Enrollment No. | 1 | 7 | U | E | C | 0 | 5 | 9

B.TECH 3RD SEMESTER, MID-TERM EXAMINATION, SEPTEMBER 2018

NETWORK ANALYSIS AND SYNTHESIS

(UEC 03 B02)

Time: 2 Hrs   Full Marks- 50

The figures in the margin indicate full marks for the questions

ANSWER ANY 5 (FIVE) QUESTIONS

5 X 10 =50

1.(A). When can you call a network (i) Linear (ii) Bilateral (iii) Lumped ?

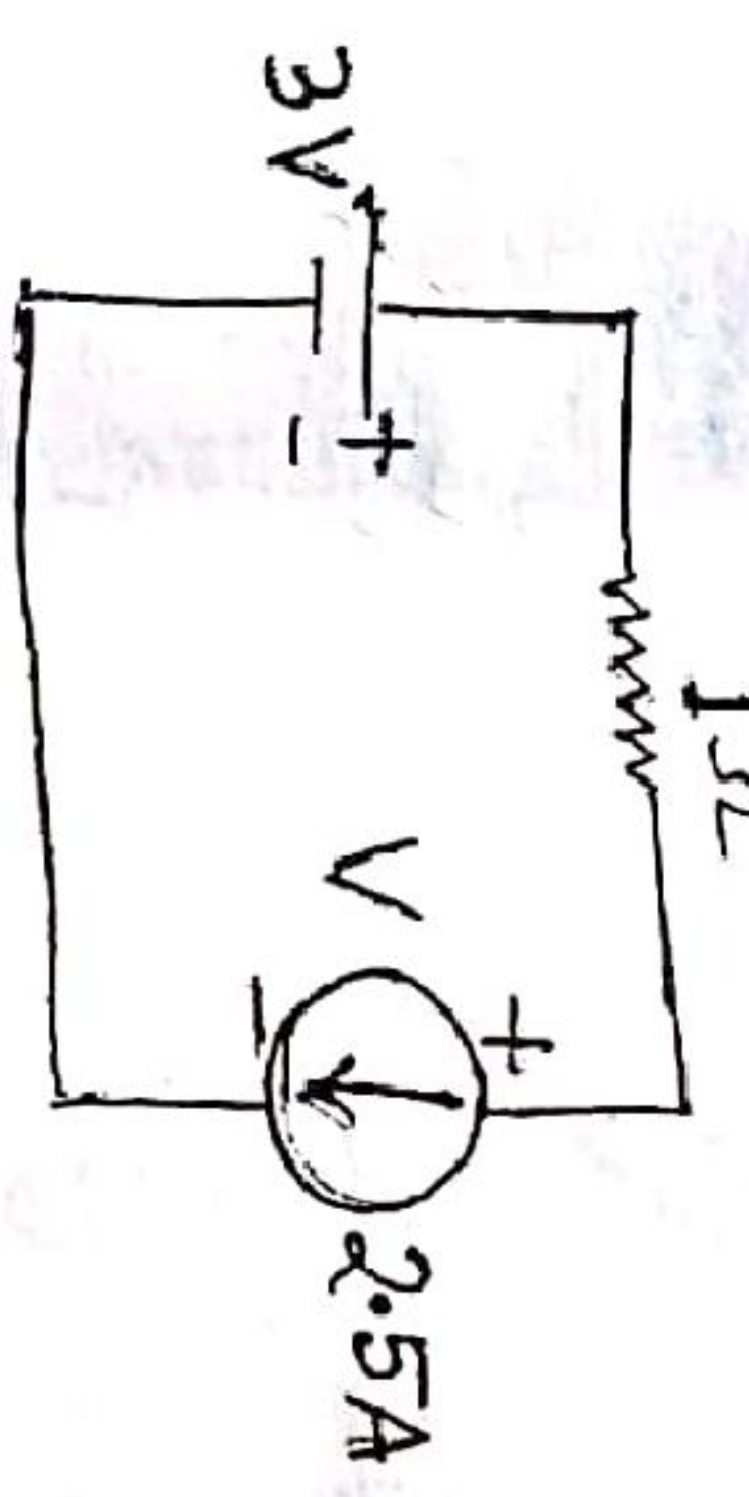(B). For the given circuit (Fig.-1), find the value 'V' using Tellegen's theorem.

