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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations Feb-2021
SIGNALS & SYSTEMS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

- 1 a How are systems classified? 2M
- b What are the Dirichlet's conditions? State them. 2M
- c State the Sampling theorem. 2M
- d State Time convolution and Frequency convolution theorem 2M
- e Find Z-transform and ROC of $x(n)=(1/2)^n u(n-2)$ 2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

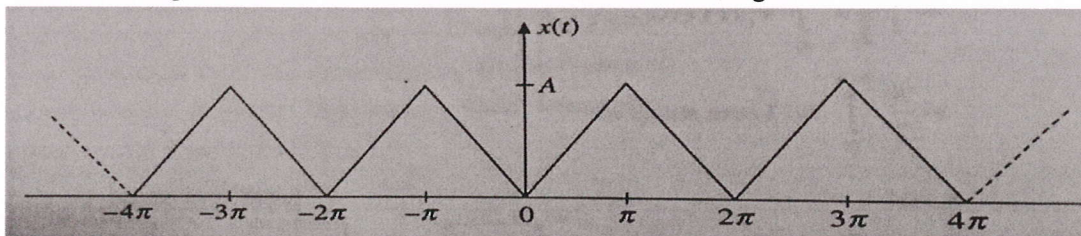
- 2 Explain the classification of signals in both continuous time and discrete time with suitable examples. 10M

OR

- 3 a Find which of the signals are causal or non-causal. 5M
(i) $x(t)=e^{2t} u(t-1)$ (ii) $x(t)=3\text{sinc}2t$ (iii) $x(n)=u(n+4)-u(n-2)$
- b Sketch the following signals 5M
(i) $2 u(t+2)-2 u(t-3)$ (ii) $u(t+4) u(-t+4)$ (iii) $\pi(t-2)$

UNIT-II

- 4 a Obtain the trigonometric series for the waveform shown in figure 5M



- b Derive the expression for Fourier transform from Fourier series. 5M

OR

- 5 State and Prove the properties of Continuous time Fourier transform? 10M

UNIT-III

- 6 a Discuss about Effects of the under sampling. 5M
- b A system produces an output of $y(t)=e^{-3t} u(t)$ for an input of $x(t)=e^{-5t} u(t)$. Determine the impulse response and frequency response of the system. 5M

OR

- 7 Find the Nyquist rate and Nyquist interval for the following signals: 10M
(i) $x(t)=1+\cos 2000 \pi t +\sin 4000 \pi t$ (ii) $10 \sin 40\pi t \cos 300\pi t$
(iii) $x(t)=\text{sinc}(100 \pi t) + 3 \text{sinc}(60 \pi t)$ (iv) $x(t)=2 \text{sinc}(100 \pi t)$

UNIT-IV

- 8 a Derive and Define the properties of Energy Spectral Density. **6M**
 b Determine the autocorrelation function and energy spectral density of $x(t)=e^{-at}u(t)$. **4M**

OR

- 9 a Derive the relation between convolution and correlation. **5M**
 b Write the properties of cross correlation for energy signals. **5M**

UNIT-V

- 10 State and prove the any five Properties Laplace Transform. **10M**

OR

- 11 a Find the Laplace transform of the signal $x(t)=e^{-at}u(t) - e^{-bt}u(-t)$ and also find its ROC. **5M**
 b Find the Laplace transform and region for the following signals. **5M**
 (i) $x(t)=e^{-5t}u(t-1)$ (ii) $x(t)=e^{2t}\sin 2t$ for $t \leq 0$

*****END*****