

GATE 2024

PREMIUM QUESTIONS



कक्षा



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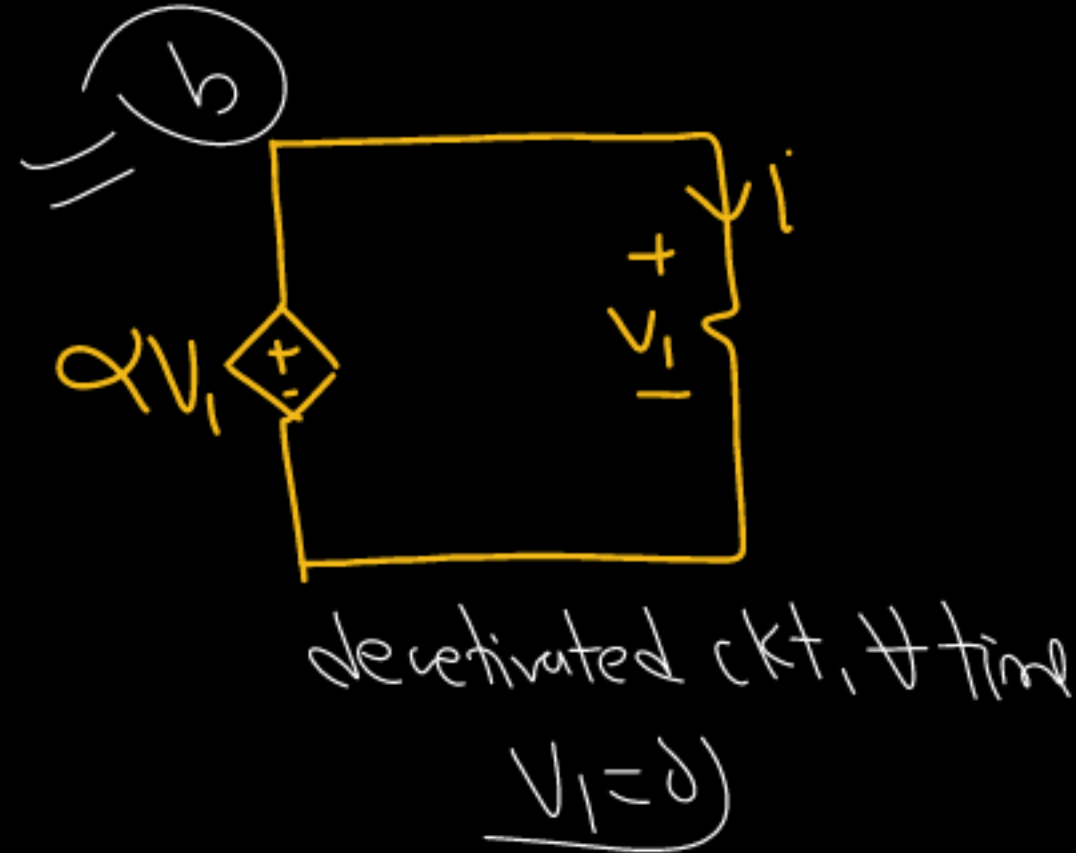
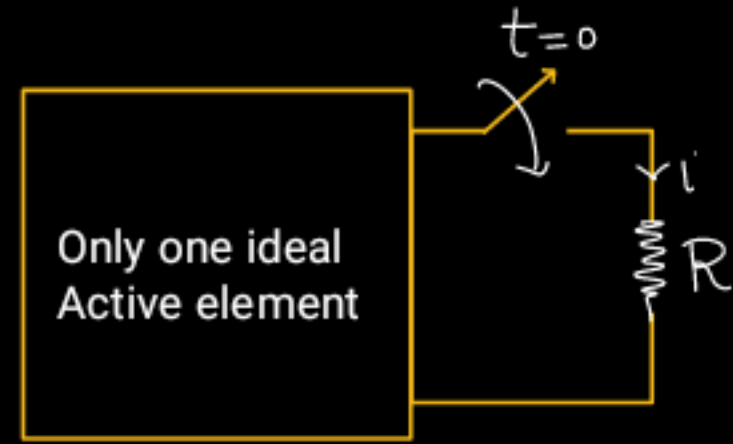
AIR 03 ME KUSHAGRA DUTT	AIR 05 PI HARSHIT KUMAR	AIR 07 ME RUSHI PRADIPKUMAR KARINA	AIR 11 CE VINEET JAIN	AIR 30 CE RITIK BANSAL	AIR 36 ECE SUHIT KUMAR
AIR 64 CE UTKARSH MISHRA	AIR 71 EE SOMESH SANIYAT PAWAR	AIR 76 CE DIPANKAR DAS	AIR 87 EC SURAJIT RABI DAS	AIR 91 EE RESHMI GUPTA	AIR 111 ES ANIL GUPTA
AIR 130 EE SAURAV PATEL	AIR 136 CE RUPESH SACHDEVA	AIR 200 ECE WASIUZZAMA	AIR 212 IN WASIUZZAMA	AIR 217 ME VISHAL KUMAR	AIR 219 ME NITISH KUMAR
AIR 258 EE MANAV	AIR 348 EE AMAN NAMDEV	AIR 392 EE GALURAV MAHAJAN	AIR 403 EC NOHAN KUMAR SINGH	AIR 567 EE SHANKAR JHA	AIR 571 ME VU MEER



Ex1 (msQ).

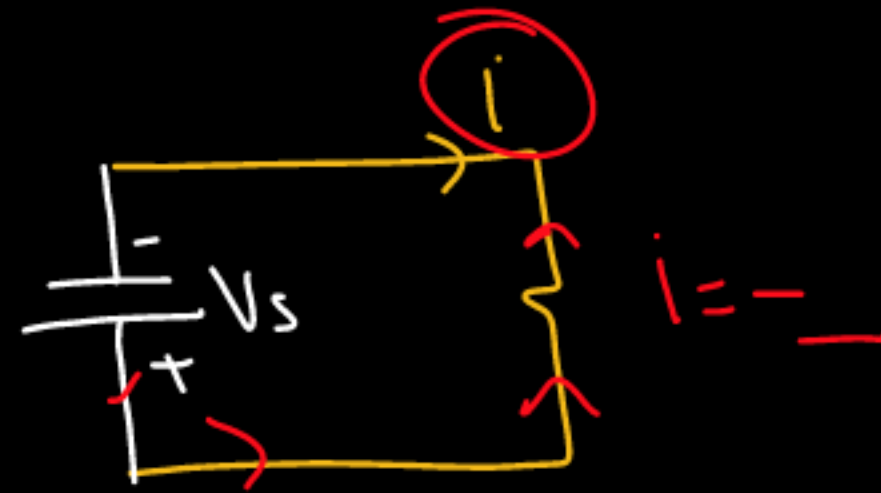
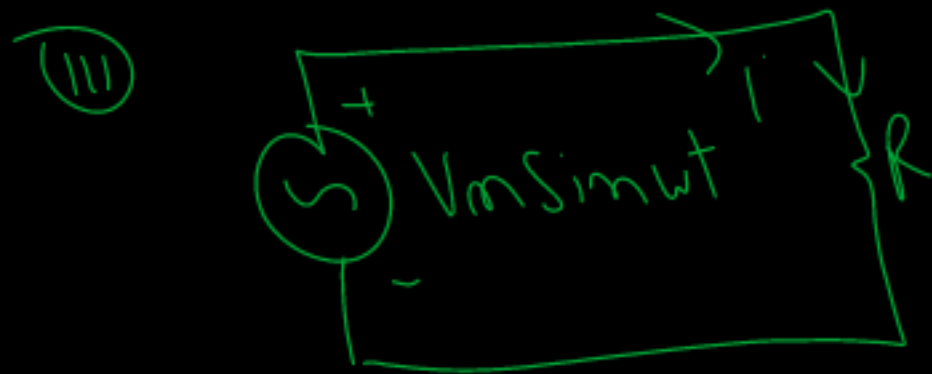
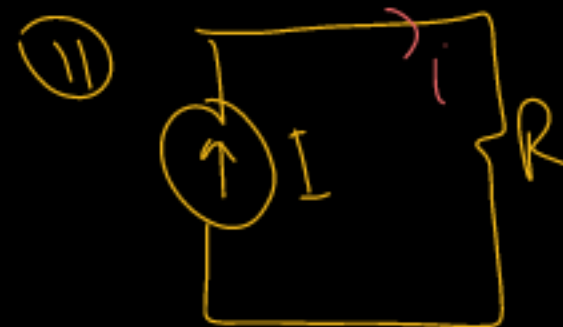
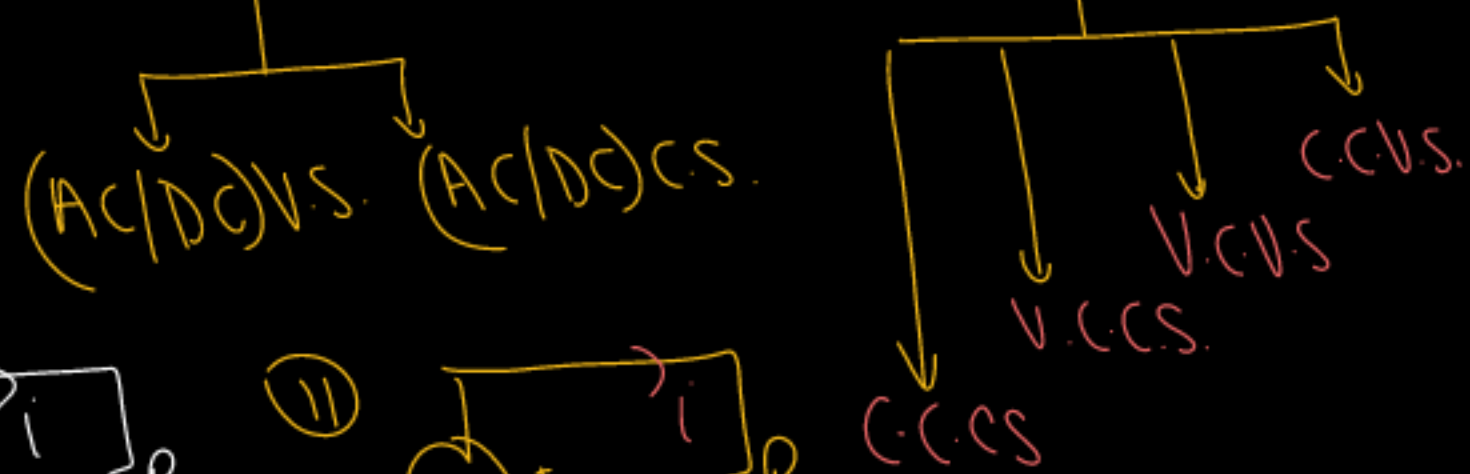
The Current "i" in the circuit can be ; For $t \geq 0$.

