Reg. No. : | | | | | | | | | | |

Question Paper Code: 41444

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

Fourth Semester

Electronics and Communication Engineering

14UEC404 - SIGNALS AND SYSTEMS

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Integration of step signal results in a _____ signal.

   (a) ramp (b) delta (c) impulse (d) triangular

2. The system y[n] =x [5n] is _____system.

   (a) non linear (b) dynamic (c) time invariant (d) non-causal

3. Fourier series is only applicable for

   (a) Energy signals (b) power signals
   (c) a periodic signals (d) periodic signals

4. The Fourier series expansion of an odd periodic function contains _____ terms.

   (a) cosine (b) sine (c) DC (d) DC and cosine

5. Convolution of signals in time domain is equivalent to _____ of signals in frequency domain.

   (a) addition (b) compression
   (c) expansion (d) multiplication

6. Bilateral and Unilateral Laplace Transform differs in terms of

   (a) lower limit of integration (b) upper limit of integration
   (c) they are same (d) bilateral transform does not exist

7. For a finite duration causal or positive time sequence the ROC is the entire Z plane except at

(a) z=0 (b) z=∞ (c) z=0 and z=∞ (d) z=1

8. The Drawback of DTFT is

(a) 0 inverse is in CT (b) inverse is in DT
(c) all the above (d) none of these

9. The output due to impulse input is called as _____response.

(a) impulse (b) frequency (c) step (d) output

10. Long division method cannot yield a ____sided sequence.

(a) one (b) positive (c) two (d) negative

PART - B (5 x 2 = 10 Marks)

11. Find the odd and even components of the signal $x(t)=e^{-10t}$.

12. State Parseval theorem as applied for Fourier series.

13. Solve the Laplace transform of Unit step function.

14. State the Parseval's theorem.

15. Obtain impulse response if $H(Z)=1+3Z^{-1}+5Z^{-2}+6Z^{-3}+4Z^{-4}$.

PART - C (5 x 16 = 80 Marks)

16. (a) Determine whether the following systems are static or Dynamic, Linear or Nonlinear, Shift variant or Invariant, Causal or Non-causal, Stable or unstable.
(i) $y(t)=x(t+1)+x(t^2)$
(ii) $y[n]=\log_{10}x[n]$ (16)

Or

(b) Analyze whether the following systems are: 1.Static or Dynamic 2. Linear or non-linear 3. Causal or non-Causal 4.Time invariant or Time Variant.
(i) $d^3y(t)/dt^3 + 2\ d^2y(t)/dt^2 + 4\ dy(t)/dt + 3\ y^2(t) = x(t+1)$
(ii) $y(t) = a\ t^2\ x(t) + b\ t\ x(t-4)$
(iii) $y(n) = a^n\ u(n)$
(iv) d) $y\ (n) = x(n)\ x(n-2)$ (16)

17. (a) Summarize the Fourier series expansion of the half wave rectified sine wave. (16)

Or

(b) Obtain Fourier transform for the following sequences
(i) $x(t)=te^{-3t}u(t)$ (ii) $x(t)= A \cos(\omega_o t)\, u(t)$ (16)

18. (a) (i) Develop H(S) = S(S+3)/(S+2)(S+1)(S+4) Using Cascade form. (8)

(ii) Develop H(S) = S+1/(S+2) (S+3) (S+4) using parallel form realization. (8)

Or

(b) Solve the differential equation with initial conditions are y(0) = 1 and $\frac{dy(0)}{dt} = 1$ and $x(t)=t^2+10t+5$

$$\frac{d^2y(t)}{dt^2} + 10\frac{dy(t)}{dt} + 24y(t) = \frac{dx(t)}{dt}$$ (16)

19. (a) Describe a real value band limited signal having no spectral components above a frequency of B Hz is determined uniquely by its values at uniform interval spaced no greater than 1/2B second apart. (16)

Or

(b) Obtain Natural Response, Forced Response for the following difference equation

$y(n)+9y(n-1)+14y(n-2)=x(n)+7x(n-1)$
$x(n)=2^n u(n)$; $y(0)=1; y(1)=2$ (16)

20. (a) A LTI DT system has the state variable description

$$A = \begin{bmatrix} 2 & -1 \\ 1 & 0 \end{bmatrix} B = \begin{bmatrix} 1 \\ 0 \end{bmatrix} C = [\,3 \quad 1\,] D = [\,2\,]$$

Determine the transfer function of state variable matrix. (16)

Or

(b) Find the state variable matrices *A, B, C* and *D* for the equation
y(n) - 3y(n - 1) - 2y(n - 2) = x(n) + 5x(n - 1) + 6x(n - 2). (16)