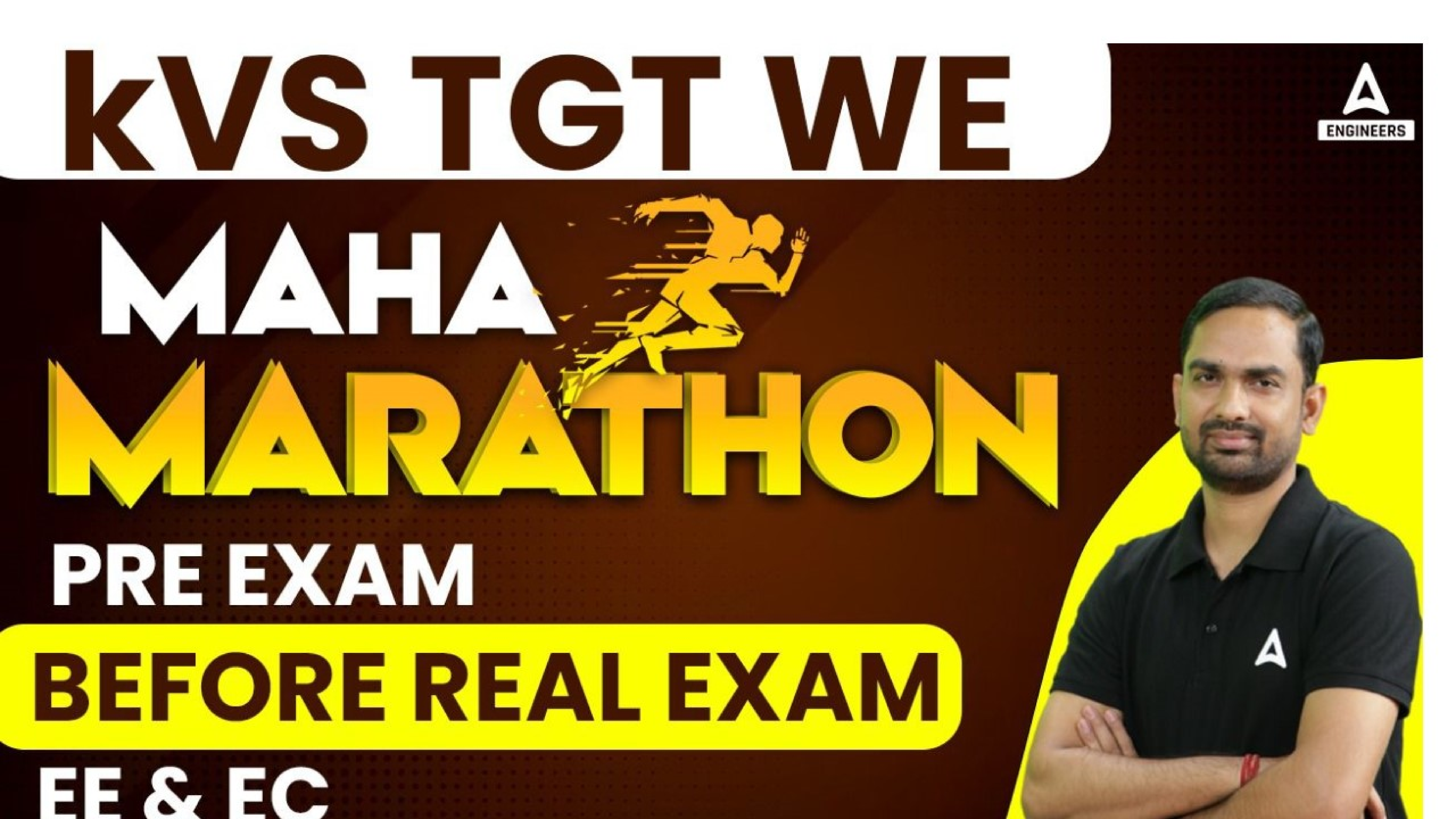
WELCOME

TO Adda247


kVS TGT WE
ENGINEERS
MAHA
MARATHON
PRE EXAM
BEFORE REAL EXAM
EE & EC

Q

A dynamomometer type wattmeter can be used on

(a) dc only

(b) ac only

(c) rectified ac only

(d) ac as well as dc

Measurement of power

→ AC + dc

$P_{avg} = VI\cos\phi$

Q **Which of the following instruments is an integrating type instrument?**

(a) Wattmeter

(b) Energy Meter

(c) Power Factor Meter

(d) None of the above

Event totalised

31 days → energy meter

$E = P \times t$

Q

The scale of power factor meter instrument is

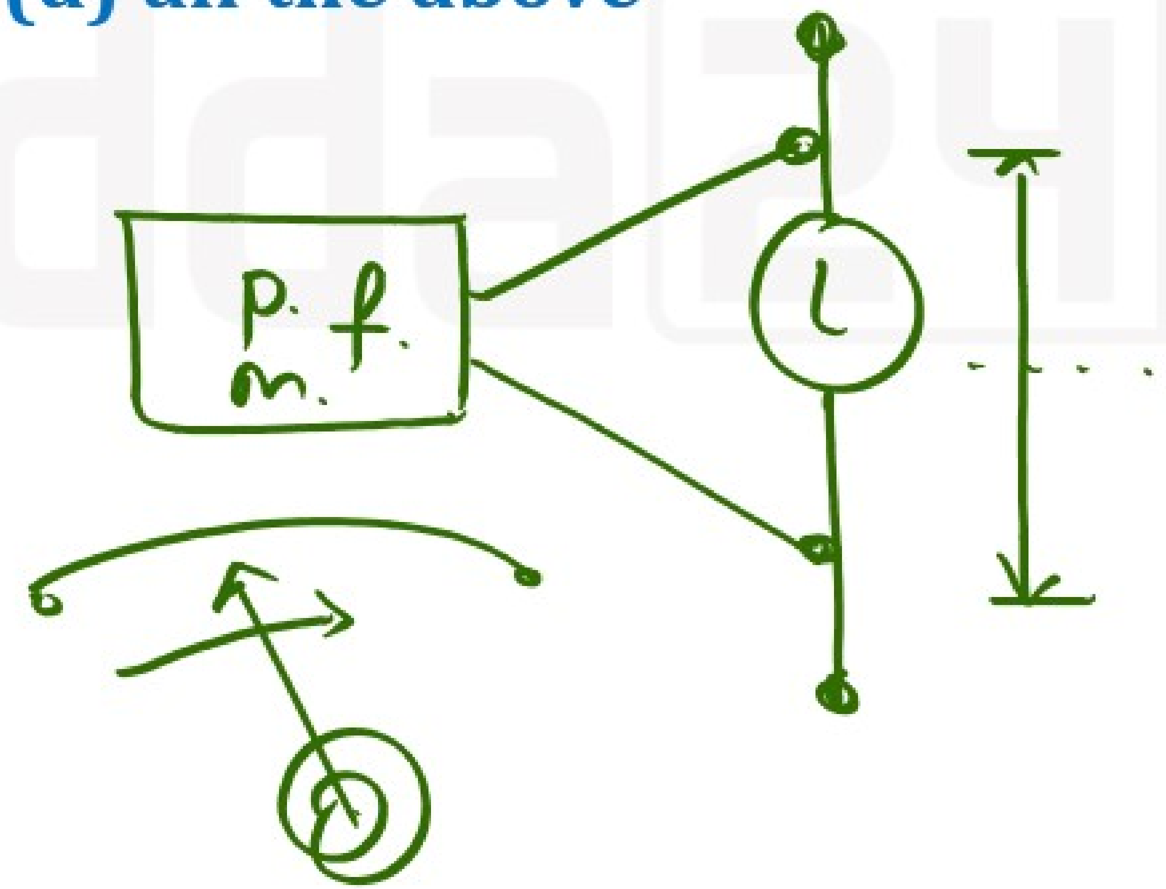
(a) Non Uniform

(b) exponential

(c) linear

(d) all the above

P.f = cosϕ



$\theta \propto$ P.f. Angle

θ = deflection of pointer

Q

① A dc ammeter has resistance of 0.1 Ω and current range is 0 – 100 A. If the range is to be extended to 0 – 500 A, then meter requires shunt resistance of

(a) 0.010 Ω

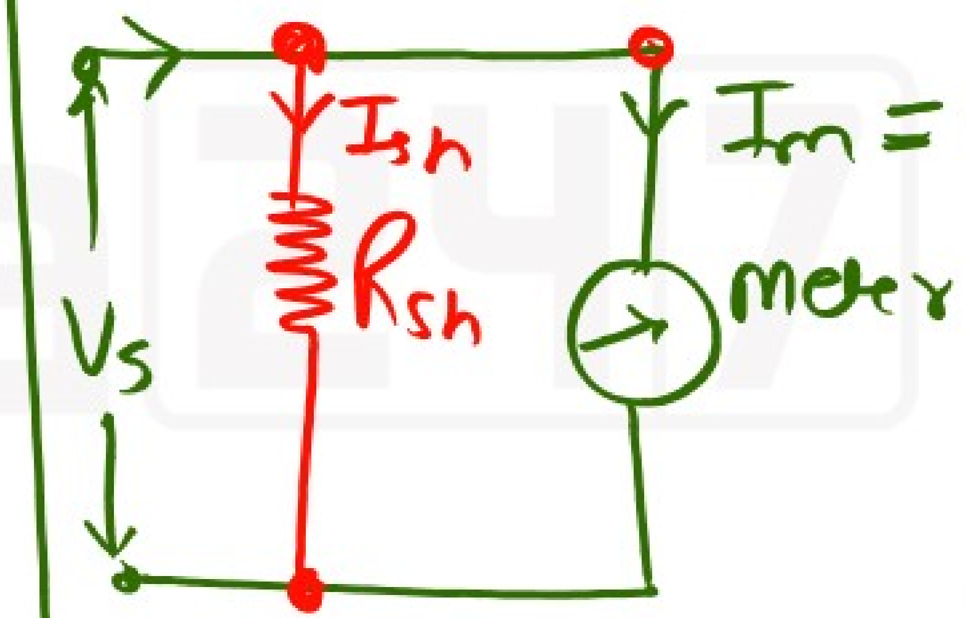
(b) 0.011 Ω

(c) 0.025 Ω ✓

(d) 1.0 Ω

$R_{sh} = \frac{0.1}{5-1}$

$I = 500$



$I_m = 100$ (fsd)

$I_{sh} R_{sh} = I_m R_m$

$R_{sh} = \frac{R_m}{m-1}$

$m = \frac{I}{I_m} = \frac{500}{100}$

Q

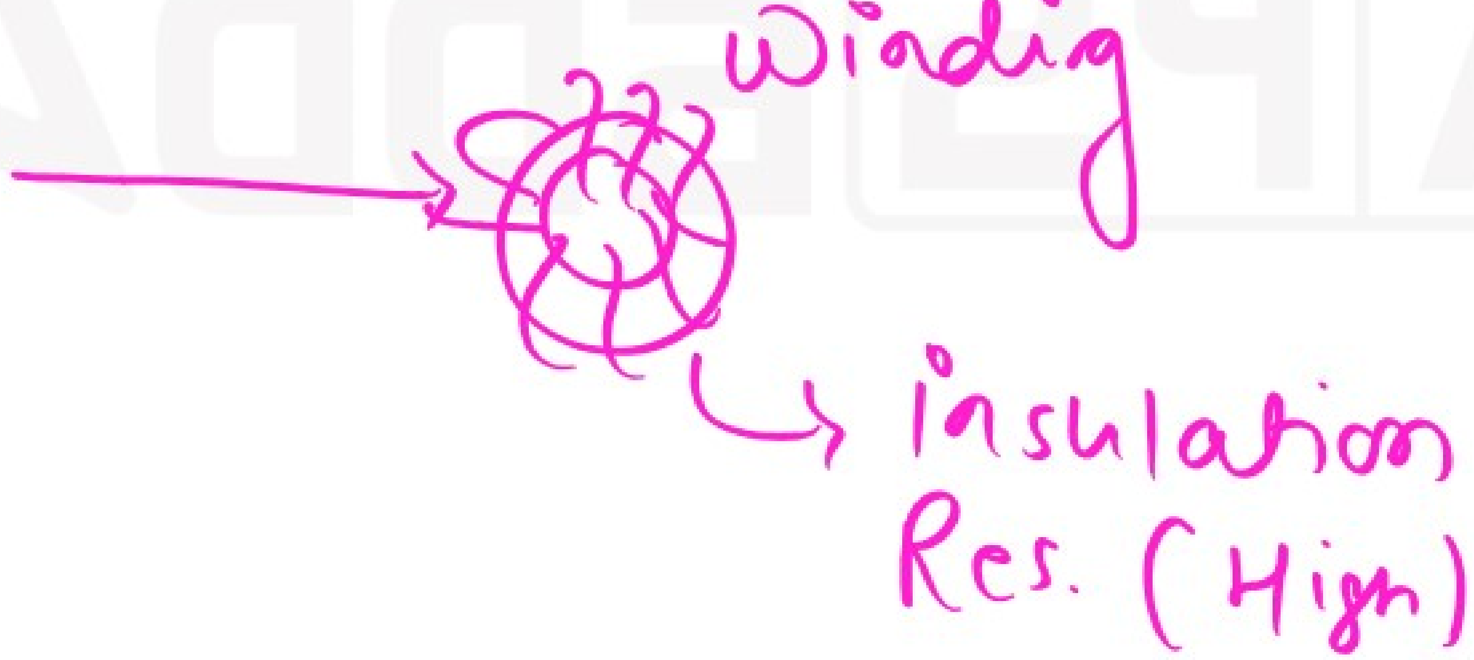
Megger is an instrument to measure

(a) a very low resistance

(b) insulation resistance ✓ → Cable, motor, X-mer ...

(c) Q of coil

(d) inductance of coil



$I \propto \frac{V}{R}$

Q

Which instrument has the lowest resistance?

(a) Ammeter → series

(b) Voltmeter → parallel

(c) Megger

(d) Frequency – meter

$P_a = I_a^2 R_a$

$R_a = 0$ (ideal)

R_a = low

$P_v = \frac{V^2}{R_v}$

$R_v = \infty$ (ideal)

R_v = High

Q

The moving coil in a dynamometer wattmeter is connected

(a) in series with the fixed coil.

(b) across the supply.

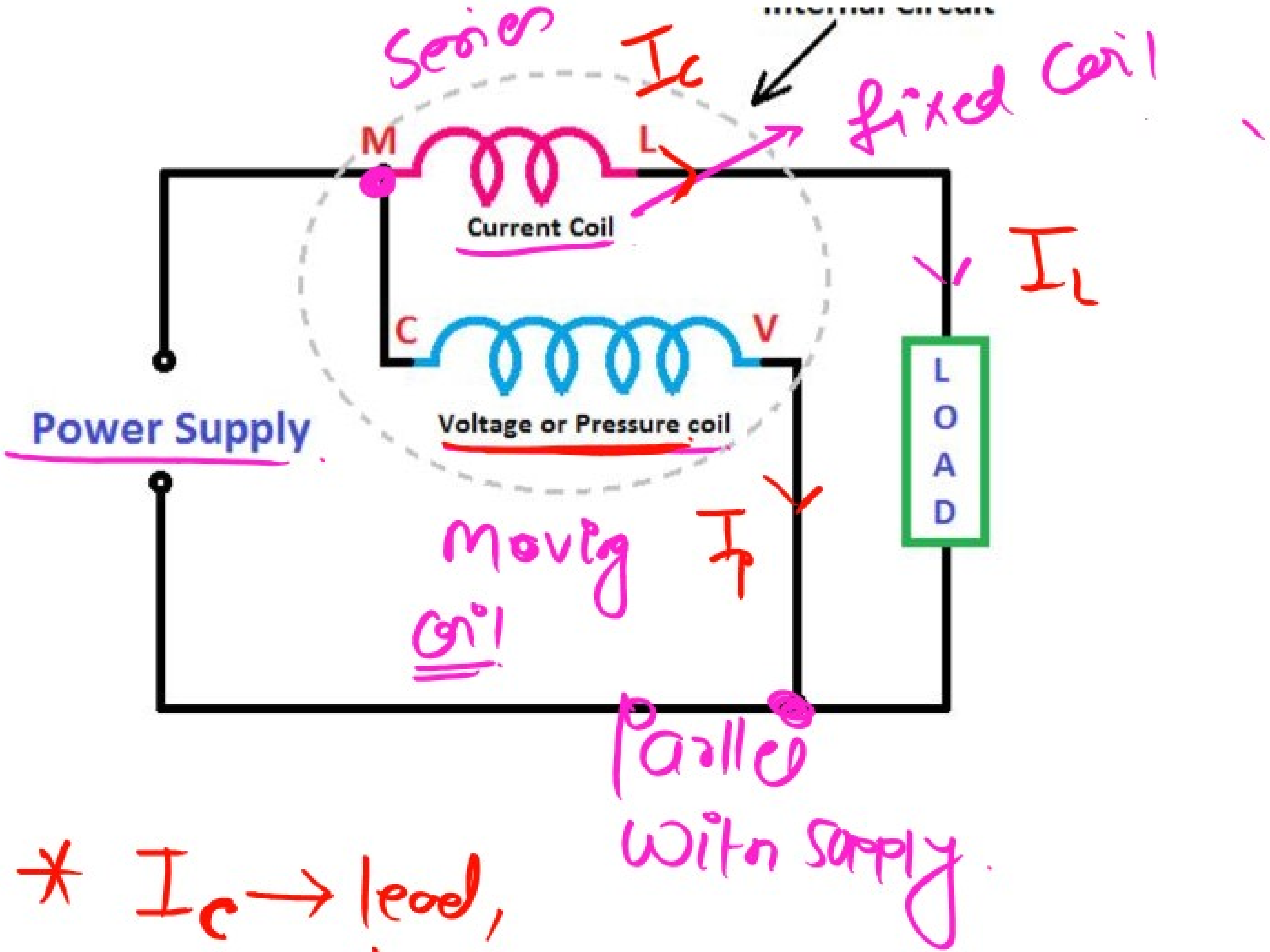
(c) in series with the load.

(d) any one of the above.

P.C

↳ Highly Res.

