Hall Ticket Number:

Code No. : 14415 N/O

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (ECE: CBCS) IV-Semester Main & Backlog Examinations, May-2019

Signal Analysis & Transform Techniques

Time: **3** hours Max. Marks: 60

*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.	Define half wave symmetry with an example.	2	1	1	1
2.	Why the mean square error criterion and not the average error criterion is chosen for minimizing the error over an interval.	2	2	3	1
3.	If the Fourier Transform (FT) of x (t) is X(ω), show that FT of $\frac{dx(t)}{dt} = j\omega X(\omega)$.	2	3	1	1,2
4.	State Paley-Wiener criteria?	2	1	1	1
5.	State sampling theorem for low pass signals.	2	1	2	1
6.	Find the Inverse LT of $X(S) = \frac{1}{(S+1)(S+2)}$ when ROC: Re(s) > -1.	2	2	1	1,2
7.	Write the expression for DTFT and IDTFT.	2	1	4	1
8.	If X (Z) $=2+3z^{-1}+4z^{-2}$, find the initial and final values of the corresponding sequence x (n).	2	3	4	1,2
9.	Find the convolution of $x(n) * \delta(n-2)$, where x (n) is given as $x(n) = \delta(n+2) + 2\delta(n) + 3\delta(n-2)$.	2	4	5	1,2
10.	Write the properties of auto correlation function.	2	1	5	1
	Part-B (5 ×8 = 40 Marks)				
11. a)	Discuss the signal approximation using mutually orthogonal signal functions.	4	2	3	1
b)	Find the Fourier series representation of the signal x (t) $=e^{-t}$ shown in Fig.1. Also sketch the magnitude and phase spectra.	4	4	1	1,2

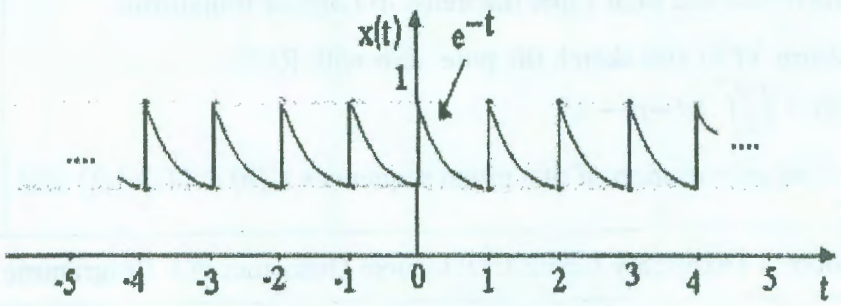

Fig.1

(t is in seconds)

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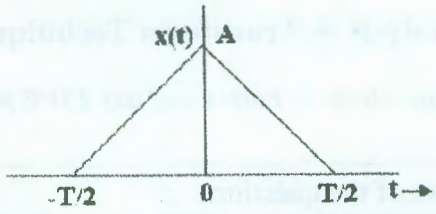
12. a)	Find the FT of the signal x (t) as shown in Fig. 2.	4	3	1	1,2
	 Fig.2				
b)	Describe the ideal filter characteristics.	4	2	1	1
13. a)	Find the Nyquist rate for the following signals (i) $x(t) = \sin(2\pi\, 10^3 t) + \cos(\pi\, 10^4\, t)$ (ii) $x(t) = \sin(1000\pi t)\sin(2000\pi t)$	4	2	2	1,2
b)	Obtain Laplace Transform for the signals (i) $x(t) = e^{-4(t-3)}u(t-3)$. (ii) $x(t) = e^{-5t}\cos(3t)\,u(t)$	4	3	1	1,2
14. a)	A Discrete Time system is described by $y(n) = e^{x(n)}$. Check weather the system satisfied the following properties or not : i) linearity ii) time invariance iii) stablity.	4	4	5	1,2
b)	Given X(Z) $X(Z) = log_e\left[\frac{1}{1-aZ^{-1}}\right]$ $\lvert Z\rvert > \lvert a\rvert$ Find the inverse Z transform.	4	3	4	1,2
15. a)	Determine the convolution of $x_1(t) = u(t+1)$ *and* $x_2(t) = u(t-2)$ where u (t) is a unit step function.	4	4	5	1,2
b)	Find the autocorrelation function of the square pulse of amplitude A and duration 0 to T.	4	2	5	1,2
16. a)	Explain the basic operations that will be performed on signals.	4	1	1	1
b)	What are the conditions for distortion less transmission and show the magnitude and phase spectrum for same.	4	2	1	1
17.	Answer any ***two*** of the following:				
a)	State and prove the initial and final value theorems in Laplace transform.	4	1	1	1,2
b)	Find the Z-Transform $X(Z)$ and sketch the pole-zero with ROC $x(n) = \left(\frac{1}{3}\right)^n u(n) + \left(\frac{1}{2}\right)^n u(-n-1)$	4	3	4	1,2
c)	Find the discrete time convolution of two given sequences x (n) = {1,2,1,2} and h (n) = {1,2,3,4}	4	2	5	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)	57
2	Knowledge on application and analysis (Level-3 & 4)	43
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	--

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