Code No: R2021043 **R20** SET - 1

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 $x(t)=20Cos(2\pi t)$. [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 (0.002πn) (ii) cos 4n (iii) cos $(\frac{\pi}{3} + 0.3n)$

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 2π. [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 magnate 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

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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 ii) $A\ Sin\ (w_0 t)\ u(t)$

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]