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Code No. : 16313

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD

B.E. (E.E.E. : CBCS) VI-Semester Main Examinations, January-2021

Signals and Systems

Time: 2 hours

Max. Marks: 60

Note: Answer any NINE questions from Part-A and any THREE from Part-B

Part-A (9 × 2 = 18 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Calculate the power of the following signal $x(t) = 5 \cos\left(10t + \frac{\pi}{4}\right)$	2	2	1	1
2.	Discuss whether the following system is Time Invariant or not $y(t) = e^{2x(t)}$	2	2	1	1
3.	Calculate the Fourier Transform of the following signal $x(t) = e^{-2t} \cdot u(t)$	2	2	1	1
4.	Define transfer function of LTI system.	2	1	1	1
5.	What is aliasing affect?	2	1	2	1
6.	Calculate the Laplace Transform of Unit Step function.	2	2	1	1
7.	Discuss Causality property of a discrete LTI System with an example.	2	2	3	1
8.	Calculate Z-transform of the following signal $x(n) = \left(\frac{5}{7}\right)^n \cdot u(n)$	2	2	3	1
9.	Calculate the convolution sum of the following sequences, $x(n) = \{1,2,3,4\}, h(n) = \{1,1,1\}$	2	2	4	1
10.	Compare the Power spectral density (PSD) and Energy density spectrum (ESD).	2	4	4	1
11.	Describe the equations of coefficients of Trigonometric Fourier Series.	2	2	1	1
12.	Calculate the Fourier Transform of unit step function.	2	2	1	1
Part-B (3 × 14 = 42 Marks)					
13. a)	Illustrate the extraction of Exponential Fourier Series from Trigonometric Fourier series.	6	2	1	1
b)	Construct the Trigonometric Fourier Series of the following waveform.	8	3	1	1

14. a)	Calculate the Fourier transform of a triangular pulse shown below.	8	2	1	1
b)	Discuss how to evaluate the unit step response of an LTI System.	6	2	1	2
15. a)	Explain the Sampling Theorem with neat diagrams.	6	2	2	1
b)	For a system with transfer function $H(s) = \frac{s+2}{s^2+4s+3}$, calculate the output response if the input is $x(t) = e^{-2t} \cdot u(t)$	8	4	1	2
16. a)	Apply DTFT on the following sequence $x(n) = \{1,2,3,4\}$ and obtain its magnitude spectrum.	7	3	3	1
b)	Apply Inverse Z-transform on $X(z) = \frac{2z-7}{z^2-5z+6}$; ROC; $ z > 2$ and obtain the signal $x(t)$.	7	3	3	1
17. a)	Calculate the convolution of the following two signals $x_1(t) = e^{-2t}u(t)$, $x_2(t) = e^{-4t}u(t)$	7	2	4	1
b)	Calculate the autocorrelation of the following function $x(t) = e^{-at}u(t)$	7	2	4	1
18. a)	Discuss the Even and Odd Symmetry properties of Fourier Series.	7	2	1	1
b)	Inspect the Parseval's Relation for Fourier Transform.	7	4	1	1
19.	Answer any <i>two</i> of the following:				
a)	Explain differentiation and integration properties of Laplace transform.	7	2	1	1
b)	Apply Z-Transform and determine the system function of a discrete time system described by the difference equation. $y(n) - \frac{1}{3}y(n-1) + \frac{1}{5}y(n-2) = x(n) - 2x(n-1)$	7	3	3	2
c)	Describe the relation between continuous convolution and continuous correlation functions.	7	2	4	1

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

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	64
2	Knowledge on application and analysis (Level-3 & 4)	36
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	0%