Fig.-1

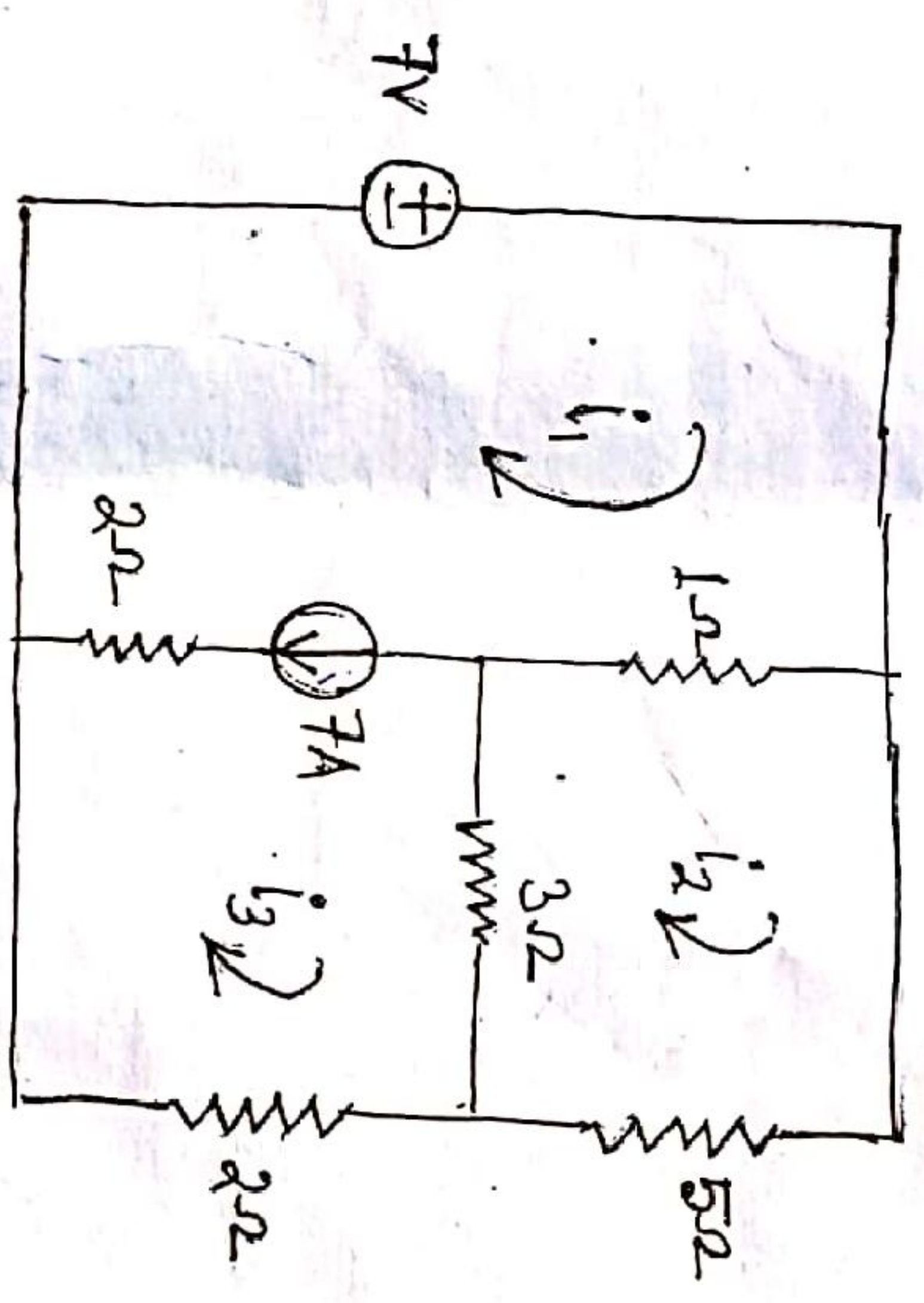(C). Find the currents i_1, i_2 and i_3 for the circuit shown in Fig.-2

Fig.-2

[(1+1+1)+2+5]=10

2.(A).State (i) Superposition theorem (ii) Reciprocity theorem.

(B). Define the following terms related to a linear graph
(i) Oriented graph (ii) Tree

(C).Determine the value of E_2(Fig.-3) such that the current through the (8+j8) Ohm impedance is zero. Use loop current Method.

