

## Electrical Network Analysis &amp; Synthesis

(20)

SE/III/CBGS/BM/ENAS

QP Code : 5259

(3 Hours)

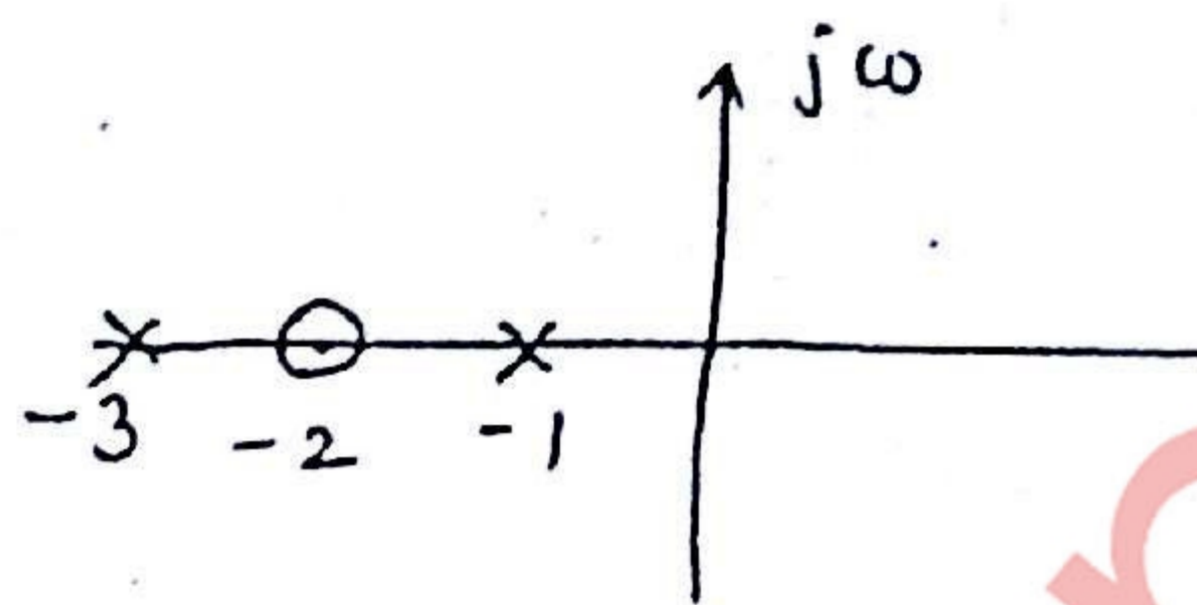
[ Total Marks : 80

- N.B. : (1) Question No.1 is compulsory.  
 (2) Attempt any three questions out of remaining five.  
 (3) Figures to the right indicate full marks.

