B.E. Computer Science & Engineering (Model Curriculum) Sem-V
TEE101CS - Signals and System

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Notes : 1. All questions carry marks as indicated.
2. Assume suitable data wherever necessary.
3. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Sketch the following signal. **8**

(i) $x(2-t)$
(ii) $x(2t-1)$
(iii) $x(4-\tfrac{t}{2})$
(iv) $x(4+t)$
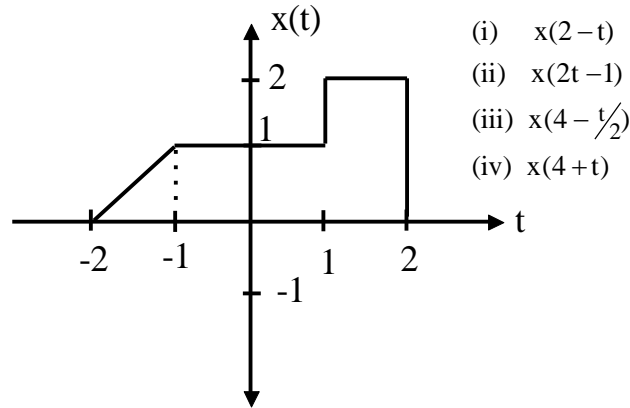
b) Determine whether the following signal are periodic or aperiodic. If periodic then determine its fundamental period. **8**

i) $x(t) = 4\cos\left(\dfrac{\pi}{100}t\right) + 2\cos\left(\dfrac{2\pi}{180}t\right)$

ii) $x(t) = 4 + \cos^2 4\pi t$

OR

2. a) Define Energy & Power signal and find whether the following signal is Energy or Power signal $x[n] = \mu[n]$. **8**
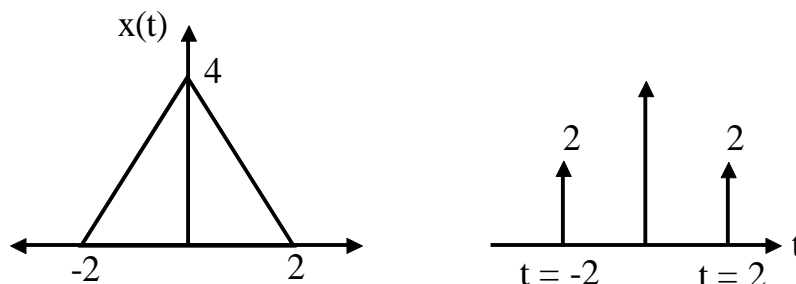
b) Explain the following system with example. **8**
i)   Stable and unstable system.
ii) Causal, Non-causal and Anti-causal system.

3. a) Find y(t) of following signal. **8**

b) Find convolution if, **8**

$$x[n] = \left(\frac{1}{2}\right)^n \cdot \mu[n]$$

$$h[n] = \delta[n] - \frac{1}{2}\delta[n-1]$$

$$y[n] = ?$$

OR

4. a) Find the convolution using graphical method. **8**
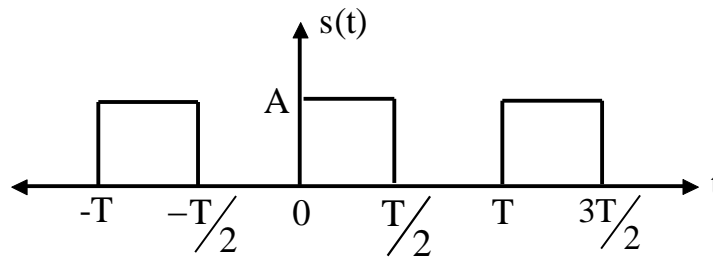   i) $x_1(n) = \{-1, \overset{\uparrow}{2}, 0, 1\}$

   $x_2(n) = \{3, \overset{\uparrow}{1}, 0, -1\}$

b) Find output y[n] for following convolution using circular method. **8**
   $x(n) = \{1, 1, 2, -1, -2\}$
   $h(n) = \{1, 2, 3, -1, -3\}$

5. a) Find the Fourier series representation of the following waveform shown in fig. **8**

b) What is Discrete-Time Fourier Transform (DTFT)? Discuss the various properties of DTFT. **8**

OR

6. a) State & Explain the Parseval's theorem for discrete time sequence. **8**

b) Find the Fourier Transform of $x(t) = e^{-at} \cdot \mu(t)$. Plot it's magnitude and phase spectrum. **8**

7. a) Find Inverse Laplace Transform of **8**
$$\frac{2s^2 - 6s + 5}{s^3 - 6s^2 + 11s - 6}$$

b) Find Laplace Transform of, $e^{-3t}(2\cos 5t - 3\sin 5t)$. **8**

OR

8. a) If $Lf(t) = \overline{f}(s)$, show that $L\left[(\cosh at)f(t)\right] = \frac{1}{2}\left[\overline{f}(s-a) + \overline{f}(s+a)\right]$. **8**

Hence evaluate, $\cosh 3t \cdot \cos 2t$.

b) Find z-transform of $x(n) = \{3, 2, -1, -4, 1\}$ and also find ROC. **8**

9. a) Explain zero order hold sampling and first order held sampling. **8**

b) Explain the types of sampling techniques in detail. **8**

OR

10. a) Consider the signal x(t) given as, **8**
$x(t) = \cos 2000\pi t + 10\sin 10,000\pi t + 20\cos 5000\pi t$
Determine,
i) Nyquist rate for this signal.
ii) If the sampling rate is 5000 samples/sec.
Then what is the discrete time signal obtained after sampling?

b) Find the Nyquist rate for each of the following signal. **8**

i) $sa(4\pi t)$

ii) $sa^3(5\pi t)$

iii) $sa^2(4\pi t) \cdot sa^4(3\pi t)$

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