

Register No:

B.E DEGREE EXAMINATIONS: APRIL/MAY 2011

Fourth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U07EC402: Signals and Systems

Time: Three Hours

Maximum Marks: 100

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

- The discrete time ramp function $r(n)$ equals
a) $u(n)$ b) $n u(n)$ c) $n^2 u(n)$ d) $u(n)/n$
- If the fundamental period of a periodic signal is 4, Find the smallest angular frequency
a) $\pi/2$ b) $\pi/4$ c) 2π d) 4π
- If $h(t)$ is the impulse, then the is obtained by taking the Laplace transforms of $h(t)$
a) LTI b) Transfer function c) Impulse response d) Linearity
- The Fourier transform of a rectangular pulse is
a) Sine function b) cosine function c) Sin C function d) cos C function
- Find the Nyquist Width for the signal given below $x(t) = (10 \cos 100 \pi t)^2$
a) 5 msec b) 0.5 msec c) 5 sec d) 0.5 sec
- The poles of Z
 $X(Z) = \frac{1}{(Z-1)(Z-2)}$ are/ is
a) $Z=0$ b) $Z=1$ c) $Z=2$ d) $Z=1$ and at $Z=2$
- If the DTFT of the signal is
 $X(e^{j\omega}) = \frac{1}{(1 - a e^{-j\omega})}$ is
a) $a^2 u(n)$ b) $u(n)$ c) $a^n u(n)$ d) $a^n u^2(n)$
- The convolution of $x(t)=u(t)$ with $h(t)=\delta(t)$ is
a) 0 b) 1 c) Z d) $e^{j\omega}$
- More memory is required in the realization of IIR system using
a) Direct form - I b) Direct form - II c) Cascade form d) Parallel form

10. How many sections are required to develop parallel structures for third order systems
 a) 1 b) 4 c) 2 d) 3

PART B (10 x 2 = 20 Marks)

11. Define deterministic and random signals
 12. State the relation between $\delta(n)$ and $u(n)$
 13. What is the relationship between Fourier transform and Laplace Transform?
 14. What is the condition for existence of Fourier transform of a signal $x(t)$
 15. What is aliasing? What are the effects of aliasing?
 16. Find the Z transform of $3^n u(n)$
 17. How you can find the step response of a system if the impulse response $h(n)$ is Known?
 18. What are the properties of convolution?
 19. Write the difference between recursive and non recursive discrete time system
 20. What are advantages of direct form-II over direct form-I structures?

PART C (5 x 14 = 70 Marks)

21. a) Find whether the given system is a) memory less b) stable c) Linear d) causal
 e) Time invariant
 (i) $y(n) = \cos[2\pi x(n+1)] + x(n)$ (7)
 (ii) $y(n) = x(n) x(n-2)$ (7)

[OR]

- b) Determine the trigonometric Fourier series representation for full wave rectified Signal

22. a) State all the properties of continuous time Fourier transforms

[OR]

- b) (i) Find the Laplace transform

$$e^{-at} u(t) + e^{-bt} u(-t) \quad (7)$$

- (ii) Find the inverse Laplace transform

$$X(S) = \frac{s}{s^2 + 2s + 5} \quad (7)$$

23. a) (i) Given $X(Z) = \frac{1}{(1-Z^{-1})(1-0.2Z^{-1})}$ Find $x(n)$ by contour integral

$$X(Z) = \frac{1}{(1-Z^{-1})(1-0.2Z^{-1})} \text{ Method (7)}$$

(ii) Determine the Z transform of the

$$x(n) = r^n (\sin \omega_0 n) u(n) \quad (7)$$

[OR]

b) Derive the sampling theorem and its reconstruction of a signal from its samples

24. a) Find the DTFT of the following

(i) $x(n) = (0.5)^n u(n) - 2^{-n} u(-n-1)$

(ii) $x(n) = (1/3)^n u(n+2)$

(iii) $x(n) = (n+1) a^n u(n)$

(iv) $x(n) = \sin(\pi/4 n + \pi/3)$

[OR]

b) (i) What is the overall impulse response $h(n)$ when two systems with impulse response $h_1(n)$ and $h_2(n)$ are in parallel and in series? (10)

(ii) Represent the sequence $x(n) = \{1, 2, -3, -1, 2\}$ as a sum of weighted impulse sequences (4)

25. a) (i) Obtain the parallel form realization for

$$H(z) = \frac{1 + 2z^{-1} + z^{-2}}{1 - 0.75z^{-1} + 0.125z^{-2}} \quad (7)$$

(ii) Obtain the cascade form realization structure

$$y(n) = 0.75 y(n-1) - 0.125 y(n-2) + 6x(n) + 7x(n-1) + x(n-2) \quad (7)$$

[OR]

b) Obtain the Direct form I and Direct Form II realization

$$y(n) - 5/6 y(n-1) + 1/6 y(n-2) = x(n) + 2x(n-1)$$
