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Question Paper Code : 60445

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Third Semester

Electronics and Communication Engineering

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

(Common to Biomedical Engineering)

(Regulations 2008/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define random signals.
2. What are the different types of representation of discrete-time signals?
3. State the Parseval's theorem for continuous-time Fourier series.
4. What is the condition for stability of a system?
5. Define transfer function with example.
6. Give the relationship of s-domain to z-domain transformation
7. State sampling theorem.
8. Find inverse z-transform for $\frac{1}{(z + 0.1)}$.
9. What are the properties of convolution?
10. Find the z-transform of
 - (a) impulse
 - (b) unit step.

PART B — (5 × 16 = 80 marks)

11. (a) What are the different classifications of signals? Explain in detail about each classification. (16)

Or

- (b) Write short notes on :
 - (i) Unit step sequence (4)
 - (ii) Unit ramp sequence (4)
 - (iii) Exponential sequence (4)
 - (iv) Impulse sequence. (4)

12. (a) Derive the Fourier transform expressions for
- (i) Rectangular pulse (8)
 - (ii) Triangular pulse. (8)

Or

- (b) Find the Laplace transform and ROC of the following signals.
- (i) $x(t) = e^{-b|t|}$ (8)
 - (ii) $x(t) = e^{-3t}u(t) + e^{-2t}u(t)$. (8)
13. (a) Explain in detail about the block diagram representation of continuous time systems. (16)

Or

- (b) A linear time invariant system is characterised by the state equation

$$\begin{bmatrix} \dot{q}_1 \\ \dot{q}_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

Where the u is a unit step function.

Compute the solution of the equation assuming initial condition as,

$$Q(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}. \quad (16)$$

14. (a) Find the discrete-time Fourier transform of the following
- (i) $x(n) = \{1, -1, 2, 2\}$
 - (ii) $x(n) = 2^n u(n)$
 - (iii) $x(n) = (0.5)^n u(n) + 2^{-n} u(-n-1)$. (16)

Or

- (b) Write the properties of z-transform. Explain in detail about complex convolution theorem and final value theorem. (16)
15. (a) Determine the impulse response $h(n)$ for the system described by the second order difference equation

$$y(n) = 0.6y(n-1) - 0.08y(n-2) + x(n). \quad (16)$$

Or

- (b) Find the state variable matrices A, B, C and D for the input-output relation given by the following equation.

$$y(n) = 6y(n-1) + 4y(n-2) + x(n) + 10x(n-1) + 12x(n-2) \quad (16)$$