UNIT – 2 CURRENT ELECTRICITY
TWO MARKS

1.Define electric current

The electric current in a conductor is defined as the rate of flow of charges through a given cross-sectional area A.

$\mathbf{I = \frac{Q}{t}}$ **Unit** : Ampere

Quantity : scalar

2.Define 1 ampere current

1A of current is equivalent to 1 Coulomb of charge passing through a perpendicular cross section in 1second

$$\mathbf{I = \frac{1C}{1s}}$$

3.Define Drift velocity

The drift velocity is the average velocity acquired by the electrons inside the conductor when it is subjected to an electric field

$\mathbf{v_d = a\,\tau}$ **Unit:** m/s **quantity :** vector

4.Define mean free time

The average time between successive collisions is called the mean free time denoted by τ . $\boldsymbol{\tau = \frac{v_d}{a}}$

Unit : s

5.Define mobility

It is defined as the magnitude of the drift velocity per unit electric field.

$\boldsymbol{\mu = \frac{v_d}{E}}$ **Unit :** m^2/Vs

Quantity : scalar

6.Define Current density (BB-10)

The current density (J) is defined as the current per unit area of cross section of the conductor.

$\mathbf{J = \frac{I}{A}}$ **Unit** : A/m^2

Quantity : Vector

7.Write down microscopic model of ohm's law (BB-3)

$$\vec{J} = \sigma\vec{E}$$

J- Current density **σ** – conductivity

E – Electric field

8. **Why current is a scalar? (BB-1)**

Current I is defined as the scalar product of the current density and area vector in which the charges cross.

It does not obey vector law of addition and multiplication .& it cannot be resolved into components unlike other vector quantities

9.Define Ohm's law or macroscopic form of ohm's law (BB-4)

At constant temperature , steady current flowing through the conductor is directly proportional to potential difference between two ends

$$\mathbf{V \propto I \qquad V = IR}$$

V-potential difference **I** - current

R - resistance

10.Define resistance

Resistance is the ratio of potential difference across the given conductor to the current passing through the conductor.

$\mathbf{R = \frac{V}{I}}$ **Unit :** ohm or Ω

11.Define Ohmic and non ohmic devices (BB-5)

Materials for which the current against voltage graph is a straight line through the origin, are said to obey Ohm's law and their behaviour is said to be ohmic

Materials or devices that do not follow Ohm's law are said to be non-ohmic.

12.Define electrical resistivity (BB-6)

Electrical resistivity of a material is defined as the resistance offered to current flow by a conductor of unit length having unit area of cross section.

$$\rho = \frac{RA}{L}$$

Unit : Ω m or ohm-meter

13.Why repairing the electrical connection with the wet skin is always dangerous.

The human body contains a large amount of water which has low resistance of around 200 Ω and the dry skin has high resistance of around 500 k Ω. But when the skin is wet, the resistance is reduced to around 1000 Ω.

14.Define equivalent resistances of resistors when connected in series and parallel

When several resistances are connected in series, the total or equivalent resistance is the sum of the individual resistances as

$$R_s = R_1 + R_2 + R_3$$

When a number of resistors are connected in parallel, the sum of the reciprocal of the values of resistance of the individual resistor is equal to the reciprocal of the effective resistance of the combination

$$\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

15.Why House hold appliances are always connected in parallel

House hold appliances are always connected in parallel so that even if one is switched off , the other devices could function properly

16.What is carbon resistor

Carbon resistor consists of ceramic core , on which a thin layer of crystalline carbon is deposited .

17.Define temperature coefficient of resistance (BB-7)

It is defined as the ratio of increase in resistivity per degree rise in temperature to its resistivity at T_0 .

$$\alpha = \frac{\Delta\rho}{\Delta T\, \rho_0}$$ **Unit :** per ^{0}C

18.Why temperature coefficient of resistance (α) is positive for conductor and negative for semiconductor

If the temperature of a conductor increases, the average kinetic energy of electrons in the conductor increases. This results in more frequent collisions and hence the resistivity increases.

As the temperature increases, more electrons will be liberated from their atoms . Hence the current

increases and therefore the resistivity decreases.

19.Define thermistor

A semiconductor with a negative temperature coefficient of resistance is called a thermistor.

Ex: Germanium , silicon

20.Define transition or critical temperature

The resistance of certain materials become zero below certain temperature T_c. This temperature is known as critical temperature or transition temperature.

21.What are superconductor

The resistance of certain materials become zero below certain temperature. The materials which exhibit this property are known as superconductors

22.When the car engine is started with headlights turned on, they sometimes become dim.

This is due to the internal resistance of the car battery.

23.Define Kirchhoff's first rule (Current rule or Junction rule) (BB-13)

It states that the algebraic sum of the currents at any junction of a circuit is zero. It is a statement of conservation of electric charge. Current entering the junction is taken as positive and current leaving the junction is taken as negative

24.Define Kirchhoff's Second rule (Voltage rule or Loop rule) (BB-14)

It states that in a closed circuit the algebraic sum of the products of the current and resistance of each part of the circuit is equal to the total emf included in the circuit. This rule follows from the law of conservation of energy for an isolated system.

25.Define Joule's heating effect.

When current flows through a resistor, some of the electrical energy delivered to the resistor is converted into heat energy and it is dissipated.

26. Define Joule's law of heating. (BB-17)

$$H = I^2Rt$$

It states that **the heat developed in an electrical circuit due to the flow of current varies directly as**

(i) the square of the current

(ii) the resistance of the circuit and

(iii) the time of flow.

27.Define thermoelectric effect

Just as current produces thermal energy, thermal energy may also be suitably used to produce an electromotive force.

28.Why circuit breaker is advantageous over fuse

Whenever there is an excessive current produced due to faulty wire connection, the circuit breaker switch opens. After repairing the faulty connection, we can close the circuit breaker switch.