↳ I_p – nearly in phase voltage



* I_c → lead, lag, upf

Q

temp. error

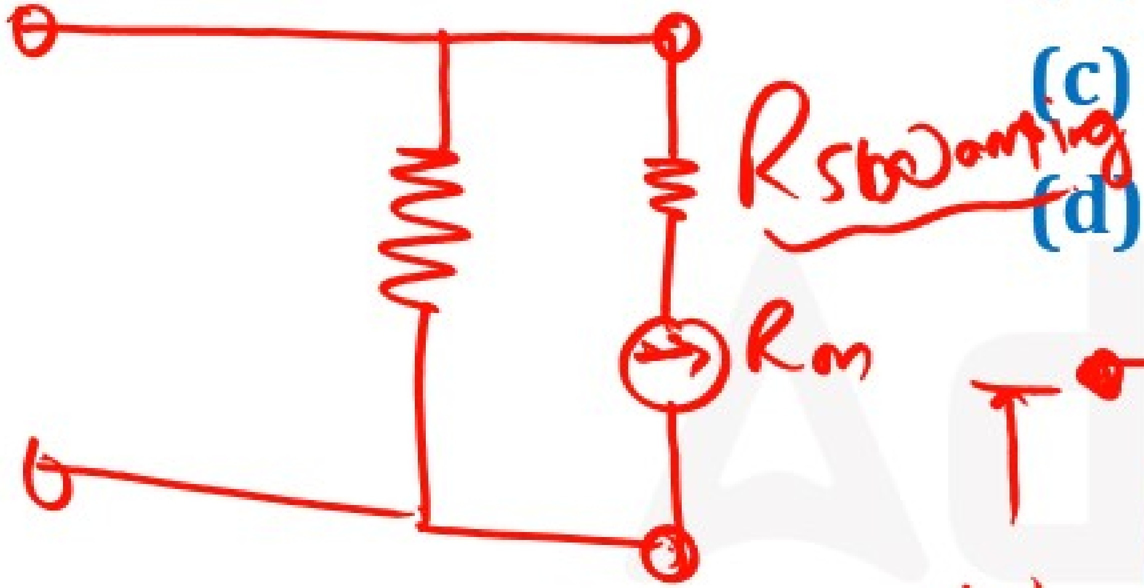
To increase the range of a voltmeter

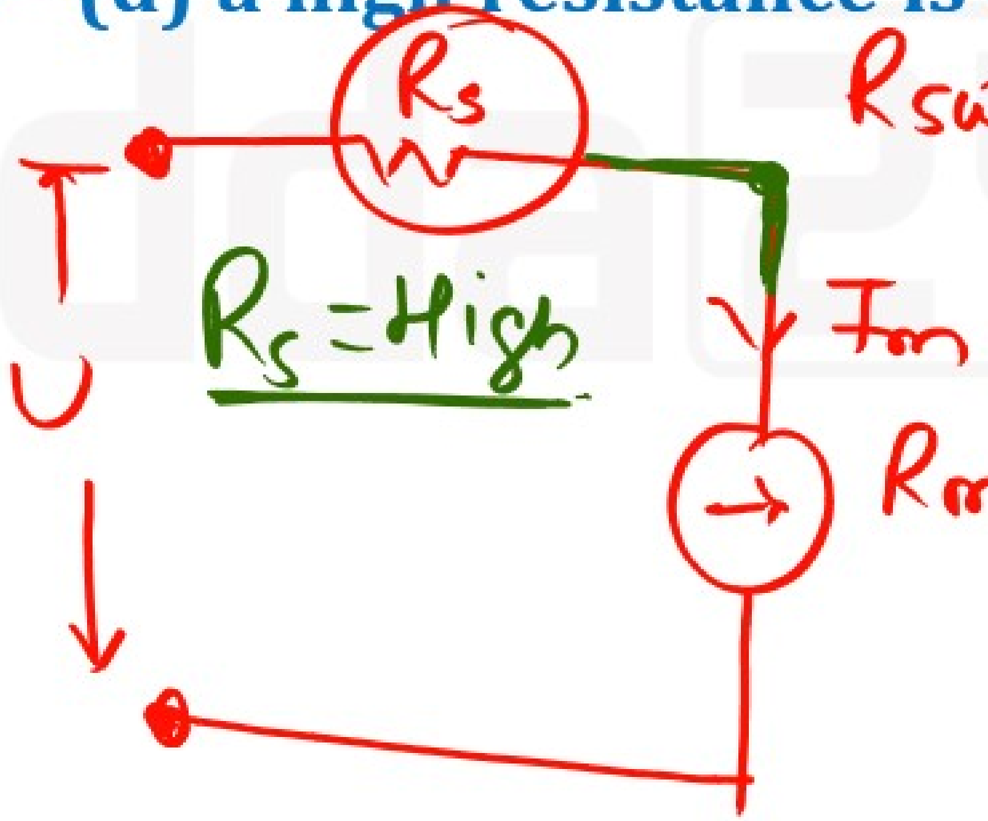
(a) a low resistance is connected series.

(b) a low resistance is connected in parallel.

(c) a high resistance is connected in series.

(d) a high resistance is connected in parallel.





Rswamp = X

$V_m = I_m R_m$

*

$R_t = R_0(1+\alpha\Delta t)$

Q

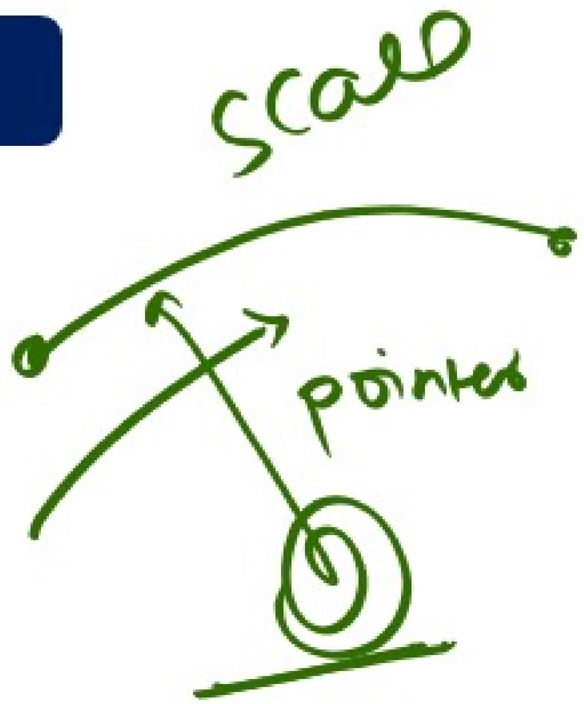
The controlling torque in gravity controlled meter is proportional to:

(a) cos θ

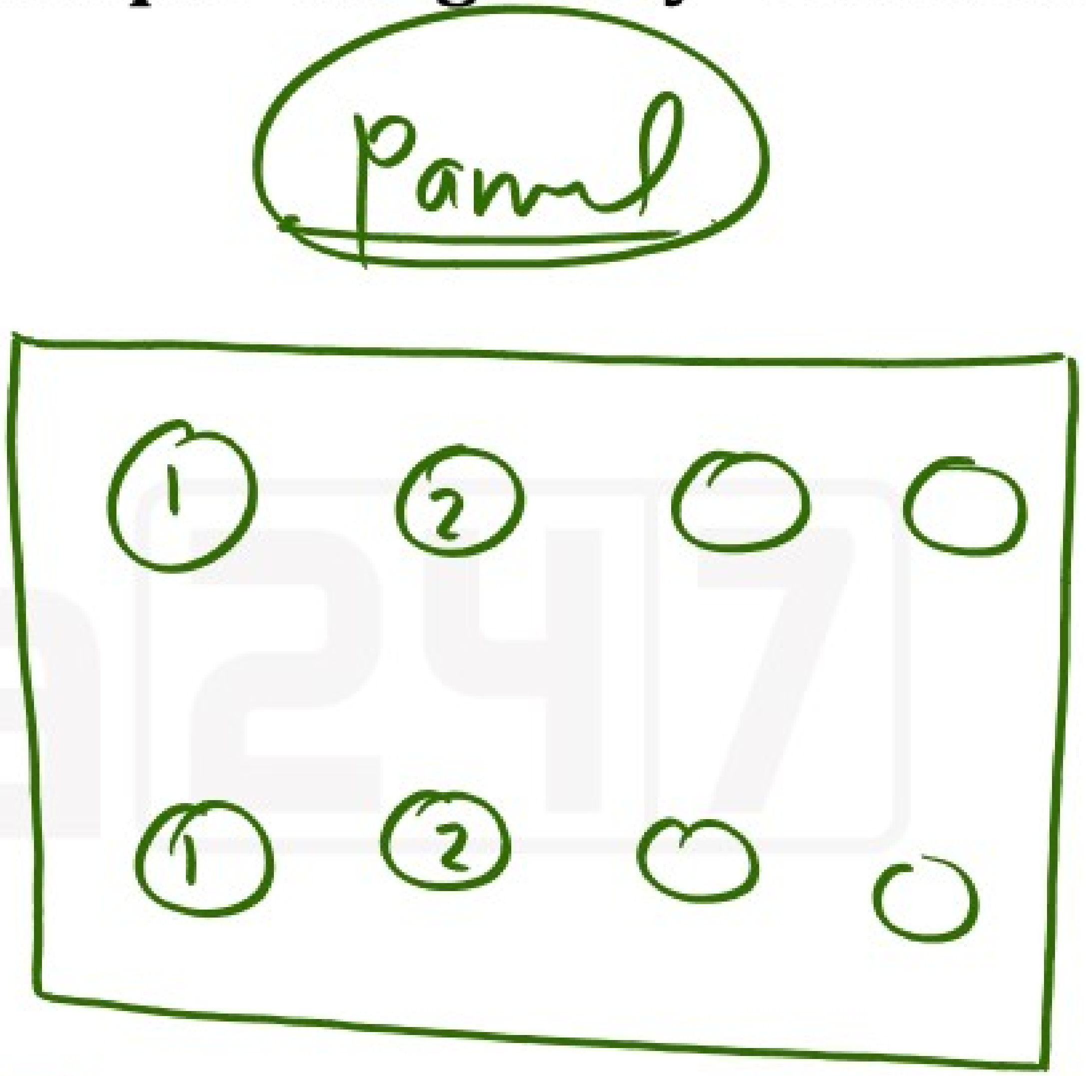
(b) sin θ

(c) tan θ

(d) 0



T_c



$T_c \propto \sin\theta$

$T_c = Wl\sin\theta$

Q

Swamping resistance is used to compensate error due to:

(a) Stray magnetic field

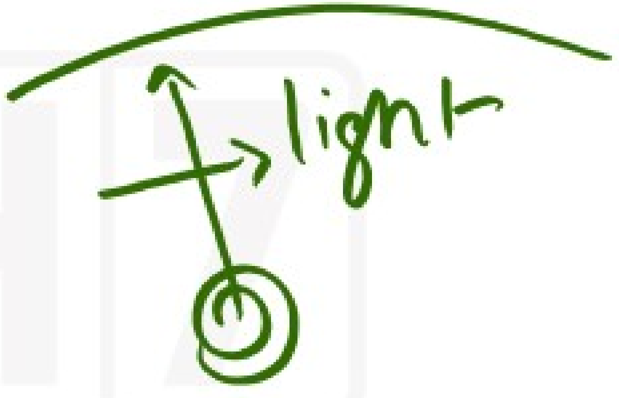
(b) Large supply voltage

(c) Large supply frequency

(d) Temperature variations ✓

R_{swamp} → Temp. error

* friction error



= Torque / Weight (High)

Q With the decrease in the strength of the permanent magnet an insulation Megger due to ageing, the Megger reading will

(a) be lower than actual. ✓

(b) be higher than actual.

(c) remain unaffected.

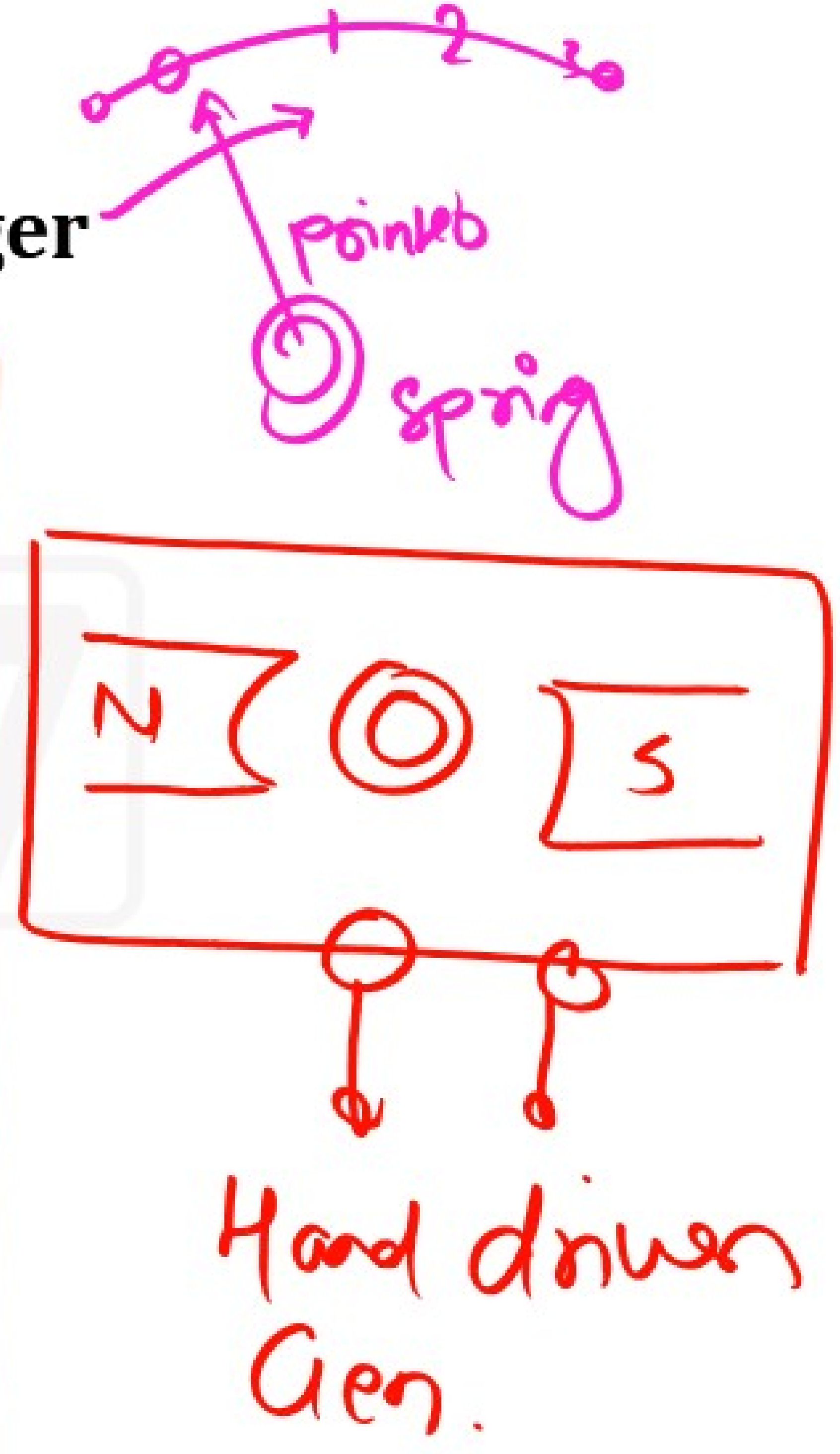
(d) fluctuate rapidly.

$\phi \downarrow \quad E \downarrow$

$T_d \propto \phi I_a$

* Megger

↳ does Not Required any ext power Source



Q

A static combination of control coil and compensating coil is used in Megger to minimize the effect of

(a) stray capacitance

(b) surface leakage

(c) stray magnetic field → ext. Magnetic field

(d) aging of magnet

Q

Match the items given in List – I and those in List – II (Temperature coefficient of Resistance). Select your answer using codes given in the lists:

List – I	List – II
(a) Aluminium	P. Negligibly small
(b) Manganin	Q. Positive
(c) Carbon	R. Negative

(a) a → R, b → Q, c → P

(b) a → Q, b → P, c → R

(c) a → P, b → Q, c → R

(d) a → R, b → P, c → Q

Q

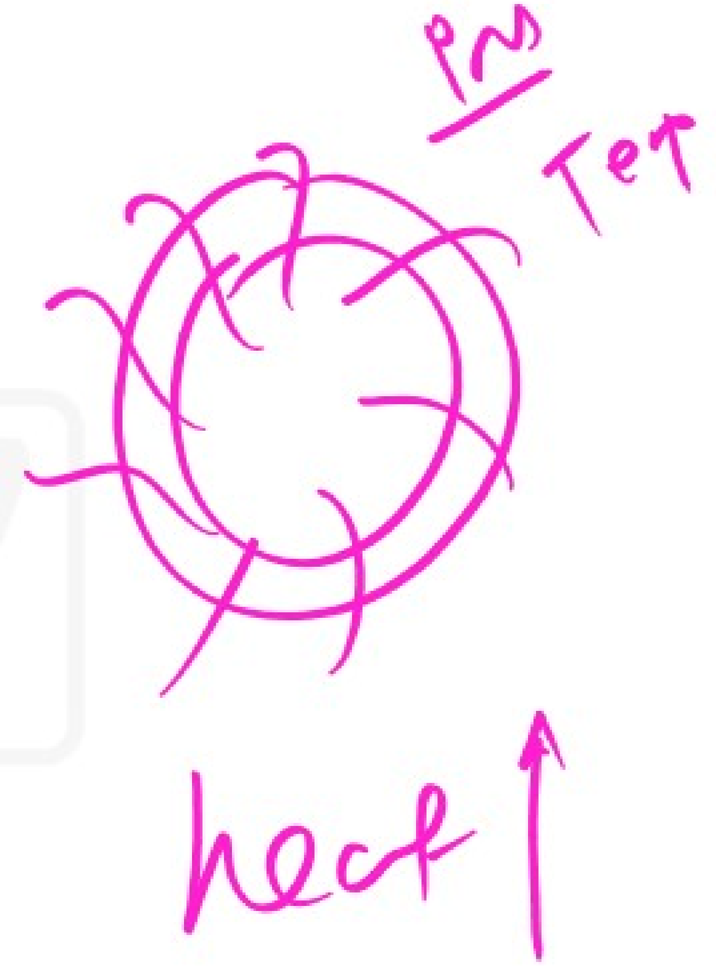
The resistance of insulations, in general, ________ with temperature rise.

(a) decreases

(b) increases rapidly

(c) increases slowly

(d) does not change



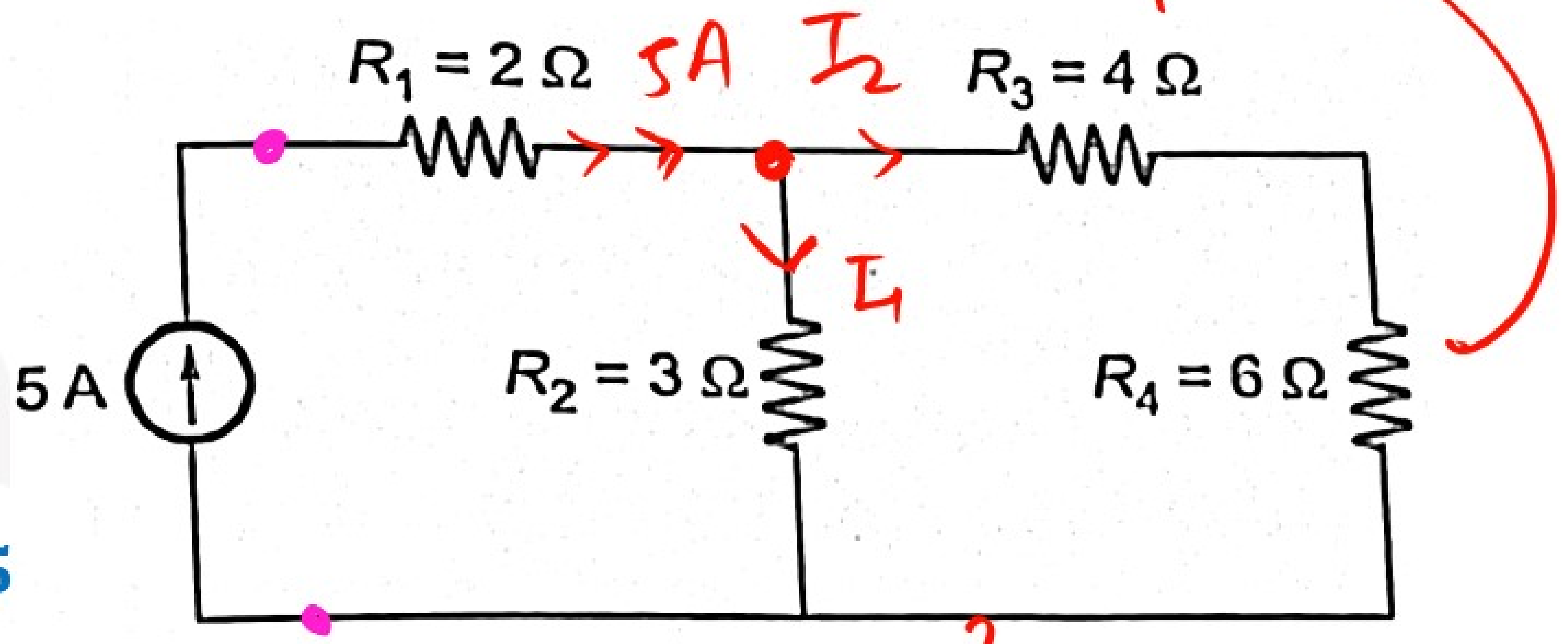
Q Determine the power (in W) delivered by the current source to the given electrical circuit.

