

**II B. Tech I Semester Supplementary Examinations, July - 2023**  
**SIGNALS AND SYSTEMS**  
 (Com to ECE, EIE, ECT)

Time: 3 hours

Max. Marks: 70

Answer any **FIVE** Questions, each Question from each unit  
 All Questions carry **Equal** Marks

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 UNIT-I

- 1 a) Define a signal? Give various classifications of signals and explain each classification. [7M]  
 b) Find the power and rms value of signal  $x(t)=20\cos(2\pi t)$ . [7M]

Or

- 2 a) Distinguish between [7M]  
 i) Linear and non linear systems  
 ii) Time variant and Time invariant systems  
 iii) Stable and Unstable systems.  
 b) Determine whether the following discrete -time signals are periodic or not? [7M]  
 (i)  $\sin(0.002\pi n)$  (ii)  $\cos 4n$  (iii)  $\cos\left(\frac{\pi}{3} + 0.3n\right)$

UNIT-II

- 3 a) Define Fourier transform. Explain the properties of Fourier transform. [7M]  
 b) Find the trigonometric Fourier series expansion of a Half wave rectified cosine function with fundamental time period of  $2\pi$ . [7M]

Or

- 4 a) Find the Fourier transform of  $x(t) = u(2t)$ , where  $u(t)$  is the unit step function. [10M]  
 b) Explain Dirchlet's conditions and its significance to obtain Fourier series representation of any signal. [4M]

UNIT-III

- 5 a) Explain the filter characteristics of ideal LPF, HPF and BPF using their magnitude and phase responses. [7M]  
 b) Obtain the impulse response of an LTI system defined by  $dy(t)/dt + 2y(t) = x(t)$ . Also obtain the response of this system when excited by  $e^{-2t}u(t)$ . [7M]

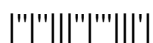
Or

- 6 a) What is the impulse response of two LTI systems connected in parallel? State the convolution Integral for CT LTI systems? [7M]  
 b) Explain the characteristics of ideal LPF and HPF. [7M]

UNIT-IV

- 7 a) Explain briefly detection of periodic signals in the presence of noise by correlation. [7M]  
 b) Explain the relation between convolution and correlation. [7M]

Or



- 8 a) Prove that auto correlation function and energy/power spectral density function forms Fourier Transform pair. [7M]  
b) Determine the autocorrelation function and energy spectral density function of  $x(t) = e^{-at} u(t)$  [7M]

## UNIT-V

- 9 a) Find the Laplace transform of the following signals: [7M]  
(i) Impulse function, (ii) unit step function and (iii)  $A \sin(\omega_0 t) u(t)$   
b) State the properties of ROC of Laplace Transform. [7M]

Or

- 10 a) State and prove the following properties of Z transform: (i) Time shifting, and (ii) Differentiation in z- domain [7M]  
b) Distinguish between Fourier transform, Laplace transform and z transforms. [7M]