The only disadvantage with the above fuses is that once fuse wire is burnt due to excessive current, they need to be replaced

29.Define Seebeck effect (BB-18)

Seebeck discovered that in a closed circuit consisting of two dissimilar metals, when the junctions are maintained at different temperatures an emf (potential difference) is developed.

30.What are factors on which magnitude of the emf developed in a thermocouple depends

(i) the nature of the metals forming the couple and

(ii) the temperature difference between the junctions.

31.What are Applications of Seebeck effect (BB-21)

Seebeck effect is used in thermoelectric generators (Seebeck generators).These thermoelectric generators are used in power plants to convert waste heat into electricity.

This effect is utilized in automobiles as automotive thermoelectric generators for increasing fuel efficiency.

Seebeck effect is used in thermocouples and thermopiles to measure the temperature difference between the two objects.

32.Define Peltier effect (BB-20)

Peltier discovered that when an electric current is passed through a circuit of a thermocouple, heat is evolved at one junction and absorbed at the other junction

33. Define Thomson effect (BB-19)

Thomson showed that if two points in a conductor are at different temperatures, the density of electrons at these points will differ and as a result the potential difference is created between these points. Thomson effect is also reversible.

34.What is superconductivity (BB-8)

The ability of certain metals , their compounds and alloys to conduct electricity with zero resistance at very low temperature is called Superconductivity

35.What is electric power and energy (BB-9)

The electric power is defined as rate at which electrical energy is delivered **Unit :** watt

Electric energy is work done by moving streams of electrons or charges **Unit :** joule

36.Write down various from of expression for power in electric circuit (BB-12)

$P = VI = I^2R = V^2/ R$

37.Derive expression for power P=VI in electric circuit (BB-11)

$P = \frac{dW}{dt} = \frac{d}{dt}(V.dQ) = V\frac{dQ}{dt}$

Since $I = \frac{dQ}{dt}$

P = VI

38.State principle of potentiometer (BB-15)

When a constant current flows through a wire of uniform area of cross section , The emf of the cell is directly proportional to the balancing length of wire between two points

$E \alpha l$

39.What do you meant by internal resistance of a cell (BB-16)

The resistance offered by electrolyte of a cell to the flow of current between its electrodes is called internal resistance of a cell

40.Distinguish between drift velocity and mobility (BB-2)

Drift velocity	Mobility
It is defined as velocity with which electrons get drifted towards positive terminal when electric field is applied	It is defined as the magnitude of the drift velocity per unit electric field
$v_d = a\tau$	$\mu = \frac{v_d}{E}$
Unit : m/s	**Unit :** $m^2V^{-1}s^{-1}$

41.Define instantaneous current

It is defined as limit of average current , $\Delta t \to 0$ $I = \lim_{\Delta t \to 0} \frac{\Delta Q}{\Delta t} = \frac{dQ}{dt}$

42.Why nickel is used as heating element

It has high specific resistance and can be heated to very high temperature without oxidation

43.What are factors on which resistivity of material depend

(i)Inversely proportional to number density of electrons

(ii) inversely proportional to average time between collisions

See all graphs , table , note , do you know and all derivations in book

Three and Five marks (Book back)

1. Describe the microscopic model of current and obtain general form of Ohm's law (pg.no ; 87 upto eq 2.12)
2.Obtain the macroscopic form of Ohm's law from its microscopic form and discuss its limitation. (pg.no ; 88 , 89 with graph)
3.Explain the equivalent resistance of a series and parallel resistor network (pg.no ; 92 ,93 eq;2.21 , 2.22 , 2.23 ,2.24,2.25.2.26 with diagram)
4.Explain the determination of the internal resistance of a cell using voltmeter. (pg.no ; 103 , 104 eq 2.35 to 2.37 with diagram)
5. State and explain Kirchhoff's rules. (pg.no ; 107 -108)
6. Obtain the condition for bridge balance in Wheatstone's bridge. (pg.no ; 109 – 110 upto eq 2.53)
7. Explain the determination of unknown resistance using meter bridge. (pg.no ; 117-118 upto eq 2.56)
8. How the emf of two cells are compared using potentiometer? (pg.no ; 113 upto eq 2.61)

Three and Five marks (Book inside)

1.Derive a relation between current and drift velocity (eq 2.7 -2.9)
2. Derive a relation between current density and drift velocity (eq 2.7 -2.10)
3.Explain about cells in series and parallel (pg.no 104 -107)
4.What is potentiometer and write down its principle (pg,no 112-113 upto 2.58)
5.Explain determination of internal resistance of a cell by potentiometer (pg.no 114)
6.Explain application of Joule's heating effect (pg.no 115-117)
7.Explain Thomson effect .Write about positive and negative Thomson effect with example (pg.no 118)
8.Explain seeback effect and its application (pg.no 117)

See all graphs , table , note , do you know and all derivations in book

See all the book back and book inside problems

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REVOLUTION FOR LEARNING – PEELAMEDU ,COIMBATORE
12TH ELECTROSTATICS ONE MARK AND BOOK BACK QUESTION TEST

Marks ; 125

Time ; 1 hr 50 min

I.Choose the best answers **45×1 = 45**

1. An electric dipole is placed at an alignment angle of 30° with an electric field of 2×10^5 N C^{-1}. It experiences a torque equal to 8 N m. The charge on the dipole if the dipole length is 2 cm is

(a) 4 mC (b) 8 mC (c) 5 mC (d) 7 mC

2. If voltage applied on a capacitor is increased from V to 4V, choose the correct conclusion.

(a) C remains the same, Q is quadrupled (b) Q is doubled, C doubled

(c) C remains same, Q doubled (d) Both Q and C remain same

3. Two metallic spheres of radii 1 cm and 3 cm are given charges of 3×10^{-2} C and 5×10^{-2} C respectively. If these are connected by a conducting wire, the final charge on the bigger sphere is

(a) 3×10^{-2} C (b) 4×10^{-2} C (c) 1×10^{-2} C (d) 2×10^{-2} C

4. The electrostatic force obeys _____

(a) Newton's I law (b) Newton's II law (c) Newton's III law (d) none of the above

5. In electrostatics if the charges are in motion, another force named _____ comes into play in addition to coulomb force.

