

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



B. Tech (Fourth Semester - Regular) Examinations, April 2026

23BECPC24004 - Signals and Systems

(ECE)

Time: 3 hrs

Maximum: 60 Marks

(The figures in the right hand margin indicate marks)

PART – A

(2 x 5 = 10 Marks)

Q.1. Answer **ALL** questions

- | | CO # | Blooms
Level |
|--|------|-----------------|
| a. Find the fundamental period of $x(n)=\sin\{\frac{n}{6} + \frac{\pi}{8}\}$ | CO1 | K2 |
| b. Find the sampling period and sampling rate if $x(t)=4\sin 1050\pi t. \cos 50\pi t.$ | CO1 | K2 |
| c. Represent in sequential form if $x(n)=\delta(n+2)-3\delta(n-2)+5\delta(n+2)-7\delta(n-4)-\delta(n+1)-\delta(n)$ | CO3 | K3 |
| d. State the time delay property of Z-transform. | CO5 | K1 |
| e. Define Phase Spectrum. | CO4 | K1 |

PART – B

(10 x 5 = 50 Marks)

Answer **ALL** the questions

- | | Marks | CO # | Blooms
Level |
|---|-------|------|-----------------|
| 2. a. Determine whether the signal is Energy signal or Power Signal. If it is Energy / Power signal, find the energy and power content $x(n)=u(n+3)-u(n-2)$ | 5 | CO1 | K3 |
| b. Find the Even and Odd components of $x(n)=\{1 -7 3,5,-6\}$ | 5 | CO1 | K3 |
| (OR) | | | |
| c. Explain Analog to Digital Converter. | 5 | CO1 | K2 |
| d. Draw the discrete time signal of $x(t)=2t+1$ for $0 \leq t \leq 1$ and the sampling period is 0.1 sec. | 5 | CO1 | K3 |
| 3.a. Draw the block diagram of 3 rd order Discrete Time System. | 4 | CO2 | K2 |
| b. Check for Time Invariance i) $y(n)=x(-n-2)$ ii) $y(n)=4x(n+3)$ | 6 | CO2 | K4 |
| (OR) | | | |
| c. Check for Linearity if $y(n)=3x(n)+2x(n+2)$ | 5 | CO2 | K4 |
| d. Check for stability $h(n)=5^n u(-n+3)$ | 5 | CO2 | K4 |
| 4.a. Determine the response of LTI System whose $x(n)=\{1,2,3,1\}$ and $h(n)=\{1,2,1,-1\}$ in time domain. | 10 | CO3 | K3 |
| (OR) | | | |
| b. Find the cross correlation if $x(n)=\{1,2,1,5,-6\}$ and $y(n)=\{2,4,-3,5,1\}$ | 10 | CO3 | K3 |
| 5.a. Find the Fourier series of $x(n)=4\cos\frac{n\pi}{2}$ | 10 | CO4 | K3 |
| (OR) | | | |
| b. State and proof the Time advance property of DTFT. | 5 | CO4 | K4 |
| c. If $H(\omega)=\frac{1}{3}(1 + 2\cos\omega)$, find $h(n)$? | 5 | CO4 | K4 |
| 6.a. Find the Z-transform of $x(n)=\sin\omega n u(n)$ | 5 | CO5 | K3 |
| b. State and proof the Differentiation Property. | 5 | CO5 | K4 |
| (OR) | | | |
| c. Find the system function and the impulse response of the system described by the difference equation,
$y(n) -3y(n-1) -4y(n-2)=x(n)+2x(n-1)$ | 10 | CO5 | K4 |

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