PHYSICS - X-PART-7 CLASS 07

Mathematical problems which are related to Joules Law.

1. How much will be the heat developed if 0.2 A current flows through a conductor of resistance 200 Ω for 5 minute?

Current I = 0.2 A
Resistance R = 200 Ω
Time t = 5 x 60 = 300 s
Heat H = ?

$H = I^2Rt$
$= (0.2)^2 \times 200 \times 300$
$= 2400$ J

* If 4.2 J is one calorie then H = 2400 / 4.2 = 571.4 calorie

2. Find out the heat developed in 3 minute by a device of resistance 920 Ω working under 230 V

Resistance R = 920 Ω

Voltage V = 230 V

Time t = 3 x 60 = 180 s

Heat H = ?

$H = (V^2/R)t$

$= (230^2/920)x180$

$= 10350$ J

Ohm's law R = V/I

I = V / R

= 230 / 920 = 0.25 A

H = ?

$H = I^2Rt$

$= (0.25)^2 \times 920 \times 180$

$= 10350$ J

3. Let's calculate the heat developed when 3 A current flows through an electric iron box designed to work under 230 V for half an hour?

Current I = 3 A
Voltage V = 230 V
Time t = 30 x 60 = 1800 s

Heat H = ?

H = Vit

= 230 x 3 x 1800

= 1242000 J

Assignment

1. Details of two electric heaters are given below. How much will be the heat developed if they are made to work for 5 minute each?

Heater - A	Heater - B
Working voltage : 230 V Resistance : 1150 Ω Working time : 5 minute	Working voltage : 230 V Resistance : 460 Ω Working time : 5 minute

- Why does the heater having low resistance get heated more?
- In which way does the change in resistance influence the heat developed?
- Find out the current in the heaters A and B and compare the heat developed.
- How do the resistors bring about a change in the current in the circuit?