

Hall Ticket Number:

Code No. : 16338 AS

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (E.E.E.) VI-Semester Advanced Supplementary Examinations, August-2022

Signals & Systems

Time: 3 hours

Max. Marks: 60

Note: Answer all questions from Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Relate the Impulse signal, Step Signal and Ramp signal.	2	3	1	2
2.	Express the signal $x(t)$ in terms of Trigonometric and Exponential Fourier Series.	2	1	1	1
3.	Show that Fourier transform of a periodic signal will be a train of impulses.	2	2	1	1
4.	Write short notes on Dirichlet conditions for Fourier Transform.	2	1	1	1
5.	What is an Anti aliasing Filter?	2	1	2	1
6.	Develop relation between Fourier and Laplace Transform. In what way it is different from Fourier transform.	2	3	1	2
7.	Verify the Discrete time Signal $x(n) = \sin(3n)$ is periodic or not.	2	3	3	1
8.	Compute the Z-transform of $x(n) = a^{n+1}u(n+1)$.	2	2	3	2
9.	Write about the Convolution Integral to find the output of the Continuous Time system.	2	1	4	1
10.	Prove that Energy Spectral Density and Autocorrelation Function forms a Fourier transform Pair	2	3	4	2
Part-B (5 × 8 = 40 Marks)					
11. a)	Check whether the following signal is periodic or not. If periodic, determine the fundamental period. i) $x(t) = \cos\left(\frac{\pi}{3}t\right) + \sin\left(\frac{\pi}{4}t\right)$ ii) $x(t) = e^{-7t} \sin 10\pi t$	4	3	1	2
b)	Derive the relation between trigonometric Fourier series and exponential Fourier series.	4	2	1	1
12. a)	State and Prove convolution in time and differentiation in time properties of Fourier transform.	4	1	1	1
b)	Evaluate the Fourier transform of $x(t) = 1 - e^{-t} \cos \omega_0 t$	4	3	1	2

Contd... 2

13. a)	Compare Instantaneous Sampling, Natural sampling and flat top sampling.	4	2	2	1
b)	Obtain the Inverse Laplace Transform of $X(s) = \frac{4}{(s+2)(s+4)}$ for ROCs i) $Re(s) < -4$ ii) $Re(s) > -2$ iii) $-2 > Re(s) > -4$	4	3	3	2
14. a)	Determine whether the following systems are linear or non-linear, time invariant or time variant. i) $y(n) = nx(n)$ ii) $y(n) = x(-n)$	4	2	3	2
b)	Compute initial value and final value of the following z-domain signals i) $X(Z) = \frac{1}{1+2Z^{-1}-3Z^{-2}}$ ii) $X(Z) = \frac{2Z^{-1}}{1-1.8Z^{-1}+0.8Z^{-2}}$	4	2	3	2
15. a)	Determine the Convolution of the following signals $x(t) = e^{-3t}u(t)$ and $h(t) = u(t-1)$	4	3	4	2
b)	List the similarities and differences in convolution and correlation of two sequences.	4	2	4	1
16. a)	Determine the Fourier Series of half wave rectified sine function $x(t) = \begin{cases} A \sin \omega t & \text{for } 0 \leq t \leq \pi \\ 0 & \text{for } \pi \leq t \leq 2\pi \end{cases}$	4	3	1	2
b)	A continuous time system is represented by the following differential equation $\frac{d^2 y(t)}{dt^2} + 3 \frac{dy(t)}{dt} + 2y(t) = 2x(t)$ Determine the impulse response of the system using Fourier Transform	4	3	1	3
17.	Answer any <i>two</i> of the following:				
a)	Explain the Sampling theorem for Band limited Signals.	4	1	2	1
b)	Determine the Discrete Fourier Series of . $x(n) = \cos^2\left(\frac{\pi}{6}n\right)$	4	3	3	2
c)	Determine the Convolution and Correlation of the following discrete sequences $X(n)=[1 \ 2 \ 4 \ 6]$ $h(n)=[2 \ 1 \ 2 \ 1]$	4	2	4	2

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	35%
iii)	Blooms Taxonomy Level – 3 & 4	45%
