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10th Electricity – Remember these terms before solving Numerical problems

1. If a net charge Q, flows across any cross-section of a conductor in time t, then the current I, through the

cross-section is

I = Q/t

Q = It

2. The electric potential difference between two points in an electric circuit carrying some current is the work

done to move a unit charge from one point to the other –

Potential difference (V) between two points = Work done/Charge

V = W/Q

W = VQ

3. Q = n x Charge on 1 electron

When a steady current flows through a conductor, the electrons in it move with a certain average ‘drift speed’.

4. If the current I, flowing in a metallic wire and the potential difference across its terminals is V .

Then potential difference, V, across the ends of a given metallic wire in an electric circuit is directly proportional

to the current flowing through it, provided its temperature remains the same. This is called Ohm’s law.

V  I  V = RI or, I = V/R

5. Resistance of the conductor depends (i) on its length, (ii) on its area of cross-section, (iii) on the nature of its

material and (iv) temperature

R  l/A  R =  l/A Or,  = RA/l

6. If resistors joined in series: V = V1 + V2 + V3 but I = I1 = I 2 = I 3

Then R = R 1 + R 2 + R 3

6. If resistors joined in Parallel: V = V1 = V2 = V3 but I = I1 + I 2 + I 3

Then 1/R = 1/R 1 + 1/R 2 + 1/R 3

7. If a current I flowing through a resistor of resistance R. and the potential difference across is V for time t sec

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Then, the work done in moving the charge Q through a potential difference V is = W= VQ.

But, Q = It

 W = V I t ------(i)

Now, Power = work done / Time

 P = W/t

{or, W = Pt [The energy supplied to the circuit by the source in time t is P × t = V I t]

 P = V I t /t [ Using eq. (i) ]

 P = VI ----------- (ii)

The amount of heat produced in time t = H

 H = the energy supplied to the circuit by the source in time t = V I t

Applying Ohm’s law, V = IR

H = I2 R t

Note: heat produced in a resistor is

(i) Directly proportional to the square of current for a given resistance,

(ii) Directly proportional to resistance for a given current, and

(iii) Directly proportional to the time for which the current flows through the resistor.

8. Electric Power: The rate at which electric energy is dissipated or consumed in an electric circuit is called

electric power.

The power P is given by P = VI Using, V = IR

 P = I2R = V2/R

Also using, V/R = I

 P = V2/R

9. The commercial unit of electric energy is kilowatt hour (kW h) = 1 unit.

10. 1 kW h = 1000 watt × 3600 second = 3.6 × 106 watt second = 3.6 × 106 joule (J)