(a) Lorentz force (b) Repulsive force (c) Attractive force (d) electromagnetic force

6. The electrostatic force is always greater in magnitude than gravitational force for _____ Object (a) bigger size (b) smaller size (c) medium size (d) all the above

7. The relative permittivity of water is _____

(a) $\varepsilon_r = 70$ (b) $\varepsilon_r = 75$ (c) $\varepsilon_r = 80$ (d) $\varepsilon_r = 85$

8.A dielectric is a non conducting material and has no free

(a) Proton (b) neutron (c) electron (d) All the above

9.The energy stored per unit volume of space is defined as

(a) Energy (b) capacitance (c) Energy density (d) none of the above

10.Electrostatic potential energy stored in dipole in a uniform electric field

(a) U = PE (b)U=-PE (c)U=PEsinΘ (d) None of the above

11.The unit of relative permittivity is

(a) $C^2N^{-1}m^{-1}$ (b) $C^{-2}Nm^2$ (c) $C^2N^{-1}m^{-2}$ (d)no unit

12. The unit of electric flux

(a) $C^2N^{-1}m^{-1}$ (b) $C^{-1}Nm^2$ (c) $C^2N^{-1}m^{-2}$ (d)no unit

13.Which of the following is scalar

(a) Dipole moment (b)electric force (c) electric field (d)Electric charge

14.The electric field inside and outside the plates of two oppositely charged plane sheets of charge density σ is (a) $\frac{\sigma}{2\epsilon_0}$, zero (b) $-\frac{\sigma}{2\epsilon_0}$, $\frac{\sigma}{2\epsilon_0}$ (c) $\frac{\sigma}{\epsilon_0}$, zero (d) zero, $\frac{\sigma}{2\epsilon_0}$

15. In a hydrogen atom the electron revolves around the proton in an orbit of 0.53Å̃ .The potential produced by the electron on the nucleus

(a)6.8V (b) 13.6V (c) 54.4 V (d) 27.2V

16.The Electric potential V as a function of distance x (meters) is given by $V=(5x^2+10x-9)$ volt. The value of electric field at point x = 1

(a) $20Vm^{-1}$ (b) $6Vm^{-1}$ (c) $11Vm^{-1}$ (d) $-23Vm^{-1}$

17.A condenser is charged to a potential of 200V and has a charge of 0.1C .The energy stored is
(a)1J (b)2J (c) 5J (d)10J
18.The magnitude of torque on dipole is maximum if
(a) $\Theta = 0^0$ (b) $\Theta = 60^0$ (c) $\Theta = 90^0$ (d) $\Theta = 180^0$
19.The magnitude of electric dipole moment of water molecule
(a) 6×10^{-30}Cm (b) 6.2×10^{-30}Cm (c) 6.1×10^{-30}Cm (d) 5.95×10^{-30}Cm
20.The potential due to a point charge fall as
(a) $1/r^2$ (b) $1/r^3$ (c) 1/r (d) -1/r
21.The time taken by a conductor to reach electrostatic equilibrium is in the order of
(a) 10^{-18} s (b) 10^{-14} s (c) 10^{-16} s (d) 10^{-19} s
22.The unit of electric susceptibility
(a)$C^2N^{-1}m^{-2}$ (b) $C^{-2}Nm^2$ (c) $C^2N^{-1}m^{-2}$ (d)no unit
23.An uniformly charged spherical shell of 2cm diameter has a surface charge density of 80μC/m^2.The charge on the shell is
(a)100.48 nC (b) 100.48 μC (c) 100.48 C (d) 102.8C
24.The capacitance of parallel plate capacitor increases from 5μf to 50 μf when a dielectric is filled between the plates .The permittivity pf dielectric is
(a) 8.854×10^{-12} $C^2N^{-1}m^{-2}$ (b)) 8.854×10^{-11} $C^2N^{-1}m^{-2}$
(c) 8.854×10^{-10} $C^2N^{-1}m$ (d) 7×10^{-12} $C^2N^{-1}m^{-2}$
25.A electric field placed at an angle in a non uniform electric field experiences
(a) neither a force nor torque (b) only force (c) only torque (d) both force & torque
26.One joule per coulomb is called
(a) ampere (b) farad (c) electric field intensity (d)volt
27.Relative permittivity is also known as
(a) dielectric strength (b)dielectric constant (c) polarizability (d)susceptibility
28.The total dipole moment per unit volume of dielectric is
(a) induction (b)charge distribution (c)polarisation (d) quantisation
29.Electrostatic force is stronger than gravitational force by
(a) 2.23×10^{39} times (b) 2.25×10^{39} times (c) 2.27×10^{39} times (d) 2.29×10^{39} times
30.When a point charge of 6 mC is moved between two point in a electric field , the work done is 1.8×10^{-5}J.The potential difference between two points
(a)1.08V (b)3V (c) 1.08 mc (d) 30V
31.The intensity of electric field produces a force of 10^{-5}N on a charge of 5μC is
(a) $5\times10^{-11}NC^{-1}$ (b) $50NC^{-1}$ (c) $2NC^{-1}$ (d) $0.5NC^{-1}$
32. Two capacitors are connected in series. Their effective capacitance is 1.5 μF. The value of one capacitor is 4 uF. What is the value of another capacitor?
a)2.4μF b) 0.24 μF c) 0.417 uF d)4.17μF
33. The work done in moving 500 *C* charge between two points separated by a distance 2m on equipotential surface is
a) 1000 J b) 103 J c) 250 J d) zero
34. The direction of electric field due to a dipole at the equitoriai line is directed the direction of dipole moment,
a) along b) opposite to c) perpendicular to d) perpendicular and opposite to
35. n capacitors of each capacitance C are connected in series and then parallel. The ratio of the effective capacitances in series to parallel is
a) 1/n b) I/n^2 c)n^2 d) n

