DPP
DAILY PRACTICE PROBLEMS

CLASS : XIITH
DATE :

Solutions

SUBJECT : PHYSICS
DPP NO. : 7

Topic :- Current Electricity

1 **(a)**

Drift velocity, $v_d = \frac{e\tau V}{mL}\left[\because E = \frac{V}{L}\right]$

Where the symbols have their usual meaning

If the temperature are not same, τ cannot be same. Then none of the given options is correct

If temperatures are same, then $\frac{v_{d_1}}{v_{d_2}} = \frac{V_1}{V_2} = \frac{1}{2}$

2 **(d)**

The light from bulb spread out uniformly in all directions.

For a 100 W bulb, intensity at a distance of 3 m is

$$I = \frac{\text{Power}}{\text{Area}} = \frac{100}{4\pi(3)^2}$$

As $I = \varepsilon_0 c E_{rms}^2 \Rightarrow E_{rms}^2 = \frac{I}{\varepsilon_0 c}$ ...(i)

For a 400 W bulb, intensity at the same point is

$$I' = \frac{400}{4\pi(3)^2} \Rightarrow E'^2_{rms} = \frac{I'}{\varepsilon_0 c}$$

$$\frac{E'^2_{rms}}{E^2_{rms}} = \frac{I'}{I} = \frac{400}{4\pi(3)^2} \times \frac{4\pi(3)^2}{100}$$

$E'^2_{rms} = E^2_{rms} \times 4 = (2.9)^2 \times 4\ [\because E_{rms} = 2.9Vm^{-1}\text{(Given)}]$

or $E'_{rms} = 2.9 \times 2Vm^{-1} = 5.8Vm^{-1}$

3 **(b)**

Neutral temperature, $t_n = \frac{t_i + t_c}{2}$

$$\Rightarrow \quad 285° = \frac{t_i + 10°}{2}$$

$$570° = t_i + 10°$$

or $t_i = 560°$

4 **(b)**

Here, V<E

$\therefore \quad E = V + Ir$

For first case

$E = 12 + \frac{12}{16}r \qquad ....(i)$

For second case

$E = 11 + \frac{11}{10}r \qquad ......(ii)$

From Eqs. (i) and (ii),

$12 + \frac{12}{16}r = 11 + \frac{11}{10}r$

$\Rightarrow r = \frac{20}{7}\Omega$

5 **(b)**

The amount of chlorine

$m = zIt = z\left(\frac{P}{V}\right)t \qquad [\because P = VI]$

$= 0.367 \times 10^{-6} \times \left(\frac{100 \times 1000}{125}\right) \times 60$

$= 0.017616 \text{ kg} = 17.616 \text{ g}$

6 **(a)**

$R_{Parallel} < R_{Series}$. From graph it is clear that slope of the line A is lower than the slope of the line B. Also slope = resistance, so line A represents the graph for parallel combination

7 **(a)**

Near room temperature, the electric resistance of a typical metal conductor increases linearly with temperature.

$R = R_0(1 + \alpha T)$

Where α is the thermal resistance coefficient.

8 **(b)**

$R = \frac{\rho L}{A} \Rightarrow 0.7 = \frac{\rho \times 1}{\frac{22}{7}(1 \times 10^{-3})^2}$

$\rho = 2.2 \times 10^{-6} ohm\text{-}m$

9 **(b)**

In the part $c\ b\ d$,

$V_c - V_b = V_b - V_d \Rightarrow V_b = \frac{V_c + V_d}{2}$

In the part $c\ a\ d$

$$V_c - V_a > V_a - V_d \Rightarrow \frac{V_c + V_d}{2} > V_a \Rightarrow V_b > V_a$$

10 **(c)**

$$m = Zi \Rightarrow t = \frac{m}{Zi} = \frac{m \times F}{E \times i} \quad \left[\because Z = \frac{E}{F}\right]$$

$$t = \frac{27 \times 96500}{108 \times 2} = 12062.5 \text{ sec } = \frac{12062.5}{3600} \text{hr} = 3.35\ hr$$

12 **(c)**

We know that $\frac{P_1}{P_2} = \frac{R_2}{R_1} = \frac{2}{1}$

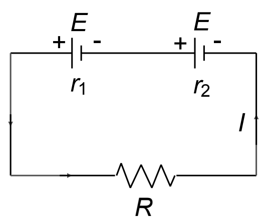
13 **(b)**

As both cells are in series, the circuit current

$$i = \frac{E + E}{r_1 + r_2 + R} = \frac{2E}{r_1 + r_2 = R}$$

As terminal potential drop across 1st cell is zero, hence

$$V_1 = E - ir_1 = E - \frac{2E}{(r_1 + r_2 + R)} r_1 = 0$$



$$\Rightarrow E = \frac{2Er_1}{(r_1 + r_2 + R)} \text{ or } r_1 + r_2 + R = 2r_1 = R = (r_1 - r_2)$$

14 **(d)**

When a circuit is made up on any two metals in thermoelectric series, the current flows across the cold junction from the later occurring metal in the series to the one occurring earlier. In thermoelectric series Bismuth comes earlier than Antimony. So, at cold junction current flows from Antimony to Bismuth and at hot junction it flows from bismuth to Antimony.

15 **(d)**

Resistivity is the property of the material. It does not depend upon size and shape

16 **(d)**

As circuit is open, therefore no current flows through circuit. Hence potential difference across X and Y=EMF of battery =120V

17 **(a)**

$$H=\frac{I^2Rt}{J}=\frac{I^2Rt}{4.2}\text{ cal}$$

18 **(b)**

Kirchhoff's second law is $\sum V=0$
It states that the algebric sum of the potential differences in any loop including those associated emf's and those of resistive elements, must equal zero.
This law represents 'conservation of energy'.

19 **(b)**

When length and radius both are doubled, in accordance with relation $R=\frac{\rho L}{A}$ the resistance of wire is reduced to $1/2$ of its initial value. As at constant voltage the heat produced $H\propto 1/R$, hence heat produced is doubled

20 **(c)**

Approximate change in resistance=$2\times\%$ change in length by stretching

PE

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	A	D	B	B	B	A	A	B	B	C
Q.	11	12	13	14	15	16	17	18	19	20
A.	C	C	B	D	D	D	A	B	B	C