

 $(\mathbf{D}\mathbf{X}\mathbf{A}\mathbf{I}\mathbf{C}\mathbf{H}\mathbf{I}\mathbf{I}\mathbf{D}\mathbf{M},\mathbf{C}\mathbf{E},\mathbf{E},\mathbf{C},\mathbf{a}\mathbf{I}\mathbf{U}\mathbf{E},\mathbf{C}\mathbf{E})$

Wednesday, 30 November 2016

Time: 3 Hours

Max. Marks: 100

- ✓ Answer ANY FIVE full Questions.
- ✓ Missing data, if any, may be suitably assumed
- **1A.** Find the even and odd part of the signal.



1B. A series RLC circuit is excited by a DC voltage of E volts by closing the switch, determine the voltage across the capacitor for the following cases with L= 1H; $C = \frac{1}{4}F$ and

i) $R = 2 \Omega$ ii) $R = 4 \Omega$ iii) $R = 5 \Omega$

Comment on results.

2A. Find the function V(t) using the pole-zero plot of following function.

 $V(s) = \frac{(s+2)(s+6)}{(s+1)(s+5)}$

2B. Using convolution theorem evaluate the inverse laplace transform of the following.

i)
$$\frac{1}{s(s+a)}$$
 ii) $\frac{1}{s(s+a)^2}$

2C. Find the even and odd part of the discrete time signal x(n) shown in Fig 2C.



(6+8+6)

(6+14)

3A. Find the laplace transform of the following functions.

i)
$$x(t) = t \cos at$$
 ii) $\frac{(1 - e^{-t})}{t}$

3B. Find the laplace transform of the following non-periodic functions.



4A. Find the laplace transform of the periodic waveform shown in Fig 4A.





4B. Find the initial and final values of the function whose laplace transform is

i)
$$F(s) = \frac{(2S+1)}{(s^3+6S^2+11S+6)}$$
 ii) $F(s) = \frac{(s+6)}{S(S+3)}$ (10+10)

5A Find the network functions $\frac{V_1}{I_1}$, $\frac{V_2}{V_1}$ for the network shown in Fig 5A.



5B Determine the source current when the switch is closed at t=0. (Fig 5B) Assume zero initial conditions.



- **6A** An alternating voltage $V=V_m \sin(\omega t)$ is applied to an R-L series circuit. Determine the current response.
- **6B.** V=50 sin 10 t is applied to a series R-C circuit with R=2 Ω and C=0.25 F. Find the equation for current. Assume zero initial conditions (10+10)
- **7A.** Find the complete response for t > 0 for an RLC circuit with $R = 6 \Omega$, L = 1 H and

 $C = \frac{1}{\alpha}F$ with initial capacitor voltage = 2V.

The circuit is excited with $V(t) = 2 \cos 4t$.

7B. Find the laplace transform of the periodic saw-tooth waveform as shown in fig 7B.



Fig 7B.

(12+8)

(8+12)

(10+10)

- **8A.** At t=0, unit pulse voltage of unit width is applied to a series R-C circuit. Find the expression for i(t).
- **8B.** Find the impulse response of the voltage across the capacitor in the network with $R=2 \Omega$, L=1 H and C=1F, All connected in series. Also find the response for step input.