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MID TERM PAPER

Q3) Bicycle are convenient .... 16W and 110V to the e-bike.

Solutions-

For e-bike the required power and voltage are;

Power, $P = 16W$
Voltage, $V = 110V$

Also,

battries $= 12V$
resistors $=$ Any value

First we need to find current "I"
As, we know that

$$P = VI$$
$$I = P/V$$
$$I = \frac{16W}{110V}$$

$$\boxed{I = 0.145 A}$$

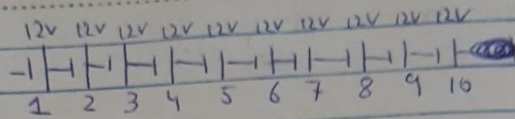Now taking 10 batteries of 12V and we connect them in series

(P.T.O)

12v 12v 12v 12v 12v 12v 12v 12v 12v
```
—|⊢|⊣|⊢|⊣|⊢|⊣|⊢|⊣|⊢|⊣|⊢|⊣|⊢|⊣|⊢|⊣|—|®|
   1   2   3   4   5   6   7   8   9  10
```

we know that in series voltage is added, so,

Total voltage = 120V

As,

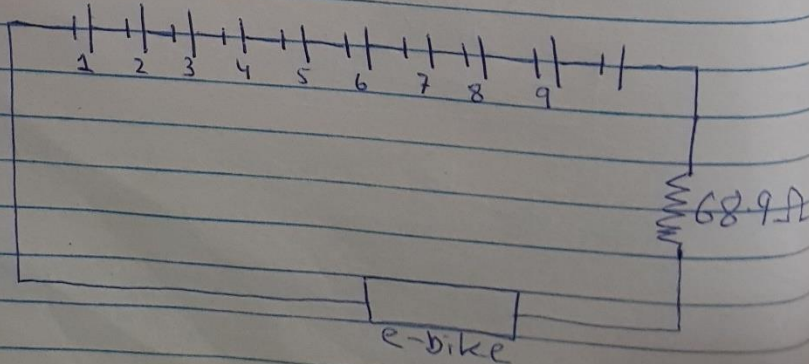Given in Question e-bike requires 110 V, Droping 10 v by resistor,

__Value of R;__

$$V = IR$$
$$R = \frac{V}{I}$$

$V = 10$
$I = 0.145A$

$$R = \frac{10}{0.145}$$
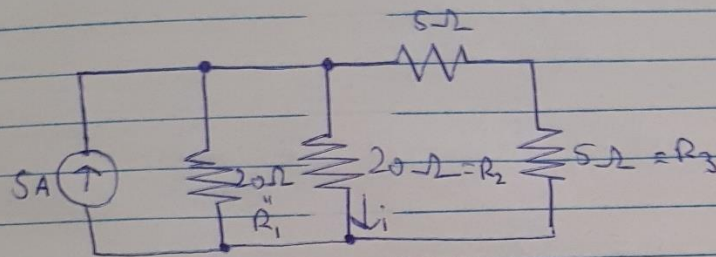
$$\boxed{R = 68.96\,\Omega}$$

```
┌─|⊢|⊣|⊢|⊣|⊢|⊣|⊢|⊣|⊢|⊣|─┐
│  1   2   3   4   5   6   7   8   9      │
│                                         │
│                                        ⧙ 68.9Ω
│                                         │
└──────────┌────────┐─────────────────────┘
           │ e-bike │
           └────────┘
```

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Q1) The circuit of figure 1 .... figure 1 is
2·5A.

Solr

Given:
$$R_1 = 20\,\Omega$$
$$R_2 = 20\,\Omega$$
$$R_3 = 5\,\Omega + 5\,\Omega = 10\,\Omega$$

By formula we know that

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

$$" = \frac{1}{20} + \frac{1}{20} + \frac{1}{10}$$

$$" = \frac{1+1+2}{20}$$

$$" = \frac{4}{20} \cdot 5$$

$$" = \frac{1}{5}$$

Reciporcalling

$$\boxed{R_{eq} = 5}$$

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Now using current divider formula

$$i = i_T \times \frac{R_{eq}}{R_i}$$

So, here,

$$i_T = 5A$$
$$R_{eq} = 5\,\Omega$$
$$R_i = 20\,\Omega$$

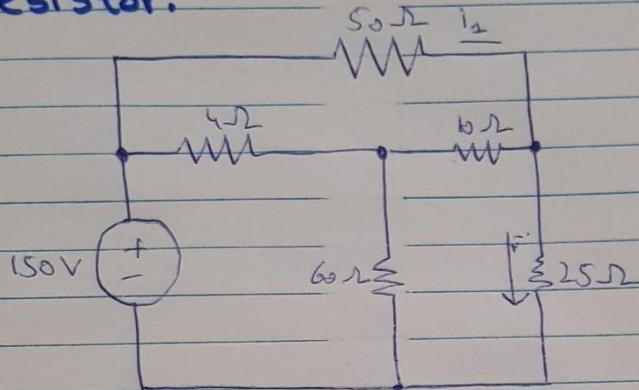putting values we get

$$i = 5 \times \frac{5}{20}$$

$$i = \frac{\cancel{25}^5}{\cancel{20}_4}$$

$$i = 5/4$$

$$\boxed{i = 1.25A}$$

In textbook there is an error as $\boxed{i = 1.25A}$ and $i \neq 2.5A$

Q2) consider the circuit ......in the 50Ω
resistor.

As we know that
   P = VI
Also,
      voltage drop
   V = IR
here   V = 50V
   So,
      $P = \dfrac{V^2}{R}$

      $P = \dfrac{(50)^2}{50}$

   $P = \dfrac{50 \times 50}{50}$

   $\boxed{P = 50 \text{ Watt}}$ Ans