

2014  
B.E. (Electrical and Electronics Engineering)  
Sixth Semester  
PC-EE-604: Signals and Systems

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.

x-x-x

Q.1a)	Sketch the waveform of following signal: $x(t) = u(t) - u(t-3)$ .	(2×5)
b)	Explain when the system said to be memory less with an example.	
c)	Relate the impulse signal, step signal, ramp signal.	
d)	Find the Nyquist rate for the signal $x(t) = 1 + \cos 10\pi t$ , in Hz.	
e)	Check whether the given system is time invariant and linear. $y(t) = x(t^2) + x(t)$	
<b>Section A</b>		
Q.2a)	Check whether the given system is linear or non-linear: $y(t) = \sin(x(t+2))$	(4)
b)	Differentiate between even and odd signals. 0	(3)
c)	State the Dirichlet's conditions for the Fourier transform to exist? 0	(3)
Q.3a)	Compute the Fourier transform of the signal, $x(t) = e^{-t} u(t)$ .	(4)
b)	State and prove the following properties of continuous time Fourier transform: Scaling, Convolution.	(3)
c)	What is a Dirac delta function? Enlist its properties.	(3)
Q.4a)	Find the constant $a_0$ of the Fourier series for function $f(x) = x$ in $0 \leq x \leq 2\pi$ .	(5)
b)	Distinguish between discrete time signals and digital signals. Explain. .	(5)
<b>Section B</b>		
Q.5a)	State and prove the duality property of DFT.	(4)
b)	What is Hilbert Transform? Write its mathematical expression.	(6)
Q.6	Given that $x(n)$ has Fourier transform $X(e^{j\omega})$ , express the Fourier transform of the following signals in terms of $X(e^{j\omega})$ : $y(n) = x(1-n) + x(-1-n)$	(10)
Q.7a)	When does aliasing occur? What is anti-aliasing filter?	(5)
b)	State and prove sampling Theorem. What is the Nyquist sampling rate?	(5)

x-x-x