- ✓ A) 10 A ✓
- ✓ B) 0 A
- ✓ C) -10 A
- ✓ D) 10 Sinwt A



Solnⁿ ⇒ two Active elements are here.

① Independent A.E. ② Dependent A.E.

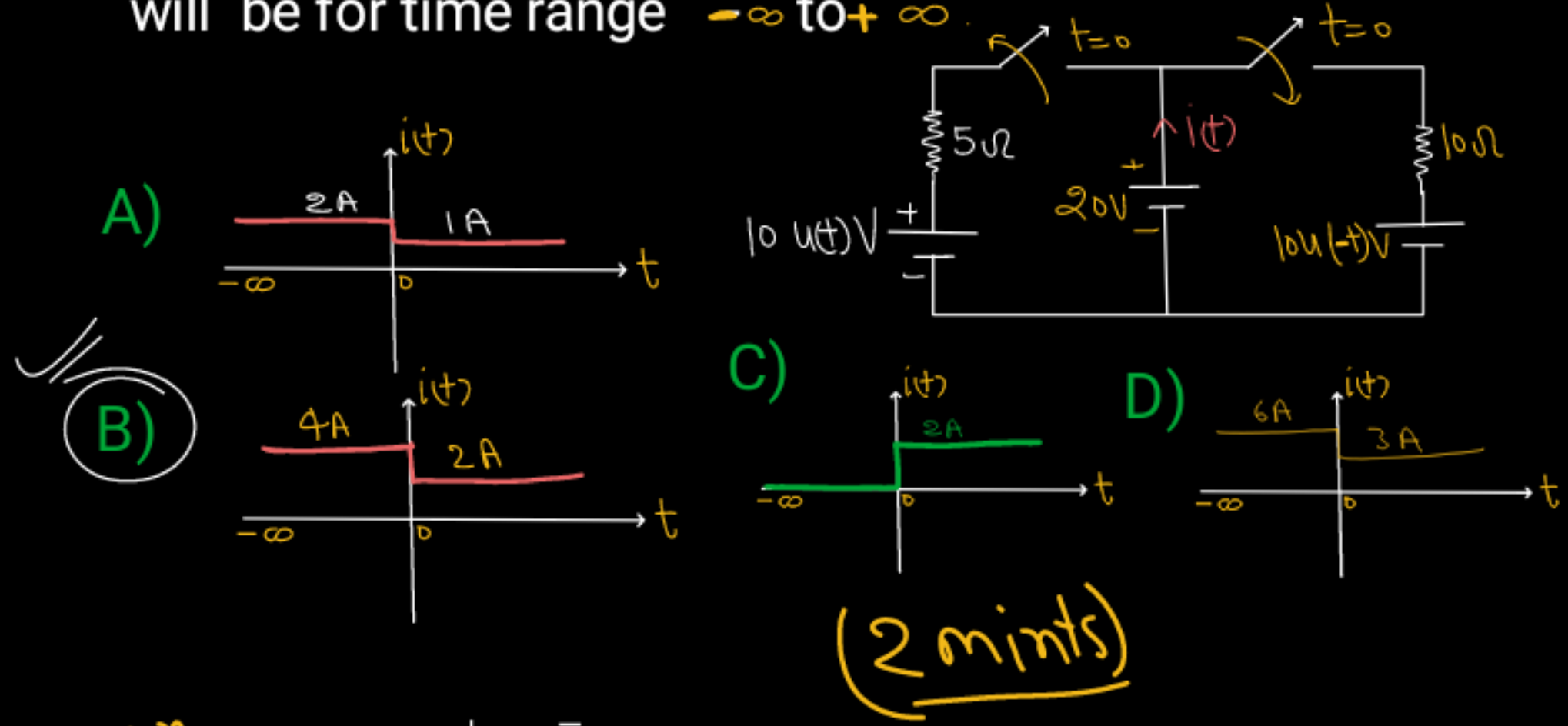


Ex2 (msQ)

Which of The following device will be unilateral

- ✓ A) Schottky diode
- ✓ B) General PN diode
- ✓ C) Zener Diode
- ✓ D) Tunnel diode

Ex3 The Response of Current " $i(t)$ " in the given circuit will be for time range $-\infty$ to $+\infty$.



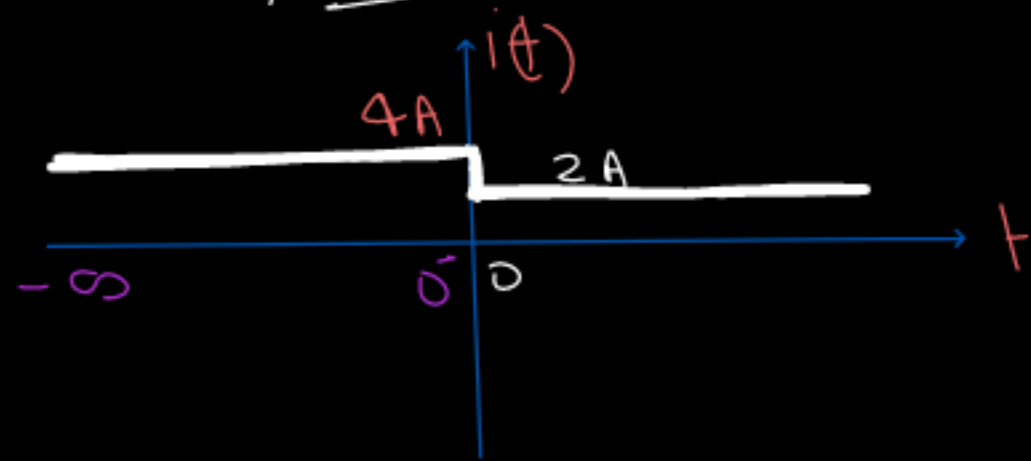
(2 mints)

Soluⁿ:- case ① $t \leq 0^-$

* $20V$, is active supply for the range of $-\infty$ to ∞ .

* $10u(t) = 10V, t > 0$
 $= 0V, t \leq 0^-$

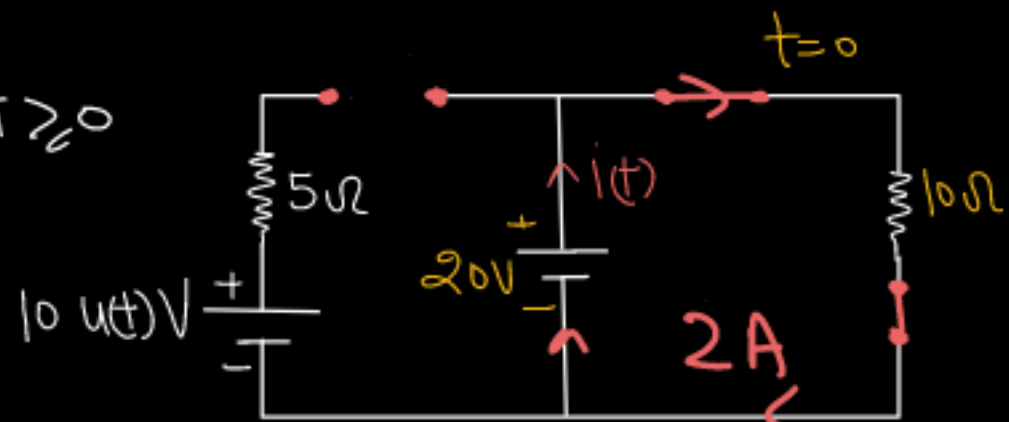
$10u(t) \text{ Volts} \rightarrow \text{S/C}, t \leq 0$