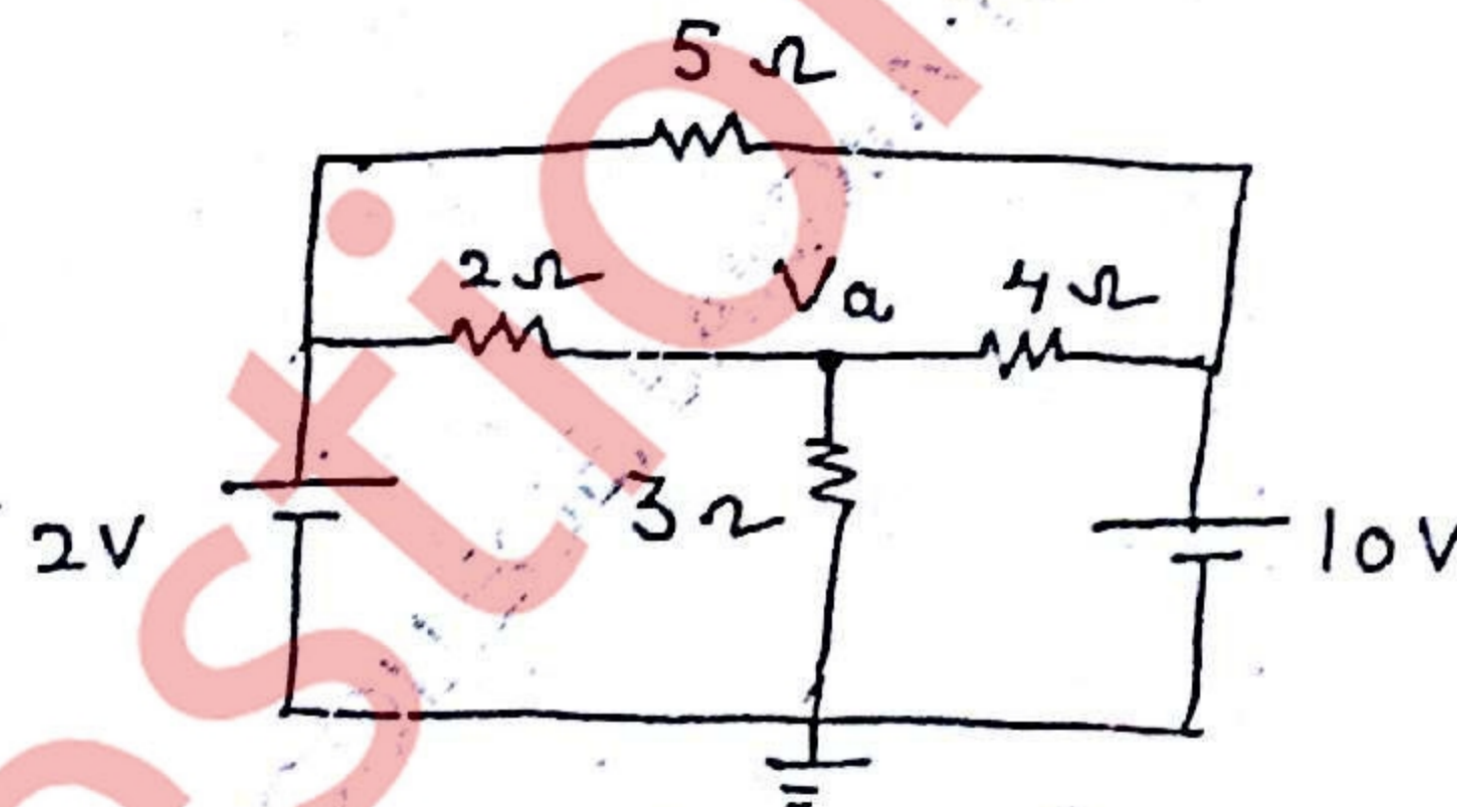
1. (a) Draw a graph and find number of possible trees. 5

$$A = \begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & -1 & 0 & 0 \\ -1 & -1 & 1 & 0 & 0 & 0 \end{bmatrix}$$

