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)

		M	L	CO	PO
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 $x(t) = 1 - e^{|t|}\cos w_0 t$	4	3	1	2

			M	L	CO	PO
13.	a)	Compare Instantaneous Sampling, Natural sampling and flat top sampling.	4	2	2	1
	b)	Obtain the Inverse Laplace Transform of $X(S) = \dfrac{4}{(s+2)(s+4)}$ 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) $X(Z) = \dfrac{1}{1 + 2Z^{-1} - 3Z^{-2}}$　ii) $X(Z) = \dfrac{2Z^{-1}}{1 - 1.8Z^{-1} + 0.8Z^{-2}}$	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 $x(t) = \begin{cases} A\sin\omega t & for & 0 \le t \le \pi \\ 0 & for & \pi \le t \le 2\pi \end{cases}$	4	3	1	2
	b)	A continuous time system is represented by the following differential equation $\dfrac{d^2 y(t)}{dt^2} + 3\dfrac{dy(t)}{dt} + 2y(t) = 2x(t)$ Determine the impulse response of the system using Fourier Transform	4	3	1	3
17.		Answer any *two* of the following:				
	a)	Explain the Sampling theorem for Band limited Signals.	4	1	2	1
	b)	Determine the Discrete Fourier Series of . $x(n) = cos^2(\dfrac{\pi}{6}n)$	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%

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