36. The electric field due to an infinite charged plane sheet at a distance r from the sheet is
a) directly proportional to r b) inversely proportional to r
c) inversely proportional to the square of r d) independent of r
37. The ratio of electric potential at points 10cm and 20cm from the centre of an electric dipole along its axial line is
a) 1:2 b)2:1 c) 1 :4 d)4:1
38. The principle used in lightning conductors (Oct 06)
a) corona discharge b) mutual induction c) self-induction d) electromagnetic induction
39. A non-polar dielectric is placed in an electric field (E). Its induced dipole moment
a) is zero b) acts in the direction of E
c) acts opposite to the direction of E d) acts perpendicular to E
40. When a dielectric slab is introduced between the plates of a charged parallel plate capacitor,its
a) potential increases b) electric field decreases
c) charge increases d) capacitance decreases
41. The phenomenon of obtaining charges without any contact with another charge is called …….
a) electrostatic induction b) electromagnetic induction
c) static induction d) dynamic induction
42. The ratio of the charge given to the conductor to the potential developed in it is called
a) reactance b) resistance c) inductance d) capacitance
43. The distribution of charges in the conductors depends on the ……of conductor
(a) volume (b)area (c) shape (d) none of these
44. i)Electric flux - maximum electric field
ii)Electric field - scalar quantity
iii)electric dipole moment - vector quantity
iv)DIielectric strength - acts from -q to +q
45. Two points A and B are maintained at a potential of 7 V and -4 V respectively. The work done in moving 50 protons from A to B is
(a) 8.80×10^{-17} J (b) -8.80×10^{-17} J (c) 4.40×10^{-17} J (d) 5.80×10^{-17} J

Fill ups **5×1 = 5**

46. i)Electrostatic energy stored in a capacitor: ii)Capacitance of a parallel plate capacitor
47. Electric field inside and outside a charged spherical shell is
48. Electric field due to a charged infinite plane and infinite wire
49. Electrostatic potential due to an electric dipole and a point charge
50. Electric field due to electric dipole at points on the equatorial line and axial line

II.Answer the following questions **10×2 = 20**

51. Write down Coulomb's law in vector form and mention what each term represents.
52. Define 'Electric field'.
53. What is mean by 'Electric field lines'? & What is meant by quantisation of charges?
54. What is the general definition of electric dipole moment?
55. Define 'electrostatic potential". & What is an equipotential surface?
56. What is meant by electrostatic energy density? & Define 'electric flux'
57. Write a short note on 'electrostatic shielding'.
58. What is Polarisation? & What is corona discharge?

59. What is dielectric strength
60. Define ‘capacitance’. Give its unit.

III. Answer the following questions **10×3 = 30**

61. What are the differences between Coulomb force and gravitational force?
62. Discuss the basic properties of electric charges.
63. Derive an expression for the torque experienced by a dipole due to a uniform electric field.
64. Obtain an expression for potential energy due to a collection of three point charges which are separated by finite distances.
65. Derive an expression for electrostatic potential due to a point charge.
66. Derive an expression for electrostatic potential energy of the dipole in a uniform electric field.
67. Explain in detail how charges are distributed in a conductor, and the principle behind the lightning conductor.
68. Derive the expression for resultant capacitance, when capacitors are connected in series and in parallel.
69. Obtain the expression for capacitance for a parallel plate capacitor. **&** Obtain the expression for energy stored in the parallel plate capacitor.
70. Discuss the various properties of conductors in electrostatic equilibrium.

IV. Answer the following question **5×5 = 25**

71.Explain in detail the effect of a dielectric placed in a parallel plate capacitor.
72. Obtain the expression for electric field due to an uniformly charged spherical shell.
73. Obtain the expression for electric field due to an infinitely long charged wire and an charged infinite plane sheet with neat diagram
74. Derive an expression for electrostatic potential due to an electric dipole.
75. Derive the electric field due to a dipole on its axial line and equatorial plane and interpret the result