- (b) Find  $Z(s)$  if  $Z(\infty) = 1$  5

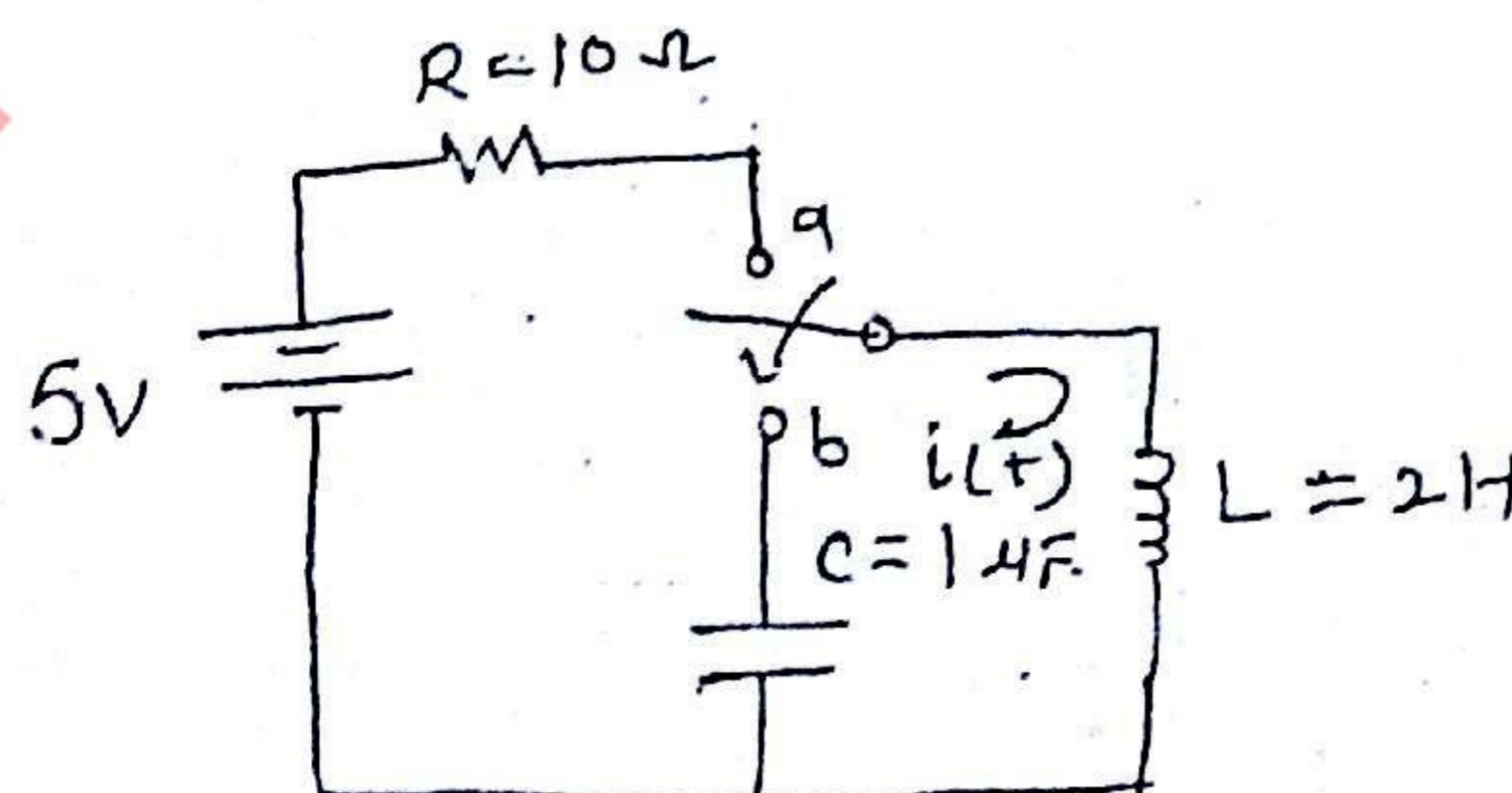


- (c) Find node voltage  $V_a$  5



- (d) Check whether polynomial is Hurwitz  
 $F(s) = s^6 + 5s^5 + 11s^4 + 25s^3 + 36s^2 + 30s + 36$  5

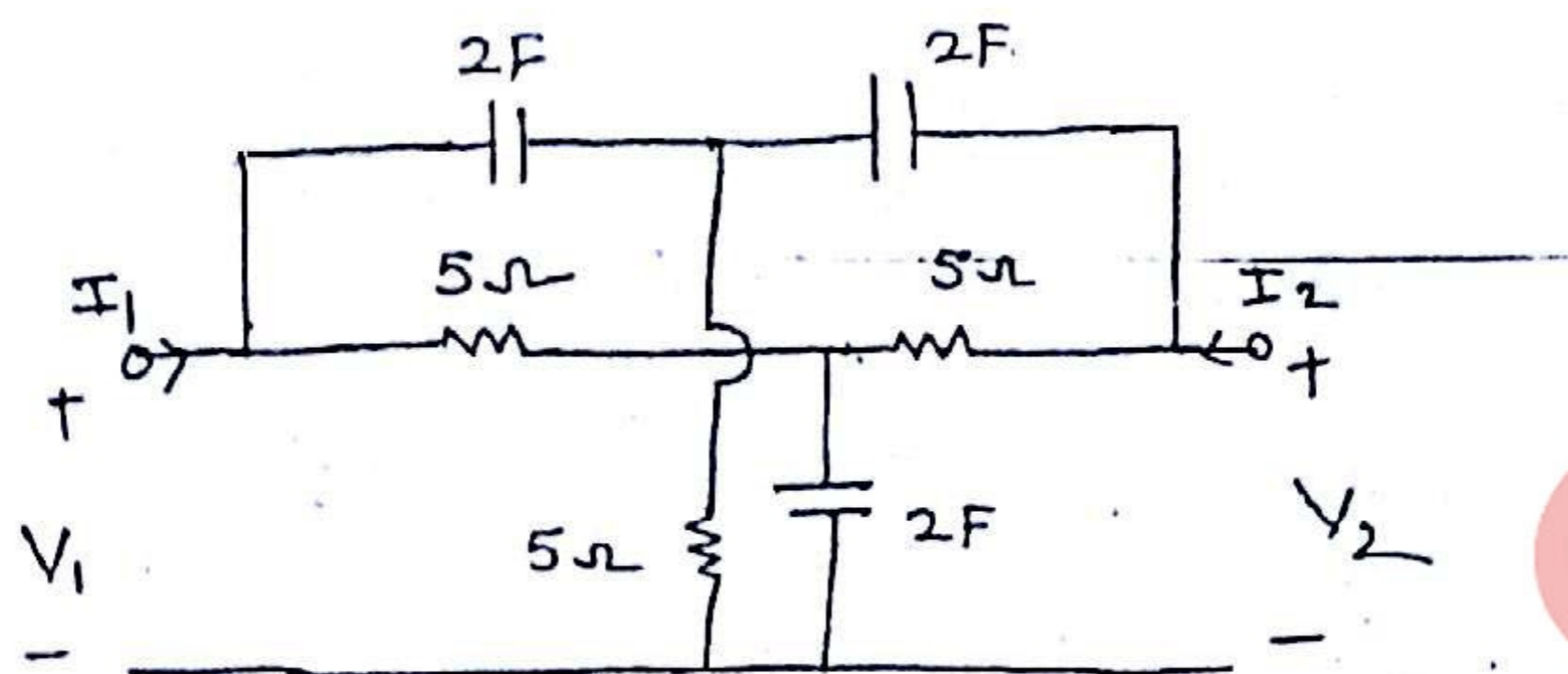
2. (a) In the given network, the switch  $k$  is moved from position  $a$  to  $b$  at  $t = 0$ . Find  $i(t)$  10