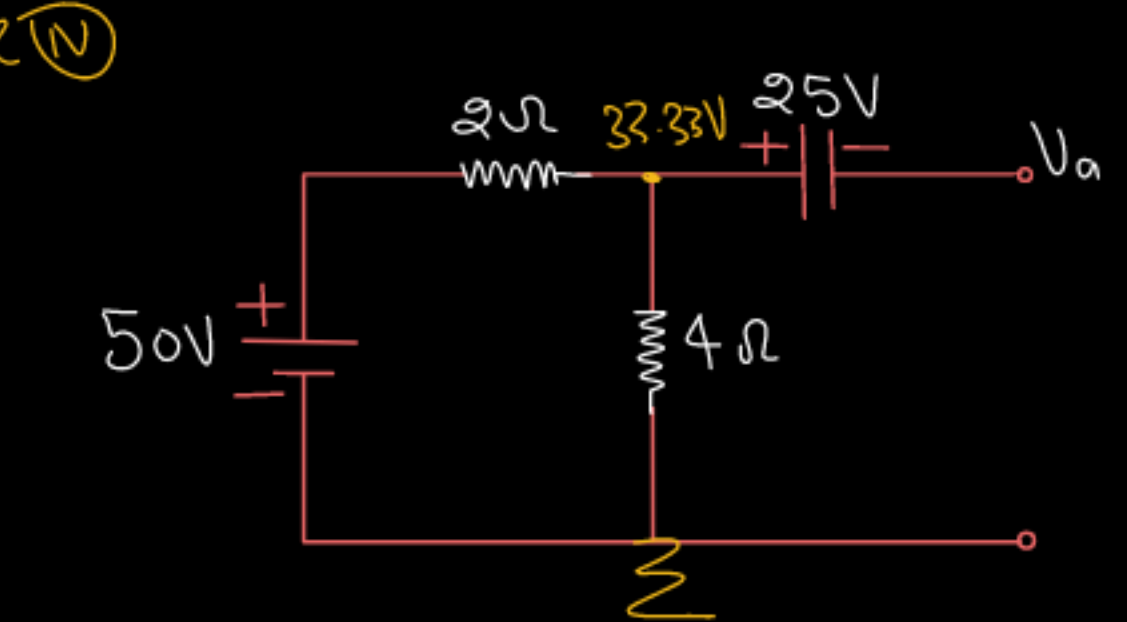
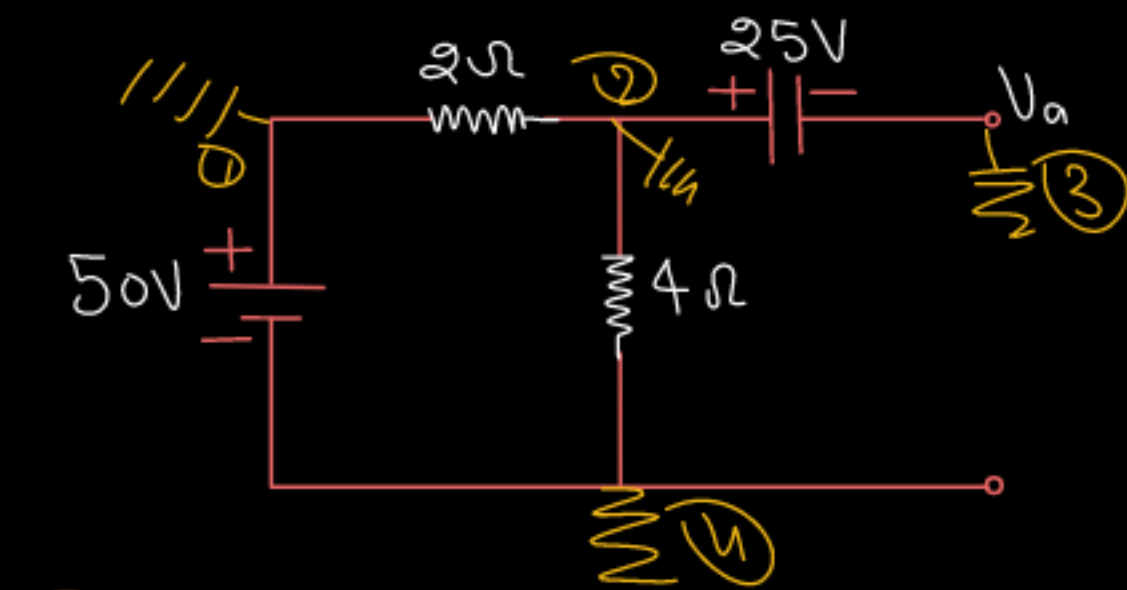
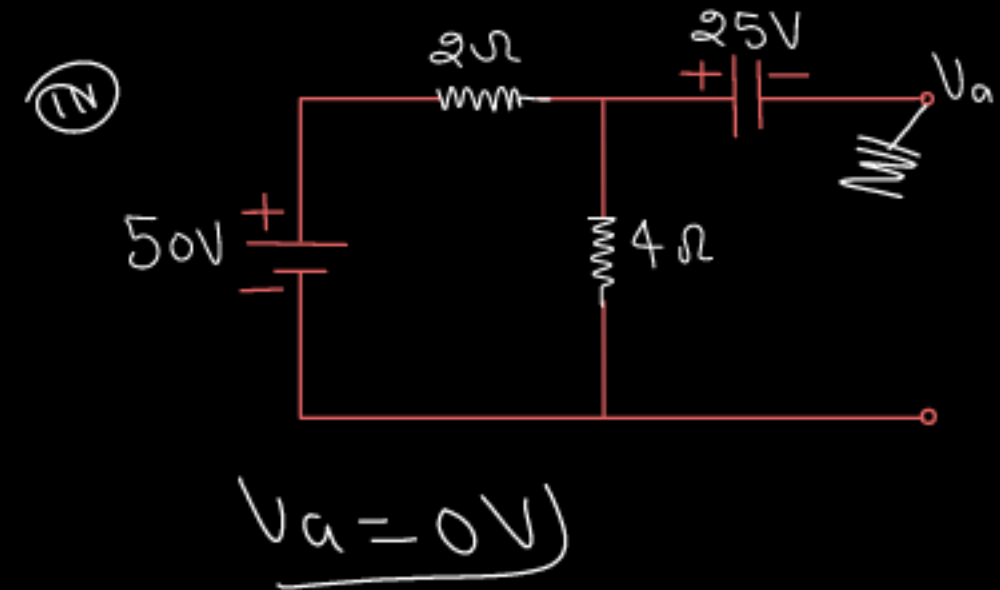
case ② $t > 0$

$10u(-t)V \rightarrow \text{S/C}, t > 0$

$i = 2A, t > 0$



$-25V, -41.67V, 0V, 8.33V$



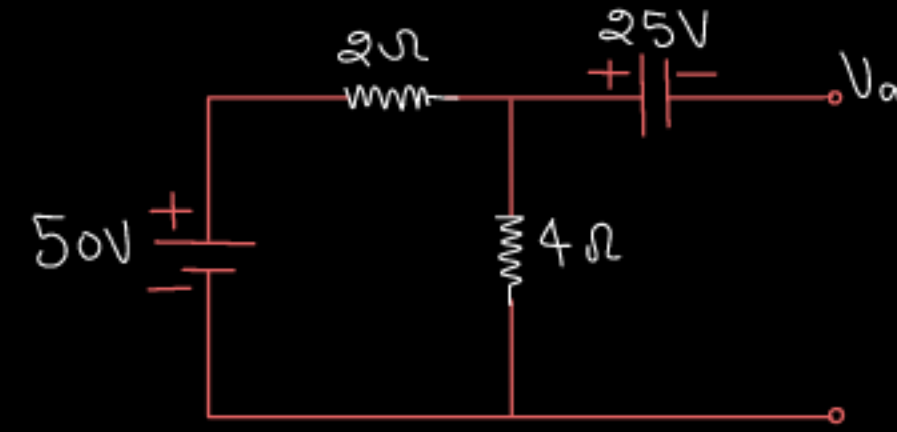
$$33.33 - V_a = 25$$

$$V_a = 8.33V$$

Ex 4

The node voltage "Va" in the circuit can be

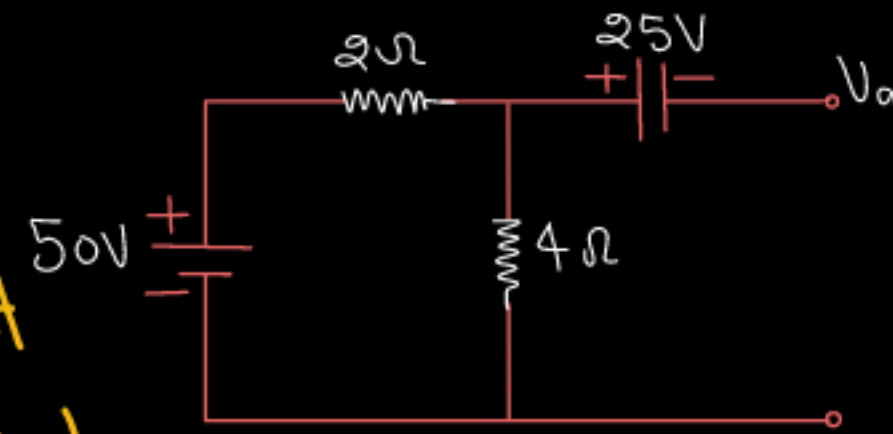
- A) 25 V
- B) 8.33 V
- C) -25 V
- D) -50 V



Soluⁿ: "to calculate node vol, ref. point is mandatory, but to calculate potential diff. ref. point is not mandatory"

* ref. point is not given in the ckt.

