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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR**  
(AUTONOMOUS)**B.Tech II Year I Semester Supplementary Examinations Nov/Dec 2019****SIGNALS AND SYSTEMS****(Electronics & Communication Engineering)**

Time: 3 hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

**UNIT-I**

- 1 a What are the basic operations on signals? Illustrate with an example. **7M**  
 b Find whether the following signals are periodic or not? if periodic determine the fundamental period. **5M**  
 a)  $\sin(10t+1) - 2\cos(5t-2)$     b)  $3\sin(200\pi t + 4\cos 100t)$     c)  $\sin(10\pi t + \cos 20\pi t)$ .

**OR**

- 2 a Sketch the following signals : (i)  $u(-t+2)$     (ii)  $-4r(t)$     (iii)  $r(-t+3)$  **6M**  
 b Determine whether the following signals are energy signals or power signals and calculate their energy and power i)  $x(t) = \text{rect}(t/T)$     (ii)  $x(t) = u(t)$     (iii)  $x(t) = \sin^2 \omega_0 t$ . **6M**

**UNIT-II**

- 3 a State and prove the differentiation in time domain and differentiation in frequency domain properties of Continuous time Fourier transform. **6M**  
 b Find the Fourier transform of the following signals **6M**  
 i)  $x(t) = e^{-3t}u(t)$     (ii)  $x(t) = te^{-at}u(t)$     (iii)  $x(t) = e^{-t} \sin 5t u(t)$ .

**OR**

- 4 a State and prove the time shifting and frequency shifting properties of discrete time Fourier transform. **6M**  
 b State and prove the convolution and multiplication properties of continuous time Fourier transform. **6M**

**UNIT-III**

- 5 a Explain filter characteristics of linear systems explain with neat diagrams. **6M**  
 b State and prove sampling theorem for band limited signals. **6M**

**OR**

- 6 a Find the Nyquist rate and Nyquist interval for the following signals **5M**  
 i)  $\text{rect}(300t)$     ii)  $-10\sin 40\pi t \cos 300\pi t$ .  
 b What is Aliasing? Explain in detail with spectral details of a sample data. **7M**

**UNIT-IV**

- 7 a Compare ESD and PSD. **6M**  
 b Derive the relation between convolution and correlation. **6M**

**OR**

- 8 a Explain the extraction of noise by Filtering. **6M**  
 b Determine the autocorrelation function and energy spectral density of  $x(t) = e^{-at} u(t)$ . **6M**

**UNIT-V**

- 9 a State and prove Time shifting property and Time scaling property of Laplace transform. **6M**  
 b Find the Laplace transform of the following: i)  $\sin \omega t u(t)$  .    ii)  $\cos \omega t u(t)$ . **6M**

**OR**

- 10 a State and prove initial and final value theorems of Z-transform. **6M**  
 b Find the inverse Z-transform of  $X(z) = z^{-1}/(3-4z^{-1}+z^{-2})$ , ROC:  $|z| > 1$ . **6M**

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