ANNA UNIVERSITY COIMBATORE

B.E. / B.TECH. DEGREE EXAMINATIONS : JUNE 2009

REGULATIONS : 2007

FOURTH SEMESTER : ELECTRONICS & COMMUNICATION ENGG.

070290013 – SIGNALS AND SYSTEMS

Time : 3 Hours **Max.Marks : 100 Marks**

PART A

(20 x 2 = 40 Marks)

ANSWER ALL QUESTIONS

1. Verify that $x(t)=A\, e^{-\delta t}\, u(t)$ is a power signal.
2. What do you mean by aliasing?
3. Define the delta and impulse functions.
4. Give the condition for an CT LTI system to be causal and stable.
5. Find the Laplace transform for a unit step function.
6. What do the Fourier series coefficients represent?
7. State the time shift property of DFT
8. Differentiate natural and forced response.
9. What are deterministic and random signals?
10. Check whether the system defined by $y(t)= 2e^{x(t)}$ is time invariant or not
11. State Dirichlet conditions for Fourier series
12. Define convolution integral
13. Check whether the given CT system $h(t) = e^{-2t}\, u(t-1)$ is stable or not.
14. Define state of a system
15. Determine the Z transform of $x(n)= \delta(n) - 0.5\delta(n-2)$.

16. State Parseval's theorem
17. Define system function of the discrete time system
18. State any two properties of Discrete time systems
19. What is the purpose of FFT?
20. List out the stages in computation of convolution sum.

PART B

(5 x 12 = 60 Marks)

ANSWER ANY FIVE QUESTIONS

21. Identify the following systems as linear or non-linear, causal or non causal and time variant or time invariant

(i) $y(n)= A+ Bx(n+1)$
(ii) $y(n)= x(3n-1)$
(iii) $y(n)=2e^{x(2n)}$
(iv) $y(n)= \cos x(n)$ (12)

22. a) Find the convolution of x(t) and h(t) where $x(t) = -1$; for $0 \le t \le 3$
$= 0$; otherwise
$h(t) = 0.5$; for $1 \le t \le 4$
$= 0$; otherwise (8)

b) State and prove the convolution in frequency property of Laplace Transform (4)

23. State and Prove the sampling value theorem. Explain the procedure for the reconstruction of a sampled signal. (12)

24. a) Solve the differential equation $dy(t)/dt + 3\, y(t) = 2x(t)$ with initial condition $y(0^+) = -1$ and input $x(t)= 2\, e^{-3t}\, u(t)$. (8)

b) State and Prove Parseval's Relations (4)

25. a) Discuss the properties of DFT: i) Circular shift ii) Circular Convolution (8)

b) Determine the IDFT of y(n)= {5, 1-j, 0, 1+j} (4)

26. a) Use Z transform to find the convolution of the pair $x_1(n)=na^n\ u(n)$ and $x_2(n)= (1/2)^n u(n)$ (6)

b) Determine the unit step response of the stable system whose difference equation is given by $y(n)-0.7y(n-1)+0.12y(n-2)= x(n-1)+2x(n-2)$, if $y(-1)=y(-2)=1$ (6)

27. Determine and plot the frequency response of the second order system described by the difference equation $y(n)-(5/6)y(n-1)-(1/6)y(n-2)= 2x(n-1)$. Assume the system is initially relaxed. (12)

28. a) Give the summary of elementary blocks used to represent discrete time systems. (6)

b) Find the Laplace transform and ROC for the signal, $x(t)= e^{-3t} u(t) + 3e^{-2t} u(t)$ (6)

*********THE END*******