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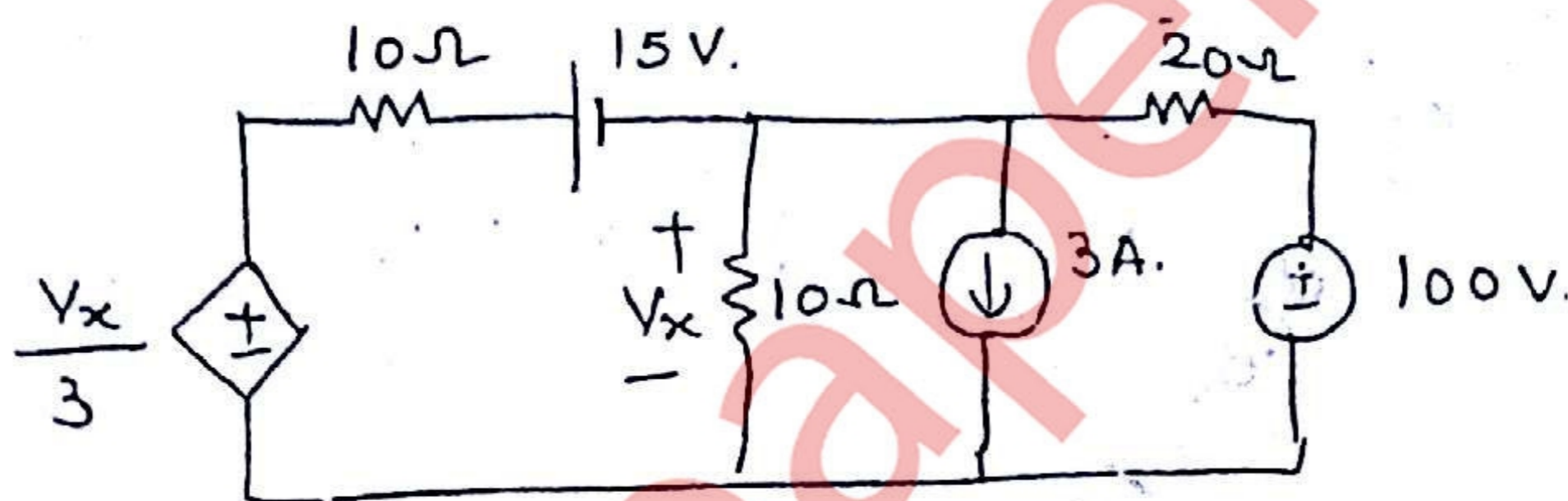
(b) Find Y parameters