By CDR

$I_1 = \frac{5 \times 10}{10+3}$

$I_2 = \frac{5 \times 3}{13}$

$10 \| 3 + 2$



(a) 92.5

(b) 107.5

(c) 104.2

(d) 93.7

$P = VI$ | $P = I^2 R_{eq}$

$P = 5^2 \times 2 + I_1^2 \times 3 + I_2^2 \times 10$

4433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Q

SI unit of electrical energy is

(a) Watt – Second

(b) Joule

(c) kWh

(d) Volt – Ampere – Second

Billing → unit consumption

$E = P \times t$

$= kWh$ (comm...

Q Which of the following materials possesses the least resistivity?

(a) Iron

(b) Manganin

(c) Aluminum

(d) Copper

Q

A current of i = 6 + 10sin $(100\pi t)$ + 20 sin $(200\ \pi t)$ is flowing through a series combination of a PMMC and moving iron instrument. Ratio of the two currents as registered by the M.I. and PMMC meter is

(a) 1.81

(b) 3.11

(c) 2.82

(d) 2.63

$I = I_m \sin\omega t$

* PMMC - only dc

* M.I = AC + dc → effective (RMS)

MI/PMMC

$i = 6 + 10\sin(100\pi t) + 20\sin(200\pi t)$

6 → dc; rest → AC

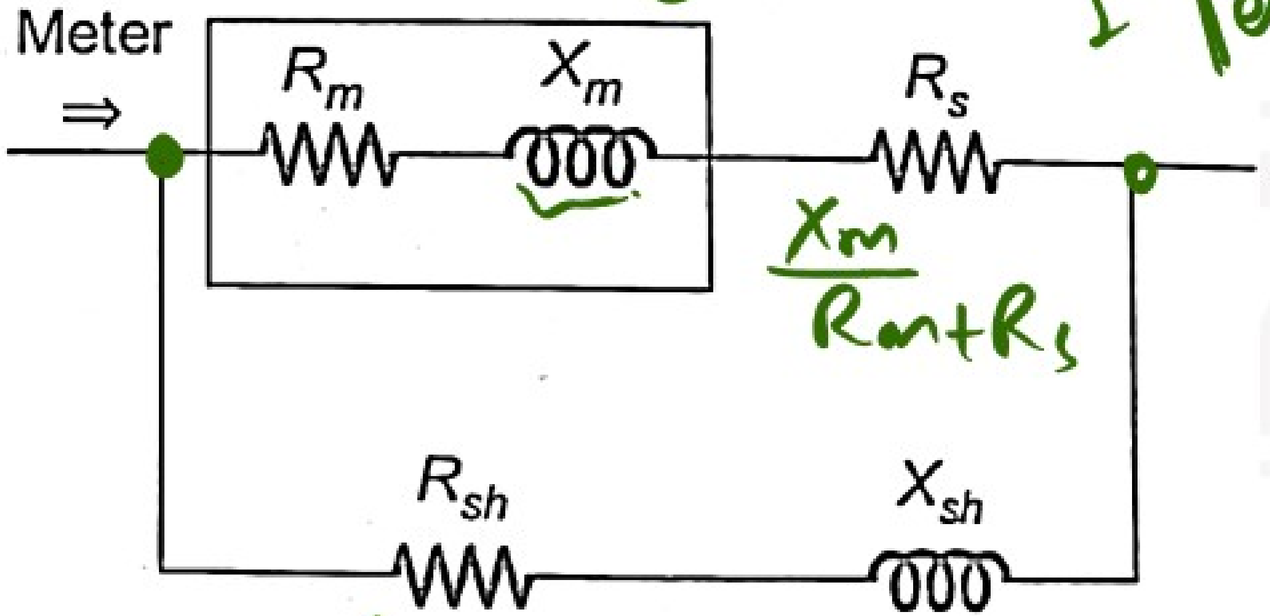
PMMC Reading = 6A

$I_{M.I} = \sqrt{6^2 + \left(\frac{10}{\sqrt{2}}\right)^2 + \left(\frac{20}{\sqrt{2}}\right)^2}$

$= \sqrt{6 + 50 + 200}$

Q

An ac meter of resistance R_m and reactance X_m is connected in series with a resistance R_s. A shunt of impedance $(R_{sh} + jX_{sh})$ is applied in parallel to the existing combination of meter and R_s. The current division across the two branches will be independent of frequency when



(a) $\frac{X_m}{R_m+R_s} = \frac{X_{sh}}{R_{sh}}$

(b) $\frac{R_s}{\sqrt{R_m^2+X_m^2}} = \frac{R_{sh}}{X_{sh}}$

(c) $\frac{X_m}{R_m} = \frac{X_{sh}}{R_{sh}}$

(d) $(R_s + R_m)^2 + X_m^2 = R_{sh}^2 + X_{sh}^2$

* $I_m = \frac{V}{Z}$

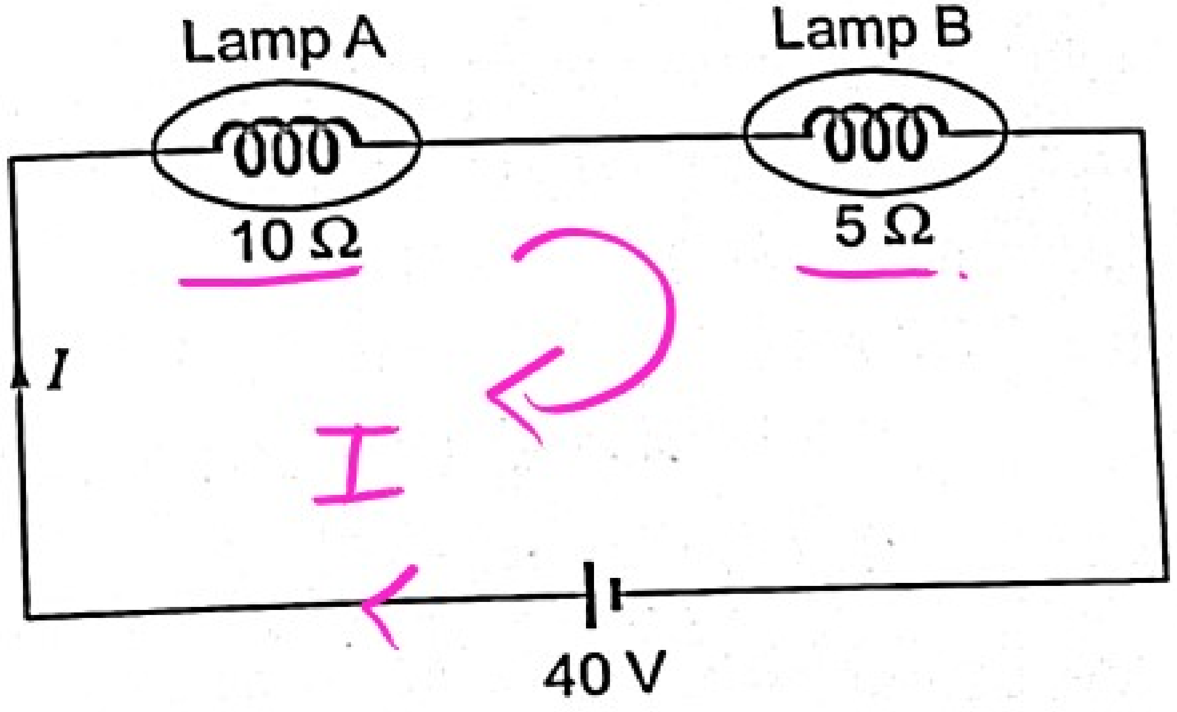
$Z = R + jX$

$X_L = 2\pi f L$

* Meter Reading is independent of temp. if meter T.C & shunt T.C are equal.

\# $\tau = \frac{L_a}{R_a} = \frac{X_{La}}{R_a}$

Q **Determine the power (in W) of lamp A and lamp B respectively for the given circuit diagram.**



(a) 75.56, 33.86

(b) 76.65, 38.86

(c) 70.76, 35.37

(d) 68.62, 38.86

$I = \frac{40}{15} = \frac{8}{3}$ Amp

$P_a = \frac{64}{9} \times 10$

$P_b = \frac{64}{9} \times 5$

Q **Which one of the following statement is TRUE?**

(a) Superposition theorem is not applicable for voltage calculation.

(b) Superposition theorem is not applicable for power calculation.

(c) Superposition theorem is not applicable for bilateral elements.

(d) Superposition theorem is not applicable for passive elements.

Q

Which one of the following is an active element in a circuit?

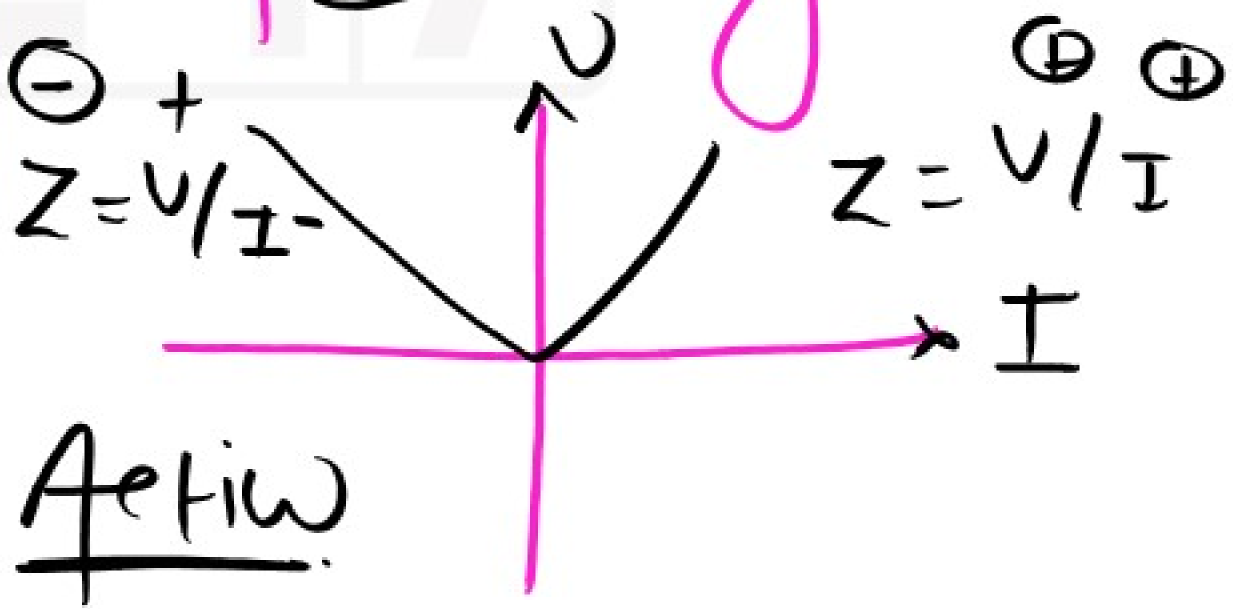
(a) Capacitor

(b) Resistance

(c) Inductor

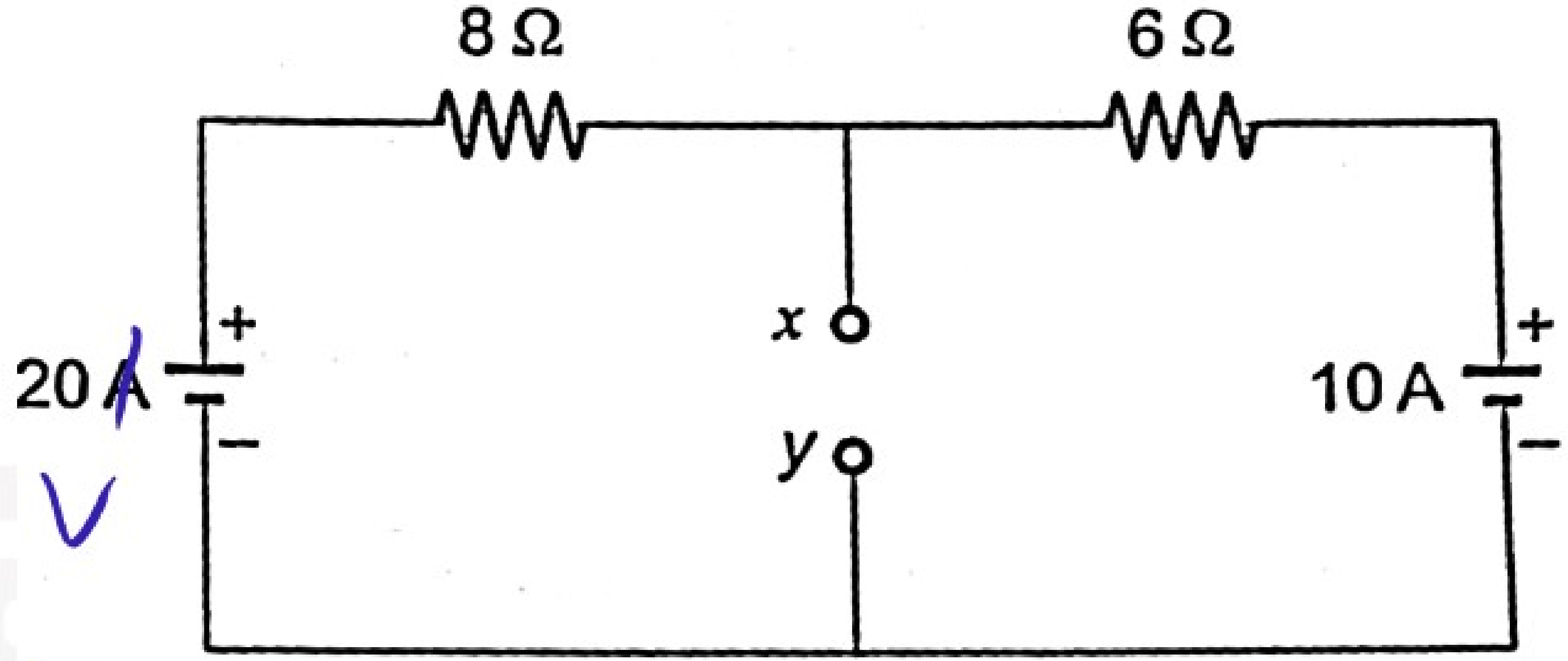
(d) Current source

* Neg. Impedance is the concept of only Active only.



Q

Determine the Thevenin's equivalent resistance (in ohms) across terminals x and y for the given electrical circuit.

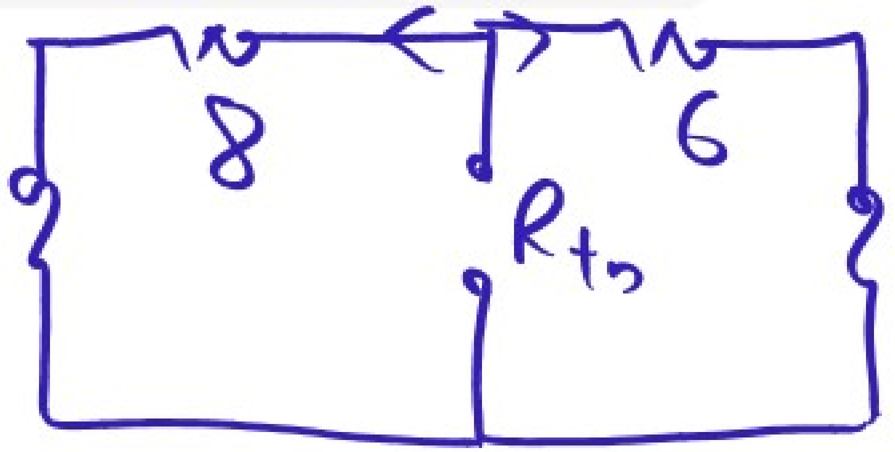


(a) 1.21

(b) 2.32

(c) 3.43

(d) 4.45

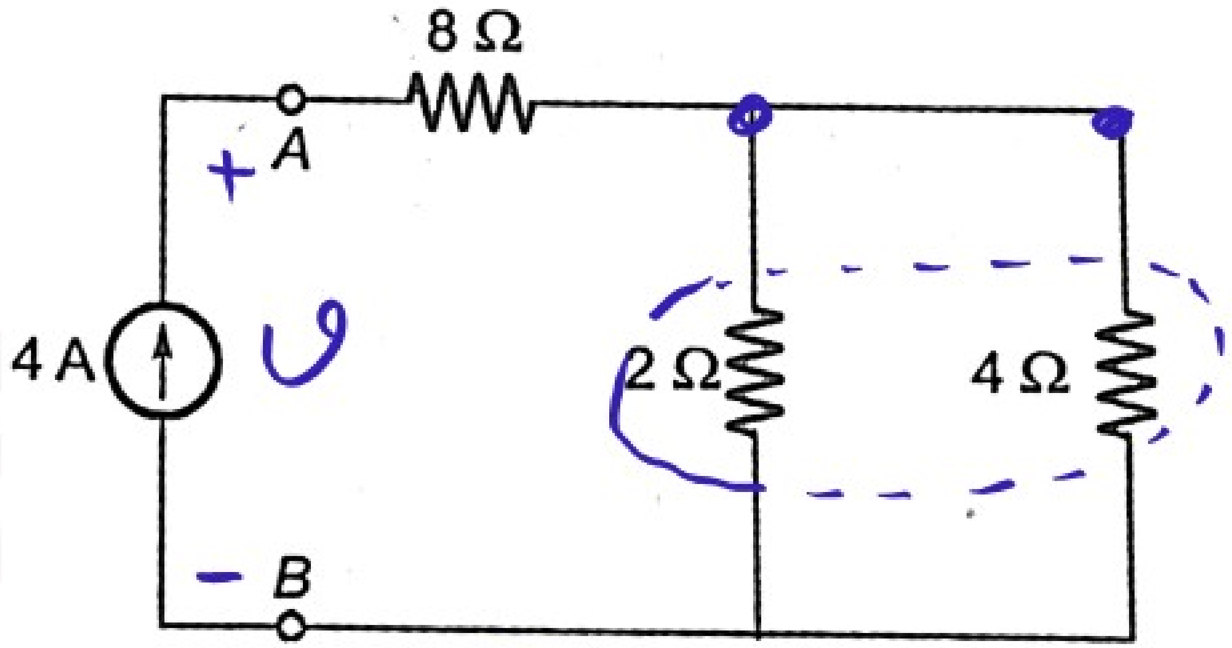


$= \frac{6 \times 8}{14}$

$= 48/14$

Q

What will be the voltage (in V) between points 'A' and 'B' in the given electrical circuit?