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REVOLUTION FOR LEARNING - PEELAMEDU
12TH METALLURGY FULL TEST

Marks : 120

Time : 1hr 45 min

I .Choose the best answers **45×1 = 45**

1. Gold and hematite and tinstone ore are concentrated by ----------process
a) Gravity separation b) Hydraulic wash c) Froth flotation d) Magnetic separation
2. Galena and Zinc blende ores are concentrated b y ----------process
a) Gravity separation b) Hydraulic wash c) Froth flotation d) Magnetic separation
3. NaCN is added to depresses the flotation property of ---------- in Froth flotation process
a) PbS b) ZnS c) H_2S d) CS_2
4. The process of Gold is reduced to its elemental state (Zero oxidation state) is called -------
a) oxidation b) cementation c) galvanization d) smelting
5. Which of the following ores undergoing Ammonia leaching process ?
a) Ni, Cu, CO b) Fe , Cu, Co c) Zn, Cu, Al d) Hg, Zn, Al
6. ……are the reagents are used in Alkali leaching
a) KOH, Na_2CO_3 b) $NaHCO_3$, NaOH c) NaOH, Na_2CO_3 d) NaCN, NaOH
7. In Acid leaching process, hot aqueous sulphuric acid is used for ---------- ores.
a) ZnS , PbS b) ZnS , HgS c) H_2S, NaCN d) CS_2 , PbS
8. Tin stone , Chromite and Pyrolusite are concentrated by ---------- process.
a) Gravity separation b) Hydraulic wash c) Froth flotation d) Magnetic separation
9..----------cannot be used as a reducing agent for Na, K, Al.
a) Hydrogen b) Carbon monoxide c) Carbon dioxide d) Carbon
10. CO cannot be used to reduce oxides such as ----------
a) ZnO, MgO b) PbO, ZnO c) ZnO , Al_2O_3 d) CaO, HgS
11.A chemical substance that forms an easily fusible slag with gangue is called ----------
a) ore b) mineral c) flux d) gangue
12. .----------is/are called basic flux
a) FeO, ZnO b) FeO, CaO c) SiO_2, FeO d) CaO, ZnO
13. Matte contains ----------and ----------
a) Cu_2S and FeS b) ZnS and FeS c) PbS and CaO d) Cu_2S and ZnS
14. The formation of Blister Copper , ----------gas is evolved.
a) sulphur trioxide b) sulphur dioxide c) carbon monoxide d) carbon dioxide
15. The oxides of the metals Fe, Pb, and Cu are reduced by ----------reducing reagent
a) Hydrogen b) Carbon monoxide c) Carbon dioxide d) Carbon
16. Nickel oxide can be reduced to nickel by using ----------
a) CO only b) H_2 only c) Water gas d) CO_2
17. Cr_2O_3 can be reduced by an/a ----------process
a) Gravity separation b) Hydraulic wash c) Aluminothermic d) Magnetic separation
18.In Aluminothermic process, the ignition mixtures are ----------
a) MgO and BaO b) MgO and Al c) Mg and BaO_2 d) MgO and Ba
18. Which of the ore undergoes Auto reduction process?
a) PbS b) ZnS c) H_2S d) HgS
19.In Spontaneous reaction , ΔG should be ----------
a) positive b) negative c) equilibrium d) equal to zero

20.In Ellingham diagram ----------are the metal oxides goes to sudden change in slope at a particulartemperature.
a) FeO, ZnO b) FeO, CaO c) SiO_2, FeO d) MgO, HgO
21.Ellingham diagram helps to select a ----------in appropriate temperature range for reduction.
a) catalyst b) oxidizing agent c) reducing agent d) flux
21.----------oxides will decompose on heating even in the absence of a reducing agent.
a) Ag_2O, HgO b) FeO, CaO c) SiO_2, FeO d) MgO, HgO
22. Ellingham diagram does not tell anything about ----------
a) rate of the reaction b) possibility of reaction taking place c) both a and b d) none of these
23. In Hall-Herold process, ----------is used for lower the melting point of the electrolytic mixture
a) Calcium oxide b) Calcium hydroxide c) Calcium chloride d) Calcium carbonate
24.Removal of impurities associated with the isolated crude metal is called ---------- process
a) Gravity separation b) Refining c) Aluminothermic d) Magnetic separation
25. Zinc and Mercury metals are refined by ----------process
a) Distillation b) Liquation c) Electrolytic d) Zone refining
26. Metals having low melting points such as tin, lead, mercury and bismuth are refined by ----------
Process. a) Distillation b) Liquation c) Electrolytic d) Zone refining
27. During electrolysis, ----------impurities are removed as a anode mud.
a) high electropositive b) less electropositive c) high electronegative d) less electronegative
28.Zone refining method is based on the principles of --------
a) distillation b) liquation c) crystallization d) fractional crystallization
29. ----------is used in the manufacture of many products such as paints, rubber, cosmetics.
a) Zinc carbonate b) Zinc oxide c) Zinc metal d) Zinc sulphide
30. ----------is used in making luminous paints, fluorescent lights and x ray screens.
a) Zinc carbonate b) Zinc oxide c) Zinc metal d) Zinc sulphide
31. ----------is used to make pipes, valves and pumps stoves.
a) Zinc b) Copper c) Cast iron d) Wrought iron
32. ----------is used for making cables, automobiles and aeroplane parts.
a) Nickel steel b) Chrome steel c) Chrome vanadium steel d) Nichrome
33.--------are used for cutting tools and curshing machines.
a) Nickel steel b) Chrome steel c) Chrome vanadium steel d) Nichrome
34. Gold nanoparticles are also used for increasing the efficiency of ----------
a) Battery cells b) Electrochemical cell c) Daniel cell d) Solar cell.
35. Kaolinite has the composition
a) Al_2O_3 b) Al_2O_3 n H_2O c) Fe_2O_3 H_2O d)None of these
36. Which of the following statements, about the advantage of roasting of sulphide ore before reduction is not true?
a) ΔG_f^0 of sulphide is greater than those for CS_2 and HS_2 .
b) ΔG_r^0 is negative for roasting of sulphide ore to oxide
c) Roasting of the sulphide to its oxide is thermodynamically feasible.
d) Carbon and hydrogen are suitable reducing agents for metal sulphides
37. Electrochemical process is used to extract

a) Iron b) Lead c) Sodium d) silver

38. Flux is a substance which is used to convert

a) Mineral into silicate b) Infusible impurities to soluble impurities

c) Soluble impurities to infusible impurities d) All of these

39. Cupellation is a process used for the refining of

a) Silver b) Lead c) Copper d) iron

40. Extraction of gold and silver involves leaching with cyanide ion. silver is later recovered by a) Distillation b) Zone refining c) Displacement with zinc d) liquation

41. Considering Ellingham diagram, which of the following metals can be used to reduce alumina? a) Fe b) Cu c) Mg d) Zn

42. Which of the following is used for concentrating ore in metallurgy?

a) Leaching b) Roasting c) Froth floatation d) Both (a) and (c)

