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B.Tech. DEGREE EXAMINATION, MAY 2019
Third Semester

EC0207 – SIGNALS AND SYSTEMS

(For the candidates admitted from the academic year 2007-2008 to 2012-2013)

Time: Three hours

Max. Marks: 100

Answer **ALL** Questions

PART – A (10 × 2 = 20 Marks)

1. Give the necessary and sufficient condition for the stability of a system.
2. Find the even and odd terms of the signal $x(t) = \sin t + \cos t + \cos t \sin t$.
3. For the continuous time Fourier series state Parseval's theorem.
4. Find the Fourier transform of $e^{-at}U(t)$.
5. What is the inverse laplace transform of $X(s) = \frac{e^{2s}}{s+1}$?
6. List out the steps involved in convolution of two signals.
7. Find the DFT of $x(n) = \delta(n - n_0)$.
8. Define DTFT pair.
9. What is Z-transform of $u(n)$ and $\delta(n)$?
10. List any four properties of ROC.

PART – B (5 × 16 = 80 Marks)

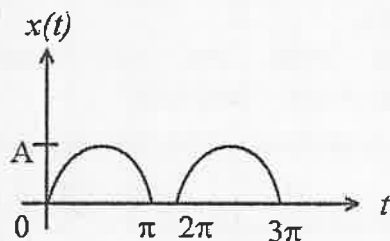
11. a. Check whether the following system is static, linear, causal and time-invariant.
(i) $y(n) = x(n)x(n-1)$

- (ii) $y(n) = x(n) \cos \omega_0 n$
 (iii) $y(n) = x(n) + \frac{1}{x(n-1)}$
 (iv) $y(n) = x(-n)$

(OR)

- b. Find the energy and power of the signal $x(n) = \left(\frac{1}{2}\right)^n, n \geq 0$
 $= (3)^n, n < 0$

12. a. Find the cosine fourier series of the following signal



(OR)

- b. Find the Fourier transforms of the following functions

- (i) $x(t) = te^{-3t}u(t)$
 (ii) $x(t) = \cos \omega_0 t u(t)$
 (iii) $x(t) = \delta(t+2) + \delta(t-2)$

13. a. Determine the response of the system using Laplace transform to a unit step applied at $t = 0$

$$\frac{d^2 y(t)}{dt^2} + \frac{3dy(t)}{dt} + 2y(t) = x(t) \quad \text{if} \quad y(0^-) = -2 \quad \text{and} \quad \frac{dy(0^-)}{dt} = 0.$$

(OR)

- b. Find the discrete convolution of the two sequences

$$x(n) = \{1, 2, -1, 1\} \quad \text{and} \quad h(n) = \{1, 0, 1, 1\}.$$

14. a. Find the DFT of a sequence $x(n) = \{2, 2, 1, 1, 0, 0, 0\}$.

(OR)

- b. Find the four point DFT of $x(n) = \sin\left(\frac{n\pi}{2}\right)$.

15. a.

$$\text{Find the inverse z-transform of } x(z) = \frac{z(z^2 - 4z + 5)}{(z-3)(z-1)(z-2)}$$

for ROC

- (i) $z < |z| < 3$
 (ii) $|z| < 1$

(OR)

- b. Determine the output of the system which is described by the difference equation

$$y(n) = 7y(n-1) - 2y(n-2) + 2x(n) - x(n-2) \quad \text{assume the input } x(n) = u(n).$$

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