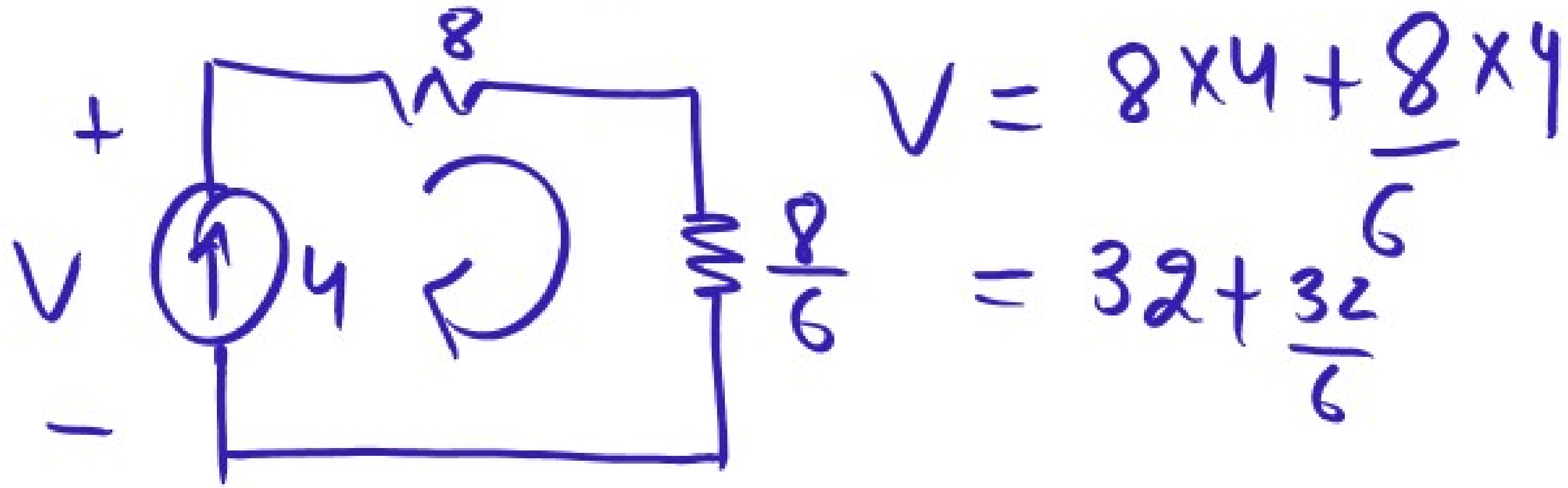


(a) 38.25

(b) 37.32

(c) 36.62

(d) 32.24



Q

The open – circuit voltage across the load is equal to 45 V. Calculate the load voltage (in V) when the maximum power is transferred to the circuit.

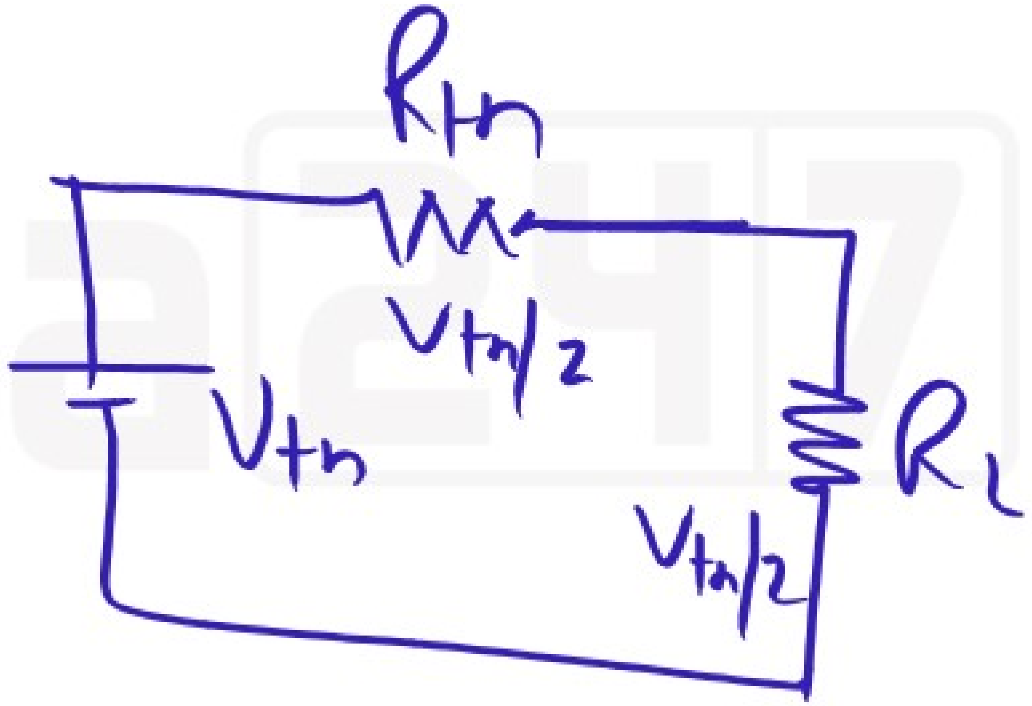
(a) 11.25

(b) 22.5 ✓

(c) 45

(d) 90

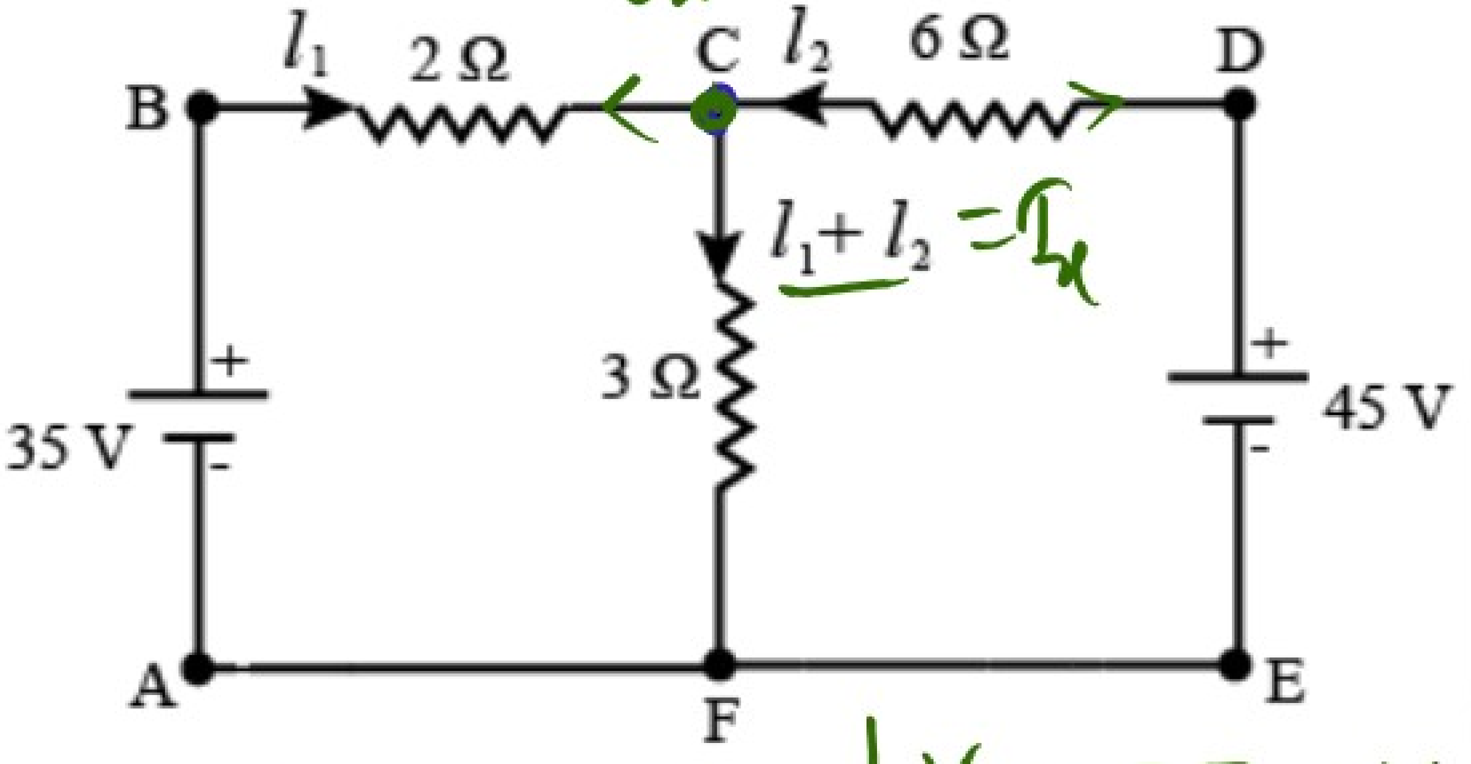
$\eta = 50\%$



MPT

$R_L = R_{th}$

Q Find the value of current (in A) across a 3 Ohm resistance



(a) 5.5

(b) 7.3

(c) 6.5

(d) 8.3

By Nodal

$$\frac{V_x - 35}{2} + \frac{V_x}{2} + \frac{V_x - 45}{6} = 0$$

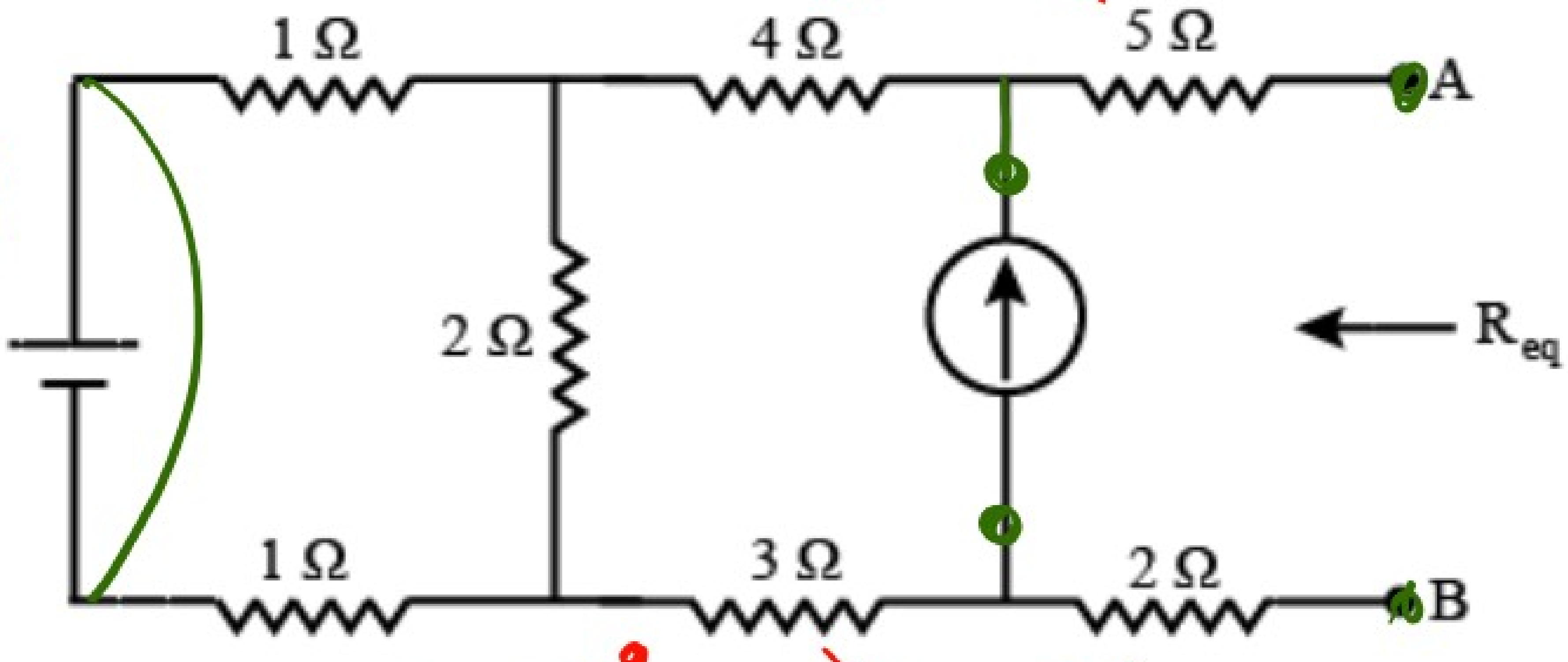
$V_x = 25$

$I_x = \frac{V_x}{3}$

$I_x = \frac{25}{3}$

Q

Find the Thevenin's equivalent resistance (in ohms) across the load terminals A – B



(a) 10

(b) 15

(c) 20

(d) 25

Q

Determine the percentage (in %) of maximum power delivered to the load resistance, when $R_L = 3R_{Th}$.

(a) 50
(b) 65
(c) 70
(d) 75

$R_L = R_{th}$

$\eta = 50\%$

$R_L = nR_{th}$

$R_L = 3R_{th}$

$P_a = I^2 \cdot R_L$

$I = \frac{V_{th}}{R_L + R_{th}}$

$R_L = 3R_{th}$

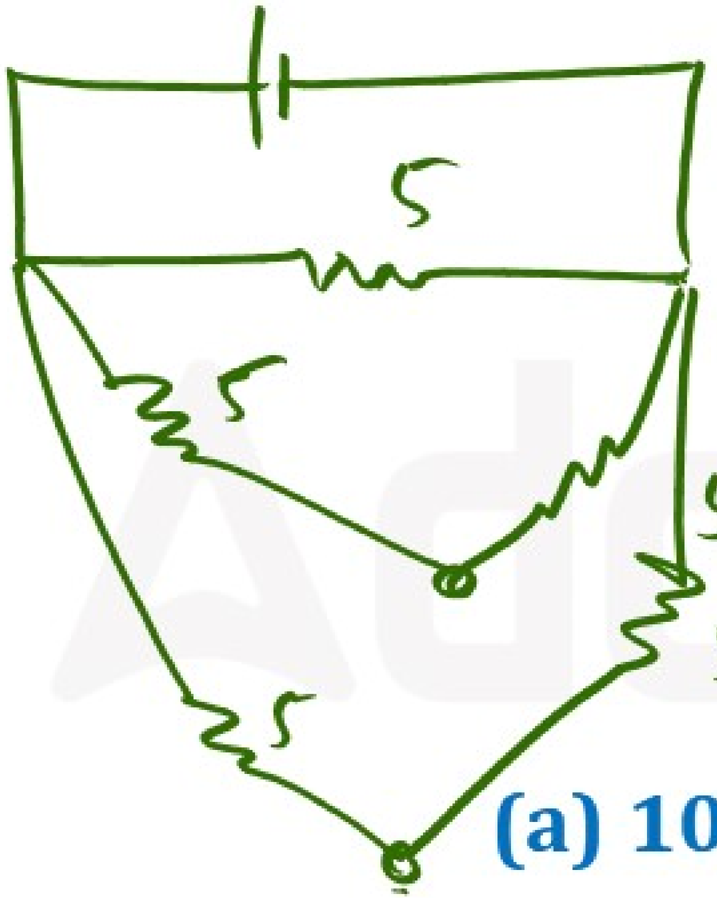
$P = \frac{V_{th}^2}{4R_{th}} \times \frac{3}{4}$

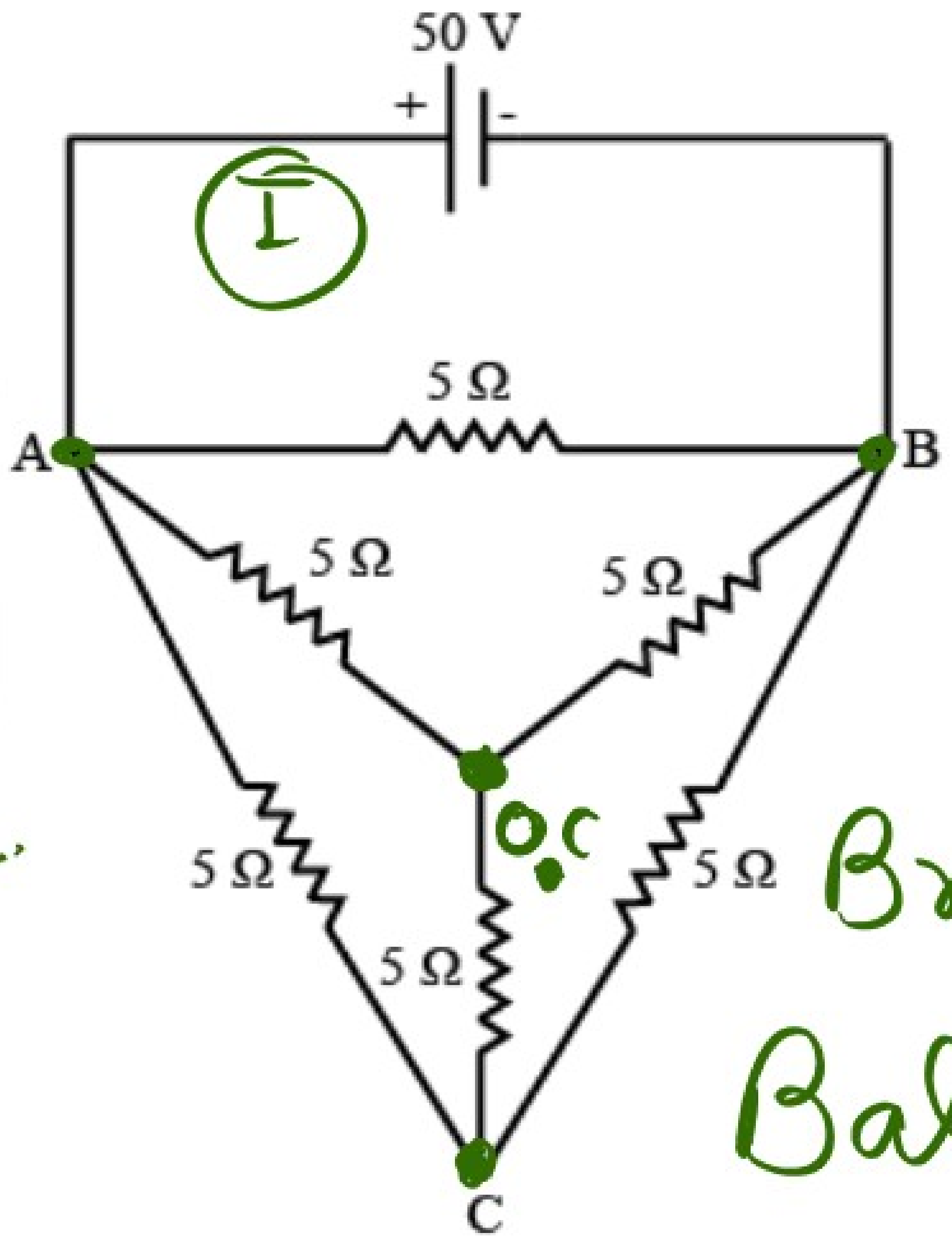
P_{mx}

75%

Q

For the circuit shown below, find the current (in A) produced by the 50 V battery





$I = \frac{V}{R_{eq}}$

$I = \frac{50}{R_{eq}}$

(a) 10 **(b) 20**

(c) 30 **(d) 40**

Bridge is Balanced.