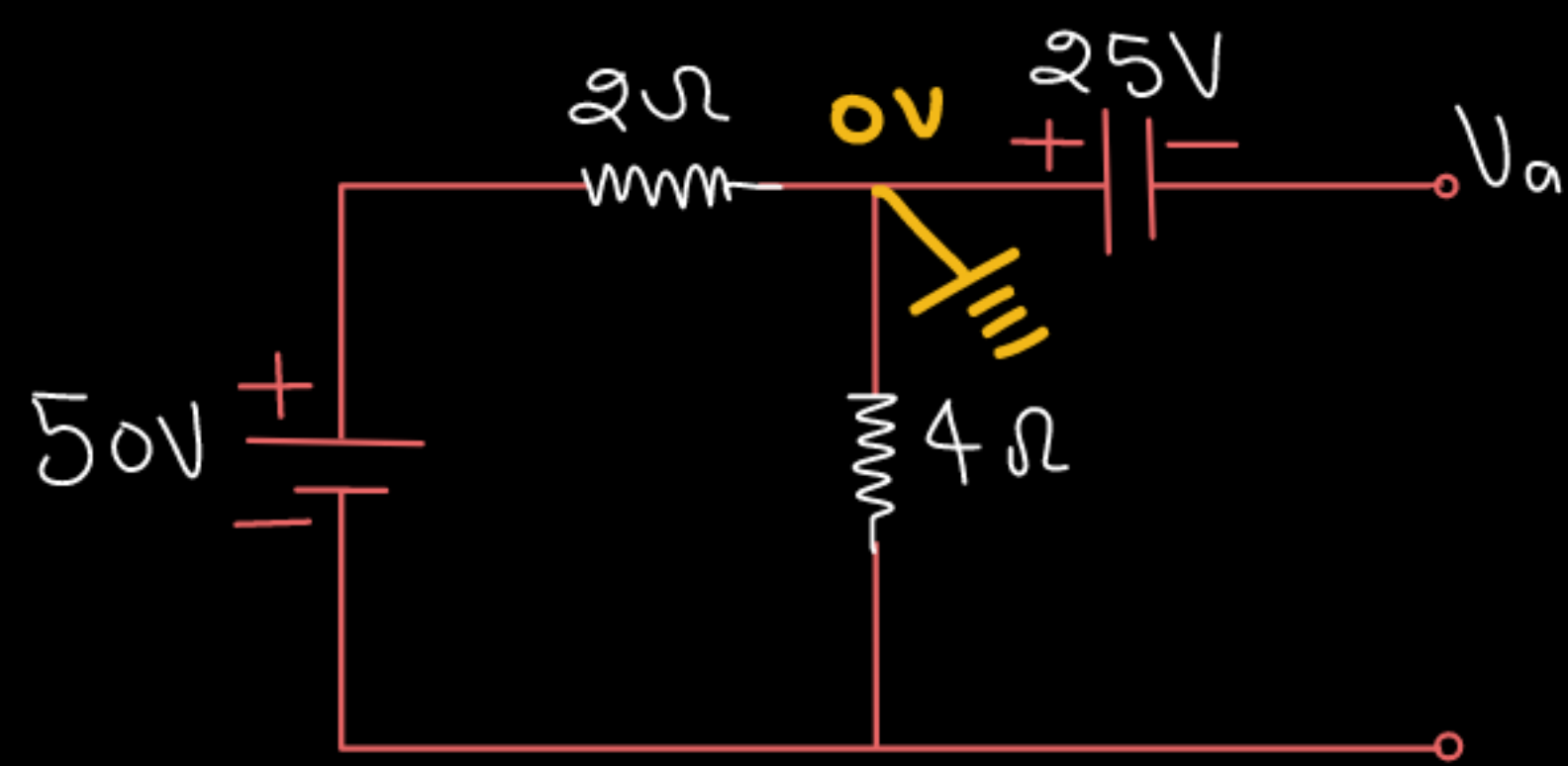
we know that, selection of ref. point will change node vol.



ex ①

$$0 - V_a = 25$$

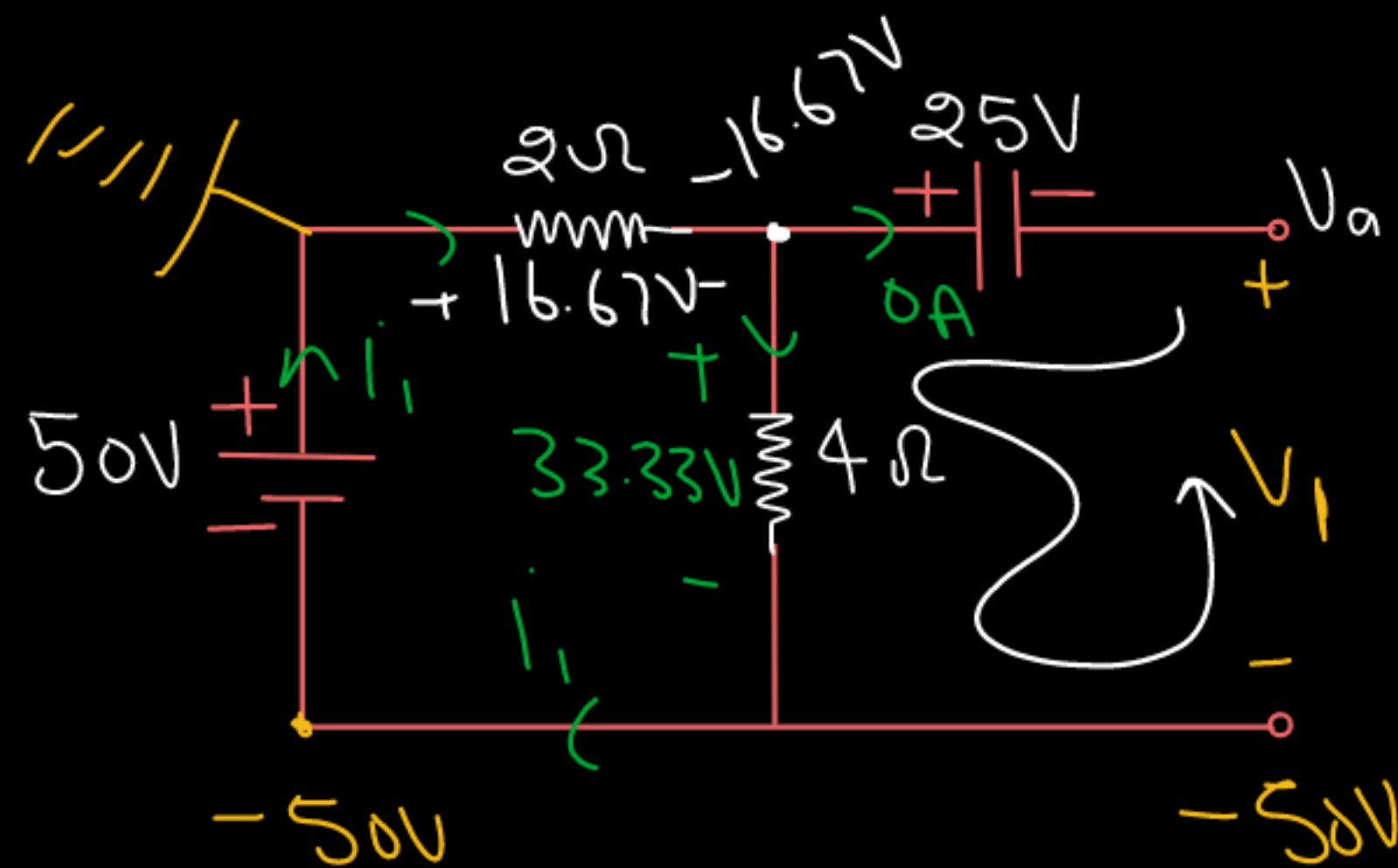
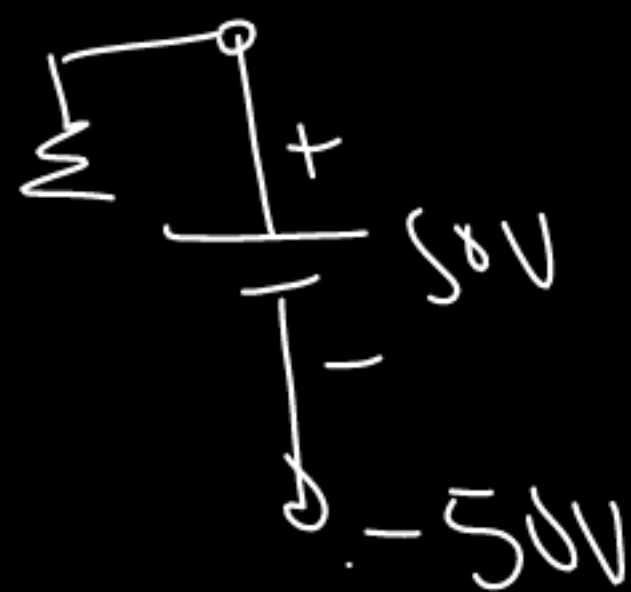
$$\therefore \underline{V_a = -25V}$$



ex ②

$$50 = 6i_1$$

$$i_1 = 8.33 \text{ Amp.}$$



$$\therefore -16.67 - V_a = 25$$

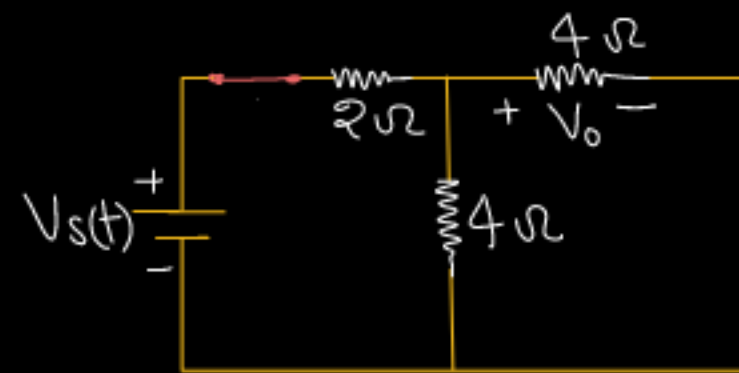
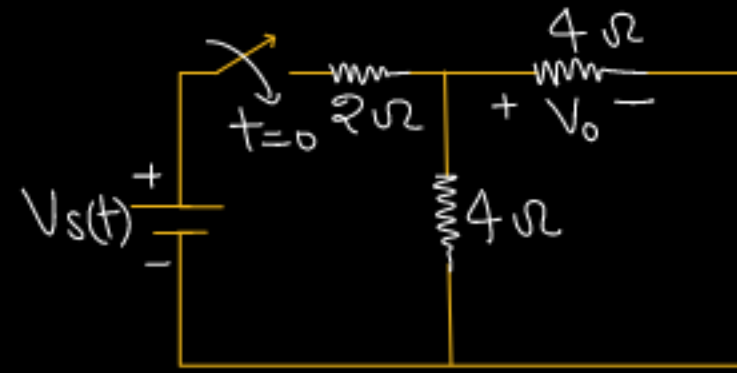
$$\underline{V_a = -41.67V}$$

