Printed Page: 1 of 2 Subject Code: BEC403

Roll No:

BTECH (SEM IV) THEORY EXAMINATION 2023-24

SIGNAL SYSTEM

TIME: 3 HRS

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief.

PFR ID-411290

a.	Determine the fundamental period of the signal $x(t) = sin(4t-1)$.	2
b.	Write the general formula for calculating Convolution in Continuous Time Domain.	2
c.	Find the Fourier Transform of continuous time signal $\mathbf{x}(t) = \delta(t+1)$.	2
d.	Calculate the Z-Transform of discrete time signal $x(n) = \delta(n + 1)$.	2
e.	Sketch the Sampled Signal of $x(t)=cos(2\pi t)$.	2
f.	Sketch the continuous time signal x(t)=u(-t+1).	2
g.	What is Parseval's Theorem?	2

SECTION B

2. Attempt any three of the following:

		(
a.	Define the following terms related to system with mathematical expressions (i) Linear	7
	System (ii) Stability (iii) Causality and (iv) Dynamic system.	
		0.
b.	A causal LTI system is described by difference equation.	7
	y(n) = y(n-1) + y(n-2) + x(n-1)	
	Find the system function $H(z)=Y(z)/X(z)$ for this system. Plot the pole-zero plot of $H(z)$ and indicate the region of convergence.	
с.	Sketch the signal $y(t)=e^{-a t }$ & find the Fourier Transform of this same signal with Magnitude & Phase Curve.	7
d.	What is ROC? Discuss any three properties of Z-Transform with mathematical expressions and example.	7
e.	Describe Natural Sampling process with graphs and mathematical equations.	7

SECTION (

3. Attempt any one part of the following:

a. Define Time Invariant system. Also check whether the given system is Time Variant or 7 Invariant system (i) $y_1(t)=tx(t)$, (ii) $y_2(n)=2x(n)+3$, (iii) $y_3(t)=2x(-t)$. Define the following with mathematical expressions and examples 7 b. (i) Energy & Power Signals, (ii) Even & odd Signals. Attempt any one part of the following: 4.

a.	What is Discrete Time Convolution? Find the convolution $y(n) = x(n)*h(n)$ of the discrete	7
	time signals $x(n)=h(n)=u(n)$.	
h	What is LTI System? An LTI system is described by differential equation	7
0.	$\frac{dy(t)}{dt} + 5y(t) = 3x(t).$	7
	Calculate (i) Transfer Function, $H(s)=Y(s)/X(s)$.	
	(ii) Output, $y(t)$ when $x(t)=u(t)$.	

M.MARKS: 70

 $2 \times 7 = 14$

 $7 \ge 3 = 21$



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7 x 1 = 7

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6. a.

b.

M.MARKS: 70

7 x 1

7 x 1 = 7

5. Attempt any one part of the following:

a.	Write any three properties of Fourier Transform. Find the Fourier Transform of the given signal using Properties $y(t)=te^{-4t}u(t)$.	7
b.	Determine the Inverse Laplace transform of the following functions using Partial Fraction method: (i) $X(s) = \frac{4(s+3)}{s(s+1)(s+2)}$ (ii) $Y(s) = \frac{4}{(s+1)(s+2)^2}$	7
.	Attempt any <i>one</i> part of the following: 7	x 1 = 7
a.	Determine the Inverse Z-Transform y(n) of the following functions $Y(z) = \frac{z^2}{(z^2+3z+2)}$, given ROC z >2.	7
b.	Determine the z-transform of $\mathbf{x}(\mathbf{n}) = (1/2)^n \mathbf{u}(\mathbf{n})$ and depict the ROC and the location of	7

Attempt any one part of the following: 7.

poles and zeros in the z plane.

		VX'
a.	Explain Ideal Sampling with time domain & frequency domain graphs and mathematical	7
	equations.	
b.	What is Nyquist Rate & Nyquist Interval? Calculate the Nyquist rate & Nyquist	7
	Interval for the following continuous-time sinusoidal signals (i) $x_1(t) = cos(20\pi t) +$	
	$\cos(40\pi t)$. and (ii) $x_2(t) = \cos(200\pi t)\cos(400\pi t)$.	