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VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (EEE: CBCS) VI-Semester Main Examinations, May-2019

Signals and Systems

Time: 3 hours

Max. Marks: 70

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

Q.No.	Stem of the question	M	L	CO	PO
Part-A (10 × 2 = 20 Marks)					
1.	Tell the signal $x(t) = \cos(t + \pi/4)$ is periodic or not. If periodic find time period.	2	2	1	1
2.	Tell whether the signal $x(t) = tu(t)$ is energy signal or power signal.	2	2	1	1,2
3.	Compute the Fourier transform of $x(t) = \sin(\omega_0 t)$	2	3	1	1
4.	Define LTI system and it's properties.	2	1	1	1
5.	State sampling theorem.	2	1	2	1,2
6.	Define ROC in Laplace transform and state it's properties.	2	1	1	1
7.	Compute DTFT of $x[n] = \{1, 2, 3, 1\}$	2	3	3	1
8.	State and prove differentiation in Z – domain property of z-transform.	2	1	3	1
9.	Explain auto correlation and cross correlation.	2	2	4	1,2
10.	What is the frequency domain equivalence of convolution in time domain?	2	1	4	1,2
Part-B (5 × 10 = 50 Marks)					
11.	Obtain the exponential Fourier series of periodic signal shown in figure.	10	3	1	1
12. a)	Compute the Fourier transform of signum function which is defined as $\text{Sgn}(t) = 1 \quad t > 0$ $= -1 \quad t < 0$	5	3	1	1
b)	State properties of Fourier transform.	5	1	1	1
13. a)	Compute the inverse laplace transform of $X(s) = \frac{5s+13}{s(s^2+4s+13)}$ $\text{Re}(s) > 0$.	5	3	1	1
b)	State and prove any two properties of Laplace transform.	5	1	1	1
14. a)	Classify Discrete Time systems with an example.	5	2	3	1
b)	Solve the following difference equation using z-transform $y[n] - \frac{7}{12}y[n-1] + \frac{1}{12}y[n-2] = x[n]$ for $n \geq 0$ and $x(n) = (\frac{1}{5})^n u[n]$ With initial conditions $y(-1)=2$ and $y(-2)=4$.	5	3	3	1

15. a)	Obtain the output signal of a system whose input signal, $x(t) = e^{-t}u(t-1)$ and the impulse response, $h(t) = 2u(t-1)$.	5	3	4	1,2
b)	State properties of continuous convolution.	5	1	4	1,2
16. a)	Test the properties causality, linearity and time – invariance for the system $y(t) = x(t) + tx(t-1)$.	5	2	3	1,2
b)	Compute the Energy Spectral Density of the signal $x(t) = e^{-t}u(t)$.	5	3	4	1,2
17.	Answer any two of the following:				
a)	Write the conditions for the existence of Laplace transform.	5	1	1	1
b)	Write Dirichlet conditions of Fourier transform	5	1	1	1
c)	Explain how the stability of an LTI system is evaluated in Z-transform	5	2	3	1,2

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)	59
2	Knowledge on application and analysis (Level-3 & 4)	41
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	0

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