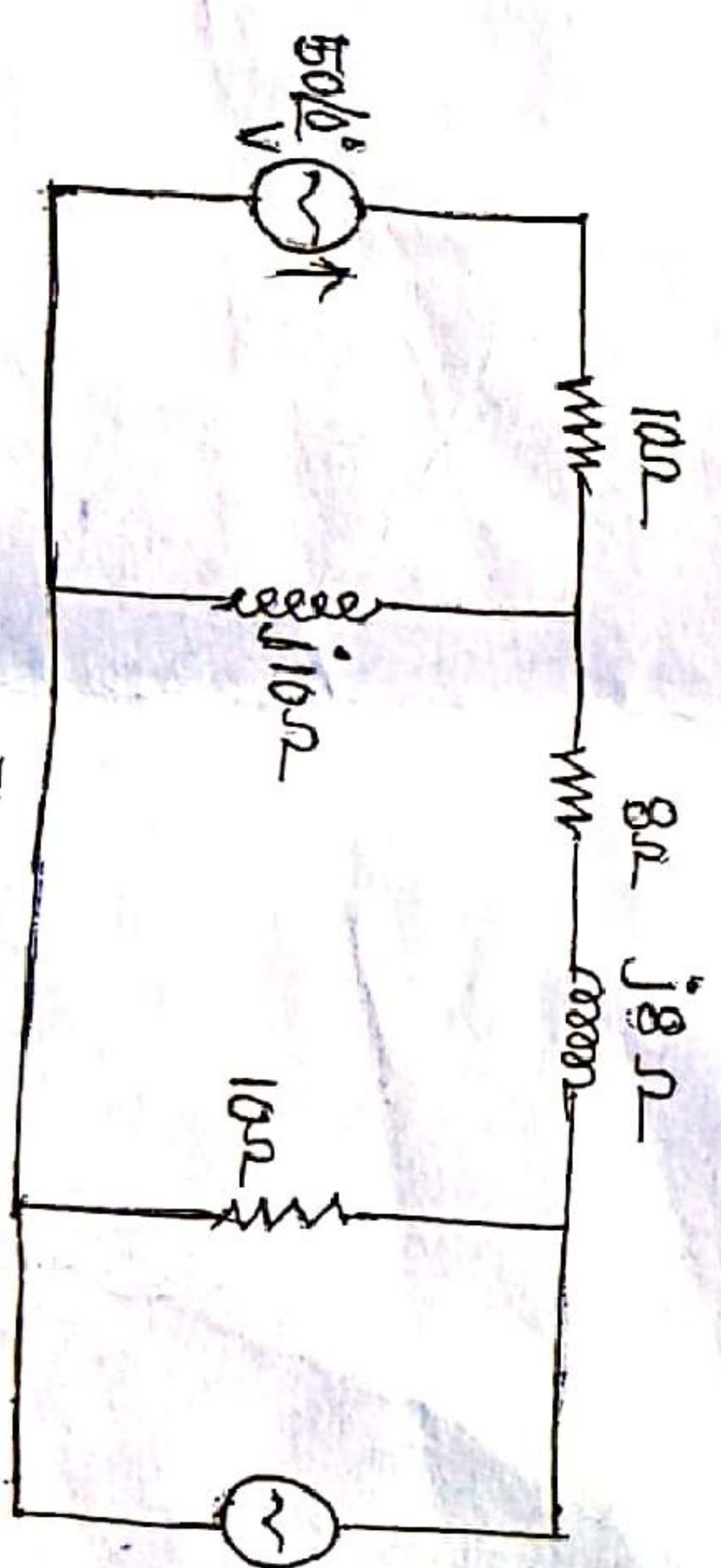Fig.-3

[(1+1)+(1+1)+5)]=10

3. (A). State and prove Compensation theorem.

(B). Using classical method of solution of differential equation, find the value of $v_c(t)$ for $t > 0$ in the circuit shown in Fig.-4. Assume initial condition $v_c(0) = 9V$
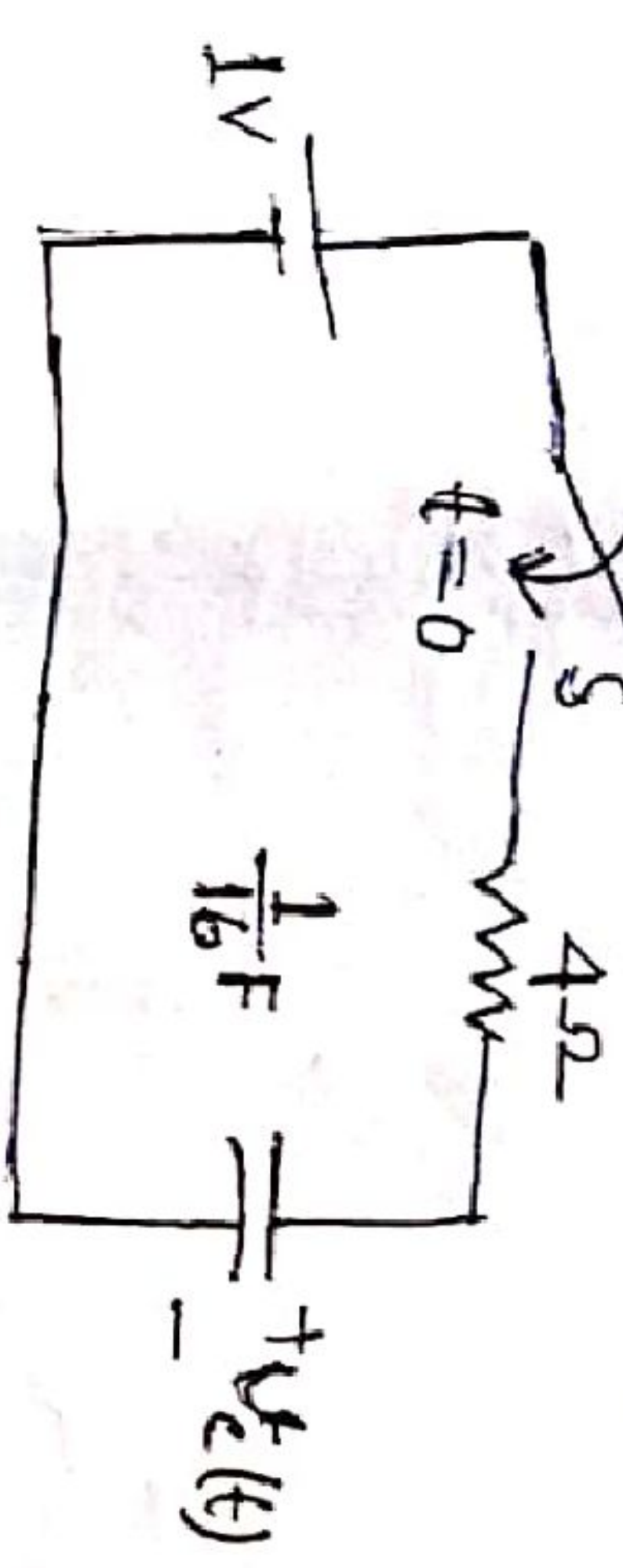
Fig.-4

[5+5]=10

4.(A). State Tellegen's theorem.

