

BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE
(AUTONOMOUS)

III - B.Tech I-Semester Supplementary Examinations (BR23), Mar/Apr - 2026

SIGNALS AND SYSTEMS (EEE)

Time: 3 hours

Max. Marks: 70

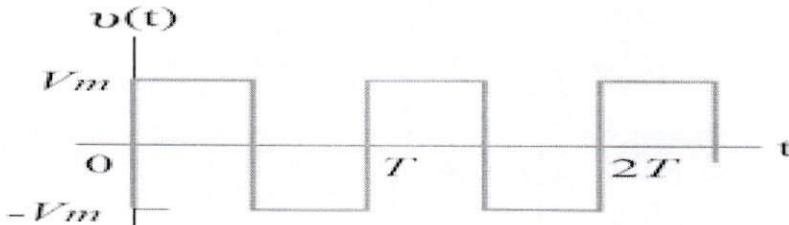
Question Paper consists of Part-A and Part-B
Answer ALL the question in Part-A and Part-B

PART-A (10X2 = 20M)

	Marks	CO	BL
1. a) Define signal and system	(2M)	CO1	BL1
b) Write the orthogonality condition for signals	(2M)	CO1	BL1
c) What are the types of Fourier series?	(2M)	CO2	BL1
d) Write Dirichlet's conditions	(2M)	CO2	BL1
e) What is convolution?	(2M)	CO3	BL1
f) Define energy spectral density	(2M)	CO3	BL2
g) Find the Laplace Transform of impulse function	(2M)	CO4	BL2
h) Write any two properties of Laplace Transform	(2M)	CO4	BL1
i) State initial value theorem	(2M)	CO5	BL1
j) What is the z transform of unit-step Sequence	(2M)	CO5	BL3

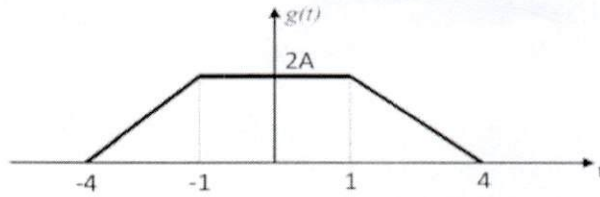
PART-B (5X10 = 50M)

2a) Explain the classification of systems with examples	5(M)	CO1	BL2
b) Explain the following basic signals with graphical representation i)Unit impulse ii)Unit step iii)Unit ramp iv)Signum function (OR)	5(M)	CO1	BL2
3a) Derive the evaluation of mean square error	5(M)	CO1	BL3
b) Prove that the two signals are orthogonal over an interval (0,1) $f_1(t)=1$ $f_2(t)=\sqrt{3} (1-2t)$	5(M)	CO1	BL2
4a) Explain the relation between Trigonometric Fourier series and Exponential Fourier series	5(M)	CO2	BL2
b) Examine the Fourier series coefficients for the periodic signal $x(t)$ shown below	5(M)	CO2	BL2



(OR)

- 5a) Compute the Fourier transform of the function shown below using Differentiation property 5(M) CO2 BL3



- b) State and prove the following properties of Continuous-Time Fourier transform 5(M) CO2 BL2
 i) Time Reversal ii) Time scaling
- 6a) Define the terms with mathematical expressions 5(M) CO3 BL2
 i) Sampling rate ii) Nyquist rate iii) Nyquist interval
- b) Explain sampling techniques 5(M) CO3 BL2
 (OR)
- 7a) Write down the properties of auto correlation function 5(M) CO3 BL2
 b) Explain Parseval's theorem 5(M) CO3 BL2
- 8a) Determine the Laplace transform of the signal and analyze its ROC 5(M) CO4 BL3
 $X(t) = e^{-at}u(t) + e^{-bt}u(-t)$
- b) Find the inverse Laplace transform of $x(s) = \frac{3}{(s+1)(s+4)}$ ROC: $-4 < \text{Re}(s) < -1$ 5(M) CO4 BL2
 (OR)
- 9a) Determine the Laplace transform of the signal 5(M) CO4 BL3
 $X(t) = 4\cos(5t) + 5\sin(4t)$
- b) Find the inverse Laplace Transform of $(s^2 + 4) / (s^2 + 2s + 5)$. 5(M) CO4 BL2
- 10a) Find the inverse z-transform of $x(z) = \frac{z}{(z+2)(z-3)}$ when the ROC is 5(M) CO5 BL2
 i) ROC: $|z| < 2$ ii) ROC: $2 < |z| < 3$
- b) Explain the constraint on ROC for various classes of signals in z-transform 5(M) CO5 BL3
 (OR)
- 11a) State and Prove any three Properties of Z-Transform 5(M) CO5 BL2
 b) Find the inverse Z-Transform of 5(M) CO5 BL2
 $X(Z) = Z^{-1} / (3 - 4Z^{-1} + Z^{-2})$ ROC: $|z| > 1$
