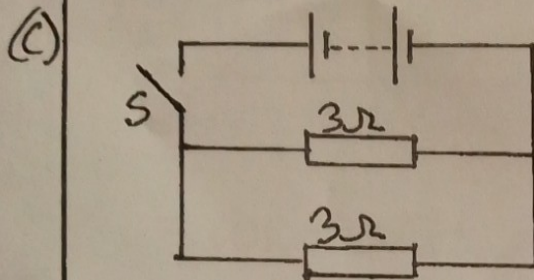


PH 202 TEST 2 MARK SCHEME 2020-2021

30

- 1(a) Electric current is the rate of flow of electric charges ①
 (b) a.c. is characterised by Periodical change in direction of current while d.c. is characterised by Unidirectional flow of current. ①



(i) p.d. across each resistor is 6V

$$I = \frac{V}{R} = \frac{6V}{3\Omega} = 2A \text{ each } ②$$

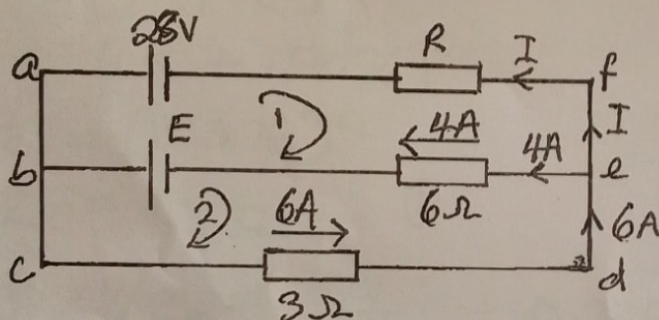
(ii) Current I through the battery

$$I = 2A + 2A = 4A \text{ } ②$$

$$(iii) Q = It = 4 \times 5 \times 60 = 1,200C \text{ } ②$$

$$(iv) E = IVt = 4 \times 6 \times 5 \times 60 = 7,200J \text{ } ②$$

2.



(a) At junction e: $I + 4 = 6$ ①

$$I = 6 - 4 = 2A \text{ } ①$$

$$I = 2A \text{ } ①$$

(b) using loop 2: bledcb ①

$$-E + 4(6) + 6(3) = 0 \text{ } ①$$

$$-E + 24 + 18 = 0 \text{ } ①$$

$$24 + 18 = E$$

$$E = 42V \text{ } ①$$

(c) using loop 1: afelba ①

$$-28 + 2(R) - 4(6) + E = 0 \text{ } ①$$

$$-28 - 24 + 42 + 2R = 0$$

$$-10 + 2R = 0$$

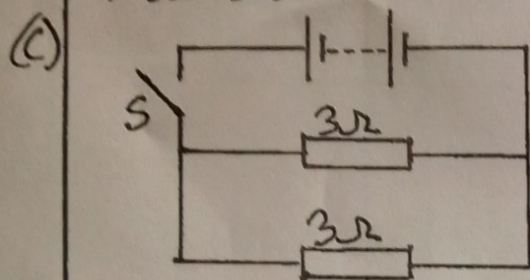
$$2R = 10$$

$$R = 10/2$$

$$R = 5\Omega \text{ } ①$$

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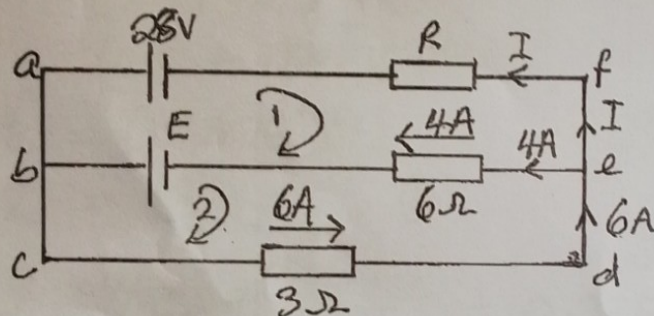
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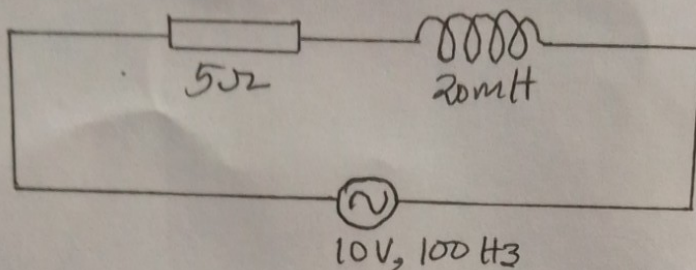
$$R = 10/2$$

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20) - Resistance dissipates electrical energy, reactance does not.

Why? $X_L = 2\pi fL$ - Reactance value depends on frequency of a.c.; resistance does not.

(b) (i)



Complete diagram with the right circuit symbols

①

(ii) $X_L = \omega L = 2\pi fL = 2\pi \times 100 \times 20 \times 10^{-3} = \underline{12.6\Omega}$ ①

(iii) $Z = \sqrt{R^2 + X_L^2}$ ①
 $= \sqrt{5^2 + 12.6^2}$
 $= \sqrt{25 + 158.76}$

$Z = \sqrt{183.76}$

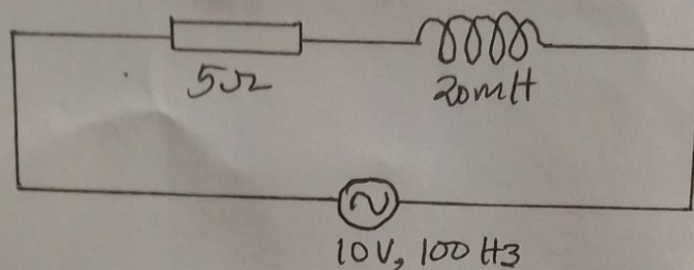
$Z = \underline{13.6\Omega}$ ①

(iv) $I = V/Z = \frac{10V}{13.6\Omega} = \underline{0.735A}$ ①

$V_L = IX_L = 0.735 \times 12.6 = \underline{9.3V}$ ①

20) — Resistance dissipates electrical energy, reactance does not.
 my 1x1mk — Reactance value depends on frequency of a.c.; resistance does not.
 = ①

(b) (i)



Complete diagram
 with the right
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 ①

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 $= \{5^2 + 12.6^2\}^{1/2}$
 $= \{25 + 158.76\}^{1/2}$

$Z = \{183.76\}^{1/2}$

$Z = \underline{13.6\Omega}$ ①

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