43.The standard free energy change for the reduction of one mole of FeO is

a) 130 $kJmol^{-1}$ b) 110 $kJmol^{-1}$ c) 65 $kJmol^{-1}$ d) 55 $kJmol^{-1}$

44.The melting point of bismuth is

a) 300K b) 400K c)545K d) 535K

45. The metal oxide which cannot be reduced to metal by carbon is

a) PbO b) Al_2O_3 c) ZnO d) FeO

II.Answer the following questions **10×2 = 20**

46. What is the difference between minerals and ores?

47. What are the various steps involved in extraction of pure metals from their ores?

48. What is the role of Limestone in the extraction of Iron from its oxide Fe_2O?

49. Which type of ores can be concentrated by froth floatation method? Give two examples for such ores.

50. Give the uses of zinc

51. Explain the following terms with suitable examples. (i) Gangue (ii) slag

52. Give the basic requirement for vapour phase refining.

53. Give the limitations of Ellingham diagram.

54.Why does copper have a blister appearance ?

55.Write the name of the metal refined by each of following process i)distillation ii)liquation iii)Electrolysis iv)Van akral method

III Answer the following questions **10×3 =30**

56. Out of coke and CO, which is better reducing agent for the reduction of ZnO? Why?

57. Describe a method for refining nickel.

58. Describe the role of the following in the process mentioned.

(i) Silica in the extraction of copper. (ii) Cryolite in the extraction of aluminium.

(iii) Iodine in the refining of Zirconium. (iv) Sodium cyanide in froth floatation.

59. The selection of reducing agent depends on the thermodynamic factor: Explain with an example.

60. What is Ellingham diagram and write down its applications

61.Write down difference between roasting and calcination

62.Explain about aluminothermic process

63.How you reduce the oxides of metals (Fe , Pb , Cu) and metals that do not form carbides with carbon at reduction temperature with neat reaction

64.Explain about electrolytic refining with example
65.Give uses of copper and gold

IV. Answer the following questions **5×5 = 25**

66. Write a short note on electrochemical principles of metallurgy
67.Write a short note on Hall herold process
68. Predict the conditions under which
A (i) Aluminium might be expected to reduce magnesia.

(ii) Magnesium could reduce alumina.

(B) Carbon monoxide is more effective reducing agent than carbon below 983K but, above this temperature, the reverse is true –Explain.

(c) it is possible to reduce Fe_2O_3 by coke at a temperature around 1200K
69.State the principle of i)Leaching ii)Smelting iii)Distillation iv) Liquation v)Vapour phase refining
70.Explain working of froth flotation process and electromagnetic separation with neat diagram

SAIVEERA ACADEMY – 8098850809
REVOLUTION FOR LEARNING PEELAMEDU
12TH PHYSICS CURRENT ELECTRICITY FULL TEST

Marks: 80

Time: 1hr 30 min

I.Choose the best answers **25×1=25**

1. The temperature coefficient of resistance of a wire is 0.00125 per °C. At 300 K, its resistances 1 Ω. The resistance of the wire will be 2 Ω at
(a) 1154 K (b) 1100 K (c) 1400 K (d) 1127 K

2. When 'n' resistors of equal resistance (R) are connected in series and in parallel Respectively ,then the ratio of their effective resistance is
(a) 1 : n^2 (b) n^2 : 1 (c) n : 1 (d) 1 : n

3. The colour code on a carbon resistor is red -red - black. The resistance of the resistor is?
(a) 2.2 Ω (b) 22 Ω (c) 220 Ω (d) 2.2 k Ω

4. The electrical resistivity of a thin copper wire and a thick copper wire are respectively P_1 Ω and P_2 Ω m. Then
(a) $P_1 > P_2$ (b) $P_2 > P_1$ (c) $P_1 = P_2$ (d) P_1 / P_2

5. Which of the following has negative temperature coefficient of resistance?
(a) copper (b) tungsten (c) carbon (d) silver

6. The temperature co-efficient of resistance for alloys is
(a) low (b) very low (c) high (d) very high

7.The emf of a battery is 3 volts and internal resistance 0.125 Ω .The difference of potential at the terminal of battery when connected across an external resistance of 1 Ω
(a) 1.67V (b) 0.67V (c) 2.67V (d) 3.67V

8.An unknown resistance is connected in parallel with a 15 Ω resistance and a 12V battery .What is the value of unknown resistance if the current is 2A
(a) 10 Ω (b) 20 Ω (c) 30 Ω (d) 40 Ω

9.Five 3 resistances are arranged in polygon (five sides) .What is resistance between any two corners
(a) 2.4 Ω (b)90Ω (c) 5 Ω (d) 40 Ω

10.Peltier effect is converse of
(a)Joule effect (b) Thomson effect (c) Raman effect (d) Seebeck effect

11.Nichrome wire is used as heating element because it has
(a) Low specific resistance (b) Low melting point
(c) High specific resistance (d) high conductivity

12.Joule heating effect is desirable in
(a) AC dynamo (b) DC dynamo (c) water heater (d) Transformer

13.The resistivity of a wire depends on
(a) Length (b) material (c) area of cross section (d) all the above

14.The resistance of a mercury is 0 when its temperature is reduced to
(a) 4.2 ^{0}C (b) 2.4 K (c) 4.2 K (d) -268.8 K

15.Melting point of a tungsten filament inside glass bulb
(a) 3380^{0}C (b) 3360 K (c) 3370 K (d) -268.8 K

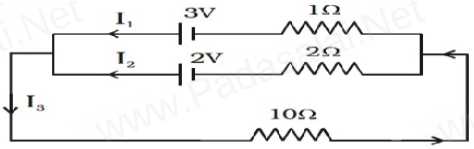
16.5A of current flowing through a resistor for 2 minute produces 3000 j of heat .The value of resistance
(a) 2.4 Ω (b) 5Ω (c) 1 Ω (d) 40 Ω