Ex5 The power delivered by Voltage Source "Vs" in the circuit can be, if supply Voltage is

$$V_s(t) = (10 + 10u(t) + 10u(-t) + 10\sqrt{2} \sin t) \text{ Volts.}$$

- A) 100 W
- B) 225 W
- C) 400 W
- D) NOT**

Solnⁿ:-



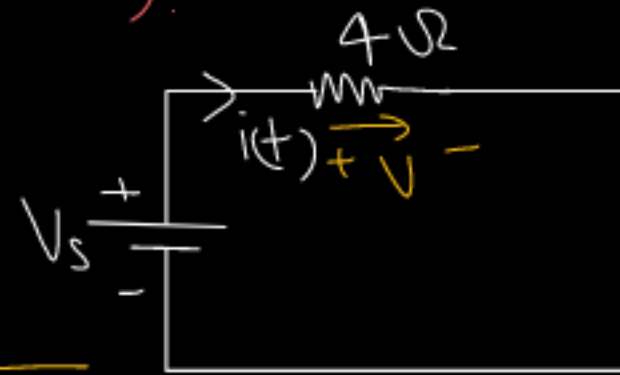
$$V_s(t) = (10 + 10u(t) + 10u(-t) + 10\sqrt{2} \sin t) \text{ Volts.}$$

$V_s(t)$; $t > 0$ will be.

$$V_s(t) = (10 + 10u(t) + 10\sqrt{2} \sin t) \text{ Volts.}$$

$$V_s(t) = (20 + 10\sqrt{2} \sin t)$$

$$P_{V_s} = P_{4\Omega} = \frac{V_s^2}{4}$$



$$\therefore V_s(t) = \sqrt{20^2 + 10^2}$$

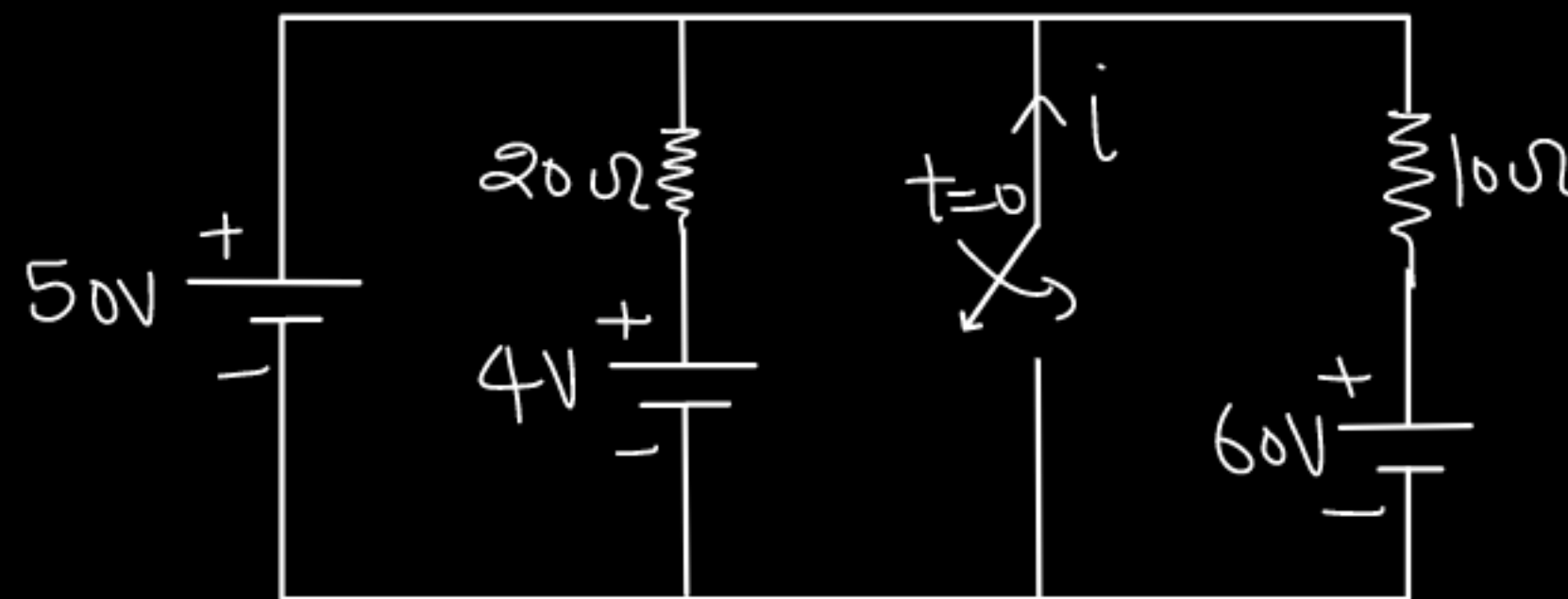
$$= \sqrt{400 + 100} = \sqrt{500} \text{ V.}$$

$$P_{4\Omega} = P_{V_s} = \frac{(\sqrt{500})^2}{4} = \frac{500}{4} = 125 \text{ W}$$

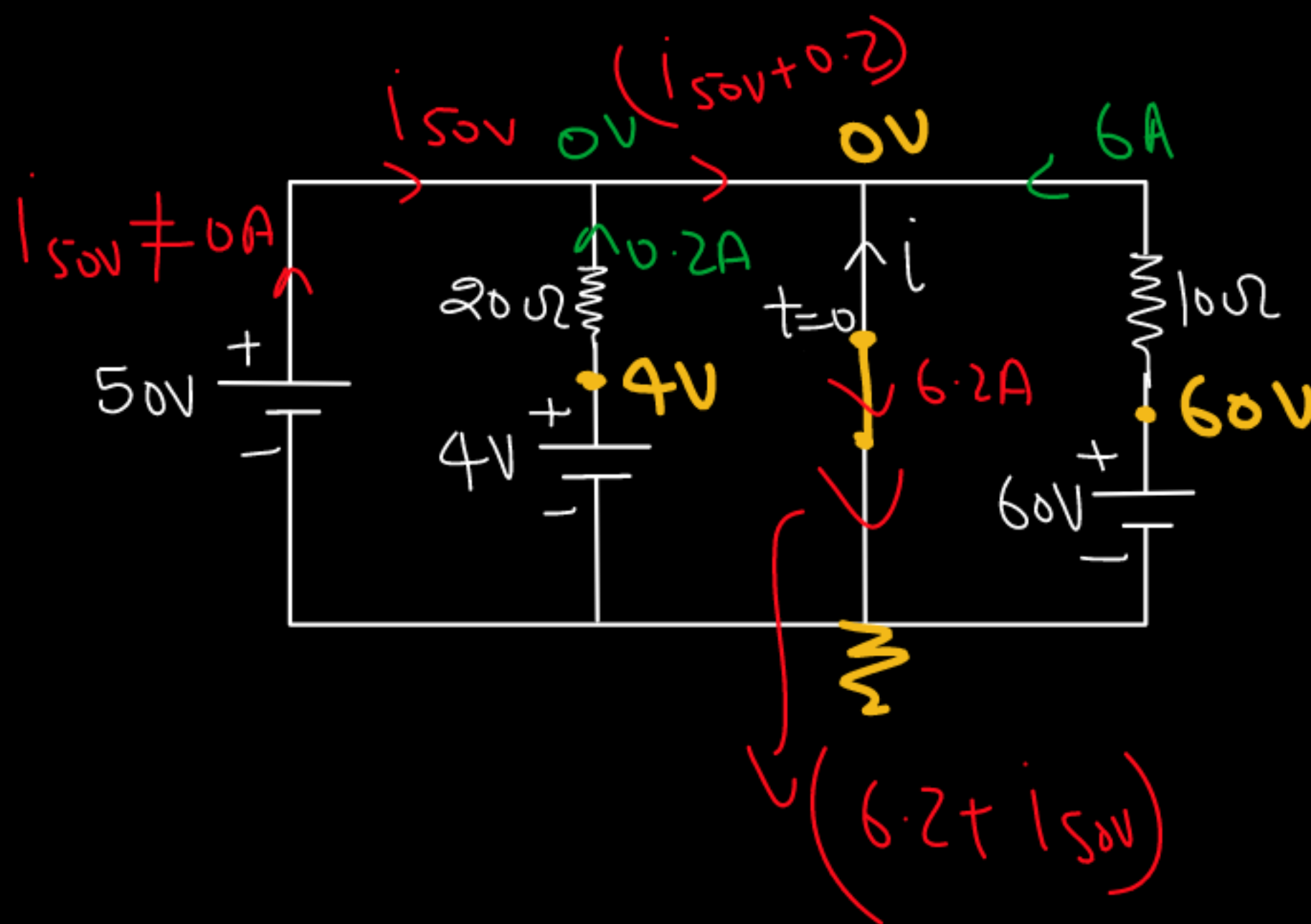
Ex6

The Current " i " in the circuit , after closing the switch , isAmp.