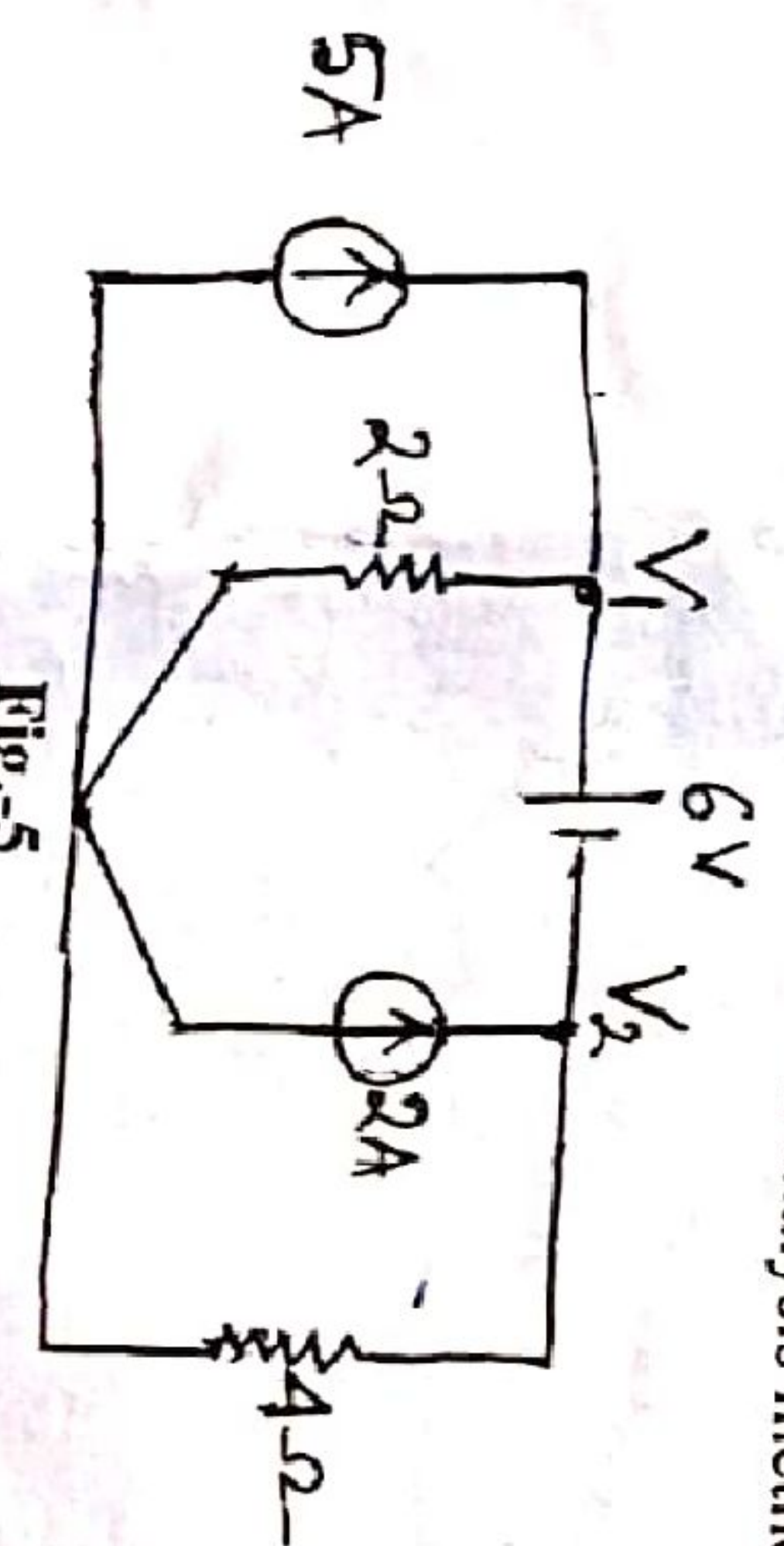(B). Find V_1 and V_2 of the circuit shown in Fig.-5. Use Nodal analysis method.

Fig.-5

[5+5]=10

(C). An RLC series circuit is energized by a constant voltage source. Discuss the conditions of under damping, critical damping and over damping of the current transient in the circuit. Sketch the current waveforms.

5.(A). What are initial conditions in the network analysis?