17.How many electrons constitute current of one ampere
(a) 6.35×10^{-19} (b) 6.28×10^{18} (c) $6.286.35\times10^{20}$ (d) 6.25×10^{18}
18.The unit of conductivity is
(a) Ω^{-1} (b) Ω (c) Ωm (d) $\Omega^{-1}m^{-1}$
19.Ohm's law is applicable for
(a) Complicated circuit (b)simple circuit (c) Primary circuit (d) secondary circuit
20.Match the following
i)electric heaters - Tungsten
ii)Electric fuses - Molybdenum
iii)Electric furnace - Lead
iv)Electrical lamp - Nichrome
21.Choose the odd one out Copper , Iron , Manganin , Aluminium
22.In Kirchoff's II law , the current is clockwise direction is taken as
(a) positive (b) negative (c) neutral (d)no direction
23.How many 160Ω resistor in parallel are required to carry a current of 5A on a 100V line
(a) 2 (b) 6 (c) 4 (d) 8
24. A toaster operating at 480W has a resistance of 120 Ω. The voltage is
a) 400 W b) 240V c) 480 W d) 240 W
25. The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of 10 Ω is
a) 0.2 Ω b) 0.5 Ω c) 0.8 Ω d) 1.0 Ω

II. Answer the following question **10×2=20**
26. State Joule's law of heating.
27. Distinguish between drift velocity and mobility.
28. Why current is a scalar?
29. Define electrical resistivity
30. Define temperature coefficient of resistance
31. Define transition or critical temperature
32. What are superconductor
33. What are factors on which magnitude of the emf developed in a thermocouple depends
34. What are factors on which resistivity of material depend
35.In a meter bridge the value of resistance in resistance box is 10 Ω .The balancing length is l_1 = 55 cm .Find the value of unknown resistance

III. Answer the following question **5×3=15**
36. Explain the equivalent resistance of a series and parallel resistor network
37. State and explain Kirchhoff's rules
38. Explain the determination of the internal resistance of a cell using voltmeter.
39. Derive a relation between current and drift velocity
40. The resistance of wire is 20 Ω .What will be new resistance .If its stretched uniformly 8 times its original length

IV. Answer the following question **4×5=20**
41. Explain determination of internal resistance of a cell by potentiometer
42. Obtain the condition for bridge balance in Wheatstone's bridge.
43. Explain Thomson effect and its types with example Explain seeback effect and its application
44. Calculate current I_1 , I_2 , I_3 in given circuit



1.ELECTROSTATICS

TWO MARKS

1.What is called triboelectric charging?

Charging the objects through rubbing is called triboelectric charging.

2.Explain about conservation of charges

The total electric charge in the universe is constant and charge can neither be created nor be destroyed. In any physical process, the net change in charge will always be zero.

3. What is Quantisation of charges? **(BB-1)**

The charge q on any object is equal to an integral multiple of this fundamental unit of charge e.
$\boldsymbol{q = ne}$ n is any integer (0, ±1, ±2, ±3, ±4…….). This is called quantisation of electric charge.

4.Write down coulomb's law in vector form & mention what each term represents **(BB-2)**

According to Coulomb, the force on the point charge q_2 exerted by another point charge q_1 is $\vec{F}_{12} = k q_1 q_2 \hat{r}_{21} / r^2$

$\hat{r}_{21}$ is the unit vector directed from charge q_1 to charge q_2 & k is the proportionality constant.

5. State Coulomb's law.

Coulomb's law states that the electrostatic force is directly proportional to the product of the magnitude of the two point charges and is inversely proportional to the square of the distance between the two point charges.

6.Define one coulomb

One coulomb is a quantity of charge which when placed at a distance of one metre in air from equal and opposite charge experiences a repulsive force of 9×10^9

r = 1m F = 9×10^9N $q_1 = q_2 = 1$C

7.Difference between electrostatic force and gravitational force **(BB-3)**

electrostatic force	gravitational force
1. force between two masses is always attractive	force between two charges can be attractive or repulsive, depending on the nature of charges
2. The value of the gravitational constant G = 6.626×10^{-11} Nm^2Kg^{-2}	The value of the constant k in Coulomb law is k = 9×10^9 Nm^2C^{-2}
3. force between two masses is independent of the medium.	force between the two charges depends on nature of the medium in which the two charges are kept at rest.
4. force between two point masses is the same whether two masses are at rest or in motion.	force between two point charges will change

8.Define Superposition principle **(BB-4)**

The total force acting on a given charge is equal to the vector sum of forces exerted on it by all the other charges.

9.Define Electric Field **(BB-5)**

The electric field at the point P at a distance r from the point charge q is the force experienced by a unit charge and is given by

$$\overrightarrow{E} = \frac{\vec{F}}{q_0} = \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}\hat{r}$$

Qunatity ; vector quantity

Unit ; NC^{-1}

10. What are two kind of electric field

Uniform electric field will have the same direction and constant magnitude at all points in space. Non-uniform electric field will have different directions or different magnitudes or both at different points in space

11.What is Superposition of electric fields.

The electric field at an arbitrary point due to a collection of point charges is simply equal to the vector sum of the electric fields created by the individual point charges.

12.Define electric dipole. **(BB-8)**

Two equal and opposite charges separated by a small distance constitute an electric dipole.

13.Define dipole moment **(BB-9)**

It is product of any one of charges of dipole and distance(2d) between them

P=2qd

Quantity ; vector quantity

Unit ; Cm

14.Define electric potential

the electric potential at a point P is equal to the work done by an external force to bring a unit positive charge with constant velocity from infinity to the point P in the region of the external electric field

15. Define equipotential surface **(BB-11)**

An equipotential surface is a surface on which all the points are at the same potential

14. Write about Properties of equipotential surfaces **(BB-12)**

(i) The work done to move a charge q between any two points A and B is zero

(ii) The electric field is normal to an equipotential surface.

