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Question Paper Code : 71445

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Third Semester

Electronics and Communication Engineering

EC 2204/ EC 35/ EC 1202 A/ 080290015 / 10144 EC 305 — SIGNALS AND SYSTEMS

(Common to Biomedical Engineering)

(Regulation 2008/2010)

Time : Three hours                                                                 Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define signal.

2. What is meant by stability of a system?

3. State the relationship between Fourier Transform and Laplace Transform.

4. Find the Fourier series coefficients of the signal $x(t) = \sin \omega t$.

5. Define convolution integral.

6. State the condition for the LTI system to be casual and stable.

7. State sampling theorem.

8. What is meant by ROC of Z-transform?

9. Define stability in LTI system.

10. List the steps involved in linear convolution.
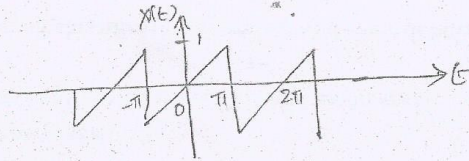
PART B — (5 × 16 = 80 marks)

11. (a) Define the following signals mathematically and represent graphically.

    (i) Impulse signal

    (ii) Ramp signal

    (iii) Step signal

    (iv) Sinusoidal signal

    (v) Exponential signal with various time period.

                                        Or

    (b) Give a broad classification of system and their details in brief.

12.  (a)  Determine the Fourier series representation of the signal.



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(b)  The continuous time LTI system is described by the equation.

$$\frac{d^2 y(t)}{dt^2} + 3\frac{dy(t)}{dt} + 2y(t) = \frac{dx(t)}{dt} + x(t)$$

Find

(i)   The impulse response of the system.

(ii)  The output response of the system for the input signal $x(t) = e^{-3t}u(t)$.

13.  (a)  Find the output response of the system described by a differential equation $\frac{d^2 y(t)}{dt^2} + 5\frac{dy(t)}{dt} + 6y(t) = x(t)$ when the input signal $x(t) = \cos t$. The initial conditions are $dy(0+)/dt = 1; y(0+) = 1$.

Or

(b)  Discuss the various properties of Laplace transform.

14.  (a)  Explain in detail the properties of Discrete-time Fourier transform.

Or

(b)  Determine the Z-transform of the following signal and plot the ROC.

(i)   $x(n) = a^n u(n)$

(ii)  $x(n) = -a^n u(-n-1)$.

15.  (a)  Describe the role of state equations and matrix n the analysis of LTI-CT systems.

Or

(b)  Find $y(n) = x(n) * h(n)$ using matrix method. $X(n) = \{1, 2, 3, 4\}; h(n) = \{1,1,1,1\}$.

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