Reg.No. _____

Karunya UNIVERSITY

(Karunya Institute of Technology & Sciences)
(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – Nov/Dec – 2016

Code : 14EC2003 | **Semester : 2016-17 ODD**
Sub. Name : Signals and Systems | **Duration : 3hrs** | **Max. marks : 100**

Q. No.	Questions				Course outcome	Marks
	PART-A (40X1=40 MULTIPLE CHOICE QUESTIONS)					
1.	A DT signal x[n]=cos[2n] is periodic or aperiodic? If it is periodic find the fundamental period N?				CO1	
	a. aperiodic	b. Periodic,N=1 sample	c. Periodic,N=2 sample	d. Periodic,N=4 sample		(1)
2.	Unit ramp signal can be represented interms of unit step signal is----------				CO1	
	a. r(t)=t.u(t)	b. r(t)=t.u(t)/2	c. r(t)=u(t)/2	d. r(t)=u(t)/t		(1)
3.	If one can represent the signal by mathematical equation then the signal is said to be----------				CO1	
	a. Deterministic signal	b. Random signal	c.Sinusoidal Signal	d.non sinusoidal Signal		(1)
4.	Determine the power which is delivered by the signal x(t)=A cos(wt)				CO1	
	a. $P=A^2/2$	b. $P=t^2/2$	c. $P=w^2/2$	d. $P=t^2$		(1)
5.	Find the even componet of a CT signal x(t)=cost+ sint+costsint				CO1	
	a. $x_e(t)=cost$	b. $x_e(t)=costsint$	c. $x_e(t)=sint$	d. $x_e(t)=cost+1$		(1)
6.	The impulse response of discrete time system is $h[n] = (4)^n u[3 - n]$, the system is----------				CO1	
	a. stable and non-casual	b. unstable and non-casual	c. stable and casual	d. causal only		(1)
7.	What is causality condition for a LTI discrete time system?				CO1	
	a. h(n)=0 for n<0	b. h(n)=0 for n>0	c. h(n)=0 for n=0	d. h(n)=0 for n-1>0		(1)
8.	A transmission is said to be _____ if the response of the system is exact replica of the input signal.				CO1	
	a. Distortionless	b. Distortion	c. LTI	d.Stable		(1)
9.	A continuous-time periodic signal $x(t)$ having a period T, is convolved with itself. The resulting signal is ----------				CO1	
	a. periodic having a period T	b. periodic having a period T/2	c. periodic having a period 2T	d. nor periodic		(1)
10.	Convolution is used to find-----				CO1	
	a.The impulse response of an LTI System	b.Frequency response of a System	c. The time response of a LTI system	d. The phase response of a LTI system		(1)
11.	No of samples in y[n]=x[n]*h[n] is---------- If x[n]=[1 2 3] and h[n]=[2 2 2 2 4]				CO1	
	a. 7	b. 6	c.5	d.4		(1)
12.	The Fourier Transform of a rectangular pulse is----------				CO2	

