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Name : .....

Reg. No: .....

FIFTH SEMESTER B.TECH DEGREE EXAMINATION, NOVEMBER 2013

Applied Electronics and Instrumentation Engineering

AI 09 502 – SIGNALS AND SYSTEMS

Time : Three Hours **Maximum : 70 Marks**

PART – A

1. Is the signal $x(t) = 10\cos^2(10\pi t)$ a periodic signal?
2. Define Causal system.
3. State sampling theorem.
4. Write the down the expression for the complex-exponential fourier series expansion of a periodic signal.
5. Find the z transform of $n^2u(n)$.

(5 x 2 = 10 Marks)

PART - B

6. Determine and sketch the even and odd components of the continuous-time signal $x(t) = e^{-t}u(t$.
7. Explain the condition for the stability of a system.
8. Determine and sketch the spectrum of $x(t) = 10 \sin 2\pi f_0 t$.
9. Find the fourier transform of $x(t) = 5e^{-2|t|}$. Plot is magnitude and phase spectra.
10. Given $F(s) = (s+8)/(s^2+6s+13)$, find $f(0)$ and $f'(0)$ using the initial value theorem.
11. Explain any two properties of z-transform.

(4 x 5 = 20 Marks)

PART - C

12. (a) With suitable examples explain the basic operations on signals.

(or)

(b) An LTI system is described by the differential equation $(dy(t)/dt) + 6\,y(t) = x(t)$. Determine its impulse response and sketch its magnitude and phase response.

13. (a) Discuss in detail about Hilbert transform and its properties.

(or)

(b) Explain the condition for distortionless transmission through an LTI system.

14. (a) Explain DFT and its properties. Find the DFT of the sequence $x(n) = \{-1,1,-1,1\}$.

(or)

(b) For the DT system described by the following difference equation, determine (i) the unit sample response sequence, h(n) (ii) the step response sequence g(n) and (iii) whether it is BIBO stable.

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

15. (a) Determine the Z-transform and the ROC of the two sided signal (i) $x(n) = (0.5)^{|n|}$ (ii) $x(n) = (2)^{|n|}$.

(or)

(b) With a suitable example explain the determination of frequency response from poles and zeroes.

(4 x 10 = 40 Marks)

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