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

[Time: 3 Hours]   [Max. Marks: 60]

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

         Part A is compulsory which carries 10 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) Distinguish between deterministic and random signals.   [1M]
   b) Express one vector in terms of the other vector.   [1M]
   c) Define the transform function.   [1M]
   d) What are the merits of Fourier transform?   [1M]
   e) Define – Impulse Response of a system.   [1M]
   f) What is meant by correlation?   [1M]
   g) State the initial value theorems of Laplace transform.   [1M]
   h) Define ROC of Laplace Transform.   [1M]
   i) Define under sampling.   [1M]
   j) What is auto-correlation?   [1M]

PART-B   (50 Marks)

2. Explain the classifications of signals with examples.   [10M]

OR

3. A rectangular function f(t) is defined by $f(t) = \begin{cases} 1 & 0 < t < \pi \\ -1 & \pi < t < 2\pi \end{cases}$ Approximate the   [10M]

above function by a wave form Sin(t) over the interval $(0, 2\pi)$, such that the mean square error is minimum.

4. Find the Fourier transform of (i) $e^{-at}u(t)$ (ii) $te^{-at}u(t)$ [5M+5M]

OR

5. Expand the function f(t) by exponential Fourier series over the interval (0,1). In this interval f(t) is expressed as f(t) = At.   [10M]

6. a) Explain the ideal filters characteristics.   [5M]
   b) Explain about distortion less transmission system and derive the expression for the transfer function.   [5M]

OR

7. For an LTI system described by a differential equation   [10M]

$$\frac{d^2}{dt^2}y(t) + 4\frac{d}{dt}y(t) + 3y(t) = \frac{d}{dt}x(t) + 2x(t),$$ the input is

$x(t) = e^{-t}u(t).$ Determine its transfer function, impulse response and its output y(t).

8. Determine the Laplace transform and the associate region of convergence for each of [4M+3M+3M] the following functions:

       (i) $x(t) = 1; 0 \leq t \leq 1$

       (ii) $x(t) = t$ for $0 \leq t \leq 1$ and

       (iii) $x(t) = 2-t$ for $1 \leq t \leq 2$.

OR

9. Find the Z- transform of the following sequences. Also specify ROC. [10M]

$$x[n] = 7 \left(\frac{1}{3}\right)^n u[n] - 6 \left(\frac{1}{2}\right)^n u[n]$$

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

OR

11. State and prove the Parseval's theorem for energy signal. [10M]

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