10



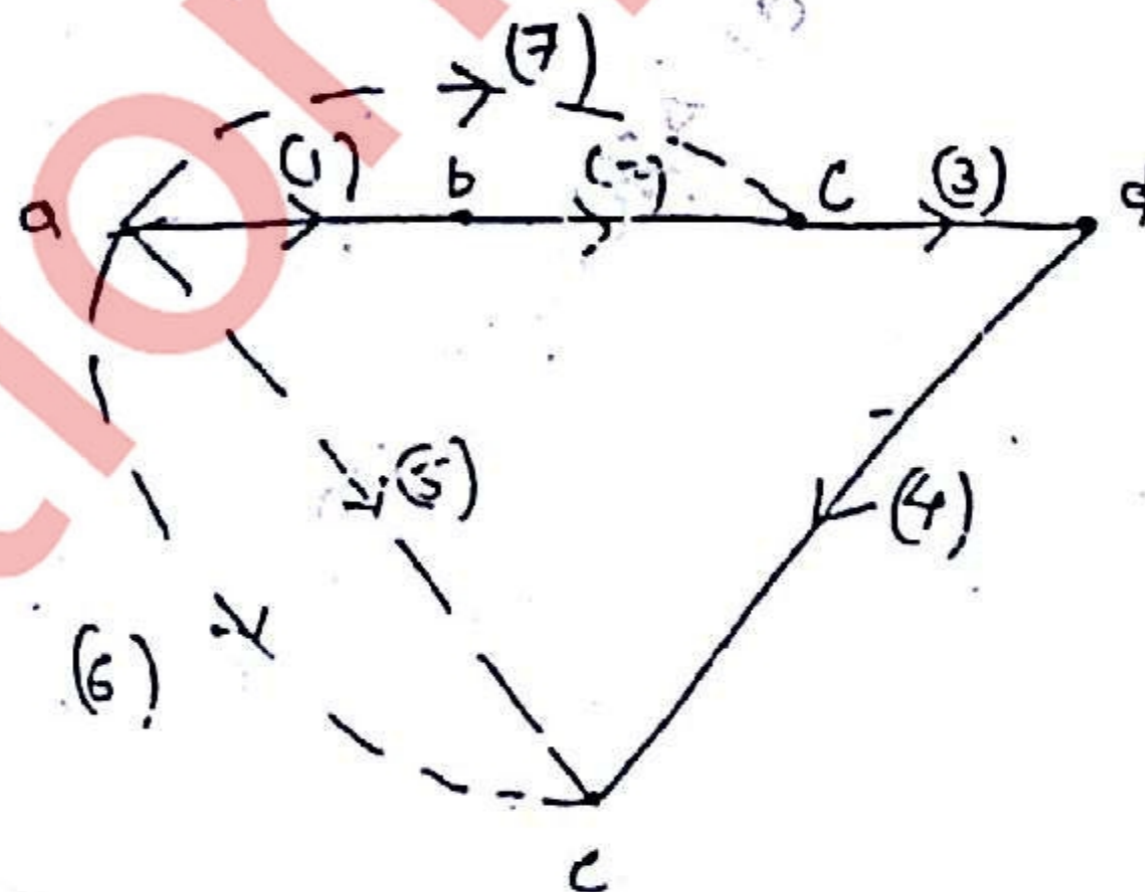
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3. (a) Find  $V_x$  using superposition theorem