(B). For the network shown in Fig.-6, K is closed at $t = 0$ with zero initial current in the inductor.
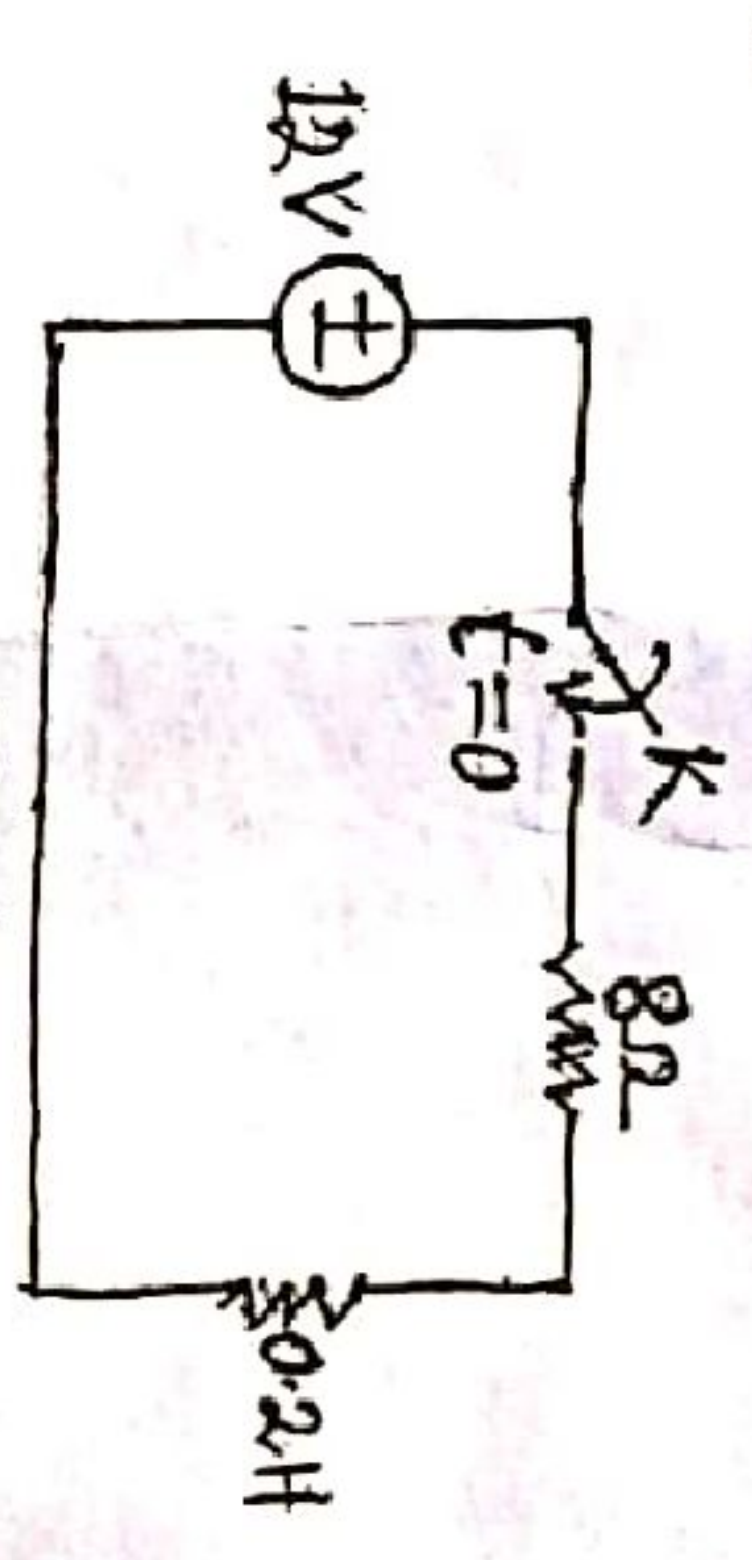Find the values of i, $\dfrac{di}{dt}$ at $t = 0^+$

Fig.-6

[2+4+4]=10

6. Draw the oriented graph of the network as shown in Fig.-7.The numerical values of resistances indicate the branch numbers. Selecting 2,3, 5 as tree element, find tie-set matrix and cut-set matrix.
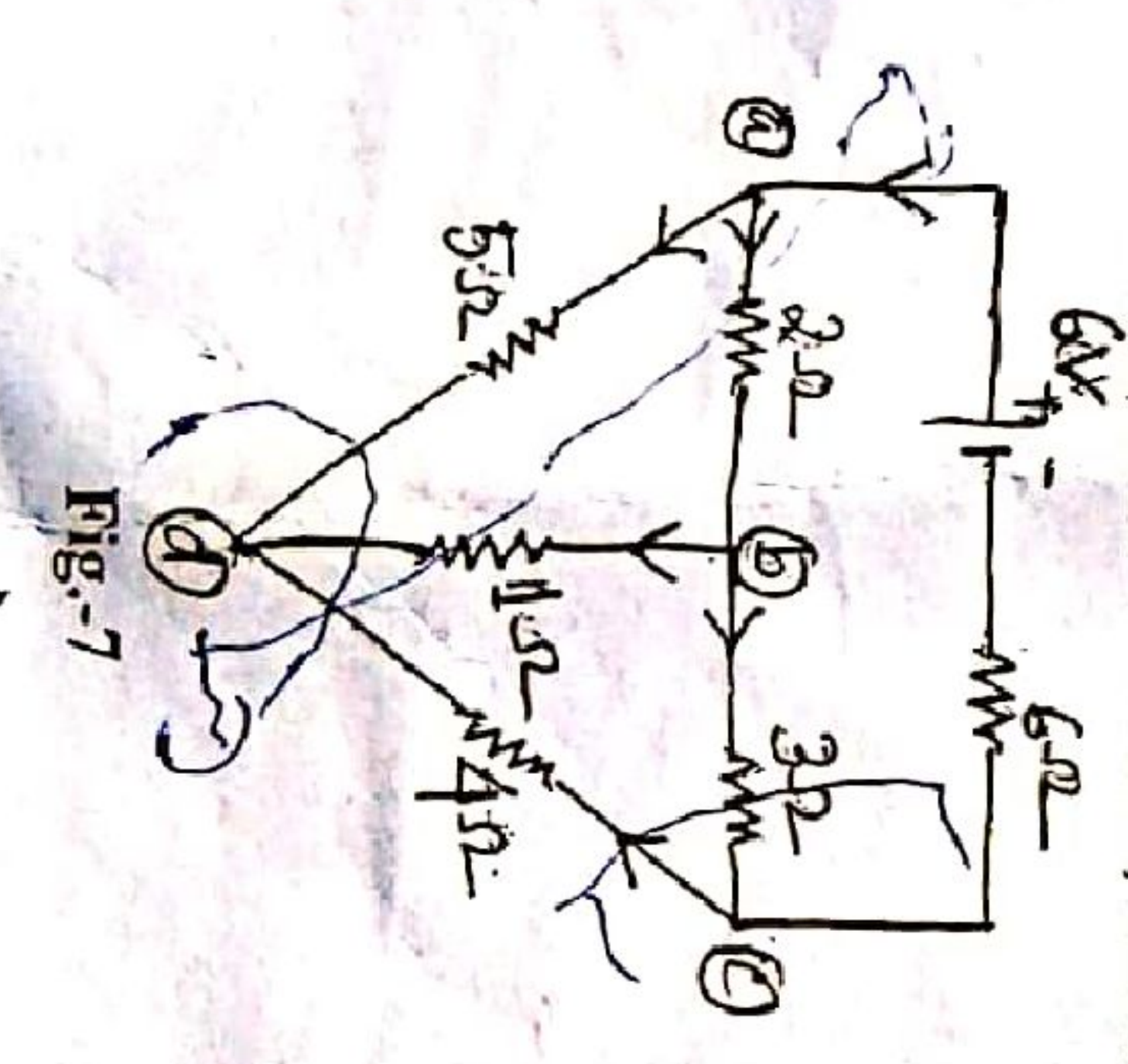
Fig.-7