$R_{eq} = 2.5\,\Omega$

Q

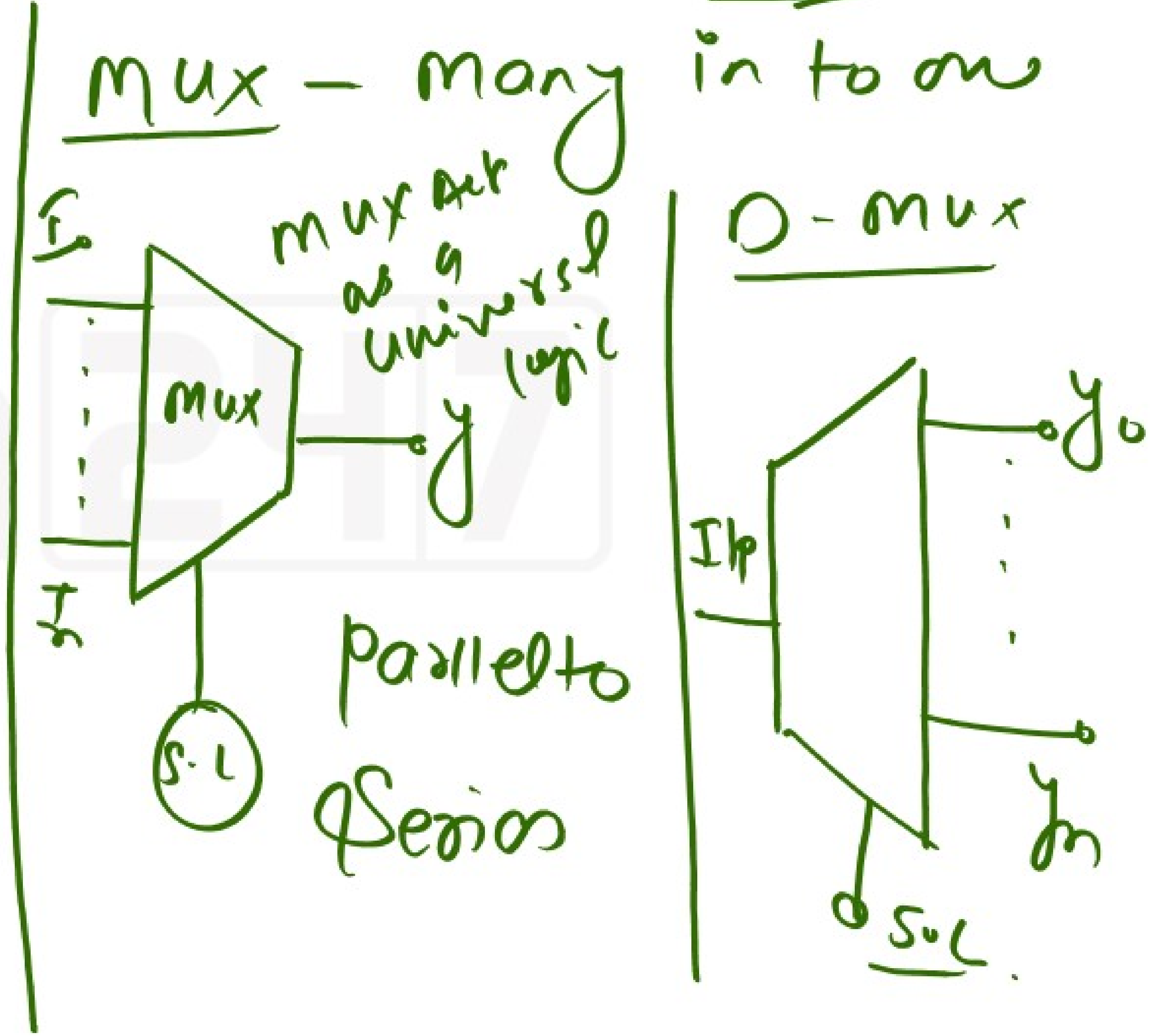
Which of the following circuits can be used as series to parallel converter?

(a) De-multiplexer

(b) encoder

(c) decoder

(d) multiplexer



Q

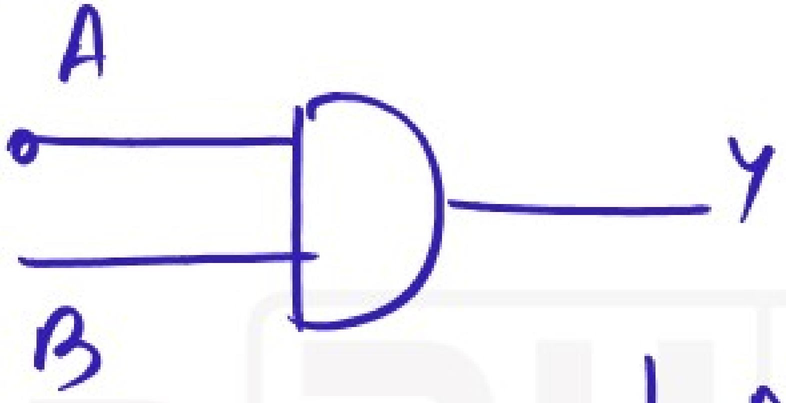
For all possible input combinations, the exact reverse output of AND gate can be obtained by _________ gate

(a) EX – OR

(b) NAND

(c) NOR

(d) NOT



$Y = A \cdot B$

$Y = 0 \cdot 0$

$Y = 0$

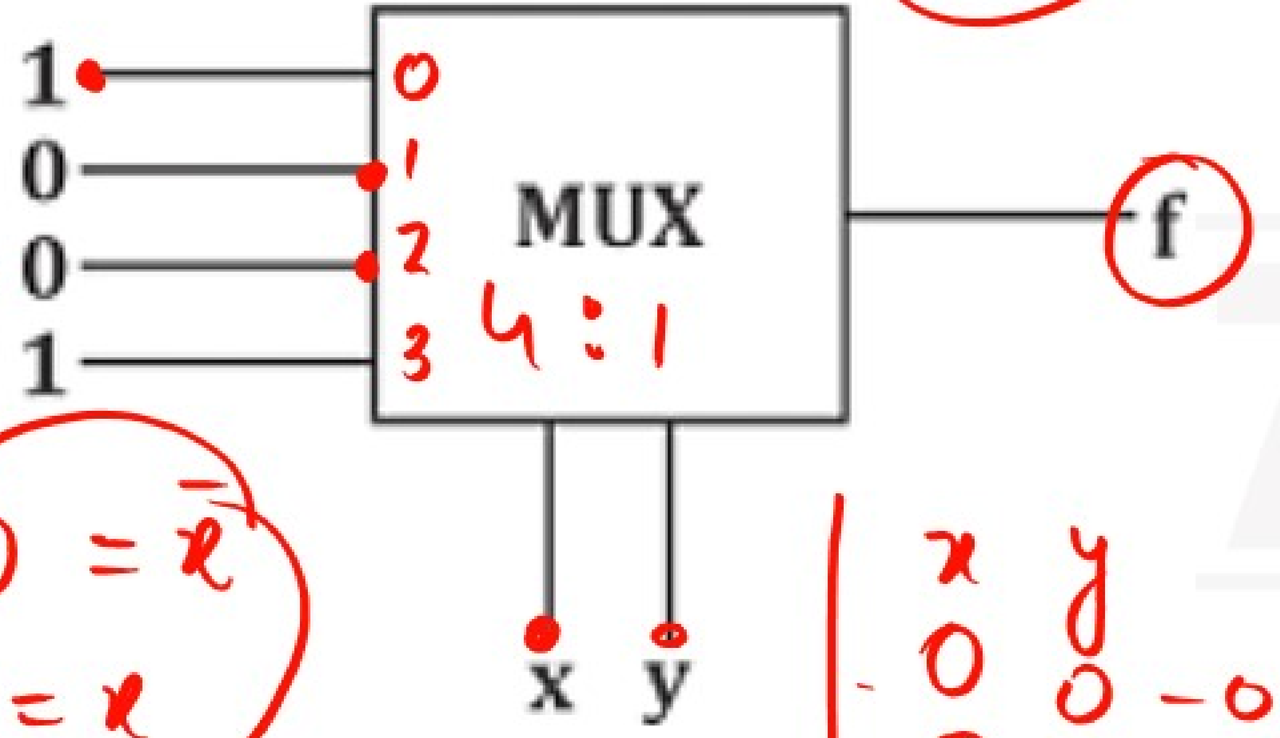
NAND Gate

$Y = \overline{AB} = \bar{A} + \bar{B}$

$= \bar{0} + \bar{0}$

$= 1$

Q What is the output f(x, y) of the multiplexer resulting fom the input logical values?



(a) XNOR gate

(b) XOR gate

(c) NOR gate

(d) AND gate

Q

The resolution of a 10 – bit D/A converter is given by ________

(a) $\frac{1}{1023}$

(b) $\frac{1}{1024}$

(c) 1023

(d) 1024

Res. $= \frac{1}{2^n - 1}$

n = No. of Bit

Res $= \frac{1}{2^{10} - 1}$

Res $= \frac{1}{1024 - 1}$

$= \frac{1}{1023}$

Q

The number of unused states in a 3 – bit Johnson counter is -

(a) 8

(b) 12

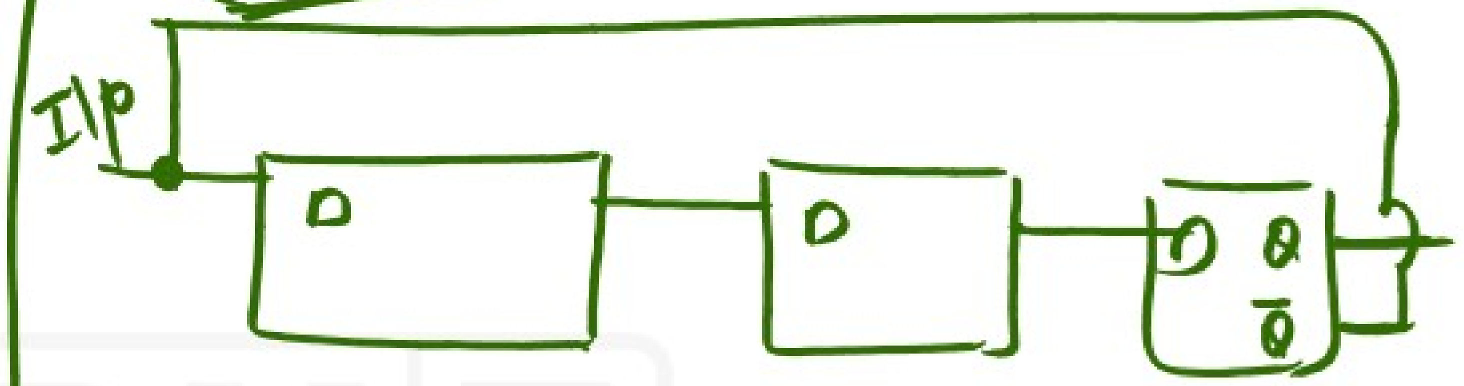
(c) 3

(d) 2

Ring → Johnson

* Counters: Sy. (any sq.), Asy (Up or down sq.)

n-Bit



→ 0000
→ 1000
→ 0100
. — —

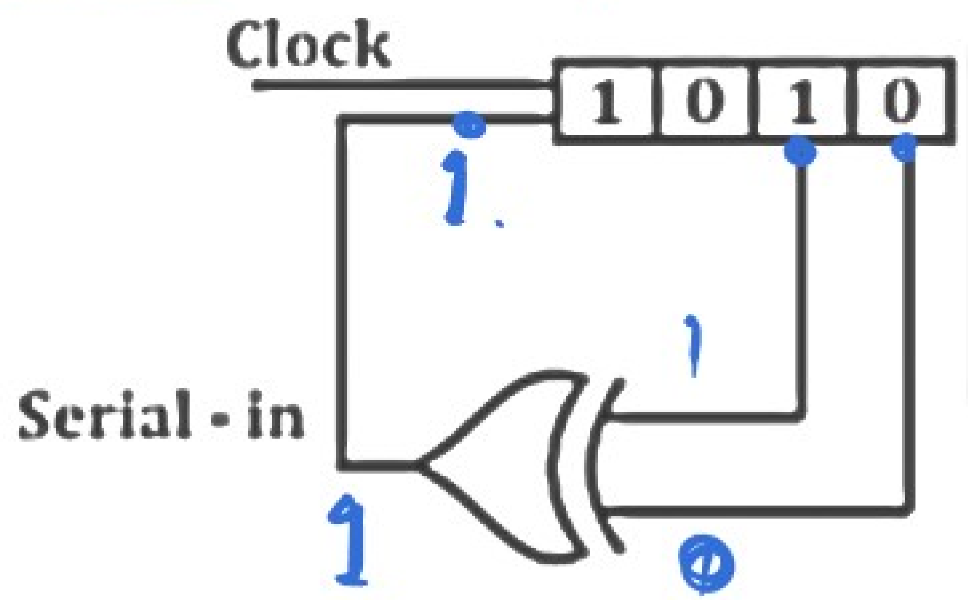
* Used state $= 2n = 6$

* total $= 2^n$

Unused state $= 2^n - 2n$
$= 8 - 6 = 2$

Q

The initial contents of the 4 – bit series – in – parallel out, right shift, shift register as shown in figure below are 1010 after 3 clock pulses the contents of the contents of the shift register will be



(a) 1111
(b) 1101
(c) 1110
(d) 1010

Q

The figure of merit of a logic family is given by ________

(a) fan out × propagation delay time

(b) Noise margin × power dissipation

(c) Propagation delay time × power dissipation

(d) gain × bandwidth

* fastest logic family = ECL

$fom = t_{pd} \times P_d$

T_{on} or T_{off} = low

logic family → I.C, used on/off

Q

Sec. **In N-P-N transistor, emitter current is**

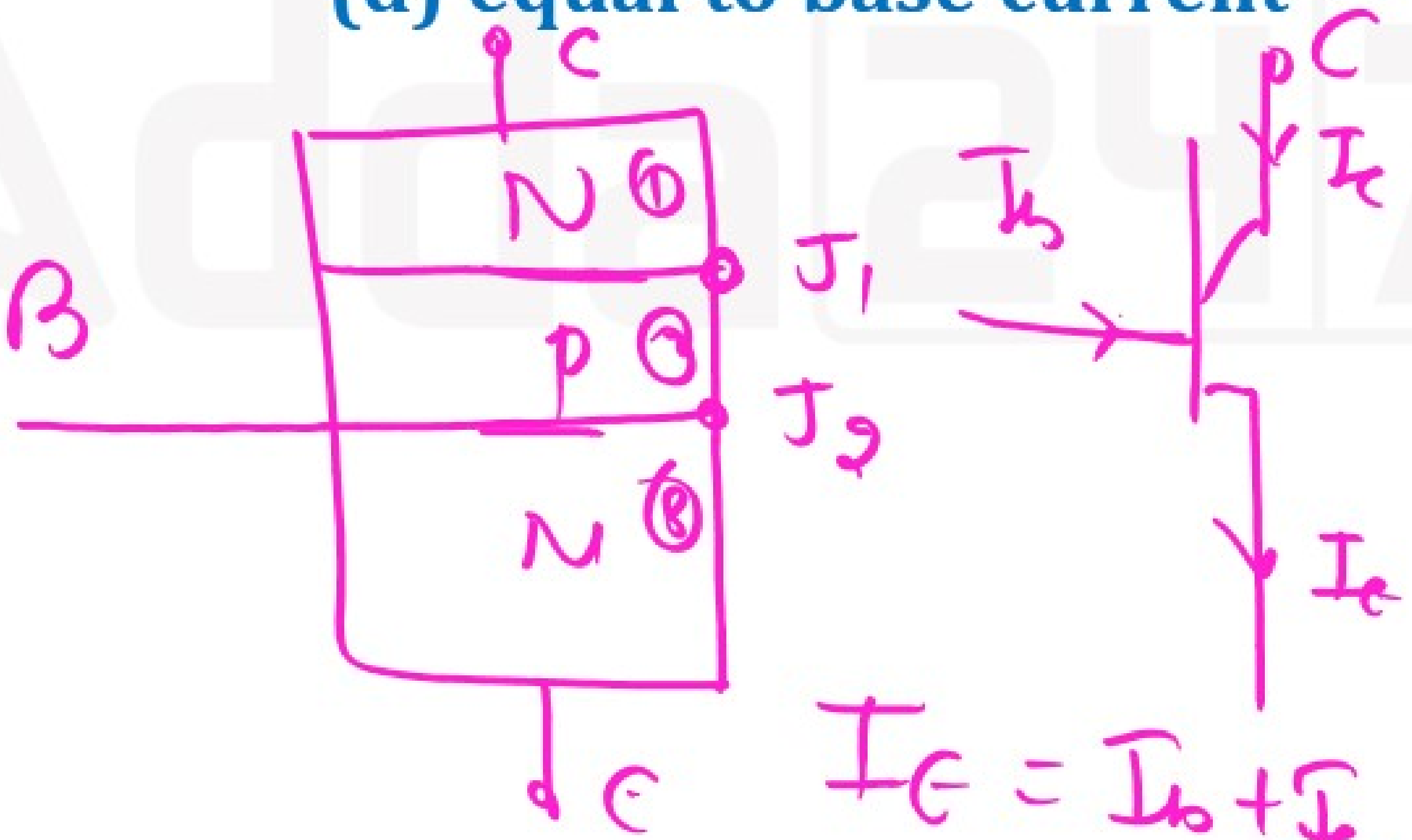
(a) Slightly less than collector current

(b) Slightly more than collector current ✓

(c) equal to collector current

(d) equal to base current

→ power



$I_E = I_b + I_c$

I_b = Continous to turned on

C, E = main

B = Control

Q

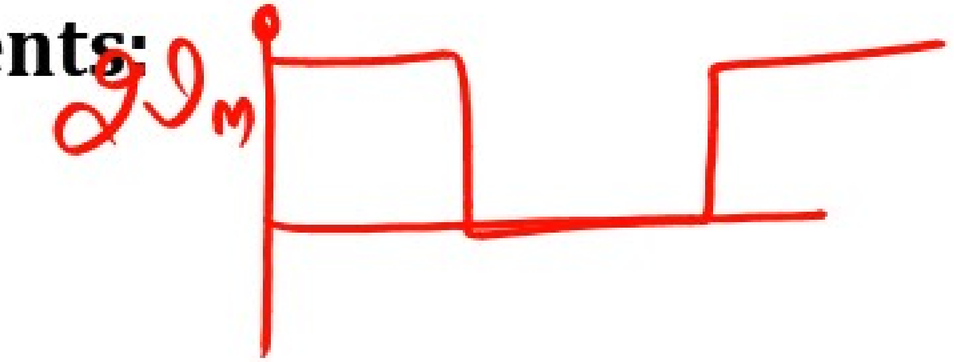
Consider the following statements:

