Code No.: EC303PC

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CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–I–Semester End Examinations (Supply) - February- 2024
SIGNALS AND SYSTEMS
(ECE)

[Time: 3 Hours]   [Max. Marks: 70]

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 20 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A   (20 Marks)

1. a) Define mean square error.   [2M]
   b) What is orthogonal signal space?   [2M]
   c) Derive the Fourier transform of an arbitrary constant.   [2M]
   d) Compare Fourier series and Fourier transform.   [2M]
   e) Define transfer function.   [2M]
   f) Define the system.   [2M]
   g) Recall the convolution property of Laplace transform.   [2M]
   h) State any two properties of the ROC of Z-Transform.   [2M]
   i) Define sampling theorem.   [2M]
   j) Define auto-correlation and cross-correlation.   [2M]

PART-B   (50 Marks)

2. Given x(t) = u(t+1) + u(t-1) – u(t-2) – u(t-4)   [10M]
    Plot the following signals
    (i) x(t)   (ii) x(t-3)

OR

3. What is the condition for two signals x(t) and y(t) to be orthogonal?   [10M]

4. State and prove any two properties of Fourier Transform.   [10M]

OR

5. a) Compute the Fourier transform of the signal   [5M]
   $x(t) = e^{-at}, t \geq 0$

   b) Explain the Significance of Hilbert Transform.   [5M]

6. Explain continuous-time LTI system is distortion less transmission.   [10M]

OR

7. Write short notes on Ideal Filter characteristics of linear system.   [10M]

8. a) Find Laplace transforms and sketches their ROC of   [5M]
   $x(t) = e^{-a|t|}, a > 0 \text{ and } a < 0$

   b) Determine the Z transform and ROC for the signal   [5M]

   $x[n] = (\frac{1}{2})^n u[n] - (\frac{1}{3})^n u[n]$

OR

9. a) A finite sequence x[n] is defined as x[n]={5,3,-2,0,4,-3}Find X(z) and its ROC   [5M]
   b) Distinguish between the Laplace, Fourier and Z-Transforms.   [5M]

10. State and prove sampling theorem for band limited signals using analytical approach.   [10M]

OR

11.a) Compare different types of sampling techniques with neat waveforms.   [5M]
   b) State and prove any two properties of cross correlation function.   [5M]

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