Register No: ……………………   Name: ....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)
(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)
FIRST SEMESTER B.TECH DEGREE EXAMINATION(R), NOVEMBER 2024
Electronics and Computer Engineering
(2024 SCHEME)

Course Code	:	**24EST1004-I**
Course Name	:	**Fundamentals of Signals and Systems**
Max. Marks	:	**60** **Duration:2.5 Hours**

PART A
(Answer all questions. Each question carries 3 marks)

1. List the properties of the Dirac delta function.

2. Distinguish between time variant and time invariant systems.

3. Explain sampling process.

4. Explain how we can obtain the frequency domain representation of a continuous-time signal.

5. Explain ROC of Z transform.

PART B
(Answer one full question from each module, each question carries 9 marks)
MODULE I

6. Describe the various types of signal classification.   9

OR

7. If $x(t) = u(t+2) - u(t-2)$. Plot i) $x(t)$ 9
   ii) $x(t-2)$
   iii) $x(2t)$

MODULE II

8. Find whether the given systems are causal and linear.   9
   i) $y(t) = x(t) + x(t-1)$
   ii) $y(t) = tx(t)$

OR

9. Determine whether the following systems are time variant and static   9
   i) $y(t) = e^{x(t)}$
   ii) $y(t) = x(t^2)$
   iii) $y(t) = cos(x(t))$

MODULE III

10. a) Explain aliasing. How can it be avoided?   5
    b) Determine the Nyquist rate of sampling for the
    signal $x(t) = 2Sin(100\pi t) + 10Cos(200\pi t) - 15Cos(300\pi t)$.   4

OR

11. a) Find the linear convolution of the sequences x[n]={2,2,1,1 } and h[n]={1,1,3}   5
    b) Derive the convolution sum for discrete time signals.   4

MODULE IV

12. Draw the magnitude and phase spectra of the signal $x(t) = e^{-2t}u(t)$.   9

OR

13. State and prove any three properties of Fourier Transform.   9

MODULE V

14. Determine the Inverse Z Transform of $X(z) = \frac{z}{2z^2-3z+1}$;   9
    If i) ROC:|z|>1   ii) ROC: |z|<1/2

OR

15. Determine the Z Transform and ROC of the sequence $x[n] = 2^n u[n] - 3^n u[-n-1]$ 9

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