20918

Name:..............

Reg.No...............



**FIFTH SEMESTER B.TECH DEGREE EXAMINATION, NOVEMBER 2011**

AI 09 502 – SIGNALS & SYSTEMS

(2009 Admission)

Time : Three Hours

Maximum: 70 Marks

**Part A ( 5x 2 Marks = 10 Marks)**
**Answer All questions**

1. State the difference between energy and power signals.
2. Find the area under the signal $x(t) = 10\ \delta(t-2)$.
3. Find the Fourier Transform of $x(t) = 1/t$.
4. What is the significance of power spectral density?
5. State the initial value theorem.

**Part B ( 4 x 5 Marks = 20 Marks)**
**Answer any four questions**

6. Determine and sketch the even and odd components of the continuous –time signal $x(t) = e^{-t}u(t)$.
7. State and prove convolution theorem.
8. State and explain Drichlet's condition for the convergence of Fourier Series.
9. Determine the DTFT of $y_1(n)=x(2n)$ given that DTFT of $x[n]=X(e^{j\omega})$.
10. Find the Laplace transform of $x(t) = e^{-3t}\cos(2\pi 100t)u(t)$.
11. Find the unilateral Z-transform of $n^2u(n)$.

**Part C ( 4x 10 Marks = 40 Marks)**

**Module I**

12. Explain the classification of signals with suitable examples.

**(or)**

13. (a) What is a Linear Time Invariant System? Explain. (4)
(b) A particular LTI system has $h(t) = e^{-2t}u(t)$. Determine its output signal y(t) corresponding to an input signal $x(t) = u(t)$. (10)

**Module II**

14. State and Prove Parseval's theorem.

**(or)**

15. If $x(t) = [t^{n-1}/(n-1)!]\ e^{-at}u(t)$, where a>0, Show that $X(f) = 1/(a+j\omega)^n$.

## Module III

16. Find the circular convolution of the two causal sequences $\{x(n)\} = \{1,2,3,4\}$ and $y(n) = \{4,3,2,1\}$ by using DFT and IDFT.

**Or**

17. Using Laplace Transform method, solve the following differential equation for the initial conditions

$$(d^2x(t)/dt^2) + (5dx(t)/dt) + 6x(t) = \delta(t) + 6u(t)$$

with $x(0^-) = 1$ and $x'(0^-) = 2$.

## Module IV

18. Find the unilateral Z-transform of $x(n) = [a^n \cos\omega_o n]u(n)$.

**Or**

19. For the Discrete time system described by the following difference equation, determine
    - (i) the unit sample response sequence h(n) (3)
    - (ii) the step response sequence g(n) and (3)
    - (iii) whether it is BIBO stable (2)

$$y(n) = 0.6\, y(n-1) - 0.08\, y(n-2) + x(n)$$