[1 +2+7]=10

6.(A) Show that current through inductor just before switching = just after switching.

(B) Differentiate the terms 'Tie set (f-Circuit)' and 'Cut set (f-Cut set)' related to a linear graph.

(C) Find the Thevenin equivalent circuit and Norton Equivalent circuit for the network as shown in Fig.-8.
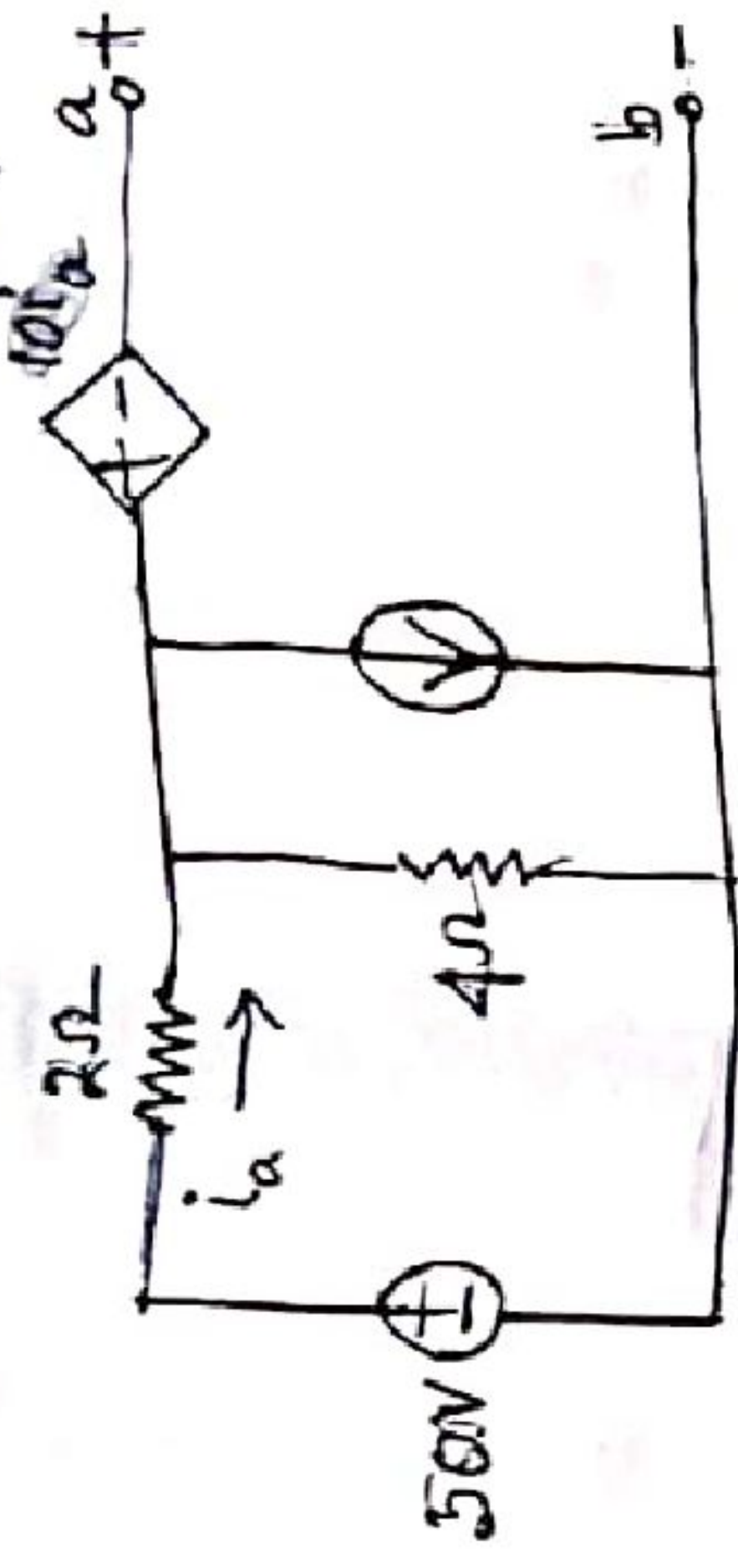

