Reg. No. : | | | | | | | | | | | | |

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

$$\begin{bmatrix} q_1 \\ q_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

Where the u is a unit step function.

Compute the solution of the equation assuming initial condition as,

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

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

Or

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

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