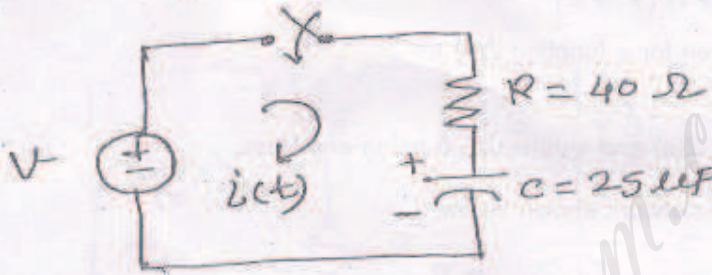


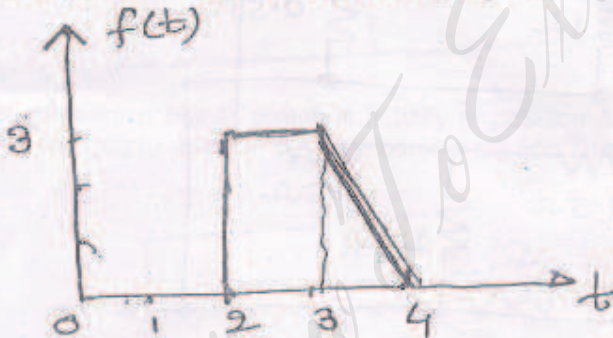
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- N.B. (1) Question No. 1 is compulsory.  
 (2) Attempt any four from the remaining questions.  
 (3) Assume suitable data if necessary.

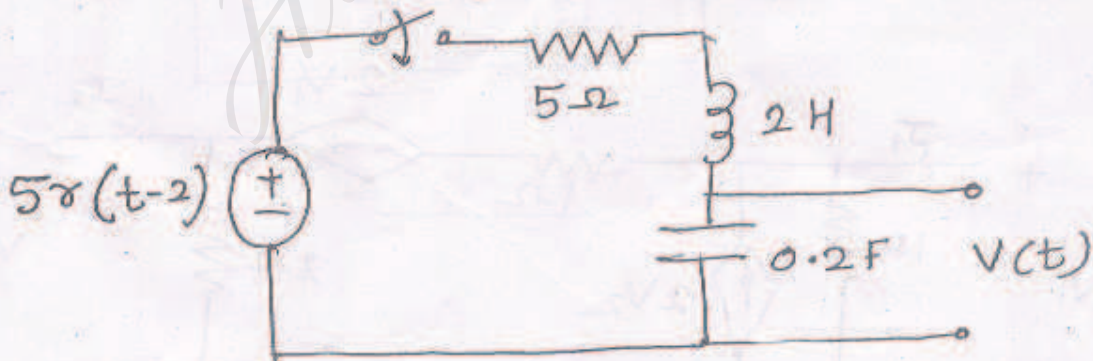
1. (a) A series RL circuit with  $R = 10 \Omega$  and  $L = 0.2 \text{ H}$  has constant voltage  $V = 50\text{V}$  applied at  $t = 0$ . Find and draw the resulting current using Laplace transform method. 4  
 (b) Find z-parameters in terms of h-parameters. 4  
 (c) Explain the properties of positive real function. 4  
 (d) Explain following symmetries in Fourier Series. 4  
 (i) Half Wave Symmetry  
 (ii) Even Function Symmetry  
 (iii) Odd Function Symmetry.  
 (e) State the important properties of LC network function. 4
2. (a) The series RC circuit has sinusoidal source  $v = 180 \sin (2000t + \phi)$  volts. An initial charge on capacitor is  $1.25 \text{ mC}$  with polarity as shown in the figure. Determine the current if the switch is closed at a time corresponding to  $\phi = 90^\circ$ . Use Laplace transform method. 8



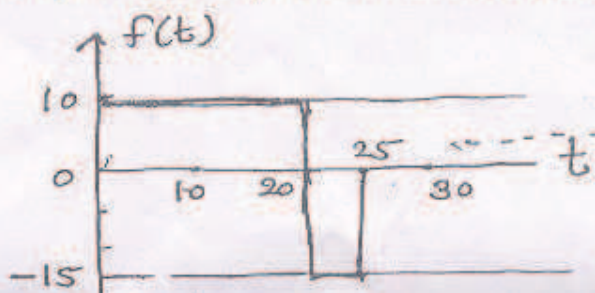
- (b) Find the Laplace Transform of the following signal. 6



- (c) For the network shown below determine the voltage across a capacitor when the switch is closed at  $t = 0$ . Assume there is no initial charge on capacitor. Use Laplace transform method. 6



3. (a) Determine trigonometric and exponential form of Fourier Series for the following periodic function. 12



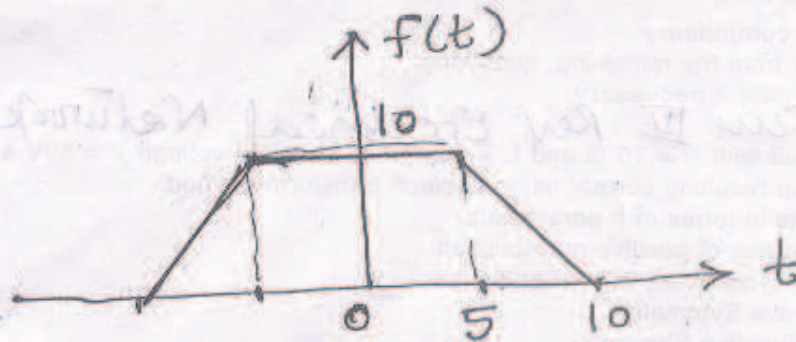


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(b) Determine Fourier Transform of the signal using suitable properties.