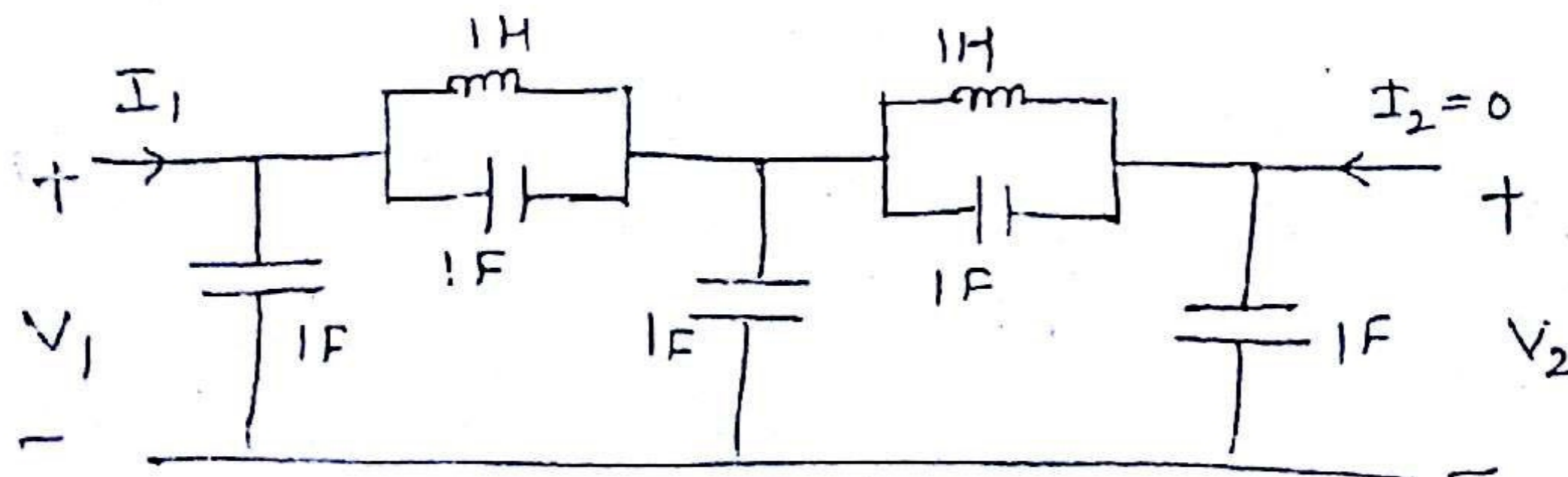
(b) For a given tree find (i) Incidence matrix (ii) f-cutset matrix (iii) Tieset matrix

