**Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

REG.NO.:

 $\frac{4}{3} 2$ **SCHOOL OF ELECTRONICS ENGINEERING**
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

SLOT:C1

 $\frac{3}{2}$

Programme Name & Branch : B.Tech (ECE & BML)
Course Code and Course Name : BAECE101-Signals and Systems
Faculty Name(s) : Dr. G. Ramachandra Reddy, Dr.J.Valarmathi,
 Dr. Malaya Kumar Hota, Dr. Christopher Clement J,
 Dr. Anantha Krishna Chintanpalli

Class Number(s) : VL2025260105979/5981/5983/5985/5987

Date of Examination : 07/10/2025

Exam Duration : 90 minutes

Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- Course Outcomes (Type the CO statements covered in this question paper. Use the CO number as per the syllabus copy)

Co2- Apply Continuous-Time Fourier Series and Fourier Transform to represent and characterize the signals and systems in frequency domain.

Co3-Employ the sampling theorem to construct the discrete signal for processing and reconstruct.

Q. No	Question	M	CO	BL
1.	Obtain the exponential Fourier series expansion of the signal $x(t) = 3 + 4 \cos(3\pi t + \frac{\pi}{4}) + 3 \sin(4\pi t - \frac{\pi}{2})$. Using these Fourier series coefficients find the average power.	10	2	3
2.	An LTI system is described by $h(t) = 4te^{-2t}u(t)$. Determine the frequency response $H(j\omega)$ and sketch the magnitude of $H(j\omega)$. Find its response $y(t)$, if the input is $x(t) = 3e^{-t}u(t)$	10	2	3
3.	a. Apply duality property to find the inverse Fourier transform of $e^{- \omega }$ X b. Let the Fourier transform of $x(t)$ be $X(j\omega)$ and $y(t)$ be $Y(j\omega)$. Express $Y(j\omega)$ in terms of $X(j\omega)$ for the relationship $y(t) = x(2t - 3) + \frac{dx(t)}{dt}$	5+5	2	3
4.	A signal $x(t) = 2 \cos(400\pi t) + 6 \cos(640\pi t)$ is ideally sampled using the impulse train method with sampling frequency = 500 Hz. If the sampled signal is passed through an ideal low pass filter, with a cut-off frequency of 400 Hz and gain equal to the sampling period, to obtain the output $y(t)$. a) Sketch the input spectrum $X(j\omega)$. b) Sketch the output spectrum $Y(j\omega)$ and compute $y(t)$.	3+7	3	3

$10 + 5 + 3 + 6 = 24$



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5.	a) Find the Hilbert-Transform of the signal $x(t) = \frac{\sin(t)}{t}$. ✓ b) Prove the properties of Hilbert-Transform for the above signal. P	6+4	3	3
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