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B. Tech. (PT) DEGREE EXAMINATION, DECEMBER 2014

Second Semester

PEC207 – SIGNALS AND SYSTEMS

Time: Three hours Max. Marks: 100

Answer ALL Questions $PART - A (10 \times 2 = 20 \text{ Marks})$

Determine whether the given signal is energy or power signal $x(t) = e^{-2t}u(t)$.

- State the condition for causal system.
- 3. Write down the Dirichlet conditions.
- . State Parseval's relation.
- 5. Find the impulse response h(t) for the system described by the difference equation

$$\frac{dy(t)}{dt} + 0.5y(t) = x(t) + 0.2 \frac{dx(t)}{dt}$$

- 6. State and prove convolution property
- 7. Show that of x(n) is real, then its DFT satisfies the relation $x(N-K) = x^*(k)$.
- 8. Write down the difference equation to represent an N th order LTI DT system.
- 9. Compare unilateral and Bilateral Z transform.
- 10. List any two properties of region of convergence in Z domain.

$PART - B (5 \times 16 = 80 Marks)$

11.a.i Explain the classification of signals (CT) with suitable example.

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time discrete For the given di $x(n) = \{-3, 2, 3, -1, 2, -1, 4\}$

signal

Sketch the following

(i) x(2-n) (ii) x(2/3n+1) (iii) x(-2n) (iv) x(-n+8/4)

(OR)
b. Determine whether the following systems are Linear, time invariant, memory less, causal and stable.

 $\frac{dy(t)}{dt} + 2y(t) = x(t) + 0.5 \frac{dx(t)}{dt}$

 $y(n) = x^2(n)$ (ii)

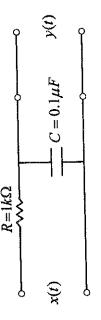
12. a. Determine the trigonometric fourier series for the half wave rectified sine wave.

(OR)

b. Determine the fourier transform of a triangular pulse with amplitude 'A' and width 'W'.

13. a. Obtain the convolution of the following two

- Signals $x(t) = e^{2t} u(-t)$ and h(t) = u(t-3)
- Derive the frequency response and impulse response of the given RC circuit.



b. What is impulse response? Compute the frequency response and impulse response of the given system.

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

14. a.i. State and prove any four properties of DTFT.

ii. Find the convolution sum of

$$x(n) = 0.5^n u(n)$$
 and $h(n) = \delta(n) + 0.8 \delta(n-1) + 0.2 \delta(n-2)$

response of the system described by the difference b.i Find the transfer function. Frequency response and impulse (12 Marks) equation. $y(n)=3x(n)+\frac{1}{3}y(n-1)$

ii State and prove convolution sum.

(4 Marks)

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15.a.i State and prove any four properties of z transform.

ii Compute the inverse z transform
$$H(z) = \frac{1}{\left(1 + 0.5z^{-1}\right)\left(1 - 0.25z^{-1}\right)}$$

b.i Compute the output response of the system whose input is $x(n) = 0.8^n u(n)$ and the impulse response $h(n) = 10 \delta(n) + 0.3^n u(n)$.

ii Describe the characteristic of DT system.