8



4. (a) Check whether the following polynomial is Hurwitz or not

$$P(s) = s^7 + 2s^6 + 2s^5 + 2s^4 + 4s^3 + 8s^2 + 8s + 4.$$

4

(b) Check whether the following function is positive real function or not.

6

$$F(s) = \frac{s(s^2 + 4)}{(s^2 + 1)(s^2 + 6)}$$

(c) Poles and Zeros are given for a function Z(s) as

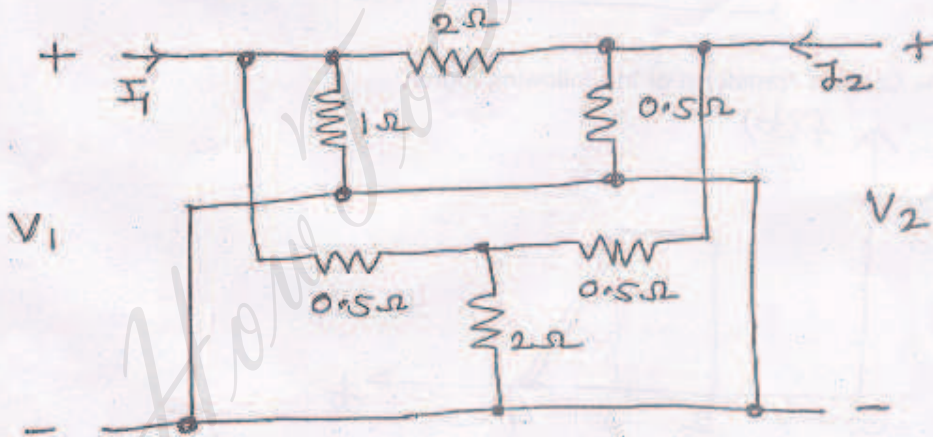
Poles	0	-2
Zeros	-1	-3

10

and  $Z(\infty) = 4$  Determine Z(s) and synthesise it using any form.

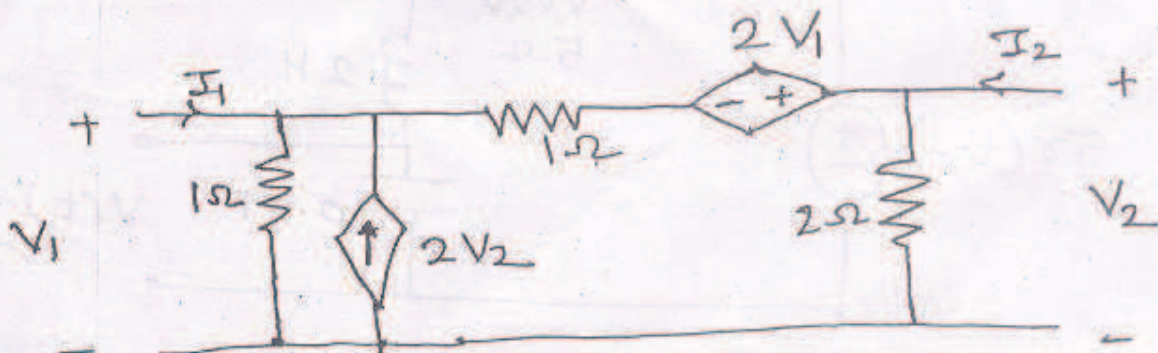
5. (a) Find Y-paramters for the network shown below :

10



(b) Find Z-parameters for the network shown below :

10





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6. (a) The transfer function is given by—

$$H(s) = \frac{2s}{(s^2 + 4)(s + 5)}$$

Determine its time domain response (using graphical method only).

- (b) The Fourier Transform of a continuous time signal  $f(t)$  is given by—

$$F(w) = \frac{10}{jw + 4}$$

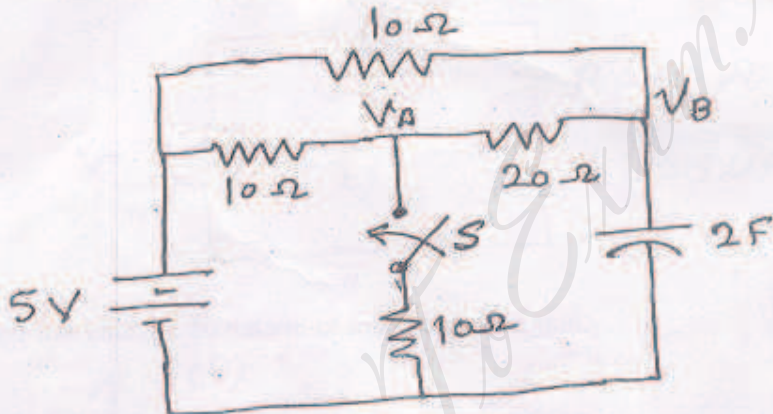
Determine Fourier Transform  $Y(w)$  if—

- (i)  $y(t) = e^{-2t} f(t)$
- (ii)  $y(t) = (2t - 3) f(t)$

- (c) Derive the condition for reciprocity and symmetry for ABCD parameters.  
 (d) Synthesise the following function using Caur II form.

$$Z(s) = \frac{s(s^2 + 3)(s^2 + 5)}{(s^2 + 2)(s^2 + 4)}$$

7. (a) In the circuit shown below the network is in steady state with switch 'S' is open. At  $t = 0$ , switch is closed. Determine  $V_A(0^-)$ ,  $V_A(0^+)$ ,  $V_B(0^-)$ ,  $V_B(0^+)$ . Also find  $V_B(t)$  at  $t > 0$ .



- (b) In the circuit shown below, switch is initially at position A. On the steady state having reached, switch is changed to position B. Find current  $i(t)$  and Draw current waveform.

