SUB :- SIGNALS & SYSTEMS

BRANCH :- BIOMEDICAL

QP CODE :- 24548

DATE :- 12/12/2017

NB: (1) Question no. 1 is compulsory
(2) Attempt any three questions of the remaining questions
(3) Assume suitable data where ever necessary

Q1 Attempt the following questions 20

a) Find the z transform and draw the ROC of

$x[n]=0.5^n u(n)+0.8^n u(-n-1)$ $\frac{z}{z-0.5} + \frac{z}{0.8-z}$ $0.8>|z|>0.5$

b) Find the initial value of

$$X(s)=\frac{2S^2+5S+12}{S^3+4S^2+14S+20} = 2$$

c) Plot the single sided spectrum of the given signal

$$x(t)=20\cos(100\pi t+20°)+6\sin(50\pi t)$$

	Amp	Freq	Phas
I	20	50	20
II	6	25	-90°

d) Determine whether the following signals are periodic or not. If periodic , find the time period

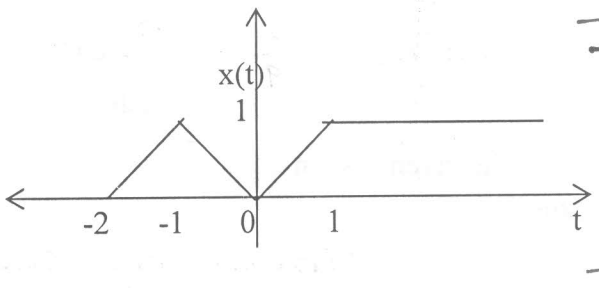
i. $x(t)=3\cos\left(4t+\frac{\pi}{3}\right)$ - Non Periodic

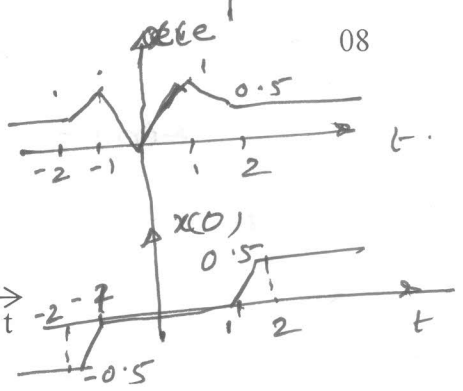
ii. $x[n]=2\cos\left(\frac{\pi}{4}n\right)+\sin\left(\frac{\pi}{8}n\right)-20\cos\left(\frac{\pi}{4}n+\frac{\pi}{6}\right)$ - Periodic $N_1=8$ $N_2=16$ $N_3=8$

Q2 a) Find the convolution sum (Mathematically) 12

x[n]={3,2,1,0,1,2,3} h[n]={2,1,0,1,2,} {6, 7, 4, 4, 10, 10, 10, 4, 4, 7, 6}

b) Find even and odd parts 08





Q3 a) Determine whether the given signals are power/ energy signals 05

i. X(t)=cos (t) Power $P=\frac{1}{2}\omega$

b) x[n]={1, 0, 2, 0, -1}, h[n]={2, 0, 2}, compute the fiollowing 05

i. x[n] h[n] {2, 0, 2}

ii. X[n] h[n+2] {2, 0, 4, 0}

c) Find y(t), if y(t)=x(t) h(t); $x(t)=e^{2t}u(t)$, h(t) = u(t-3) 06

$y(t)=0 \quad t<0$

$=\frac{1}{2}-\frac{e^{-2(t-3)}}{2} \quad t>0$

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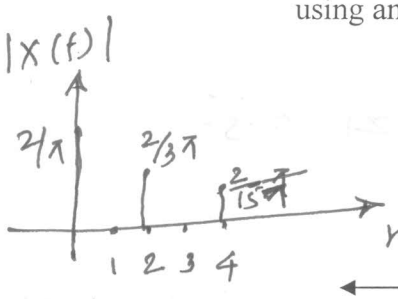
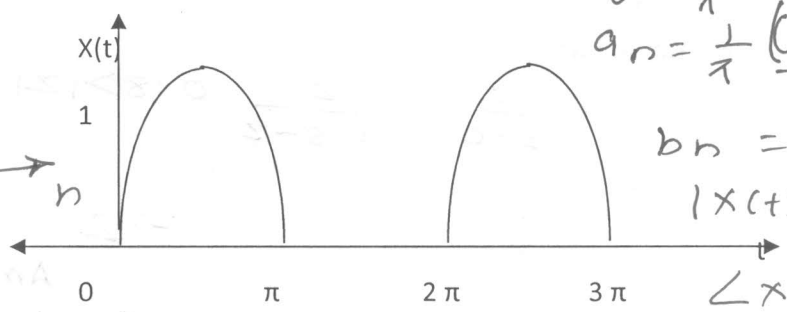
d) Find DTFT of $x[n] = a^n u[n]$ 04

$\frac{1}{1-ae^{-j\omega}}$

Q4 a) Find the Quadrature Fourier series fourier coefficients of the following signal using and sketch the spectrum 10





$a_0 = \frac{1}{\pi}$

$a_n = \frac{1}{\pi}\left(\frac{1-(-1)^{n+1}}{1-n^2}\right)$

$b_n = 0$

$|X(t)| = \frac{2}{\pi(1-n^2)}$

$\angle X(t) = 0$

Q4 ~~Q5~~ b) Given $x[n] \longleftrightarrow z^2/(z^2-16)$ 10

Using the properties of z-transform determine the following

$x1[n] = x[n] * x[-n]$ $\quad \frac{1}{(z^2-16)(z^{-2}-16)}$

$x2[n] = 2^n x[n]$ $\quad \frac{-z^2}{z^2-64}$

Q5 a) Find the Laplace transform of the signal and their ROC 10

$x(t)=e^t u(-t) + e^{-3t} u(t)$ $\quad \frac{1}{s+1} \; \frac{-1}{s-1} \quad -3 < \sigma < 2$

$x_2(t) = e^t \sin(400\pi t)u(t)$ $\quad \frac{400\pi}{(s-1)^2+(400\pi)^2} \quad \sigma > 1$

b) Find IZT , 10

$$X[Z] = \frac{1-\frac{1}{3}z^{-1}}{(1-z^{-1})(1+2z^{-1})}; ROC\ |z| > 2$$

$x(n) = \frac{2}{9}(1)^n u(n) + \frac{7}{9}(-2)^n u(n)$

Q6 a) Prove the time shifting property of Laplace Transform 05

b) Determine whether the given system is causal/ non causal, Static/ Dynamic, Variant/ Invariant 10

i. $y(t)=x(t-2)+x(2-t)$ – linear, noncausal, static, time invariant.

ii. $y[n]=\cos(n\pi x[n])$ – nonlinear, causal, static, time invariant

c) Prove the differentiation property of Z transform 05