

**BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE  
(AUTONOMOUS)**

**II - B.Tech I-Semester Supplementary Examinations (BR23), March - 2026**

**SIGNALS AND SYSTEMS (ECE)**

Time: 3 hours

Max. Marks: 70

*Question Paper consists of Part-A and Part-B  
Answer ALL the question in Part-A and Part-B*

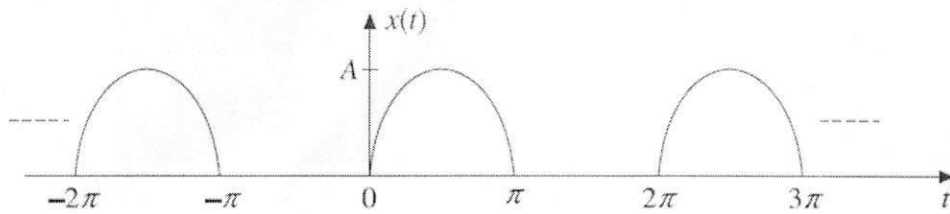
PART-A (10X2 = 20M)

	Marks	CO	BL
1. a) Define unit impulse function.	(2M)	1	1
b) Find the fundamental period of $x(t) = \sin 40\pi t + \cos 20\pi t$ .	(2M)	1	1
c) Calculate the Fourier transform of complex exponential function $e^{j\omega_0 t}$ .	(2M)	2	1
d) How do you obtain exponential Fourier series coefficients from trigonometric Fourier series coefficients?	(2M)	2	1
e) Examine the characteristics of LPF.	(2M)	3	1
f) State the convolution of two signals in time domain.	(2M)	3	1
g) Identify the sampling conditions of a continuous-time signal that lead to aliasing.	(2M)	4	1
h) State Parseval's theorem.	(2M)	4	1
i) State the Z-transform of $a^n u(n)$ .	(2M)	5	1
j) Define the region of convergence (ROC) in the context of transform techniques such as the Laplace and Z-transforms.	(2M)	5	1

PART-B (5X10 = 50M)

2a. Explain the classification of signals with suitable examples and diagrams.	5(M)	1	2
b. Determine whether the following discrete time signals are periodic or not? If periodic determine the fundamental period?	5(M)	1	3
i) $\sin\left(\frac{2\pi n}{3}\right) + \cos\left(\frac{2\pi n}{5}\right)$ ii) $\cos\left(\frac{n}{6}\right) \cos\left(\frac{n\pi}{6}\right)$			
(OR)			
3a. State whether the following system is Linear, Causal, time-invariant and stable	5(M)	1	3
$y(n) + y(n+1) = x(n) + x(n-2)$			
b. Explain concept of analogy between vectors and signals.	5(M)	1	2
4a. Write Dirichlet's conditions	5(M)	2	1
b. Find the Inverse Fourier transform for the following functions			
i) $X(\omega) = \frac{j\omega}{(2+j\omega)^2}$ ii) $X(\omega) = \frac{4(j\omega)+6}{(j\omega)^2+6(j\omega)+8}$	5(M)	2	2
(OR)			
5a. Discuss the concepts of Trigonometric Fourier series and derive the expression for Trigonometric Fourier coefficients.	5(M)	2	2

- b. Find the Fourier Series expansion of the half wave rectified sinewave shown below.



5(M) 2 2

- 6a. State and prove any two properties of convolution function? 5(M) 3 2

- b. Find the convolution of the following signals by graphical method.  
 $x(t) = e^{-3t} u(t), h(t) = u(t+3)$  5(M) 3 3

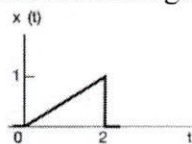
(OR)

- 7a. Obtain the relationship between bandwidth and rise time of ideal low pass filter? 5(M) 3 3

- b. Draw and explain the ideal filter characteristics of LPF, HPF and BPF 5(M) 3 2

- 8a. Explain and prove Parseval's relation for continuous aperiodic signals. 5(M) 4 3

- b. Determine the autocorrelation for the function given below.



5(M) 4 3

(OR)

- 9a. State and prove sampling theorem for band limited signals. 5(M) 4 3

- b. Discuss the relation between correlation and convolution 5(M) 4 2

- 10a. Compute the Laplace Transform and determine the Region of Convergence for  $x(t) = e^{-2t} u(t) + e^{-t} \cos(3t) u(t)$ . 5(M) 5 3

- b. 5(M) 5 3

Compute the inverse Laplace transform of  $X(s) = \frac{1}{s^2+3s+2}; Re\{s\} > -1$ .

(OR)

- 11a. State and prove any three properties of Z- Transform. 5(M) 5 3

- b. Apply the method to compute the inverse Z-transform of

$$X(z) = \frac{3 - \frac{5}{6}z^{-1}}{(1 - \frac{1}{4}z^{-1})(1 - \frac{1}{3}z^{-1})}; |z| > \frac{1}{3}$$

5(M) 5 3

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