

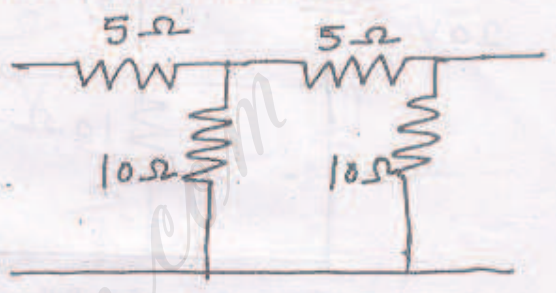
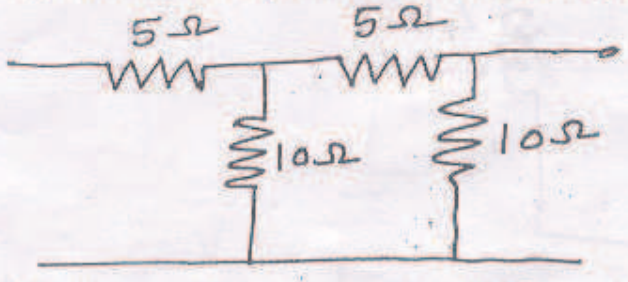
(3 Hours)

[Total Marks : 100

- N.B. : (1) Question No. 1 is compulsory.
 (2) Attempt any four questions out of remaining six questions.
 (3) Assume any suitable data if necessary.

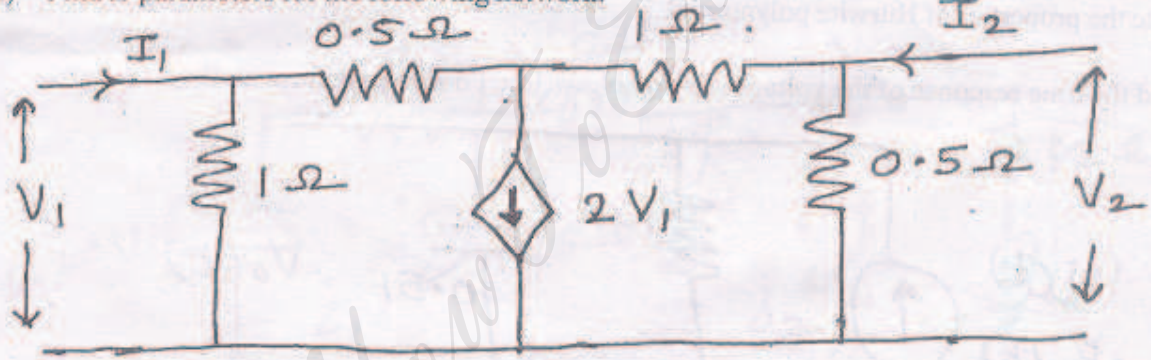
Master

1. (a) Find whether the following polynomial is Hurwitz or not— 4
 $S^4 + 7S^3 + 4S^2 + 10S + 6$
 (b) Explain odd function and even function as regards to Fourier Series. 4
 (c) Obtain ABCD parameters if the following two networks are connected in cascade. 4

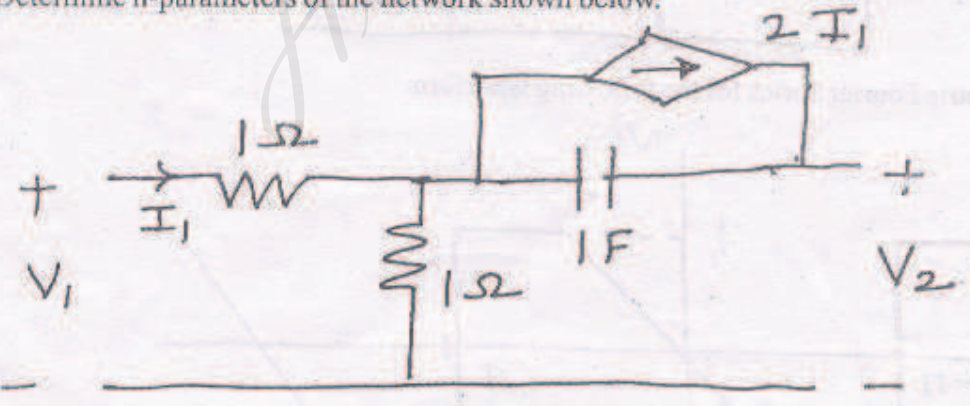


- (d) State an important properties of LC network functions. 4
 (e) State and explain following theorems for Laplace transform. 4
 (i) Initial value theorem (ii) Final value theorem.

