1. (a) Determine the Fourier Transform of a trapezoidal function shown in figure 5a. Draw its spectrum.


Figure 5a
(b) Using Parseval's theorem for power signals, Evaluate $\int_{-\alpha}^{\alpha} e^{-2 t} u(t) d t . \quad[10+6]$
2. (a) Determine an expression for the correlation function of a square wave having the values 1 or 0 and a period T .
(b) The energy of a non periodic wave form $E=\int_{-\infty}^{\infty} v^{2}(t) d t$.
i. Show that this can be written as $E=\int_{-\infty}^{\infty} v(t) d t \int_{-\infty}^{\infty} v(f) e^{j 2 \pi f t} d f$.
ii. Show that by interchanging the order by integration we have

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\begin{equation*}
E=\int_{-\infty}^{\infty} v(f) v^{*}(f) d f=\int_{-\infty}^{\infty}|v(f)|^{2} d f \tag{8+8}
\end{equation*}
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3. (a) Define: i) Even and odd functions
ii) Periodic and aperiodic signals.
(b) The following waveform is made up of straight line segments. For this waveform, write an expression for $\mathrm{v}(\mathrm{t})$ in terms of steps, ramps and related waveforms shown in figure 3.


Figure 3
(c) Evaluate the integrated $\int_{-1}^{1} e^{-|t|} \mathrm{dt}$.
$[4+6+6]$
4. (a) Determine the Fourier Series of wave form shown in figure 4 a up to 5th harmonic. When time of repetition. $T=20 \mathrm{~m} \mathrm{sec}$.


Figure 4a
(b) Discuss the method of computing the effective value of the non-sinusoidal periodic wave form.
5. (a) How we can reconstruct the original signal from sampled signal.
(b) What is an apecture effect? Explain why flat top samples get the aperture effect.

$$
[8+8]
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6. (a) Explain Paley - Wiener criterion with reference to physical realizability of a system.
(b) A periodic signal shown below is transmitted through a system with transfer function $\mathrm{H}(\omega)$ shown in figure 7b. Find the PSD spectrum and power of the output signal for $T=\frac{2 \pi}{3}$. Also calculate the power of input signal $\mathrm{f}(\mathrm{t}) .[6+10]$


Figure 7b
7. (a) Obtain the Laplace transform of ${ }^{-a t} \operatorname{Cos}\left(\omega_{c} t+\theta\right)$
(b) Find the Inverse Laplace transform of
i. $\frac{s^{3}+1}{s(s+1)(s+2)}$
ii. $\frac{s-1}{(s+1)\left(s^{2}+2 s+5\right)}$
8. (a) Find the inverse $z$ - transform of
$X(z)=\frac{1}{1024}\left[\frac{1024-z^{-10}}{1-\frac{1}{2} z^{-1}}\right],|z|>0$.
(b) Distinction between Laplace, Fourier and Z transforms.

II B.Tech II Semester Examinations,APRIL 2011 SIGNALS AND SYSTEMS
Common to Instrumentation And Control Engineering, Electronics And Computer Engineering
Time: 3 hours
Max Marks: 80
Answer any FIVE Questions
All Questions carry equal marks

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(c) Evaluate the integrated $\int_{-1}^{1} e^{-|t|} \mathrm{dt}$.
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Figure 7b
8. (a) Obtain the Laplace transform of $e^{-a t} \operatorname{Cos}\left(\omega_{c} t+\theta\right)$
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Figure 4a
(b) Discuss the method of computing the effective value of the non-sinusoidal periodic wave form.

## II B.Tech II Semester Examinations,APRIL 2011 SIGNALS AND SYSTEMS

## Common to Instrumentation And Control Engineering, Electronics And

 Computer EngineeringTime: 3 hours
Max Marks: 80
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Figure 3
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