**3-CURRENT ELECTRICITY**

**1. Definitions of Electric Current**

1. Electric current =  or  2. As *q = ne, so*   3. In case of an electron revolving in a circle of radius *r with speed v*, period of revolution of the electron is  Frequency of revolution,  Current at any point of the orbit is I = charge flowing in 1 revolution x No. of revolutions per second or 

**2. Ohm’s law, Resistance, Resistivity, Conductance, Conductivity, Current Density and Colour Code of Carbon Resistors**

1. Ohm’s law,  or *V = IR* 2. Resistance of a uniform conductor,  3. Resistivity or specific resistance,  4. Conductance  5. Conductivity =  or  6. Current density =  or  7. Colour code of carbon resistors.

**3. Drift Velocity**

1. Current in terms of drift velocity (*vd*) is *I = en A vd* 2. Current density, *j* = *envd*

3. No. of atoms in one gram atomic mass of an element, *N= Avogadro’s number = 6.023* x *1023* 4. In terms of relaxation time   and  5. Relation between current density and electric field,  or 

**4. Mobility of Charge Carriers**

1. Mobility,  2. Electric current, *I* = *enAvd = enA μE*

 3. Conductivity of metallic conductor,4. Conductivity of semiconductor 

**5. Temperature Variation of Resistance**

Temperature coefficient of resistance  if  and , then  or  **** **6. Combination of Resistances in Series and Parallel**

1. The equivalent resistance Rs of a number of resistances connected in series is given by  2. The equivalent resistance Rp of a number of resistances connected in parallel is given by  3. For two resistances in parallel Currents through the two resistors will be and 

**7. EMF, Internal Resistance, Terminal Potential Difference and Grouping of Cells**

1. EMF of a cell,  2. For a cell of internal resistance *r*, the emf is  3. Terminal p.d. when a current is being drawn from the cell.  4. Terminal p.d. of a cell, 

 5. Terminal p.d.. when the cell is being charged,  6. Internal resistance of a cell, 

**8. Grouping of Cells**

1. For *n* cells in series,  2. For *n* cells in parallel,  3. For mixed grouping,  where *n* = no of cells in series in one row. *m* = no. of rows of cells in parallel. 4. For maximum current, the external resistance must be equal to the total internal resistance.

i.e.  or *nr = mR*

**9. Heating Effect of Current, Electric Power and Electric Energy**

1. Heat produced by electric current, joule =  or joule =  2. Electric power,  3. Electric power, 

**10. Kirchhoff’s Laws**

1.  (Junction rule) or Total incoming current = Total outgoing current 2.  (Loop rule)

**11.(i) Comparison of E.M.F.s of two Cells (ii) Measurement of internal Resistance of a cell by a Potentiometer**

1. For comparing e.m.f.s of two cells,  2. For measuring internal resistance of a cell,  3. Potential gradient of the potentiometer wire,  4. Unknown emf balanced against length 

**12. (i) Wheatstone Bridge (ii) Slide Wire Bridge**

1. For a balanced Wheatstone bridge,  If X is the unknown resistance  or  2. In a slide wire bridge, if balance point is obtained at *l* cm from zero end, then  or 