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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Regular Examinations Feb-2021

SIGNALS, SYSTEMS AND RANDOM PROCESSES

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 60

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

UNIT-I

- 1 a Explain the classification of signals in continuous time with suitable examples. **6M**
 b Find which of the signals are causal or non-causal. **6M**
 (i) $x(t) = e^{2t} u(t-1)$
 (ii) $x(n) = u(n+4) - u(n-2)$

OR

- 2 a Check whether the following system is **6M**
 (i) Static or dynamic
 (ii) Linear or Non- Linear

$$3y(t)/dt + 2d^2y(t)/dt^2 + 4dy(t)/dt + 3y^2(t) = x(t+1)$$

 b Sketch the following signals **6M**
 (i) $x(t) = 2u(t+2) - 2u(t-3)$
 (ii) $x(t) = r(t) - r(t-1) - r(t-3) + r(t-4)$

UNIT-II

- 3 a State and Prove Time Shifting and Time Convolution Properties of Fourier Series. **8M**
 b State and Prove Linearity, Time Reversal Properties of Fourier Series. **4M**

OR

- 4 a Find the Fourier transform of the following **7M**
 (i) $x(t) = \text{sgn}(t)$ (ii) $x(t) = u(t)$ (iii) $\cos \omega t$
 b Discuss about Dirichlet's Conditions. **5M**

UNIT-III

- 5 a Explain the procedure to perform convolution Graphically. **6M**
 b Examine the convolution of the following signals by graphical method **6M**
 $x(t) = e^{-3t} u(t)$ and $h(t) = u(t+3)$

OR

- 6 a Consider a stable LTI System characterized by the differential equation **5M**
 $dy(t)/dt + 2y(t) = x(t)$, Find its impulse response.
 b Discuss the Following **7M**
 (i) Linear Shift Invariant systems
 (ii) Transfer Function

UNIT-IV

- 7 a Determine the Laplace transform of the signal $x(t) = e^{-at} u(t) - e^{-bt} u(-t)$ and also find its **6M**
 ROC.
 b Find the Laplace transforms and region for the following signals **6M**
 (i) $x(t) = e^{-5t} u(t-1)$ (ii) $x(t) = e^{-a|t|}$

OR

- 8 a Explain about Joint and Conditional probability 6M
 b State the properties of Joint & Conditional Probability. 6M

UNIT-V

- 9 a Explain the concept of power spectral density. 6M
 b Discuss the properties of power spectral density. 6M

OR

- 10 a Briefly explain the concept of Random process. 6M
 b The power spectral density of a stationary random process is given by 6M
 $S_{xx}(\omega) = A ; -k < \omega < k$
 0; otherwise. Find the auto correlation function.

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