10



4. (a) Find voltage ratio  $\frac{V_2}{V_1}$

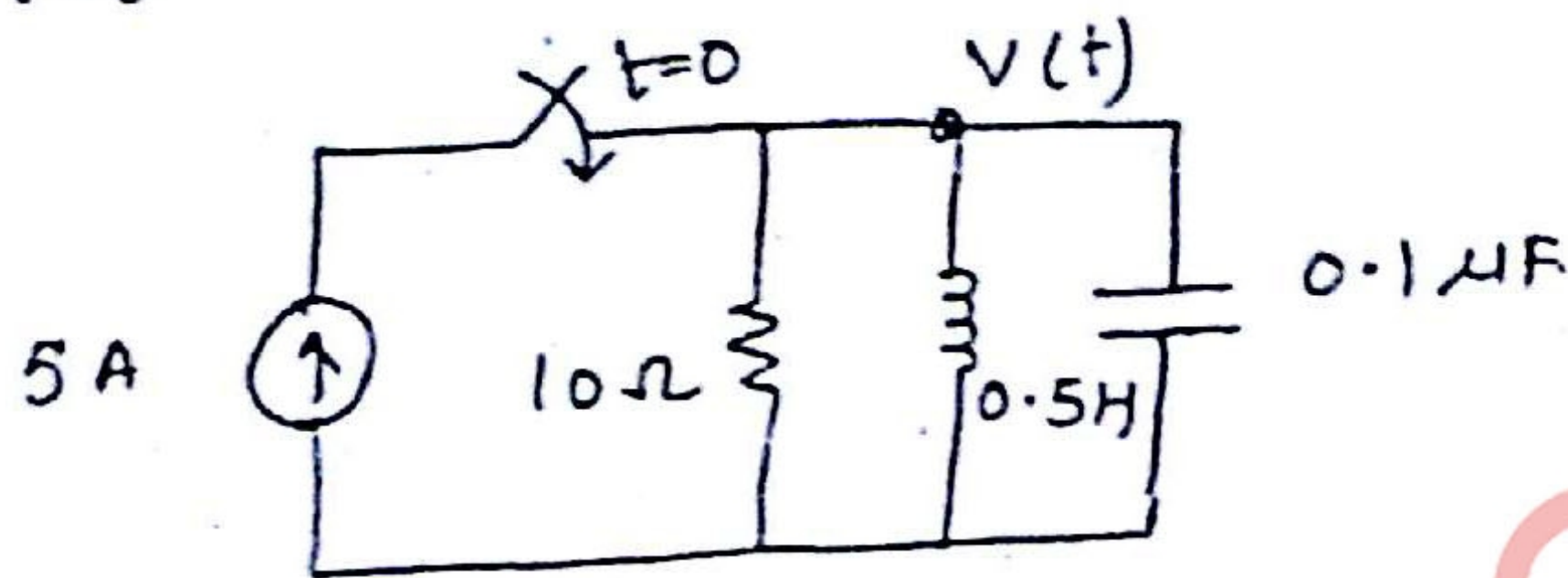
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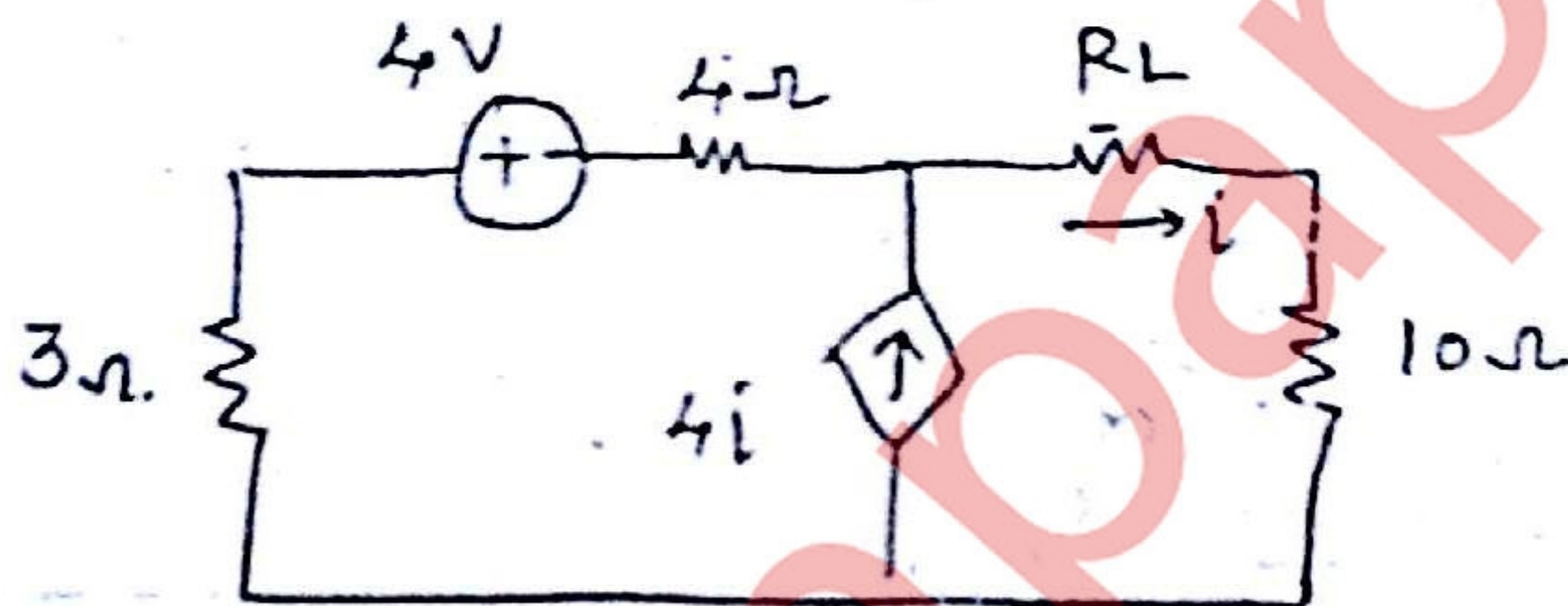
(b) Obtain condition of symmetry and reciprocity of h - parameters and draw equivalent circuit. 10

5. (a) In the given network switch is closed at  $t = 0$  solve for 8

$v, \frac{dv}{dt}, \frac{d^2v}{dt^2}$  at  $t = 0^+$



(b) Find  $R_L$  such that maximum power will be delivered to it. Also find the power. 8



(c) Write short note on initial condition and its significance. 4

6. (a) Realize the following function using Foster I and II 10

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

(b) Test whether  $F(s) = \frac{s^2 + 4s + 3}{s^2 + 6s + 8}$  is positive real. 6

(c) Draw dual of the following circuit 4