2. (a) Find Z-parameters for the following network. 10



- (b) Determine h-parameters of the network shown below. 10



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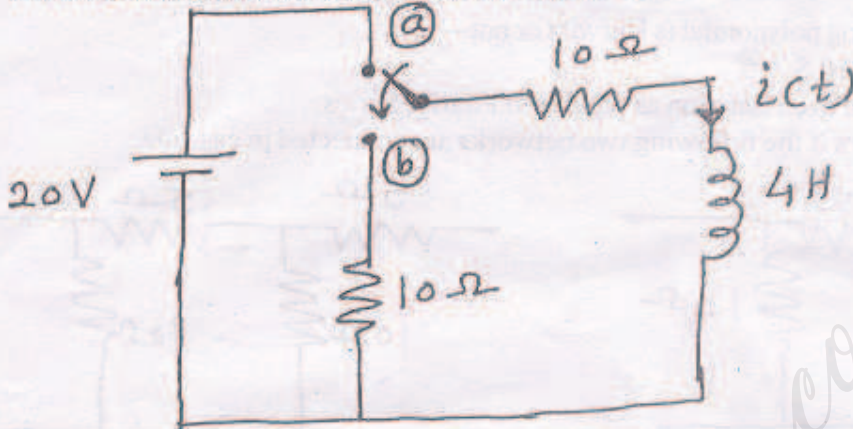
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3. (a) A transfer function is given by— $F(s) = \frac{5s}{(s+5-j15)(s+5+j15)}$ 10

Find the time domain response. Use graphical methods to determine the residues.

(b) The circuit is initially under steady state. The switch is moved from position (a) to position (b) at $t=0$. Find the current $i(t)$ after switching. Use Laplace transform. 10



4. (a) Check the positive realness of the following functions. 10

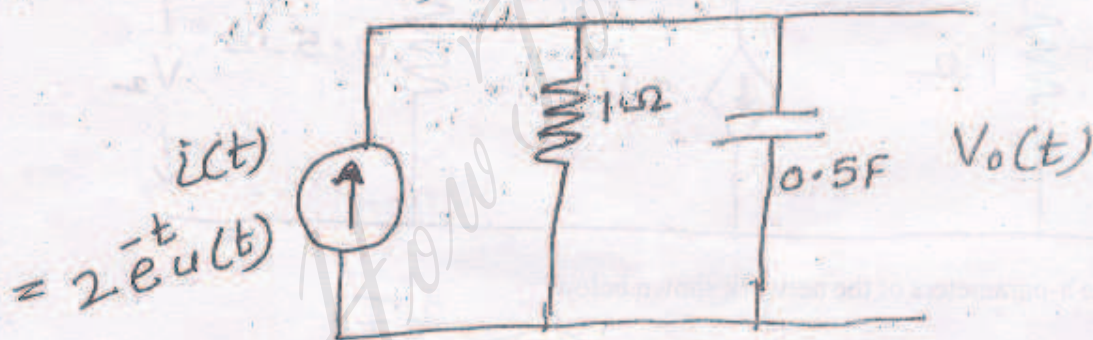
(i) $\frac{s^3 + s + 6}{s^3 + s + 1}$

(ii) $\frac{s^4 + 3s^3 + s^2 + s + 2}{s^3 + s^2 + s + 1}$

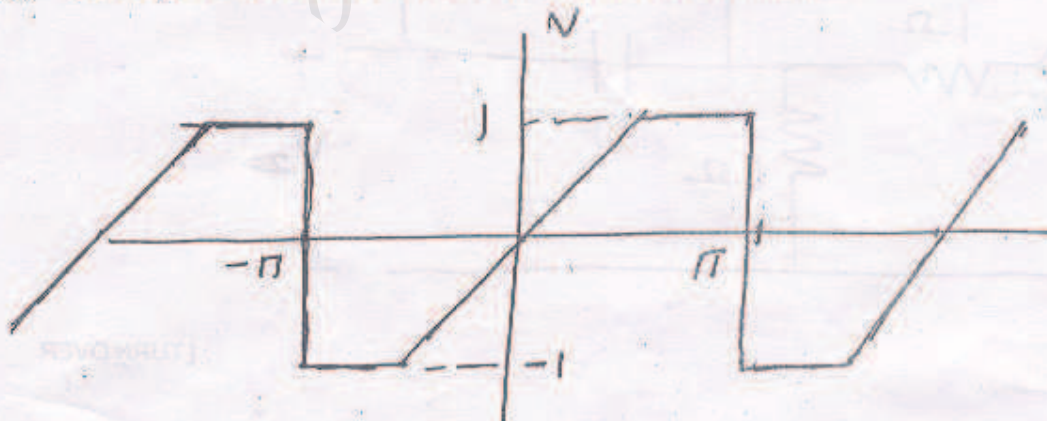
(b) State the properties of positive real function. 5