- A) 6.2 A ~~X~~
- B) -6.2 A ~~X~~
- C) greater than 6.2 A
- D) 5.8 A

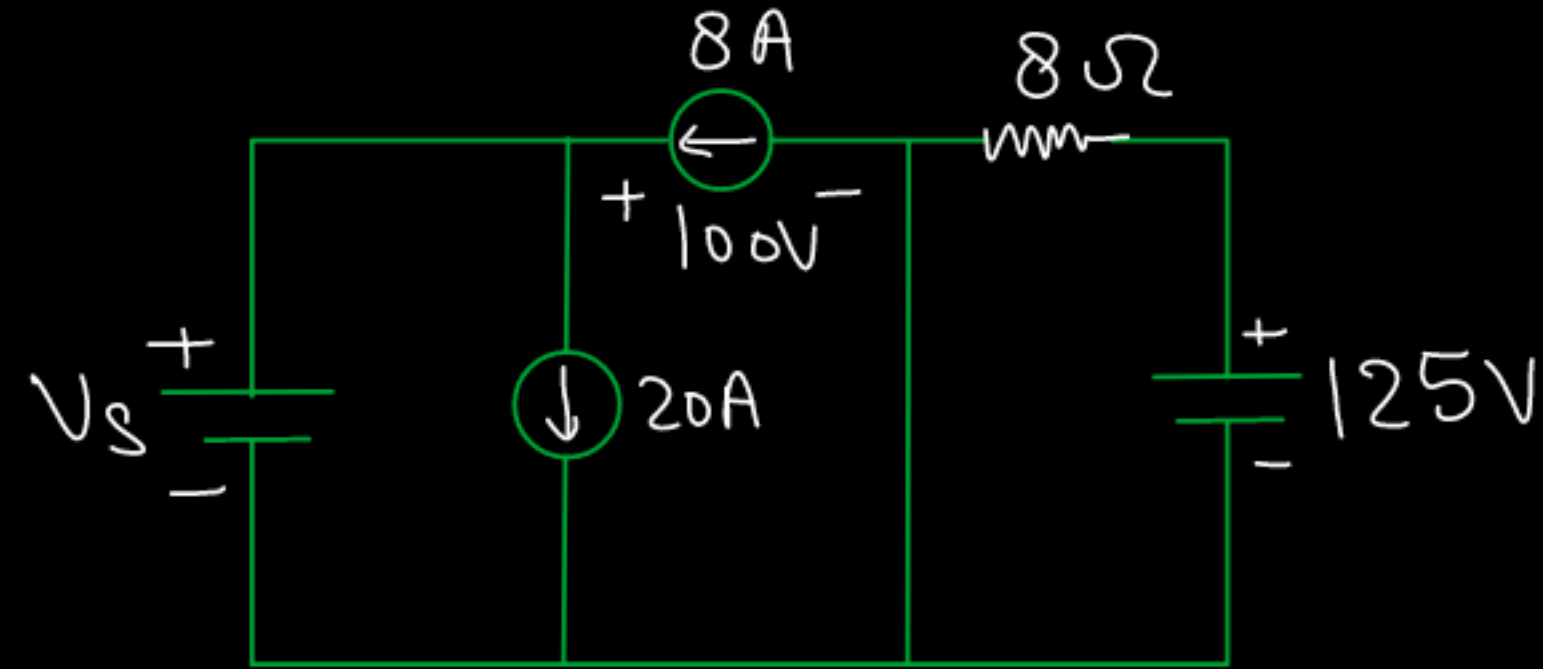


Solution: $+ \geq 0$



Ex -7 (N.A.T).

The power delivered by voltage Source "Vs" in the circuit will beWatts



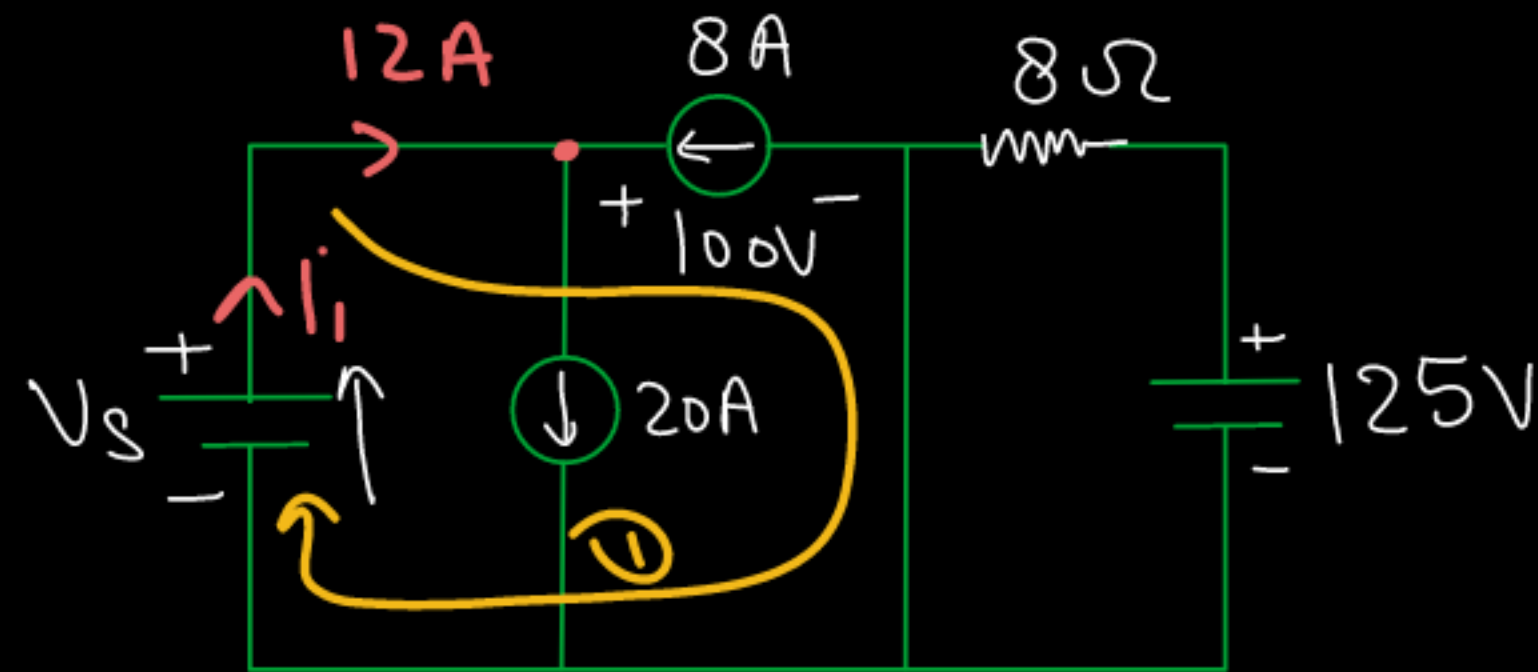
Soln° Power of V.S. (Vs) will.

$$P_{Vs} = (V_s \times i_i) W$$

$$= 100 \times 12$$

$$= \underline{1200 W}$$

$\frac{P}{W}$
Ans



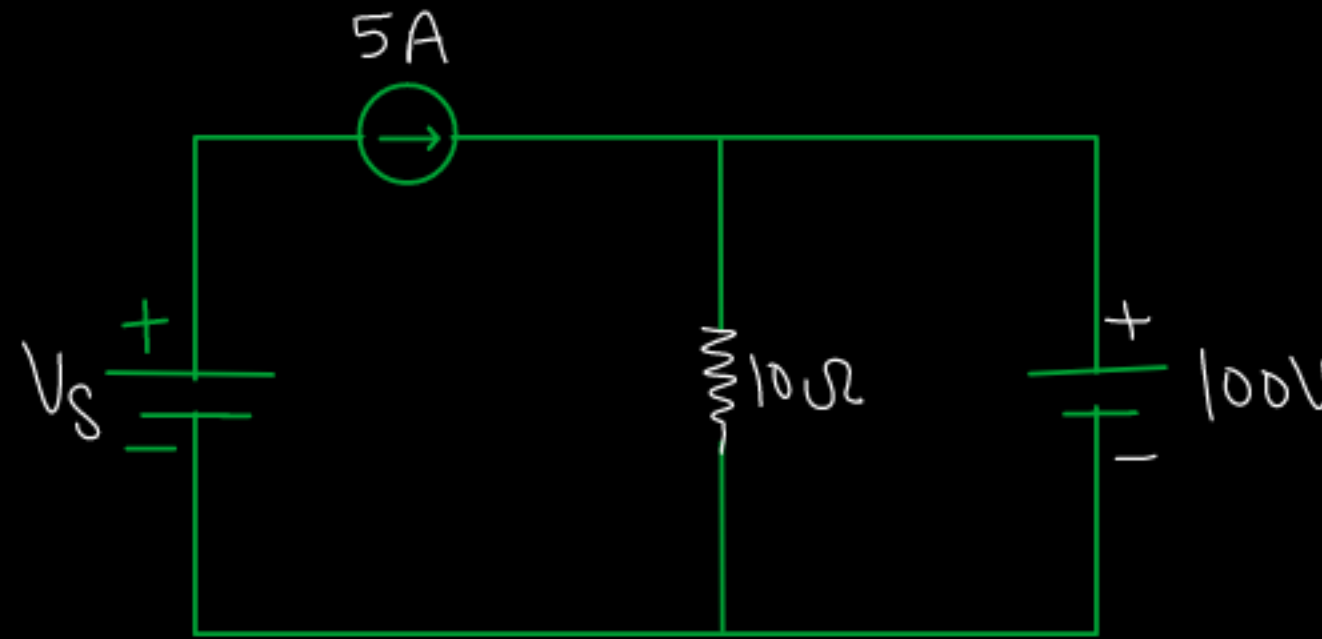
KVL in loop - 1.

$$-V_s + 100 = 0$$

$$\underline{V_s = 100V}$$

Ex8 Which of the following statement will be correct for given circuit ..