Fig.-8

[2+(3+3)]=10

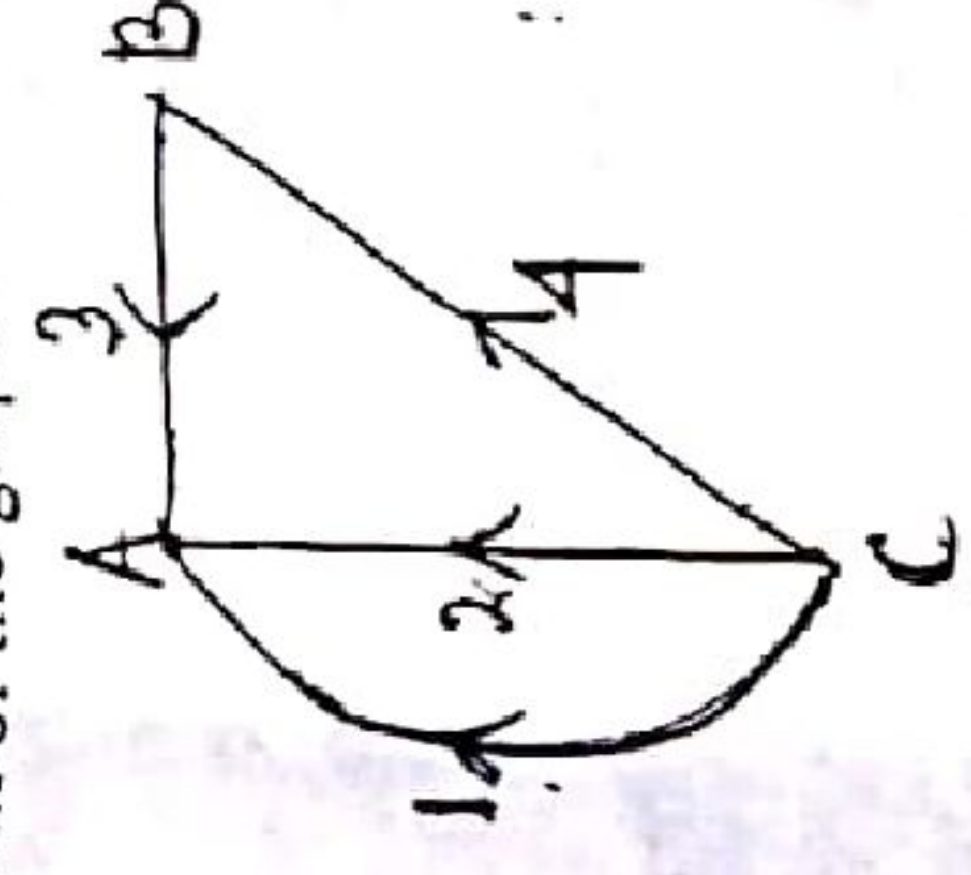7.(A) Find the Complete Incidence Matrix of the graph as shown in Fig.-9.

Fig.-9

(B) Find the value of Z_L to be connected between the terminals A-B (Fig.-10) for Maximum Power Transfer.
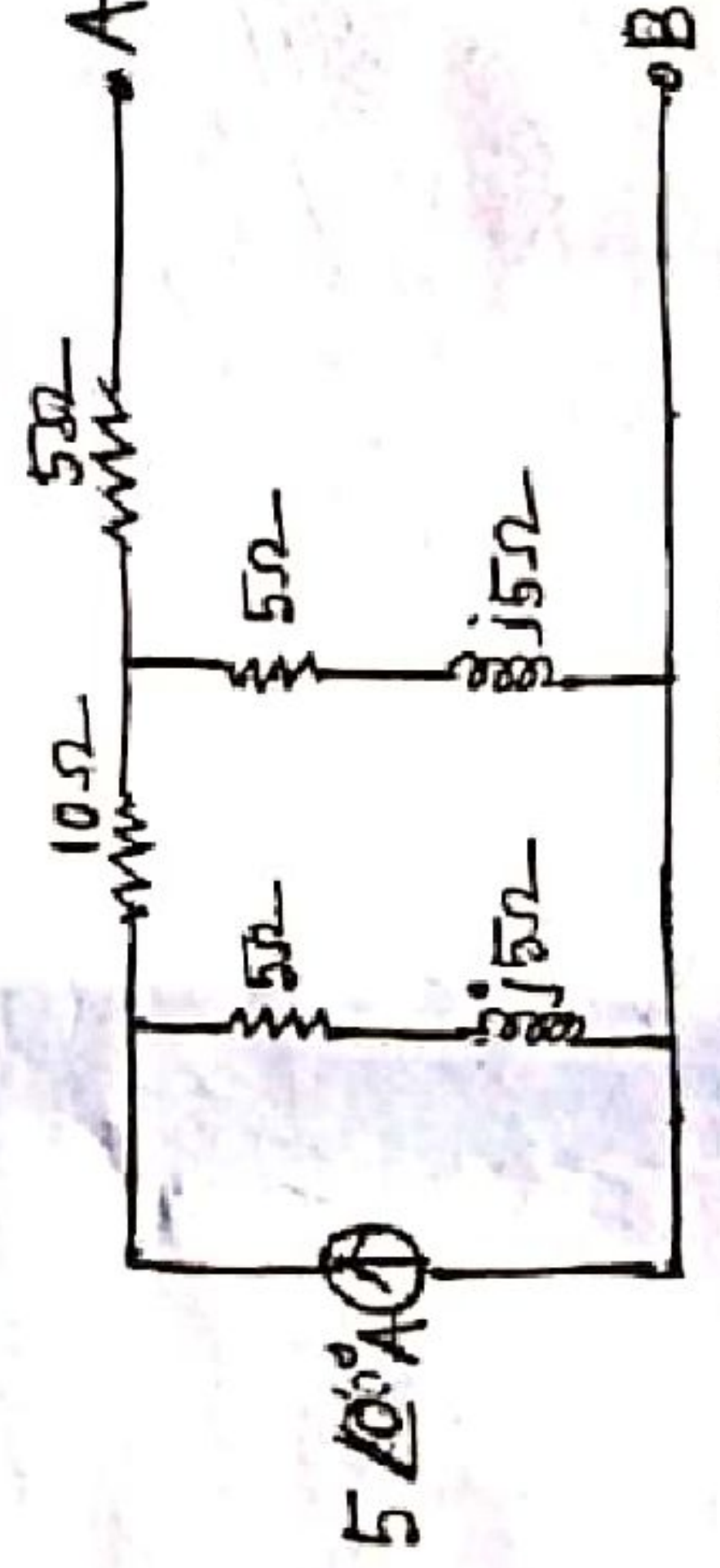

