StudentBounty.com ROLL NO. Code: AE06/AC04/AT04 Subject: SIGNALS & SYSTEM AMIETE - ET/CS/IT (OLD SCHEME) **JUNE 2012** Time: 3 Hours PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE OUESTION PAPER. NOTE: There are 9 Ouestions in all. • Ouestion 1 is compulsory and carries 20 marks. Answer to 0.1 must be written in the space provided for it in the answer book supplied and nowhere else. The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination. • Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks. • Any required data not explicitly given, may be suitably assumed and stated. Choose the correct or the best alternative in the following: 0.1 (2×10) a. A system y(n) = x(-n) is (A) Causal (B) Non Causal (C) Both (**D**) None b. Step function u(t) is obtained from impulse function $\delta(t)$ by (A) Integrating (**B**) Differentiating (C) Double Integration (**D**) Differentiating twice c. A system y(t) = t x(t) is (A) Non linear (**B**) Unstable (C) Linear (D) Both (A) and (B) A signal that violates the first Dirichlet condition i.e. x(t) must be absolutely d. integrable is (A) t^2 **(B)** t (**C**) t^{3} **(D)** 1/t e. The frequency response of discrete time filters must be periodic with period (A) 2π **(B)** π **(D)** $3\pi/2$ (C) $\pi/2$ The FT of a periodic impulse train in time domain with period T is a periodic f. impulse train in frequency domain with period **(A)** 4π/ T **(B)** π/ T (C) $3\pi/T$ **(D)** 2π/ T g. The Frequency response of an LTI system with impulse response $h(t) = e^{-t} u(t)$ is (A) $1/(i\omega \pm 1)$

 $(\mathbf{P}) 1/(i \alpha)$

1)

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h.	FT is used to convert from which are	Time domain to	o frequency domain, the sig	nals		
	(A) Periodic	(B) Aper	riodic	3		
	(C) Both	(D) Non	ie			
i.	i. Step response of a first order system					
	(A) Always exhibits Ringing					
	(B) Does not exhibit Ringing					
	(C) Sometimes exhibits Ring					
	(D) Sometimes does not exhi					
j.	For a signal which is bandlin will be	Rate				
	(A) 100 Hz	(B) 200) Hz			
	(C) 50 Hz	(D) 150) Hz			
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Answer any FIVE Questions out of EIGHT Questions. Each question carries 16 marks.

Q.2	a.	(i) Show that any real signal $x(t)$ is composed of its even and odd parts. (ii) Find out the energy of the signal $x(t) = e^{-3t} u(t)$.	(4) (4)
	b.	Give the five classification of systems with an example of each.	(8)
Q.3	a.	Find out the linear convolution of $x(n) = \{1, 2, 3, -6\}$ with $h(n) = \{2, 1, -1, 3, 5\}$, (8)
	b.	Enlist the properties of continuous time Fourier series.	(8)
Q.4	a.	Find out the response $y(t)$ of an LTI system with impulse response $h(t) = e^{-at} u(t)$; a>0 to the input signal $x(t) = e^{-bt} u(t)$; b>0	e (8)
	b.	(i) Prove the Multiplication property of DTFT.	(4)
		(ii) Find the DTFT of $x(n) = u(n-2) - u(n-6)$	(4)
Q.5	a.	Give the time domain and frequency domain analysis of First order Continuous-Time systems.	r (8)
	b.	Explain Sampling theorem. How is sampling done with Zero Order Hold? What is Aliasing?	? (8)
Q.6	a.	(i) Find out the LT of $x(t) = 3e^{-2t} u(t) - 2e^{-t} u(t)$ and sketch the ROC in solane.	(4)

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- KudentBounty.com (ii) Find out the Inverse LT of $X(s) = \frac{1}{(s+1)(s+2)}$ when ROC: Re(s) > -1
- b. Find the LT of $x(t) = t e^{-a t} u(t)$ using the properties of LT.
- a. (i) If $X(z) = 2+3z^{-1}+4z^{-2}$. Find the initial and final values of the **0.7** corresponding sequence x(n). (4) (ii) Find the z transform of $x(n) = 7 (1/3)^n u(n) - 6 (1/2)^n u(n)$ (4)
 - b. Using partial fraction expansion method determine the inverse z- transform

of X(z) =
$$\frac{3 - \frac{5}{6}z^{-1}}{\left(1 - \frac{1}{4}z^{-1}\right)\left(1 - \frac{1}{3}z^{-1}\right)}|z| > \frac{1}{3}$$
 (8)

a. (i) Find the Fourier transform of the signal x(t)(4) **Q.8** (ii) Find the convolution using waveform method of signals $x(t) = e^{-at}u(t)$ and h(t) = tu(t). (4)



- b. Find mean, variance and standard deviation of uniform PDF in [-2n,2n]. (8)
- Q.9 a. Define mean of a strictly stationary random process X(t). Also define Autocorrelation function and mention its properties. (8)
 - b. What is Power Spectral Density? Give its properties. (8)