- ✓ **A)** 5A Current Source will deliver power
- ✓ **B)** 5A Current Source will absorb power
- ✗ **C)** 100 V Voltage Source will absorb power
- ✗ **D)** V_s will be 100V.

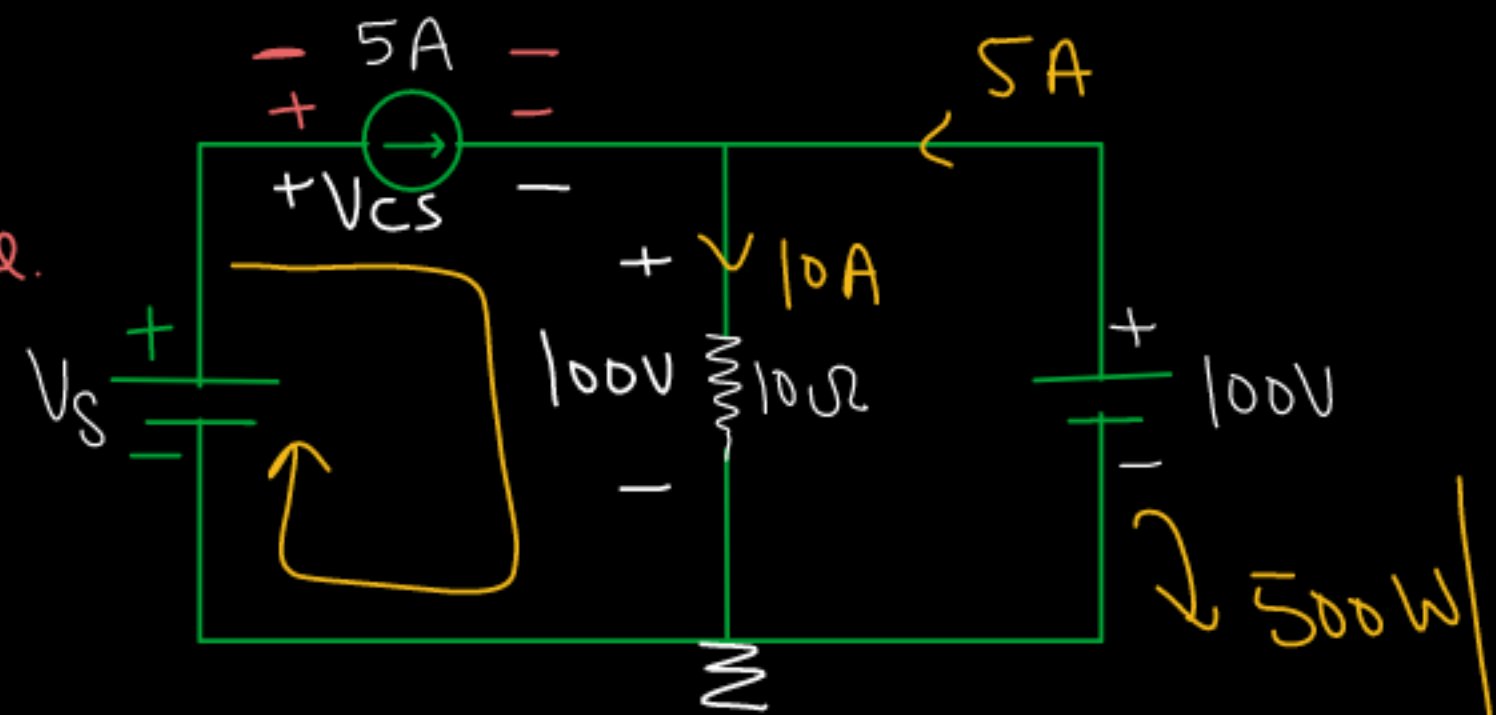


Solnⁿ :-

* $V_{cs} \rightarrow$ unknown value.