(c) State the properties of Hurwitz polynomial. 5

5. (a) Find the time response of the voltage shown below. Use Fourier transform method. 10



(b) Find trigonometric Fourier Series for the following waveform. 10



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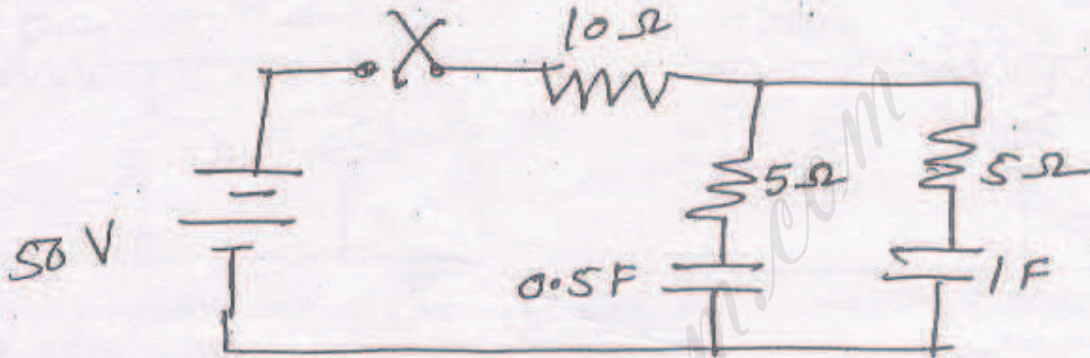
6. (a) Synthesize the RC driving point impedance in Cauer II form—

$$Z(s) = \frac{(s+1)(s+3)}{s(s+2)}$$

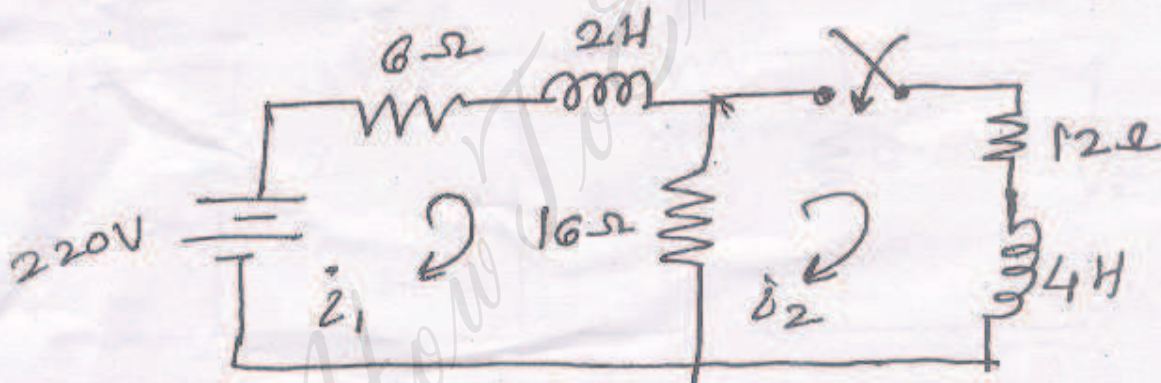
(b) Synthesize in Foster I form if—

$$Y(s) = \frac{(s+5)(s+7)(s+9)}{(s+6)(s+5)s}$$

7. (a) For the network shown determine the current $i(t)$ when the switch is closed. Assume that the network is initially relaxed. Draw the waveform of $i(t)$. 10



(b) In the circuit shown below the switch is initially open till steady state condition is reached. It is closed at $t=0$. Determine the loop currents. 10



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