	a. Another rectangular pulse	b. Triangular pulse	c. Sinc function	d. Impulse		(1)
13.	The Fourier Transform exist only if the signal satisfies---------conditions				CO2	
	a. Superposition	b. Shannon	c. Dirichlet	d.Norton		(1)
14.	Which one of following is correct condition to check the stability of system?				CO1	
	a. Bounded I/P unbounded O/P	b. Bounded I/P bounded O/P	c. unbounded I/P bounded O/P	d. unbounded I/P unbounded O/P		(1)
15.	Fourier Transform of continuous non-periodic signal is				CO2	
	a. aperiodic	b. periodic	c. none	d. 0		(1)
16.	---------- property of Fourier Transform states that the compression in time domain is equivalent to expansion in the frequency domain				CO2	
	a. Scaling	b. Shifting	c. Reversal	d. Linearity		(1)
17.	The quantity $\|X(j\omega)\|^2$ plotted against ω is termed as ----------of the signal				CO2	
	a. energy spectrum	b. power spectrum	c. frequency spectrum	d.phase spectrum		(1)
18.	The ratio of Fourier transform of output and input of a system is called -------				CO2	
	a. Laplace Transform	b. Z-transform	c. Transfer Function	d. efficiency		(1)
19.	By using time shifting property, Continuous time Fourier transform of x(t-3) is ---				CO2	
	a. $X(j\omega)$	b. $e^{(-j3\omega)} X(j\omega)$	c. $e^{(j3\omega)}X(j\omega)$	d. $e^{(-j3\omega)}$		(1)
20.	Continuous time Fourier Transform of δ(t) is ---------				CO2	
	a. $1/2\pi$	b. 2π	c.0	d. 1		(1)
21.	Find inverse LT of X(s)=(3s+4)/(s+1)(s+2)				CO2	
	a. $x(t)= e^{-t}u(t)-e^{-2t}u(t)$	b. $x(t)= e^{-t}u(t)-e^{-3t}u(t)$	c. $x(t)= e^{-2t}u(t)-e^{-2t}u(t)$	d. none		(1)
22.	Check the system for its stability and causality. The impulse response of the system is $h(t)=e^{-t}u(t)$				CO2	
	a. causal and stable	b. causal or stable	c. causal only	d. stable only		(1)
23.	Find the inital,final values of the following signal $X(s)=(2s+3)/(s^2+5s+6)$				CO2	
	a. 2,0	b. 0,2	c. 1,1	d. 1,-1		(1)
24.	Find the transfer function of the system which is described by the differential equation dy(t)/dt+3y(t)=x(t)				CO2	
	a. 1/(s+3)	b. 1/(s+2)	c. 1/s	d.0		(1)
25.	What are the poles of $[e^{(-3t)}+ e^{(-2t)}]$ u(t) signal				CO2	
	a. 2 & 3	b. -2 &- 3	c. -3, 2	d. -2,3		(1)
26.	The signal x(t) can be recovered from $x_p(t)$ by means of a				CO2	
	a. low pass filter with gain T	b. lowpass filter with gain T and cut off frequency greater than ω_M	c. lowpass filter with gain T and cut off frequency greater than ω_M and less than $\omega_s - \omega_M$	d. lowpass filter with gain T and cut off frequency greater than ω_M and less than $\omega_s + \omega_M$		(1)
27.	A bandlimited signal with maximum frequency f_m can be fully recovered from its samples if sampled at a frequency greater than or equal to				CO2	

	a. f_m	b. 2 f_m	c. $f_{m/2}$	d. $4f_m$		(1)
28.	A signal having a spectrum ranging from o to 10KHZ is to be sampled and converted to discrete form. What is the minimum number of samples per sec that must be taken to ensure recovery?				CO2	
	a. 20,000	b. 2000	c. 10,000	d. 1000		(1)
29.	A signal is sampled at greater than nyquist rate is said to be ----------				CO2	
	a. oversampled	b. undersampled	c. reconstructed	d. aliasing		(1)
30.	The signal x(t)=10 cos (10Πt) is sampled at a rate of 8 samples per sec.what is the required sampling rate?				CO2	
	a. 10 Hz	b. 1 Hz	c. 8 Hz	d. 5 Hz		(1)
31.	Find x(n) if $x(e^{-j\omega})=1-e^{-j\omega}+2e^{-2j\omega}+2e^{-3j\omega}$				CO3	
	a. {1,-1,2,2}	b. {0,-1,2,3}	c. {0,-1,3}	d. {-1,2,3}		(1)
32.	If $X(e^{j\omega}) = 1/(1+0.3\, e^{-j\omega})$ then x(n)= ----------				CO3	
	a. $(0.3)^n u(n)$	b. $(-0.3)^n u(n)$	c. $(1/3)^n u(n)$	d. $(3)^n u(n)$		(1)
33.	The DTFT of δ(n-k)----------				CO3	
	a. $e^{-j\omega k}$	b. 0	c. 1	d. $e^{-j\omega}$		(1)
34.	The DTFT of u(n)----------				CO3	
	a. $1/(1-e^{-j\omega})$	b. $e^{-j\omega k}$	c. 1	d. 0		(1)
35.	Find the frequency response of the system with the impulse response of h(n)=δ(n)-δ(n-1)				CO3	
	a. $1-e^{-j\omega}$	b. $e^{-j\omega}$	c. $1-e^{-j\omega/2}$	d. 1		(1)
36.	If x(n) is a causal sequence then the ROC is the entire Z plane except at ----------				CO3	
	a. z=0	b. z=1	c. z=-1	d. z=-2		(1)
37.	The ROC of the signal $x(n)=(0.5)^n u(-n)$ is ----------				CO3	
	a. $\|z\|<0.5$	b. $\|z\|<0.2$	c. $\|z\|>0.5$	d. $\|z\|>0.1$		(1)
38.	The ROC of an LTI stable system contains----------				CO3	
	a. unit circle	b. circle with radius=0.5	c. circle with radius=0.3	d.none		(1)
39.	Find the Z transform of the signal x(n)=u(n)-u(n-3)				CO3	
	a. $X(z)=1+z^{-1}+z^{-2}$	b. $X(z)=1+z^{-1}$	c. $X(z)=1+z^{-2}$	d. X(z)=1		(1)
40.	The ROC of the signal $x(n)=a^{\|n\|}$ is----------				CO3	
	a. $a<\|z\|<(1/a)$	b. $a<\|z\|$	c. $\|z\|<(1/a)$	d. $\|z\|>(1/a)$		(1)

