Code No: **R1631023** **R16** SET - 1

III B. Tech I Semester Supplementary Examinations, August - 2021

SIGNALS AND SYSTEMS

(Electrical and Electronics Engineering)

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 **(14 Marks)**

1. a) A continuous time signal x(t)=2t. Sketch the following signals: [2M]
(i) x(-t); (ii) x(t/2).
b) Find the Fourier transform of $\delta(t-t_0)$. [2M]
c) What is the condition that a signal can be reconstructed from its samples? [2M]
d) State Parseval's theorem. [3M]
e) Find the Inverse Laplace transform of $\frac{1}{(s+a^2)}$. [3M]
f) Find the $z-$transform of $x[n-n_0]$. [2M]

PART –B **(56 Marks)**

2. a) Determine the average power and normalized energy of the signal: [7M]
$x(t)= A \sin(\omega_0 t+\theta)$.
b) Discuss orthogonal vector space and orthogonal signal space and its importance in signal analysis. [7M]

3. a) Consider the periodic square wave x(t) as shown in fig.1 given below. Determine the complex exponential Fourier series of x(t). [7M]

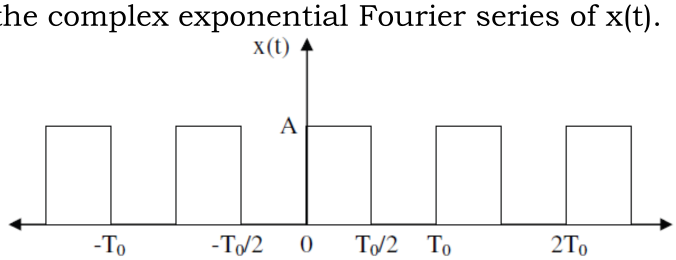

Figure 1

b) Find the Fourier transform of the signal $x(t)= \frac{\sin at}{\pi t}$. [7M]

4. a) Explain briefly the band pass sampling. [7M]
b) Determine the Nyquist rate for continuous time signal: [7M]
$X(t)= 6 \cos(50\pi t)+ 20 \sin(300\pi t)+10 \cos(100\pi t)$.

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5. a) Define causality and physical realization of system. Also, explain about Paley-Wiener criterion for physical realization of system. [7M]
   b) Write short notes on cross correlation and its properties. [7M]

6. a) If F(s) = $\frac{S}{(S+1)(S-3)}$, find all possible f(t). [7M]
   b) Find the inverse Laplace transform of F(s) = $\frac{2}{(S+1)(S+5)}$. [7M]

7. a) A finite sequence x[n] is defined as x[n] = {5, 3, -2, 0, 4, -3}. Find X[z] and its ROC. [7M]
   b) Consider the sequence x(n) = $a^n,\ 0 \leq n \leq N-1, a > 0$ and x(n) is zero otherwise. Find X(z). [7M]

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