



MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

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III B.Tech II Sem Regular End Examination, June 2022

Signal and Systems

(Electrical and Electronics Engineering)

Time: 3 Hours.

Max. Marks: 70

Note: 1. Question paper consists: Part-A and Part-B.

2. In Part - A, answer all questions which carries 20 marks.

3. In Part - B, answer any one question from each unit.

Each question carries 10 marks and may have a, b as sub questions.

PART- A

(10*2 Marks = 20 Marks)

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|-------|--|----|-----|-----|
| 1. a) | List the functions which can be used as orthogonal functions | 2M | C01 | BL1 |
| b) | Write mathematical expressions for unit step and Signum function | 2M | C01 | BL1 |
| c) | Find whether the signal $3 \sin(4t+\pi/3)$ is periodic or not | 2M | C02 | BL2 |
| d) | State Dirichlet's conditions | 2M | C02 | BL1 |
| e) | Define signal bandwidth and system bandwidth | 2M | C03 | BL1 |
| f) | Write the Paley-Wiener criteria for physical realization of system | 2M | C03 | BL2 |
| g) | Find the inverse Laplace transform of the signal $\frac{s}{(s+a)^2}$ | 2M | C04 | BL2 |
| h) | Write the relation between Laplace transform and Fourier Transform. | 2M | C04 | BL1 |
| i) | State sampling theorem | 2M | C05 | BL1 |
| j) | List any two applications of correlation operation. | 2M | C05 | BL3 |

PART- B

(10*5 Marks = 50 Marks)

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|------|--|----|-----|-----|
| 2 a) | List the classification of signals using examples. | 5M | C01 | BL1 |
| b) | With examples explain causal and stable systems. | 5M | C01 | BL1 |

OR

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|---|--|-----|-----|-----|
| 3 | Derive the expression for Mean square error when a signal is approximated with orthogonal functions. | 10M | C01 | BL2 |
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|------|--|----|-----|-----|
| 4 a) | List the properties of Fourier transform | 5M | C02 | BL1 |
| b) | Find the transform of rectangular function of duration τ sec. | 5M | C02 | BL2 |

OR

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|---|---|-----|-----|-----|
| 5 | Derive the relation between Trigonometric Fourier series coefficients and Exponential Fourier series coefficients | 10M | C02 | BL2 |
|---|---|-----|-----|-----|

- 6 a) State and explain the conditions for distortion less transmission through a system. 5M C03 BL2
 b) State and prove any two properties of convolution. 5M C03 BL1
- OR**
- 7 Calculate the convolution of two signals $x(t)=e^{-at} u(t)$ and $u(t)$ graphically 10M C03 BL2
- 8 a) Find the inverse Laplace transform of $H(s)=\frac{24s}{(s+2)(s+6)}$ for $\text{Re}(s)>0$ 5M C04 BL2
 b) Find the unilateral Z-transform and ROC for the discrete signal - $(1/2)^n u[-n-1]$ 5M C04 BL2
- OR**
- 9 Using one sided Z-transform determine $y(n)$, $n>0$ if the system is defined with the difference equation $y(n)+0.5y(n-1)-0.25y(n-2)$; and initial conditions, $y(-1)=y(-2)=1$. 10M C04 BL3
- 10 a) With neat diagrams show the effect of under sampling 5M C05 BL1
 b) Derive the relation between convolution and correlation 5M C05 BL2
- OR**
- 11 Derive the relation between auto correlation and power spectral density 10M C05 BL2