PART B(8 X 5 = 40 MARKS) (ANSWER ANY EIGHT)			
41.	Check the following signals are energy signal or power signal and obtain the corresponding energy,power values. (a) x(t)=cos t (b) $x[n]=(1/3)^n u(n)$	CO1	(5)
42.	Find the convolution of two infinite duration sequence $h(n)=a^n u(n)$ for all n and $x(n)=b^n u(n)$ for all n	CO1	(5)
43.	The impusle response of the system is h(t)=u(t-3) and input the is $x(t)=e^{2t}u(-t)$ find the response of the system y(t) using convolution.	CO1	(5)
44.	Find the Frequency response of an LTI system described by the differential equation	CO2	(5)

	$\frac{d^2y(t)}{dt^2} - 5\frac{dy(t)}{dt} + 6y(t) = \frac{dx(t)}{dt} - 10x(t)$		
45.	A signal has laplace transform of X(s)=s+2/(s2+4s+5) find the LT of Y(s) for the following signals (i) $y_1(t)=e^{-t}x(t)$ (ii)$y_2(t) = x(2t)$	CO2	(5)
46.	Find the laplace transform and ROC for the following signals $x(t)=e^{-b\|t\|}$	CO2	(5)
47.	Find the Nyquist rate and Nyquist interval for the following signal x(t)= sin(4000πt) sin(1000πt)	CO2	(5)
48.	Consider a LTI system which is characterized by the difference equation y(n)-(3/4)y(n-1)+(1/8)y(n-2)=2x(n) Find the impulse response of the system	CO3	(5)
49.	State and prove the Time shifting and convolution properities of DTFT	CO3	(5)
50.	Using Z transform find the convolution of two discrete time sequences $x_1(n)=\{1,2,-1,0,3\}$ $x_2(n)=\{1, 2,-1\}$	CO3	(5)
	PART C(2 X 10 = 20 MARKS) (ANSWER ANY TWO)		
51.	Check the following systems are a) static or dynamic b) linear or non linear c) causal or noncausal d)time variant or time invariant y(t)=10 x(t)+5	CO1	(10)
52.	Find the Continuous time Fourier Transform of the following (a) $x(t)= e^{(-at)}u(t)$ (b) $x(t)= e^{(-3t)}[u(t+2)-u(t-3)]$	CO2	(10)
53.	By using Long Division method,Find the inverse Z transform of $X(Z)=(1+2z^{-1})/(1-2z^{-1}+z^{-2})$ when a) x(n) is causal b) x(n) is anti causal	CO3	(10)

ALL THE BEST