

**II B. Tech I Semester Supplementary Examinations, October/November - 2020****SIGNALS & SYSTEMS**  
(Com to ECE, EIE and ECC)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. Answer **ALL** the question in **Part-A**  
 3. Answer any **FOUR** Questions from **Part-B**
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**PART -A**

1. a) Define orthogonal vector space. (2M)
- b) Find the Fourier transform of  $x(t) = e^{j2\pi ft}$  (3M)
- c) State Parseval's theorem (2M)
- d) What is the impulse response of two LTI systems connected in parallel? (2M)
- e) Give the Relationship between Laplace Transform and Fourier Transform (2M)
- f) Write the time reversal property of z transform (3M)

**PART -B**

2. a) Prove that  $\cos n\omega_0 t$  and  $\cos m\omega_0 t$  are orthogonal to each other for all integers m, n (7M)
- b) Explain about different types of systems with an example (7M)
3. a) What is Hilbert transform? how does it differ from other transforms? (7M)
- b) Find the trigonometric Fourier series representation of a periodic square wave  $x(t) = 1$ , for the interval  $(0, \pi)$ .  
 $= 0$ , for the interval  $(\pi, 2\pi)$  (7M)
4. a) State and prove sampling theorem for low pass signals. (7M)
- b) Explain about impulse and flat top sampling methods? (7M)
5. a) What is an LTI system? Explain its properties. Derive an expression for the transfer function of an LTI system. (7M)
- b) Determine the autocorrelation function and energy spectral density function of  $x(t) = e^{-at}u(t)$  (7M)
6. a) Find the Laplace transform of the following signals (7M)  
 i) Impulse function ii) unit step function iii)  $A \sin \omega_0 t u(t)$
- b) Explain the Time convolution and Scaling properties of Laplace transform. (7M)
7. a) Find the Z transform of  $x(n) = a^n u(n+1)$  and its ROC. (7M)
- b) Explain the properties of ROC for Z Transforms. (7M)