

University Institute of Engineering & Technology

(Recognised Under Section 2(f) and 12B of UGC)

Kurukshetra University, Kurukshetra

Roll No. -

THEORY EXAMINATION - DECEMBER 2017

TIME - 3 Hrs.

B.TECH - ECE

SEMESTER - III

M.M. - 75

COURSE NO. - ECE 201

COURSE TITLE - SIGNALS AND SYSTEMS

Note: All questions in Part-A and Part-B are compulsory. Attempt any four questions from Part-C selecting at least one from each unit.

PART-A (15 Marks)

Q. No. - 1 Answer the following questions carrying one mark each. 15x1=15

(i)	Define signum function?
(ii)	The time derivative of unit step function is _____
(iii)	Check the stability for the system with output $y(t) = t * x(t)$.
(iv)	Explain time shifting property.
(v)	Find even component of $x(t) = e^{-t} \sin(t)$.
(vi)	Define Autocorrelation.
(vii)	The condition $h(t)=0$ for $t < 0$ must be satisfied by the system that is a) Memoryless b) Causal c) BIBO stable d) Invertible
(viii)	The Convolution operator is i) Commutative ii) Associative iii) Both iv) None of these.
(ix)	The coefficient X_k for DTFS are periodic or non-periodic.
(x)	Write the orthogonality condition for two signals $x(t)$ and $y(t)$ over the interval $[0, T]$.
(xi)	The fourier transform of 1 is _____
(xii)	Write the differentiation property of fourier transform.
(xiii)	The DTFT of $x[n]$ is _____
(xiv)	Region of convergence of a anti-causal system is i) entire s-plane ii) right half of s-plane iii) left half of s-plane iv) does not exist
(xv)	Define nyquist interval.

11) ②

PART-B (20 Marks)

UNIT-I		5
2	Write the condition for periodicity for sum of signals. Also check whether the signal $x(t)=[\sin(2t+\pi/3)]^2$	
UNIT-II		5
3	Explain Probability density function with properties and their proof.	
UNIT-III		5
4	Determine the exponential fourier series for $x(t)=e^{2t}$ for the interval $[0, \pi]$	
UNIT-IV		5
5	Find the laplace transform for $x(t)=e^{-3t}u(t)-e^{2t}u(-t)$. Also check the causality and stability for $x(t)$.	

PART-C (40 Marks)

UNIT-I		05
6 (a)	Explain singular functions.	05
6 (b)	Check whether the signal $x[n]=\sin[\pi/2 n]$ is energy signal or power signal.	06
7(a)	The following system have input $x[t]$ and output $y[t]$. $y[t]=\int_{-\infty}^t x(\tau)d\tau$ Determine whether the system is a) Stable b) Causal c) Linear	04
7(b)	Explain the causality and stability property for systems	
UNIT-II		
8	Explain impulse response and unit step response for a system with input $x(t)$ and output $y(t)$.	10
9	The Probability density function of a random X is $p(x) = (1-x)$ for $1 \leq x \leq 2$. Find the mean, variance and standard deviation.	10
UNIT-III		
10	Explain i) sampling theorem ii) Aliasing iii) Determine the discrete time sampling obtained after sampling $x(t)=\cos(200\pi t)$ if sampled at a rate of $f_s=250$ Hz and also determine its sampling interval.	2,2,6
11	Write the dirichlet conditions for Fourier series. Determine the fourier series coefficients for signal (i) $x(t+t_0)$ (ii) $d^2x(t)/dt^2$ (iii) $x(2t)$ when $x(t)$ is periodic signal with time period T and fourier coefficient X_n .	10
UNIT-IV		
12	Explain i) frequency shifting ii) Time scaling iii) Convolution iv) Differentiation property of Fourier Transform with proof.	10
13	The unit response of an LTI system is $s(t)=e^{-t}u(t)$. For certain input $x(t)$, output $y(t)=4e^{-t}u(t)+u(t)$. Determine input $x(t)$.	10

COURSE

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