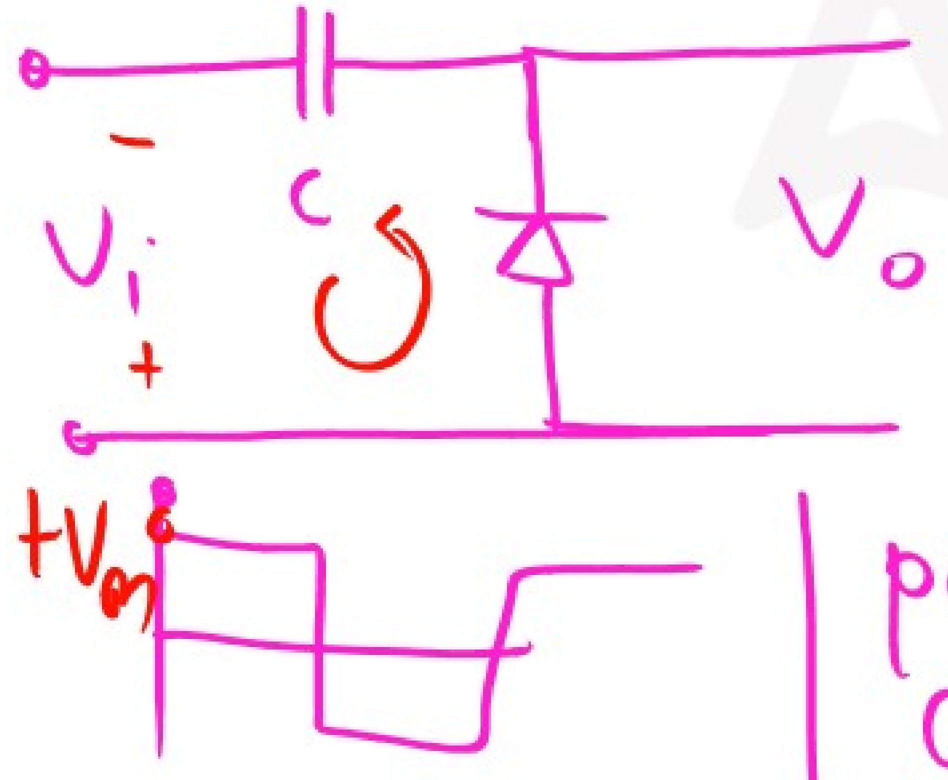
A clamper circuit

1. Amplifies the waveform

2. Adds or subtracts a dc voltage to or from a wave form

3. Does not change the shape of the waveform which of the statements given above are correct?



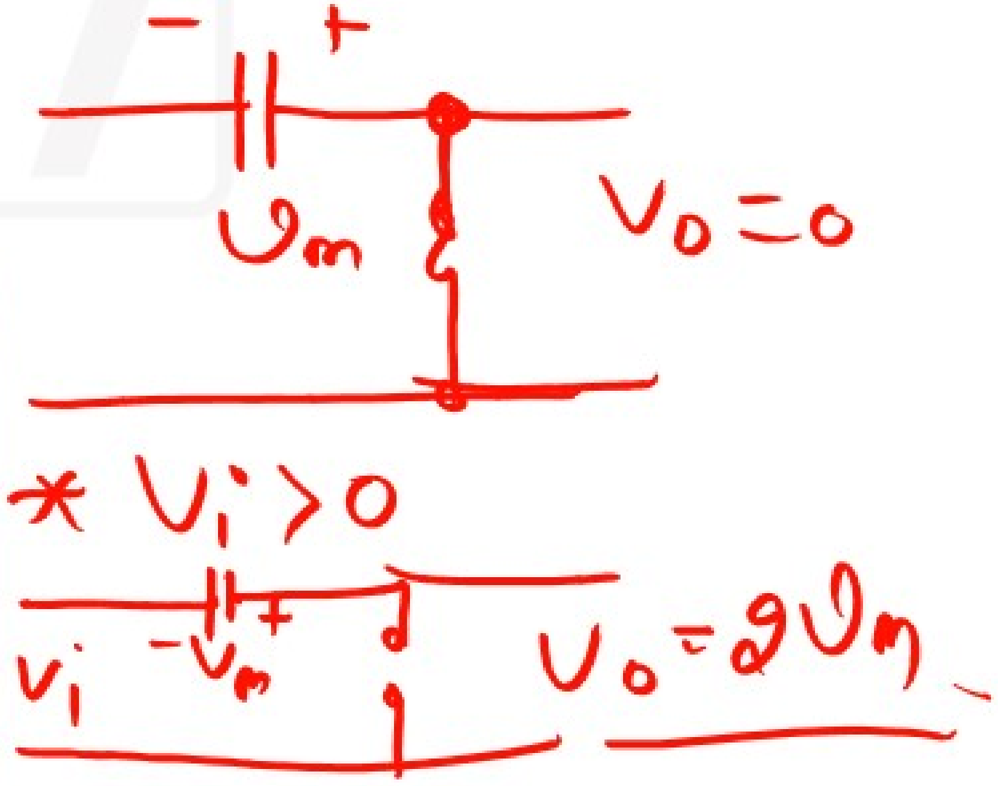


(a) 1 and 2

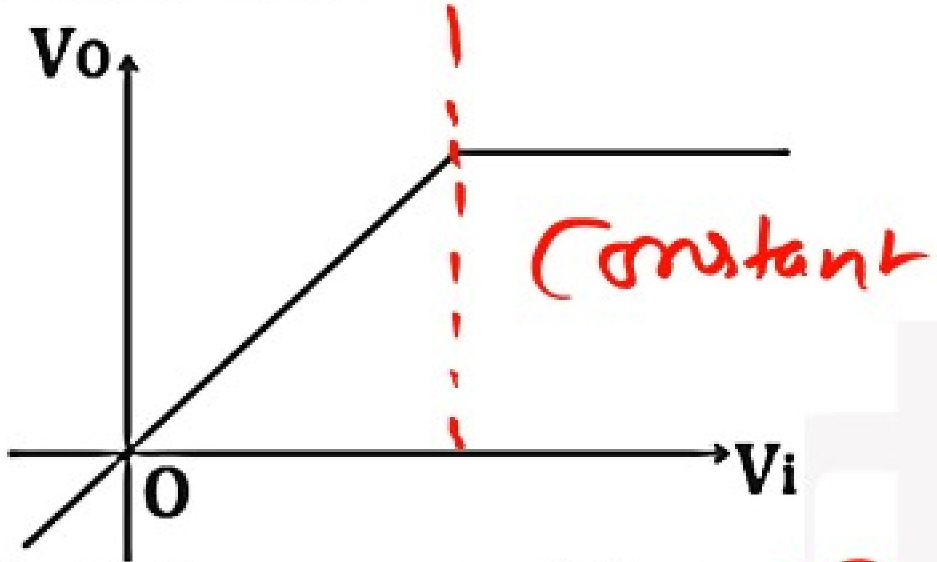
(b) 2 and 3

(c) 1 and 3

(d) 1, 2 and 3



Q **The voltage transfer characteristic as shown in the figure will relate to a**



1. Full wave rectifier

2. Half wave rectifier

3. Voltage regulator

Which of the above is/are correct?

(a) 1 and 2 (b) only 1

(c) only 2 (d) only 3

Q

Which transistor configuration is most suitable for impedance matching.

(a) CE configuration

(b) CB configuration

(c) CC configuration ✓

(d) CE and CB both

* Impedance matching

↳ MPT

$Z_L = Z_S$

* Common Collector

A_v = unity

$V_o \propto V_i$

Q

A rectifier which has ripple factor of 0.482 and power conversion efficiency equal to 81.2%. the rectifier is __________.

1. full wave (non-bridge) rectifier

2. Half wave rectifier

3. bridge rectifier

Which of these are correct?

(a) 1 and 2

(b) only 2

(c) only 1

(d) 2 and 3

(e) None.

Ripple factor = Harmonics

$$R.f = \sqrt{ff^2 - 1}$$

$$ff = \frac{V_{rms}}{V_0}$$

	R.f	η
HWR	= 1.21	40
FWR (Bridge / mid)	= 0.48	81.02

TUF = 0.281 HWR

= 0.681 mid point FWR

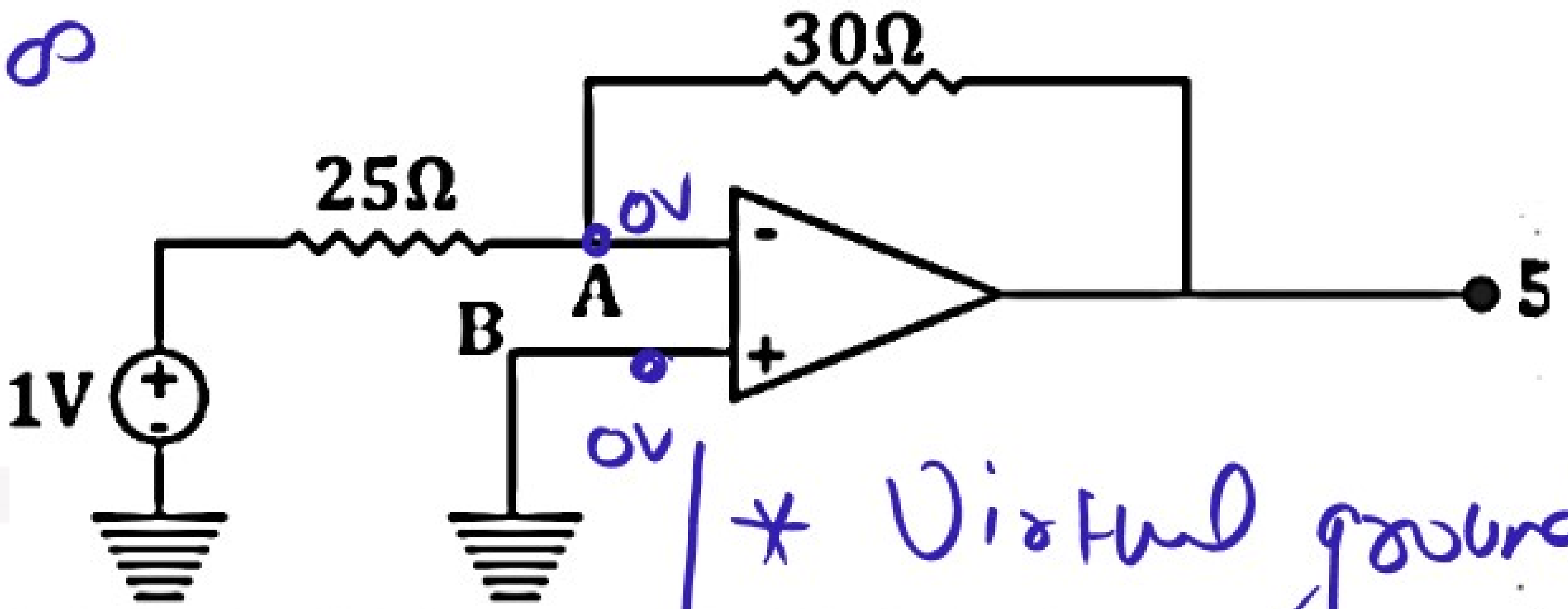
= 0.812 FWR bridge

Q

In an ideal operational amplifier depicted in fig. the potential at node A is:

tricks

All things are = ∞ excluding $R_0 = 0$



(a) 0 V

(b) 0.5 V

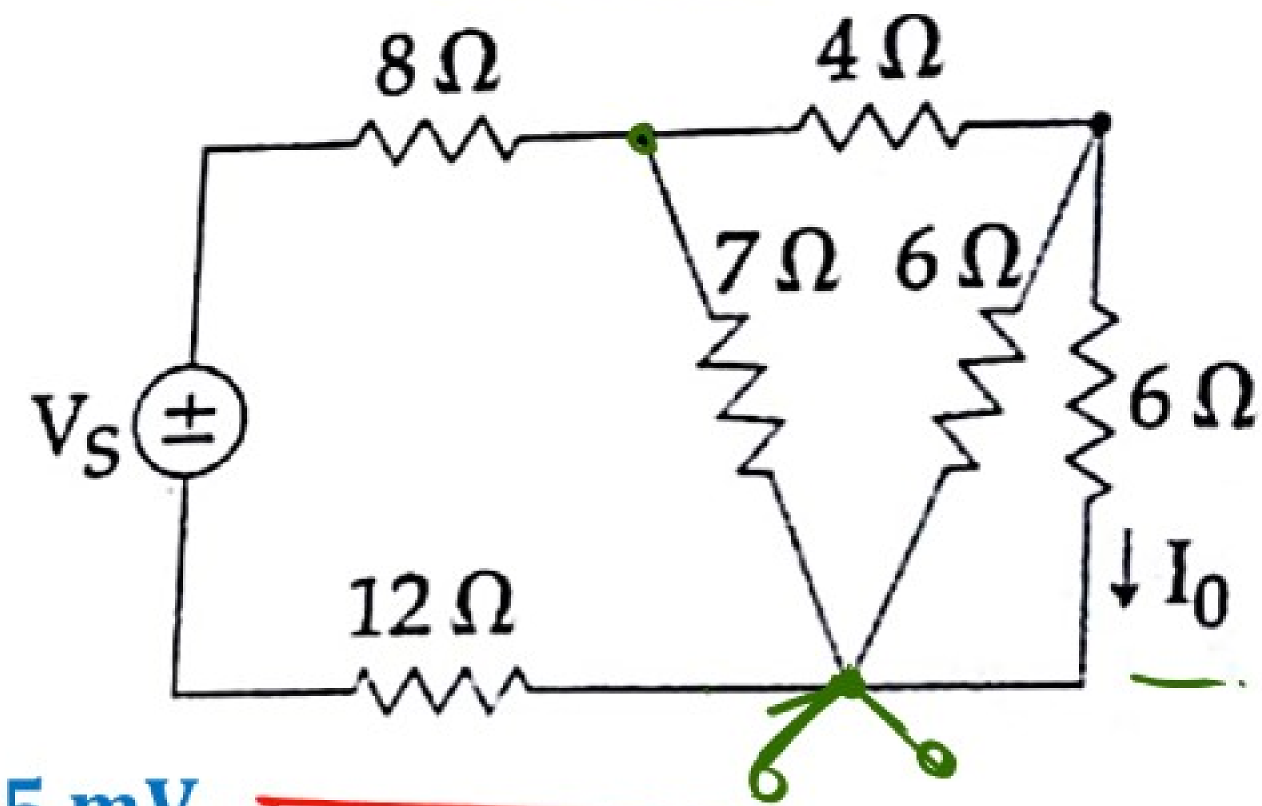
(c) 10 V

(d) can-not be determined.

* Virtual ground $V_1 = V_2$

* $I_{in} = 0$, $R_{in} = \infty$

Q For the network shown in the following figure the value of V_s which makes $I_0 = 7.5$ mA is:



(a) 725 mV

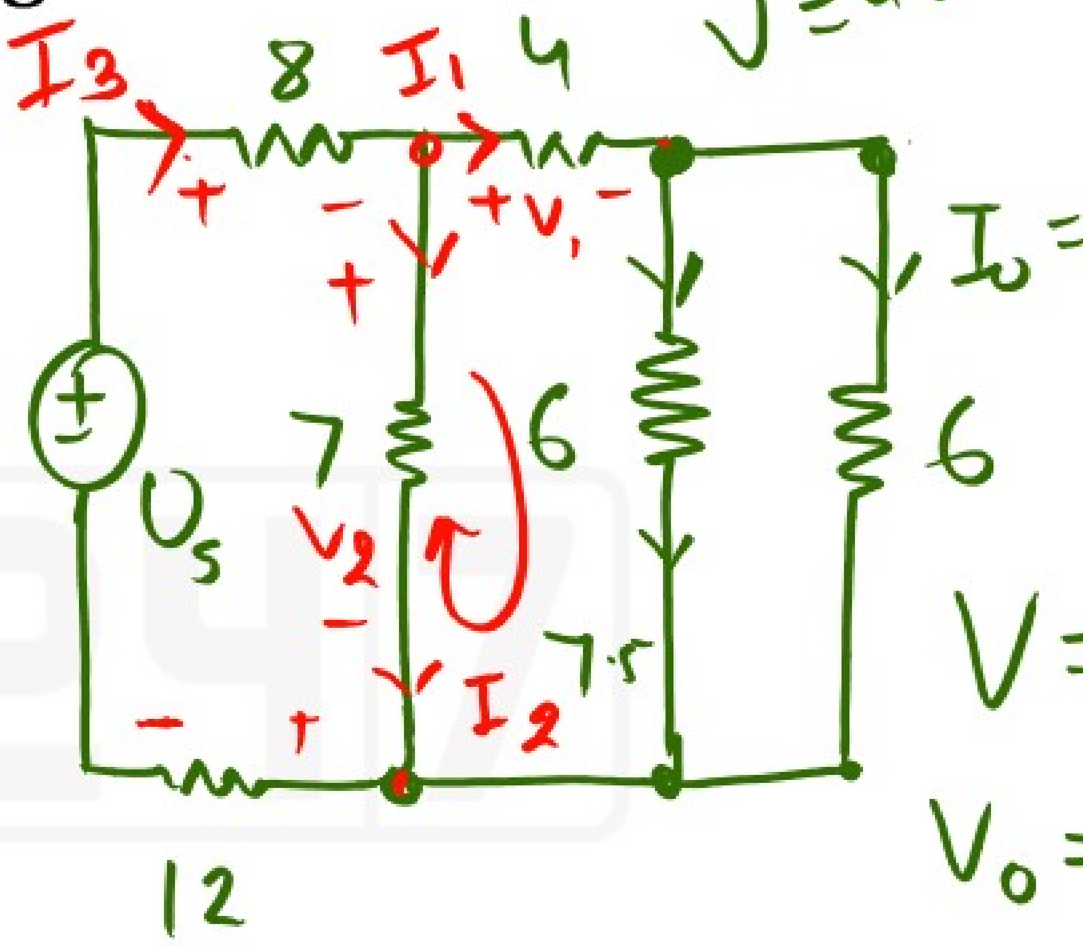
(b) 680 mV

(c) 695 mV

(d) 705 mV ✓

$V_2 = 60 + 45 = 105\,V$

$I_2 = \frac{105}{8}$



$I_0 = 7.5\,mA$

$V = 7.5 \times 6$

$V_0 = 45\,V$

$I_1 = 7.5 + 7.5 = 15\,mA$

$V_1 = 15 \times 4 = 60\,m$

Q

In a fullwave rectifier, the load resistance R_L = 2 kΩ. Each diode has idealized characteristics having slope corresponding of 400 Ω. Voltage applied to each diode is 240 sin 50 t. V. Average value of load current will be

(a) 82.00 mA

(b) 70.72 mA

(c) 63.84 mA

(d) 100.00 mA

Q

$A + A\bar{B} + A\,\bar{B}C + A\,\bar{B}C\,\bar{D}$ simplifies to:

(a) A + B

(b) $\bar{A}$ + B

(c) A. $\bar{B}$

(d) A

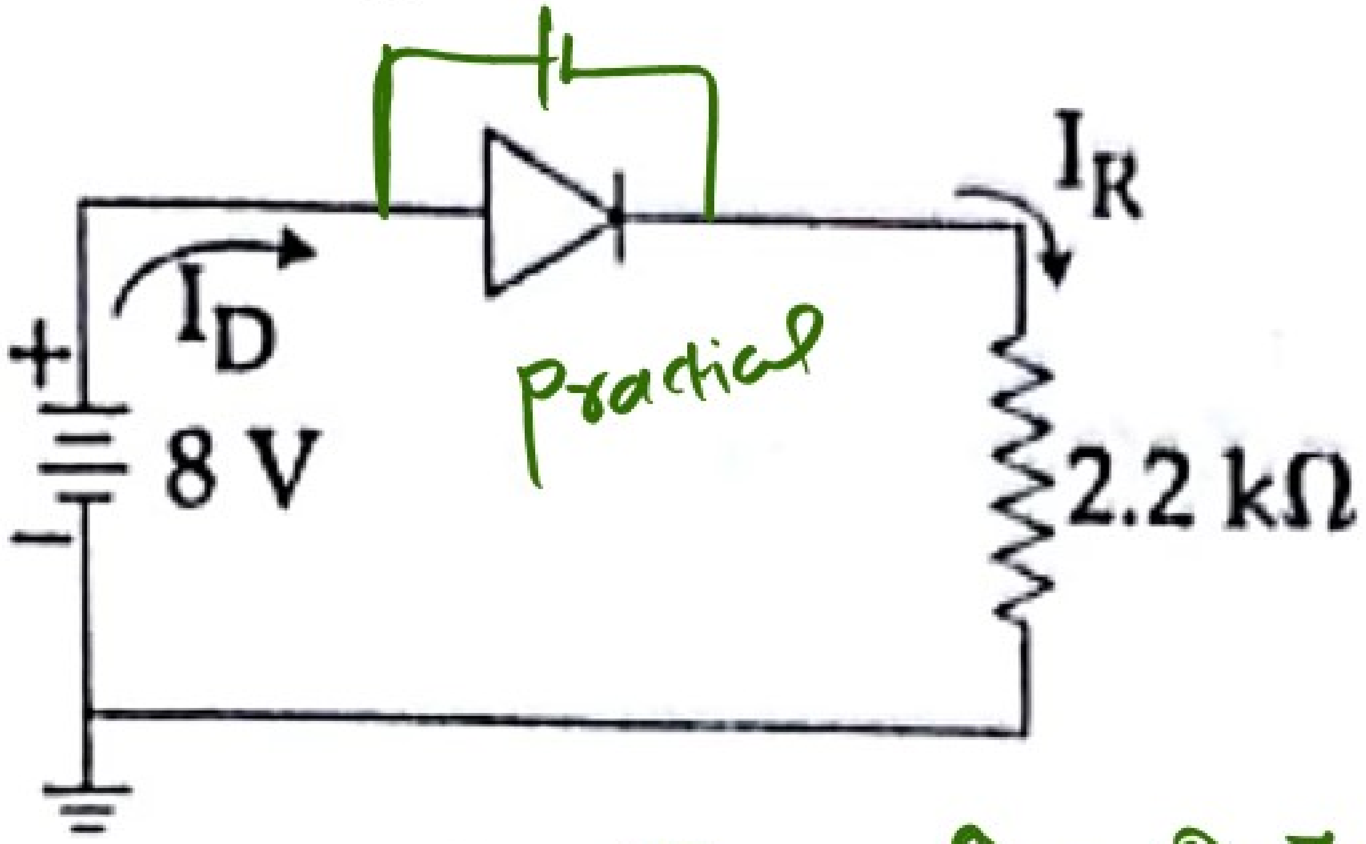
$f = A + A\bar{B} + A\bar{B}C + A\bar{B}C\bar{D}$

$f = A[1 + \ldots\ldots] = A$

हमेशा 1

Q

For a series Si diode configuration shown below the current I_D is:



$V_T = 0.7$ Si
$= 0.3$ Ge

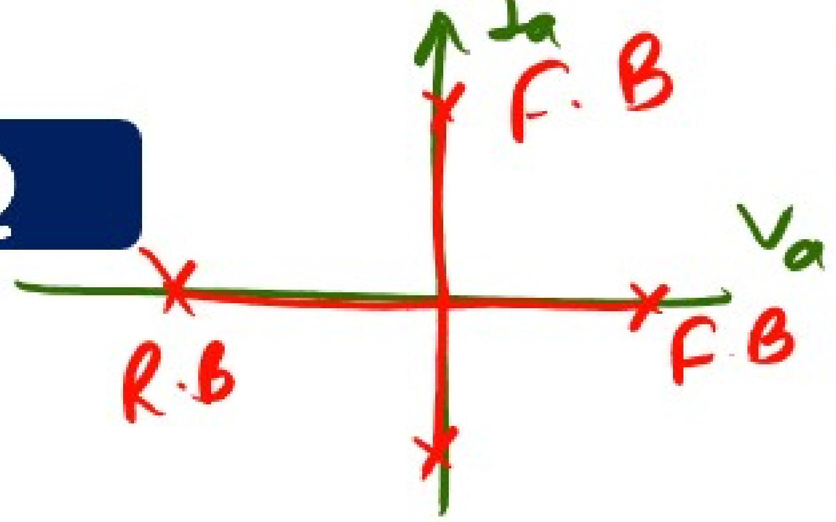
(a) 3.32 mA
(b) 3. 95 mA
(c) 3.63 mA
(d) 3.64 mA

Ideal —

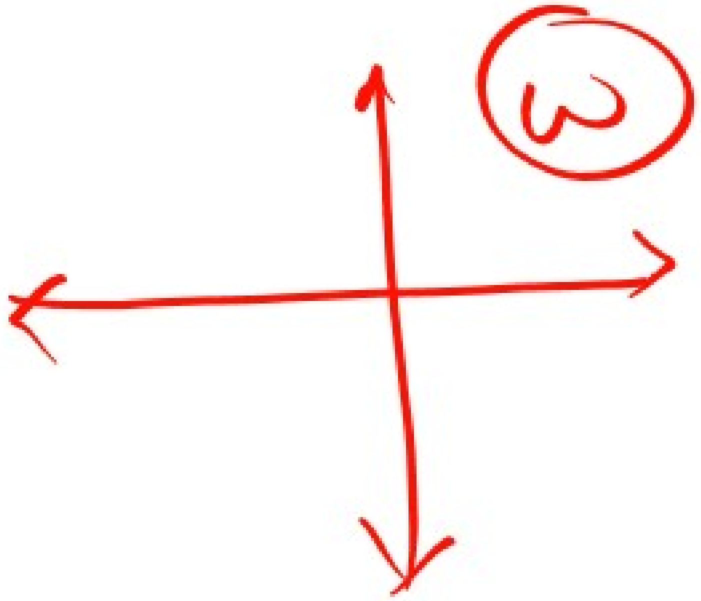
$I = \frac{8-0.7}{2.2}$

$I = 3.318$

Q



4-Quad



A TRIAC is:

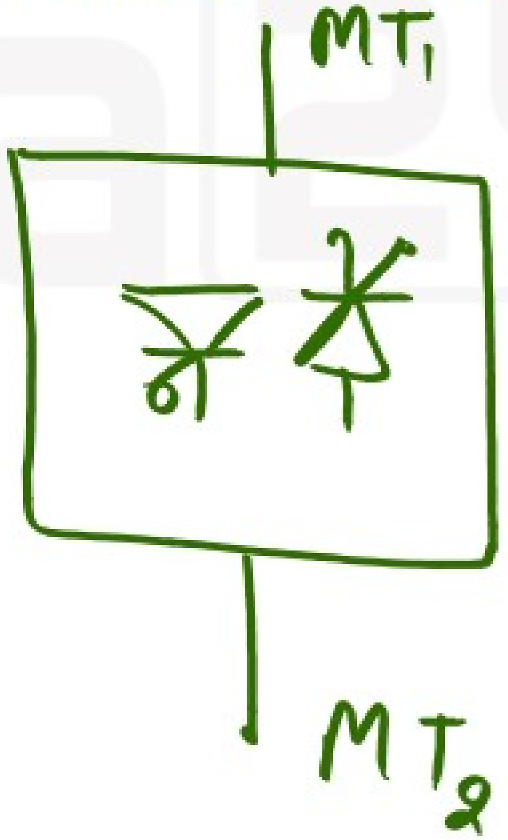
(a) bilateral device

(b) two terminal device

(c) unilateral device

(d) four terminal device

two SCR



* Connected in Antiparallel

Q

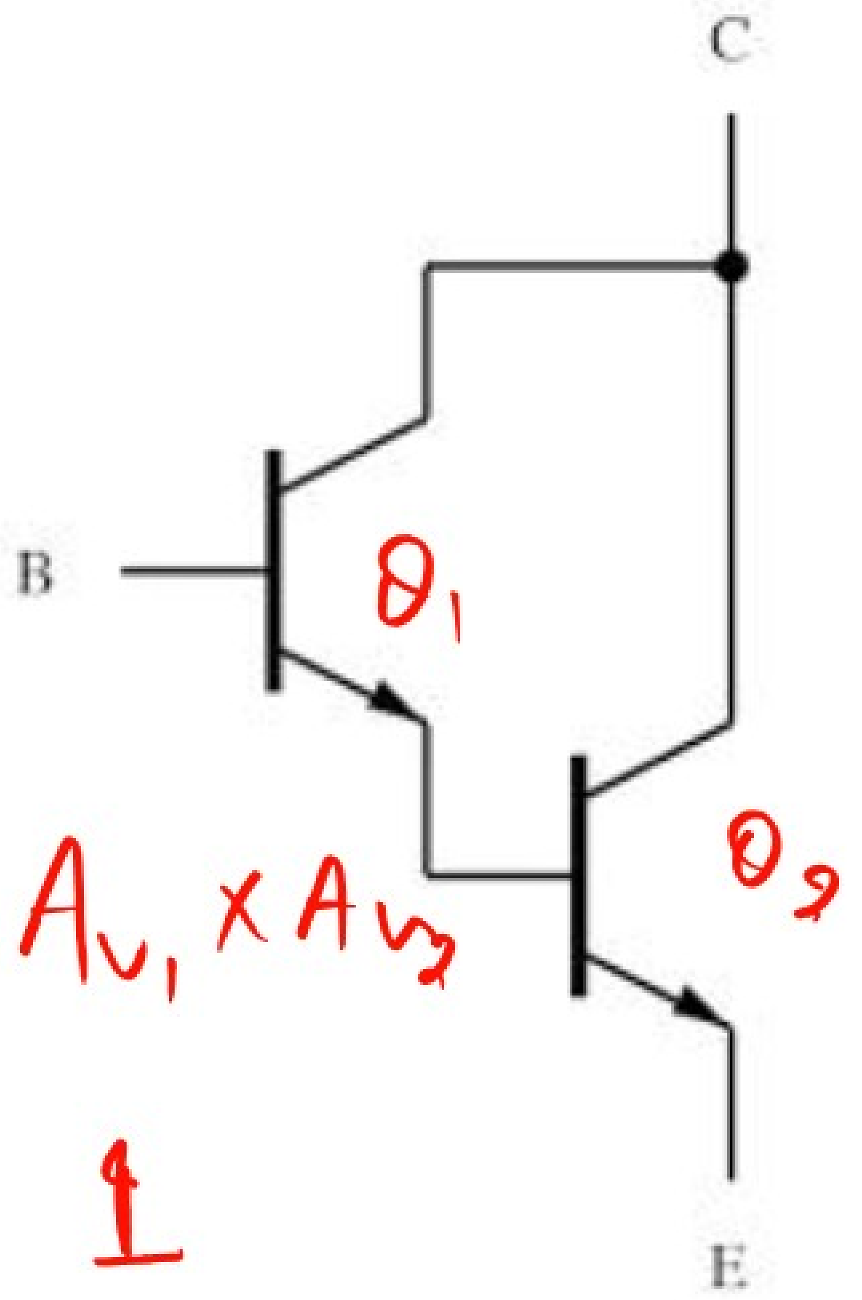
The current gain of a Darlington pair in common emitter configuration is approximately:

(a) $\frac{1+\beta}{1-\beta}$

(b) $\frac{\beta}{1+\beta}$

(c) 2β

(d) β^2



$$A_V = A_{V_1} \times A_{V_2}$$
$$= 1$$

$$A_I = h_{fe} \times h_{fe}$$
$$= h_{fe}^2 = \beta^2$$

Q

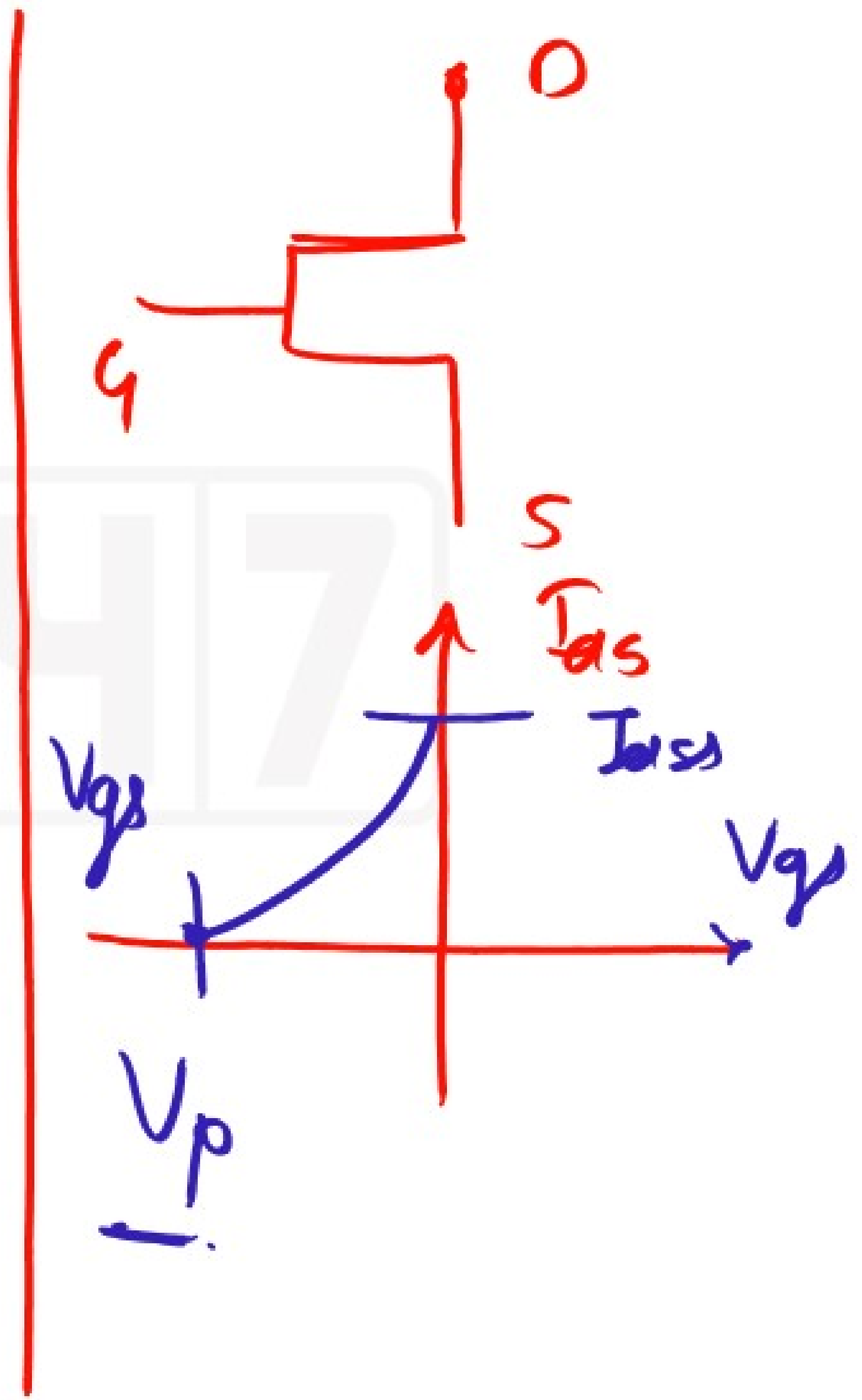
In junction field effect transistor, the drain current can be approximated as:

(a) $I_{DS} = \frac{I_{DSS}}{V_P}\left(1 - \frac{V_{GS}}{2}\right)$

(b) $I_{DS} = I_{DSS}\left(1 - \frac{V_{GS}}{V_P}\right)$

(c) $I_{DS} = I_{DSS}\left(1 - \frac{V_{GS}}{V_P}\right)^{\frac{1}{2}}$

(d) $I_{DS} = I_{DSS}\left(1 - \frac{V_{GS}}{V_P}\right)^{2}$



Q A PMMC meter has an internal resistance 200 Ω and the current required for its full scale deflection is 50 μA. The meter is capable of measuring on its own a maximum voltage of:

(a) 10 μV

(b) 5 mV

(c) 10 mV

(d) 5 μV

$V_m = I_m R_m$

$= 50 \times 10^{-6} \times 200$

$= 1000 \times 10^{-6}$

$= 10\,mV$

Q **The voltage gain in a common emitter configuration is:**

(a) $-\frac{hfeR_L}{R_0}$

(b) $-hfe$

(c) $-\frac{hfeR_L}{R_i}$

(d) $hie + (1 + hfe)R_e$

$h_{fe} = \beta$

$A_V = \frac{V_0}{V_i} = \frac{-h_{fe}R_L}{R_i}$

* BJT

↓

Small signal Analysis

- Low freq.
  - → H-model
  - → π - "
  - → T - "
- High freq.
  - → π & T Model

Q

In a voltage series feedback amplifier, if R, is the input resistance without feedback. then input resistance with feedback is:

(a) $R_{if} = \frac{R_i}{1+Av\beta}$

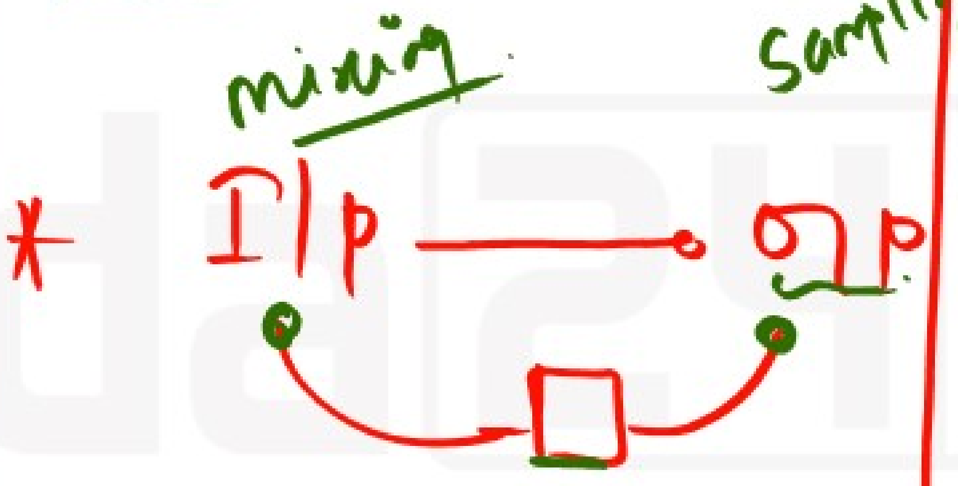
(b) $R_{if} = R_i\,(1 - Av\beta)$

(c) $R_{if} = R_i\,(1 + Av\beta)$ ✓

(d) $R_{if} = R_i$

Stab ↑

feedbck Amf.



