QP Code: SN23BTECH222 | Reg. No | | | | | | | | | | | AY 23

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

B. Tech (Fifth Semester - Regular) Examinations, November 2025

23BELPC35003/23BEEPC35003 – Signals and Systems

(EE & EEE)

Time: 3 hrs | Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

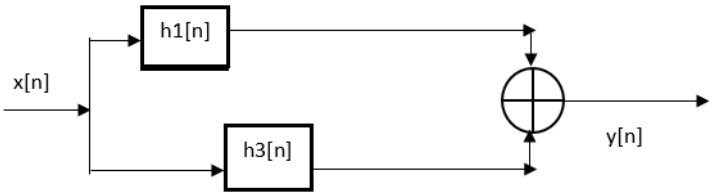
		CO #	Blooms Level
Q.1.	Answer ***ALL*** questions		
a.	For the following discrete time signal find the graphical, sequential and tabular representation. The signal is represented by: $x[n] = \{1,1,\underset{\uparrow}{2},-2,1,-2,4\}$	CO1	K3
b.	Two discrete time signals are represented by: $x_1[n] = \{2,2,\underset{\uparrow}{2},2\}$ $x_2[n] = \{\underset{\uparrow}{1},1,-1,1\}$ Find $x_1 \times x_2$	CO2	K3
c.	Check whether the following system is causal and non-causal. y[n] = x[2n] +x[n-1] + x[n+5]	CO3	K3
d.	Define circular convolution for two discrete time systems.	CO4	K1
e.	Find the z-transform and ROC for x[n] = {1, -2, 1, 3} ↑	CO5	K3

PART – B **(10 x 5 = 50 Marks)**

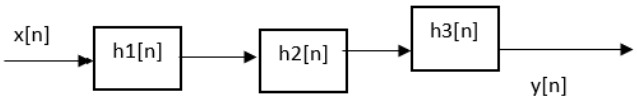
		Marks	CO #	Blooms Level
	Answer ***ALL*** the questions			
2. a.	Determine whether the following signal is periodic or not? If periodic evaluate the periodicity. $x[n] = \sin\left(\left(\frac{3\pi n}{4}\right) + 1\right)$.	5	CO1	K4
b.	Two discrete time signals are represented by: $x_1[n] = \{2,1,\underset{\uparrow}{2},1,-2\}$ $x_2[n] = \{\underset{\uparrow}{1},1,1,1,2\}$ Evaluate $(i)2x_1 + 3x_2 \ and \ (ii)3x_1 - 7x_2$	5	CO1	K4
	(OR)			
c.	Determine the values of energy and power of following signal: $x[n] = e^{j\left(\frac{\pi n}{2}\right)}$. Check whether the signal is an energy or a power signal ?	5	CO1	K3
d.	Find the even and odd parts of the signal $x[n] = 4^n$.	5	CO1	K3
3.a.	Two discrete time signals are represented by: $x_1[n] = \{1,1,\underset{\uparrow}{2},2,-2\}$ $x_2[n] = \{\underset{\uparrow}{1},2,2,1,2\}$ Evaluate $(i)x_1 \times 3x_2 \ and \ (ii)3x_1 \times 5x_2$	5	CO2	K4
b.	Find y[n] if x[n] and h[n] are as follows:	5	CO2	K3

$x[n] = \{1, -1, 1, 2\}$
$h[n] = \{2, -2, 0, 3\}$
↑

(OR)

c.	Find the value of Υ_{x1x2}, If $x_1[n] = \delta[n+1] + \delta[n+2] + \delta[n-1] + \delta[n-2]$ $x_2[n] = \delta[n] + \delta[n-2] + \delta[n+1] + \delta[n-1]$	5	CO2	K3
d.	Evaluate the z-transform of the signal x[n] = $[3(3)^n - 4(2)^n]$ u[n]	5	CO2	K4
4.a.	Determine whether the following systems are time-invariant or time variant.			
	(i) y[n] = x[n] + x[n-1]	5	CO3	K3
	(ii) y[n]= ax[n]+x[-n]			
b.	As shown in the figure find y[n] if, $x[n] = \{1, -1, 1, 1\}, h_1[n] = \{2, -1, 0, 1\}, h_2[n] = \{3, -1, 1, 1\}$ 	5	CO3	K3

(OR)

c.	As shown in the figure find y[n] if, $x[n] = \{-1, -1, 1\}, h_1[n] = \{2, -1, 0\}, h_2[n] = h_3[n] = \{2, 2, 1\}$ 	5	CO3	K3
d.	Check whether the following system is linear and non-linear system. $y[n] = n^2 x[n] + 2n\, x[n]$	5	CO3	K3
5.a.	Find the forced response of the difference equation: y[n]+5y[n-1]+6y[n-2] = x[n]+2x[n-1] with input x[n]= 2 u[n] initial conditions y[-1]= y[-2]= 2.	5	CO4	K3
b.	Find the unit step response of the following difference equation: y[n]+12y[n-1]+36y[n-2] = x[n]+x[n-1] with the initial conditions y[0]=4 and y[1] = 2.	5	CO4	K3

(OR)

c.	Given two discrete time sequences: $x_1[n] = \{1, -1, 1\}\ and\ x_2[n] = \{1, 2, 2\}$ Find the circular convolution of the two sequences.	5	CO4	K3
d.	Two discrete time sequences are given by: $x_1[n] = \{1, 2, 1\}\ and\ x_2[n] = \{1, 1, 1\}$ Evaluate the value of Υ_{x1x2}	5	CO4	K4
6.a.	Evaluate poles and zeros for the system described by difference equation $y[n] + 3y[n-1] + 4y[n-2] = x[n] - 2x[n-1]$	5	CO5	K4
b.	Find the impulse response of the following system described by the difference equation: y(n) - 3y(n-1) - 4y(n-2) = x(n) + 2x(n-1) using z-transform method.	5	CO5	K3

(OR)

c.	Find the z-transform of the signal $x[n] = r^n \cos(n\theta)\, u[n]$	5	CO5	K3
d.	Evaluate the inverse z-transform of $X(z) = \frac{z(z-5)}{(z-0.7)(z-0.2)(z+0.9)}$ using partial fraction method.	5	CO5	K4

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