$$V_{cs} > 0V$$

$$\underline{V_{cs} < 0V}$$



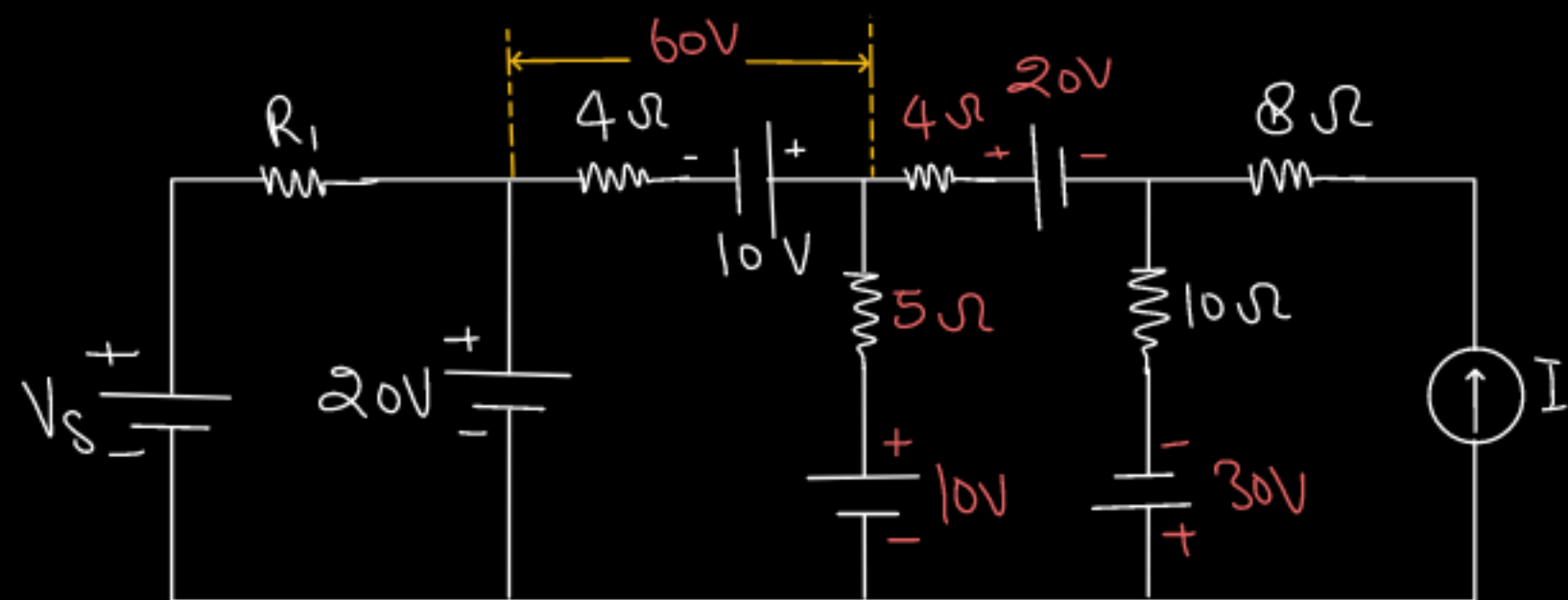
$$\# -V_s + V_{cs} + 100 = 0$$

$$(V_s = (V_{cs} + 100))$$

So, $V_s \rightarrow$ we can't determine

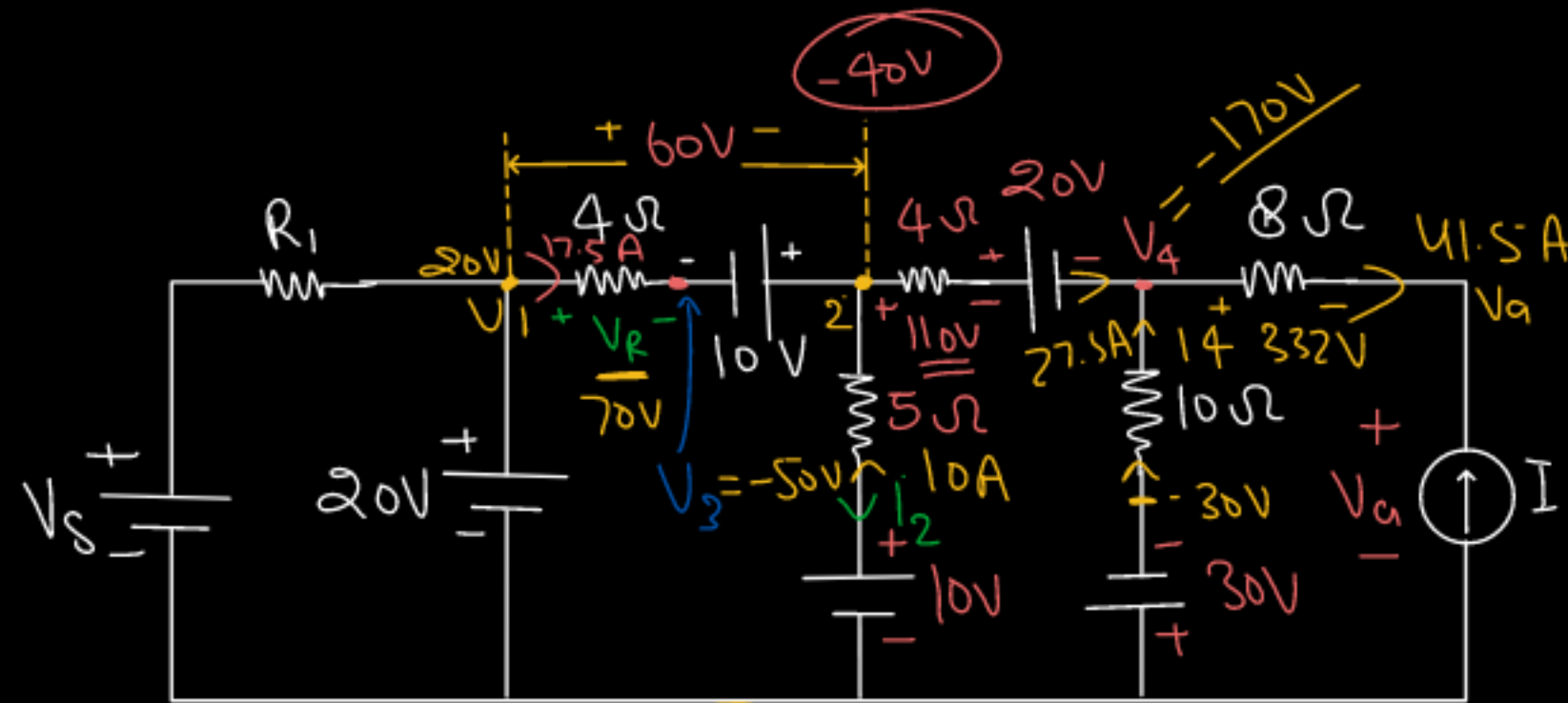
Ex-9

Power delivered by Current Source is



Solution

$P_{cs} = (V_a \times I)$



Potential diff in b/w points '1' and '2'

$$V_3 - (-40) = -10$$

$$V_3 = -50V$$

$$V_1 - V_3 = V_R$$

$$20 - (-50) = V_R$$

$$\therefore V_R = 70V$$

$$V_1 - V_2 = 60 = V_R - 10$$

$$V_1 = 20V$$

$$V_2 = ?$$

$$V_1 - V_2 = 60$$

$$20 - V_2 = 60$$

$$-V_2 = 40 \therefore V_2 = -40V$$

$$-170 - V_a = 332$$

$$\therefore V_a = -502V$$

$$-40 - 0 = 5I_2 + 10$$

$$-50 = 5I_2$$

$$\therefore I_2 = -10Amp$$

$$-40 - V_4 = 110 + 20$$

$$-170 - V_4 = 0$$

$$\therefore V_4 = -170V$$

$$P_{cs} = -502 \times -41.5$$

$$P_{cs} = 20833W$$

$$\underline{\underline{del. = 20.83kW}}$$

Ex-10

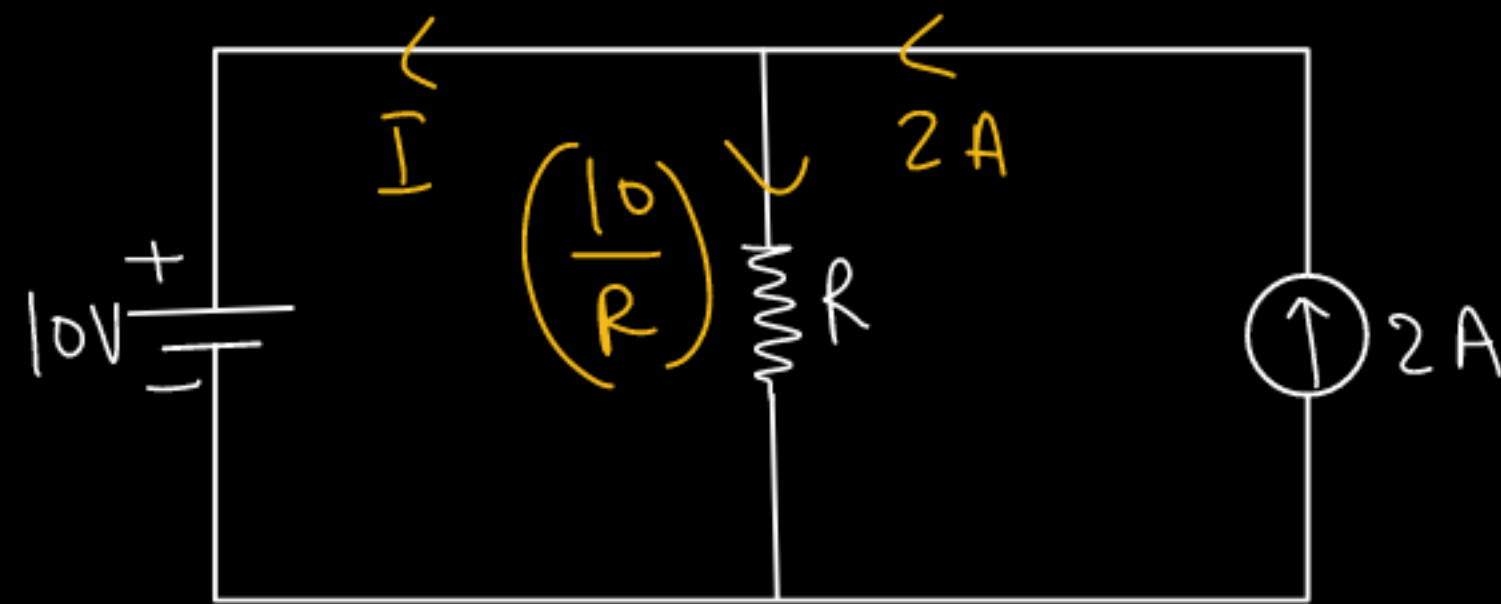
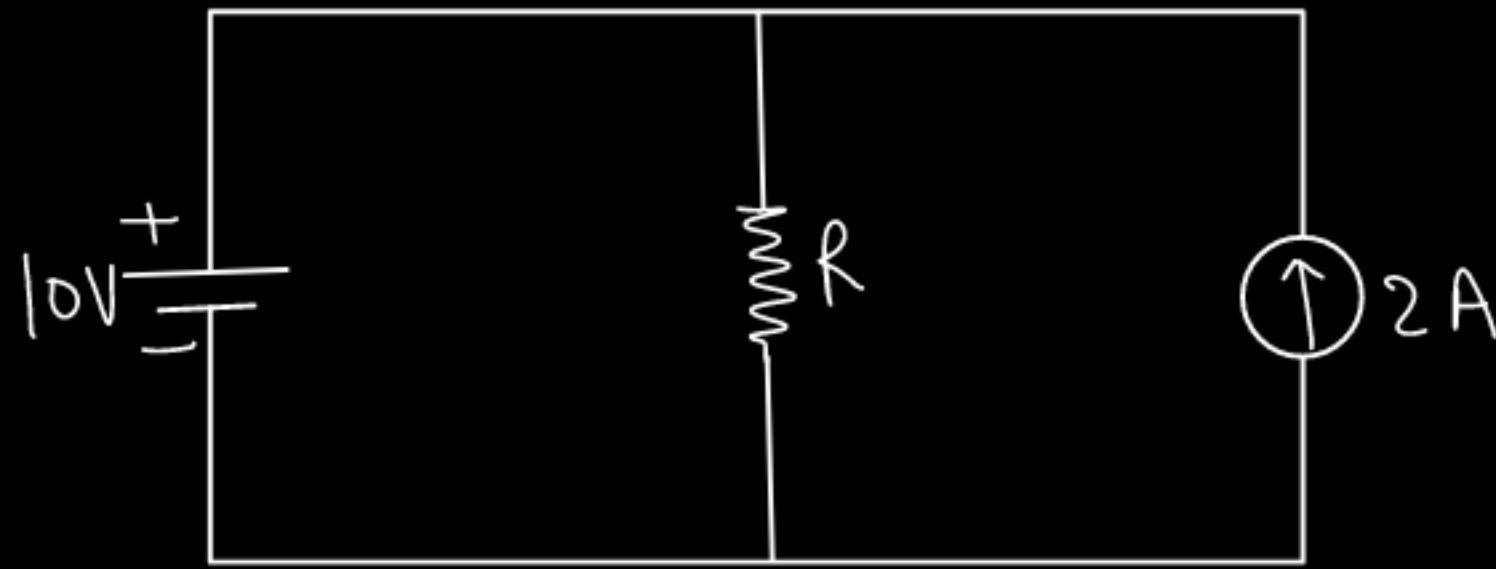
For what value of resistance, only current Source will deliver power

A) $R > 5\Omega$

B) $R \geq 5\Omega$

C) $R \leq 5\Omega$

D) $R = 1\Omega$



Soln needed \rightarrow

$$\underline{I > 0}$$

$$\text{i.e. } 2 > \left(\frac{10}{R}\right)$$

$$\therefore (R > 5\Omega)$$

Ex-11

Current through 8 ohm resistance isAmp.
The VI Characteristics of all Sources is shown
in figure below

