

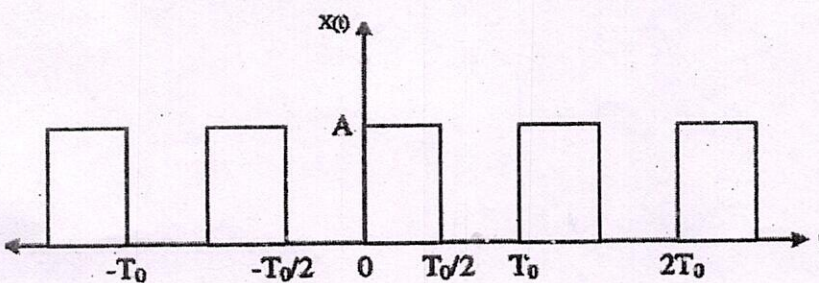
2053
B.E. (Electrical and Electronics Engineering)
Sixth Semester
PC-EE-604: Signals and Systems

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

1a)	Enlist the properties of Dirac delta function.	(2×5)
b)	Sketch the waveform of following signal: $x(t) = u(t) - u(t-3)$.	
c)	Distinguish between continuous time and analog signals.	
d)	How aliasing effect can be overcome?	
e)	What are the Dirichlet's conditions of Fourier series?	
Section A		
2a)	Determine whether the following function is periodic or not. If so find the period. $x(t) = 3\sin 200\pi t + 4\cos 100t$.	(4)
b)	Differentiate between power and energy signals.	(3)
c)	State and prove the time shifting property of a system.	(3)
3a)	Check whether the given system is linear or non-linear: $y(t) = t \cdot x(t)$.	(4)
b)	Write the formulae for Fourier constants for $f(x)$ in the interval $(-\pi, \pi)$.	(3)
c)	What is the Parseval's identity in context with the Fourier Transform? Discuss mathematically.	(3)
4	Consider the periodic square wave $x(t)$ as shown in figure 1 given below. Determine the complex exponential Fourier series of $x(t)$	(10)
 <p style="text-align: center;">Figure 1</p>		
Section B		
5a)	State and prove sampling theorem. What is the Nyquist sampling rate	(6)
b)	Given that $x(n)$ has Fourier transform $X(e^{j\omega})$, express the Fourier transform of the following signals in terms of $X(e^{j\omega})$: $y(n) = x(1-n) + x(-1-n)$	(4)
6a)	A continuous time signal is: $x(t) = 8 \cos 200\pi t$. Find: i) Minimum sampling rate ii) If $f_s = 400\text{Hz}$, what is the continuous signal obtained after sampling. iii) What is the frequency of sinusoidal that yields samples identical to those obtained in part (ii).	(5)
b)	Find the Fourier transform of signum function.	(5)
7a)	What kind of filter is an ideal Hilbert transformer? Discuss. How much phase shift does Hilbert transformer impart on the input?	(5)
b)	State and prove the duality property of DFT.	(5)

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