

Time : 3 Hours

EE 272 NETWORK ANALYSIS & SYNTHESIS

Max Marks :100

**Answer ALL Questions**

**Part-A**

**10 x 2 = 20**

1. Define the state of the dynamic system .
2. What is meant by torque –current analogy
3. What is the Laplace Transform of unit step function and unit integral function
4. Give the convolution integral of  $f(t)*g(t)$
5. If  $Z_{11}= 2\Omega$  ;  $Z_{21}= 1 \Omega$ ;  $Z_{21}=1\Omega$  and  $Z_{22}= 3\Omega$  ,What is the determinant of the admittance matrix?
6. What are active and passive ports?
7. What are Dirichlet's conditions?
8. Mention any two applications of Fourier series.
9. State any two properties of Hurwitz polynomials.
10. Check the positive realness of the following function  $(S^2+2S)/(S^2+1)$ .

**Part-B**

**5 x 16 =80**

11. For the network shown in figure 1 write a single differential equation relating the input and output of the System.
- 12.(a) The Z parameters of a two port network are  $Z_{11}=10\Omega$ ;  $Z_{22}=15\Omega$ ;  $Z_{12}=Z_{21}=5\Omega$ . Find the equivalent T network and ABCD parameters.  
(OR)
- 12(b) The port currents of a two-port network are given by  $I_1=2.5V_1-V_2$ ;  $I_2=-V_1+V_2$ . Find the equivalent  $\pi$ -network.
- 13.(a) Find the first and second Foster forms of the function  $\frac{(s+1)(s+3)}{s(s+2)}$ .  
(OR)
- 13.(b) Find the first and second Cauer forms of the given function  $\frac{(s+1)(s+3)}{s(s+2)}$
- 14.(a) For the circuit shown in figure 2, determine the current when the switch is closed at a time corresponding to  $t = 0$ ,  
Assume initial charge on the capacitor is  $q_0 = 2$  coulombs with polarity shown.  
(OR)
- 14.(b) For the circuit shown in figure 3, determine the current in the circuit when the switch is closed at  $t = 0$ .  
Assume there is no initial charge on the capacitor or current in the inductor.

15.(a) Evaluate the Fourier series of the signal shown in figure 4. Sketch the amplitude and phase spectrum.

(OR)

15 (b) Find the Fourier transform of the signal shown in figure 5. Sketch the amplitude and phase spectrum.

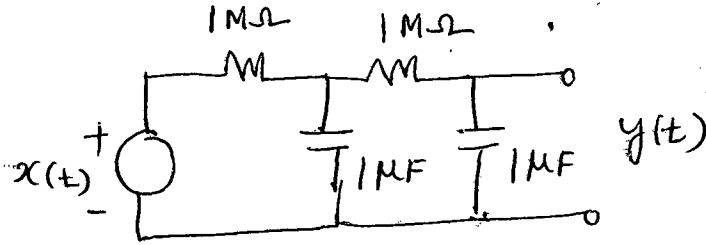


Figure - 1

$x(t)$  - input  
 $y(t)$  - output.

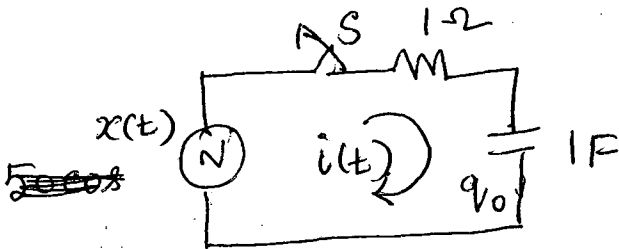


Figure - 2

$$x(t) = 50 \cos(50t + \phi)$$

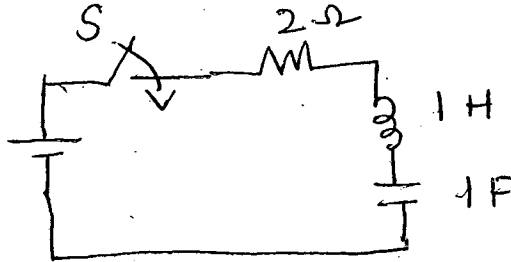


Figure - 3

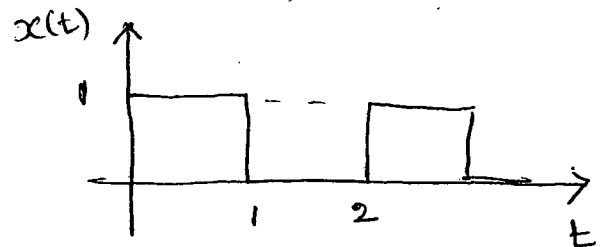


Figure - 4

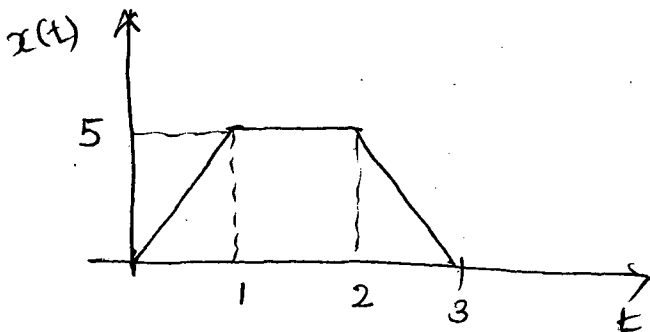


Figure - 5