* Gain × B.W = c

B.W ↑, Gain ↓

↑ $R_{if} = R_i(1+A\beta)$

A = open Gain

β = feedback

* $R_{of} = R_o / 1+A\beta$

* f/b → parllel
  ↳ Voltge
  → Series
  → Curren

Q

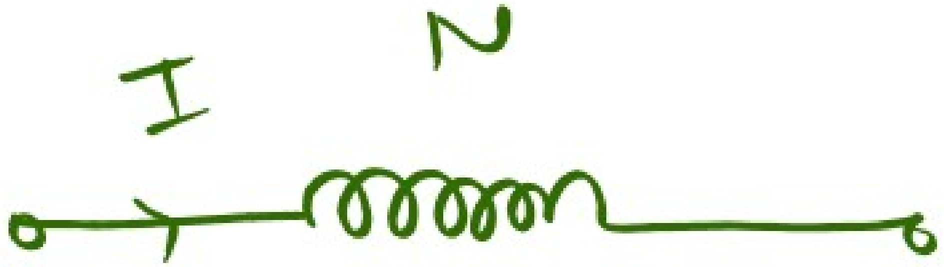
The induced emf in a coil is given as:

(a) $e = L\frac{d\varphi}{dt}$

(b) $e = L\frac{di}{dt}$

(c) $e = -L\frac{di}{dt}$

(d) $e = L\frac{d^2i}{dt^2}$



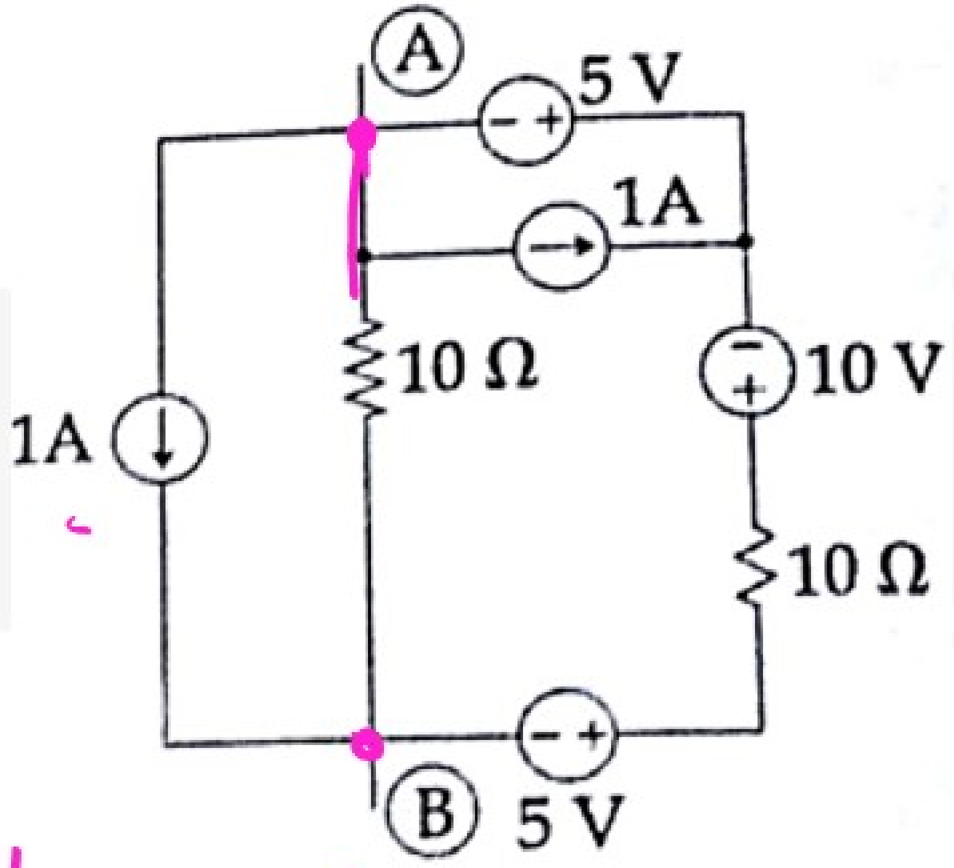
$V_L = \frac{L\,dI_L}{dt}$

$= \frac{\mu_0 \mu_r N^2 A}{l}$

lenz law

Q

An equivalent single current source between 'A' and 'B' in the following figure will be:



(a) 1A, 5 Ω

(b) 2A, 5 Ω

(c) 1A, 10 Ω

(d) 2A, 10 Ω

Q **The gain of an RC – Coupled amplifier decreases at high frequencies due to:**

(a) Inter – electrode capacitance and shunt capacitance ✓

(b) Coupling capacitors

(c) Emitter by pass capacitors

(d) Out capacitance of signal so

Gain ↓ → f high → C inter Jn Cap.

Gain ↓ f low → Coupling Cap.

Q Consider the following statements regarding the formation of P-N junctions:

1. Holes diffuse across the junction from P-side to N-side.
2. The depletion layer is wiped out.
3. There is a continuous flow of current
4. A barrier potential is set up across the junction.

Which of the above statement are correct?

(a) 1 and 3

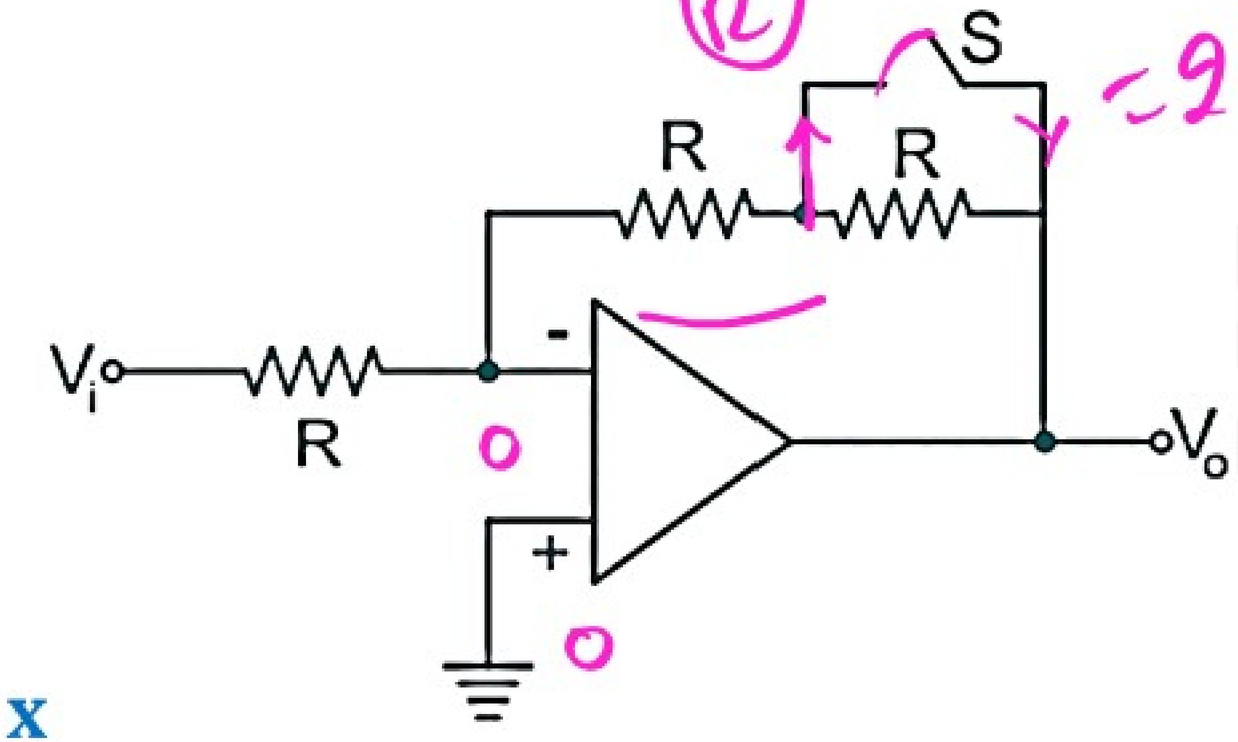
(b) 2 and 3

(c) 1 and 4

(d) 2 and 4

Q

The magnitude of the gain $\frac{v_0}{v_i}$ in the inverting op-amp circuit shown in the figure is x with switch S open. When switch S is closed, the magnitude of the gain will be



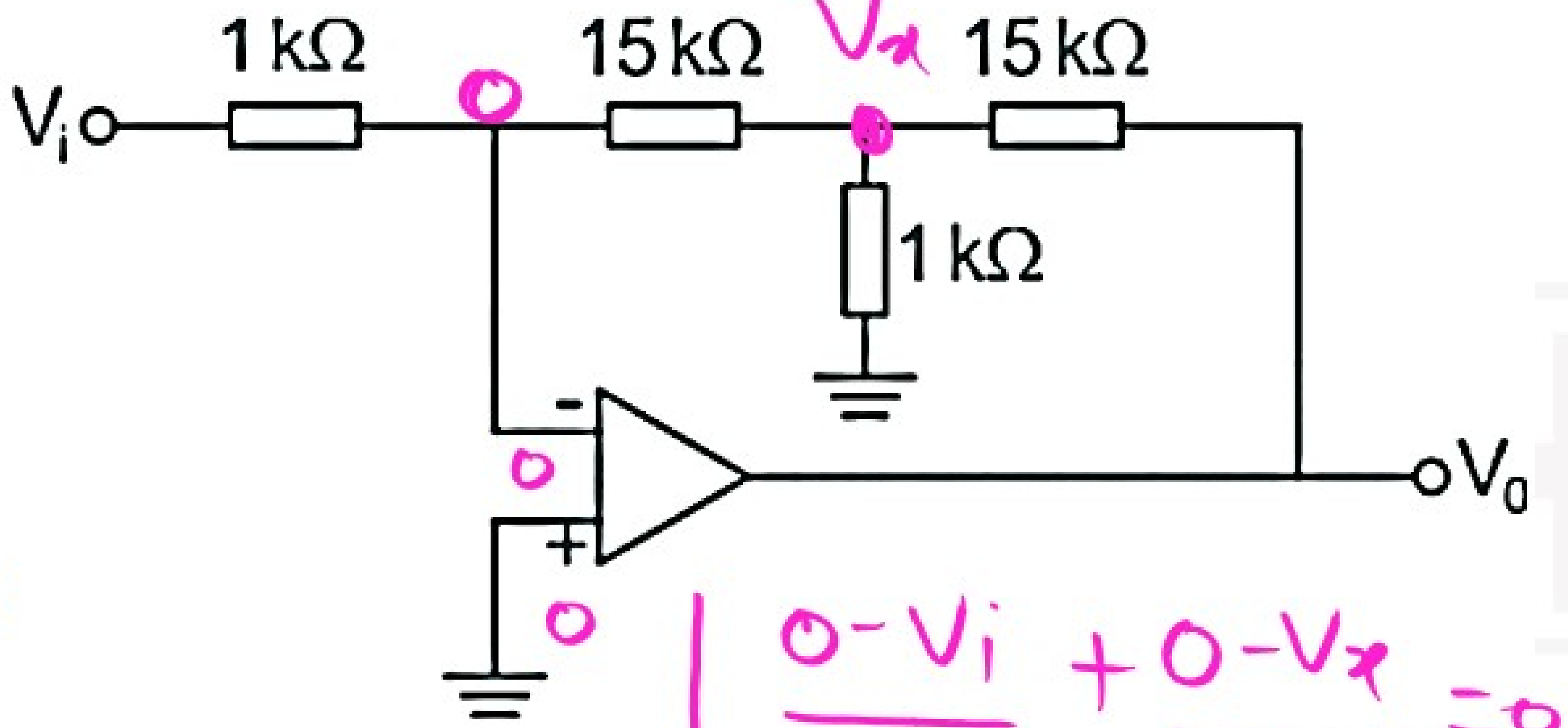
(a) x

(b) x/2

(c) 2x

(d) 2/ x

Q **What is the gain of the amplifier circuit as shown in the figure?**



(a) 255

(b) 31

(c) -3

(d) -255

$$\frac{0-V_i}{1}+\frac{0-V_x}{15}=0$$

$$V_i=\frac{-V_x}{15}$$

$$V_x=-15V_i$$

at V_x

$$\frac{V_x-0}{15}+\frac{V_x}{1}+\frac{V_x-V_0}{15}=0$$

$$\frac{V_0}{V_i}=-255$$

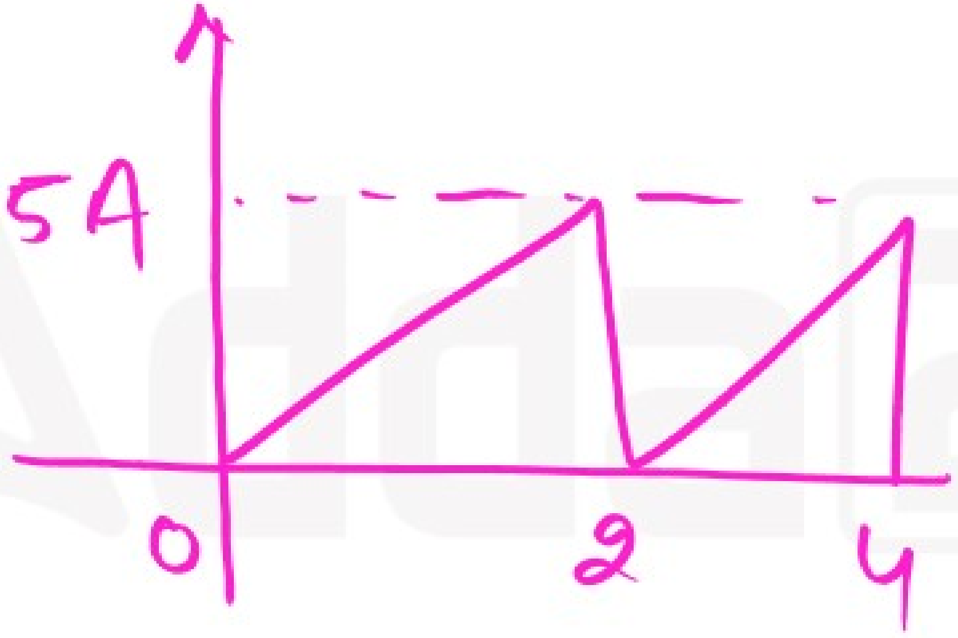
Q The Kirchhoff's current law works on the principle of conservation of

1. charge
2. energy
3. power

Which of the above is/are correct?

(a) 1 only
(b) 2 only
(c) 3 only
(d) 1, 2 and 3

Q A waveform shown in the figure is applied to a resistor of 20 Ω. The power dissipated in the resistor is



(a) 100 W

(b) 600 W

(c) 900 W

(d) none

$P_L = I_r^2 \cdot R$

$I_{rms} = \frac{I_m}{\sqrt{3}} = \frac{5}{\sqrt{3}}$

$P_L = \left(\frac{5}{\sqrt{3}}\right)^2 \times 20$

Q

For what minimum value of propagation delay in each flip-flop will a 10-bit ripple counter skip a count, when it is clocked at 10 MHz?

(a) 5 ns

(b) 10 ns

(c) 20 ns

(d) 40 ns

$f_{max} = \frac{1}{n t_{pd}}$

n = No. of Bit

$t_{pd} = \frac{1}{f_{max}} = \frac{1}{10 \times 10^6 \times 10}$

Q

In a master-slave JK flip – flop

(a) both master and slave are positive – edge-triggered

(b) both master and slave are negative – edge-triggered

(c) master is positive – edge – triggered and slave is negative – edge – triggered

(d) master is negative – edge – triggered and slave is positive – edge – triggered

* Race Around Cond. J=1 K=1

* M-S-f/f.

Q When a transmission line section is first short – circuited, and then open – circuited, it shows input impedances of 25 Ω and 100 Ω, respectively. The characteristic impedance of the transmission line is

(a) 25 Ω

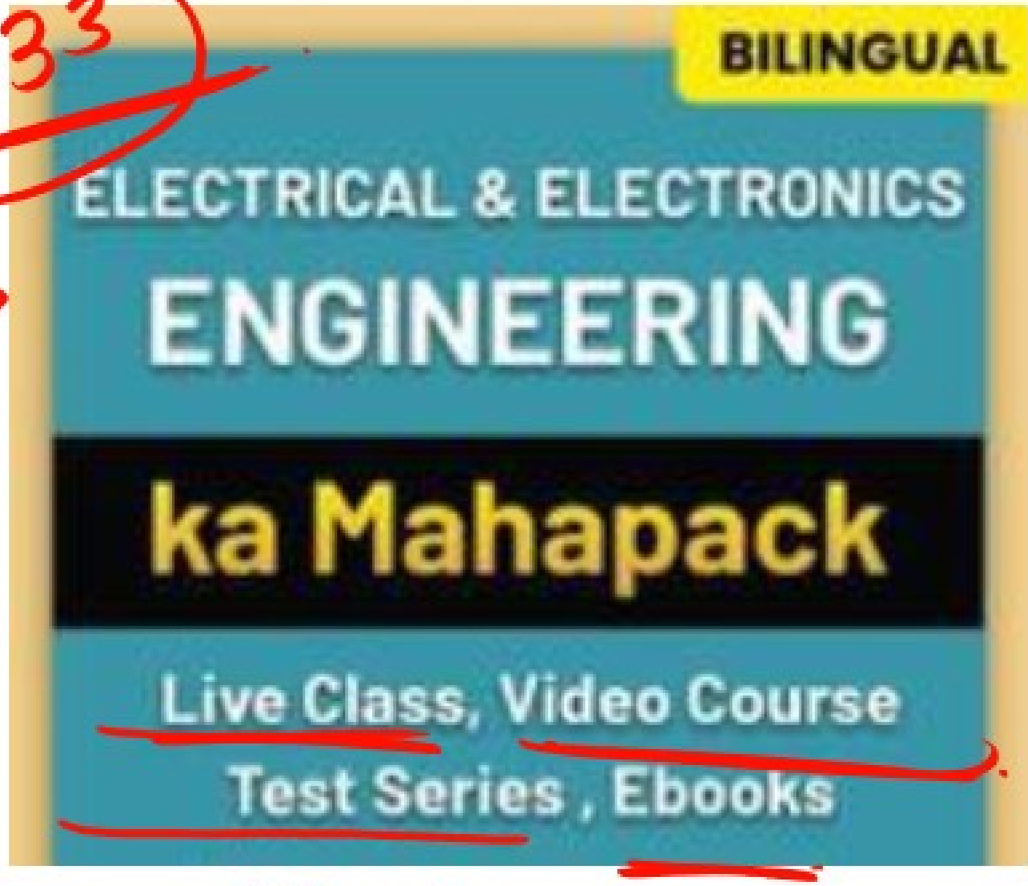
(b) 50 Ω

(c) 75 Ω

(d) 100 Ω

$Z_c = \sqrt{Z_{sc} \times Z_{oc}}$

$= \sqrt{25 \times 100}$



All in one.

SSC-JE + RRb-JE

6-pm

4433

4 cat

Tw.

4433