**II B. Tech II Semester Supplementary Examinations, February - 2022**
**SIGNALS AND SYSTEMS**
(Electrical and Electronics Engineering)

Time: 3 hours                                                                   Max. Marks: 75

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

1  a)  What are the basic operations on signals? Illustrate with an example.  [8M]

   b)  Determine whether the following signals are energy or power signals  [7M]
       (a) $x(t) = \sin^2 \omega_0 t$  (b) $x(t) = t\, u(t)$.

Or

2  a)  Define a system. How are systems classified? Define each one of them.  [8M]

   b)  Distinguish between Causal and Non-casual systems with an example.  [7M]

3  a)  What is the Fourier transform of a Rectangular pulse from $t = -T/2$ to $t = T/2$.  [8M]

   b)  Find the Fourier transforms of signal $x(t) = e^{-A(t)} \sin(t)$.  [7M]

Or

4  a)  Find the Fourier Transform of $f(t) = t \cos(2t)$ using properties.  [8M]

   b)  State and prove Differentiation and integration properties of Fourier Transform.  [7M]

5  a)  What is the effect of under sampling?  Discuss different types of samplings.  [8M]

   b)  Explain the signal recovery from its sampled signals.  [7M]

Or

6  a)  Find the Nyquist rate and Nyquist interval for the signals  [8M]
       (a) rect (300t)   (b) -10 sin 40πt cos 300 πt.
   b)  Explain about the Natural sampling.  [7M]

7  a)  Obtain the conditions for distortionless transmission through a system.  [8M]

   b)  Illustrate the ideal LPF, HPF and BPF characteristics.  [7M]

Or

8  a)  Explain the detection of periodic signals in the presence of noise by autocorrelation.  [8M]

   b)  State and prove Parseval's power theorem.  [7M]

9  a)  Define Laplace transform of signal x(t) and its region of convergence.  [8M]

   b)  Find the Laplace transform of the following signal and its ROC.  [7M]
       $x(t) = e^{-5t} [u(t) - u(t-5)]$.

Or

10  a)  Distinguish between one-sided and two sided z-transforms and its ROC.  [8M]

    b)  Find the inverse z- transform of $x(z) = z/(z+2)(z-3)$  when the ROC is  [7M]
        i) ROC: $|z| < 2$    ii) ROC: $2 < |z| < 3$.