Fig.-10

(C) Calculate the current through the capacitor by Superposition theorem for the circuit shown in Fig.-11
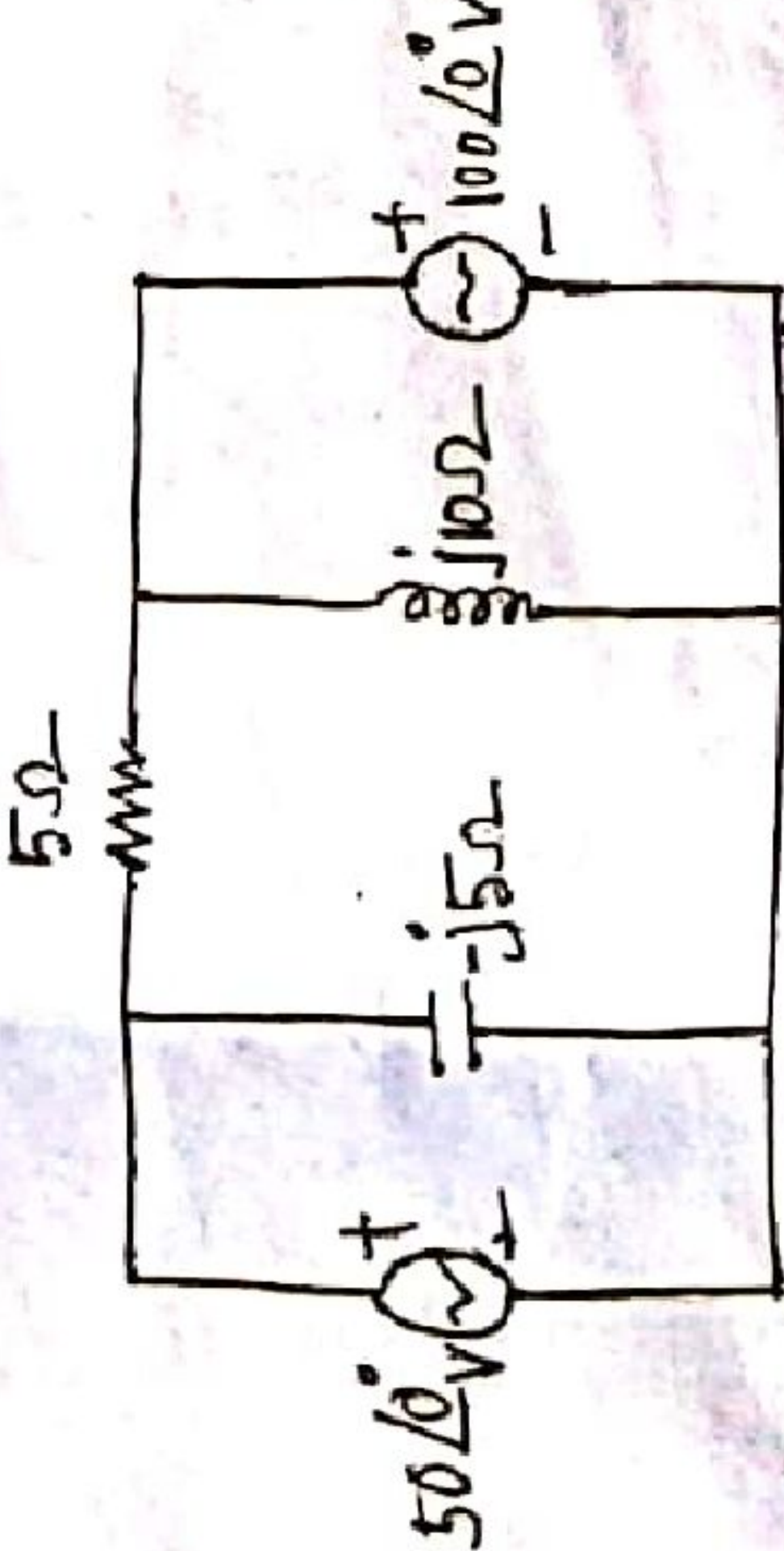

Fig.-11

[4+3+4]=10