16. Define Electric Flux **(BB-15)**

The number of electric field lines crossing a given area kept normal to the electric field lines is called electric flux

Unit ; Nm^2C^{-1}

$\Phi_E = EA\cos\theta$

17. Define Gauss's law

Gauss's law states that if a charge Q is enclosed by an arbitrary closed surface, then the total electric flux ΦE through the closed surface is

$$\Phi E = \frac{Q_{encl}}{\varepsilon_0}$$

18. Define electrostatic shielding **(BB-17)**

It is process of isolating of certain region of space from external space . It is based

on the fact that electric field inside the cavity is zero

19. Why it is always safer to sit inside a bus than in open ground or under a tree ?

The metal body of the bus provides electrostatic shielding, since the electric field inside is zero. During lightning, the charges flow through the body of the conductor to the ground with no effect on the person inside that bus.

20. Define electrostatic induction

charging without actual contact is called electrostatic induction

21. What is dielectric

A dielectric is a non-conducting material and has no free electrons. The electrons in a dielectric are bound within the atoms. Examples ; Ebonite, glass and mica

22. What is Non-polar molecules

A non-polar molecule is one in which centers of positive and negative charges coincide.It has no permanent dipole moment.

Examples ; hydrogen (H_2), oxygen (O_2), and carbon dioxide (CO_2)

23. What is Polar molecules

In polar molecules, the centers of the positive and negative charges are separated even in the absence of an external electric field. They have a permanent dipole moment.

Examples ; H_2O, N_2O, HCl, NH_3.

24. What is electric polarization **(BB-18)**

Polarisation is defined as the total dipole moment per unit volume of the dielectric.

$\vec{p} = \chi \vec{E}_{ext}$

χ is a constant called the electric susceptibility which is a characteristic of each dielectric.

25. What is dielectric breakdown or strength **(BB-19)**

When the external electric field applied to a dielectric is very large, it tears the atoms apart so that the bound charges become free charges. Then the dielectric starts to conduct electricity.

26.What is capacitors

Capacitor is a device used to store electric charge and electrical energy. It consists of two conducting objects (usually plates or sheets) separated by some distance.

27.Define capacitance **(BB-20)**

The capacitance C of a capacitor is defined as the ratio of the magnitude of charge on either of the conductor plates to the potential difference existing between the conductors.

$$\mathbf{C}=\frac{Q}{V}$$

Unit ; coulomb per volt or farad (F)

28. What is called energy density

The energy stored per unit volume of space is defined as energy density

$$\mathbf{u_E} = \frac{U}{VOLUME}$$

29.Write about action of points or corona discharge ? **(BB-21)**

Process of Leakage of charges from sharp pointed conductor.

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PEELAMEDU-8098850809

PHYSICS TEST
(ELECTRIC POTENTIAL & FLUX)
TOTAL MARKS ; 55

I.CHOOSE THE CORRECT ANSWERS 10×1=10

1.Which charge configuration produces a uniform electric field?
(a) point Charge (b) infinite uniform line charge (c) uniformly charged infinite plane (d) uniformly charged spherical shell
2.The work done in moving 2C charge from A to B at a distance of 2m in an equipotential surface is ……..
(a)8J (b) 5J (c)0J (d)15J
3.Unit of electric potential is
(a)J m (b) Kg m^2 s^{-2} C^{-1} (c)JC (d)none of these
4.The point at which electric potential is zero between a point charge +q and -2q placed at a distance of 9m
(a)8m (b) 5m (c)3m (d)6m
5.point charge potential and dipole potential are
(a)rectangularly and axially symmetric
(b)spherically and rectangularly symmetric
(c) there is no symmetric
(d)spherically and axially symmetric
6. Unit of electric field is
(a)NC (b) Vm (c)$KgmC^{-1}s^{-2}$ (d)both a & b
7.Four charges +q ,-q , +q , -q are placed in the corners of square .point in which electric potential is zero
(a)at midpoint of two charges
(b)at corners (c)at sides (d)at centre
8.Total electric flux in the closed surface is (a)depend on location of charges
(b)independent of charges enclosed by surface
(c)depends on charges inside surface
(d)none of these

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(c)depends on charges inside surface
(d)none of these

9.In case of finite length wire E = $\frac{1}{2\pi\varepsilon_0}\frac{\lambda}{r}$ is true at
(a)only at midpoint of wire (b) only at both ends (c)at midpoint and both ends (d)none of these
10.Electric field due to two parallel charged infinite sheets at a point outside the sheets is
(a)$\frac{\sigma}{2\varepsilon_0}$ (b) $\frac{\sigma}{\varepsilon_0}$ (c) $\frac{2\sigma}{\varepsilon_0}$ (d)zero

II. Answer the following 10×2=20
1.What are the properties of an equipotential surface?
2. Define 'electric flux'
3. Give the relation between electric field and electric potential
4. Define 'electrostatic potential energy'.
5. What is an equipotential surface?
6.Define Gauss law
7.Define potential difference
8. Calculate the electric flux through the rectangle of sides 5 mm and 10 mm kept in the region of a uniform electric field 100 NC $^{-1}$.The angle θ is 30^0.
9. A water molecule has an electric dipole moment of 6.3×10^{-30} Cm. A sample contains 10^{22} water molecules, with all the dipole moments aligned parallel to the external electric field of magnitude 3×10^5N C $^{-1}$. How much work is required to rotate all the water molecules from θ = 0^0 to 90^0?
10.Write about principle of microwave oven

II. Answer the following 5×3=15
1.Derive Electrostatic potential energy for collection of point charges
2.Write about The electric flux for Uniform electric field and its three cases
3.Derive Electric field due to two parallel charged infinite sheets
4.Derive Electric field due to an infinitely long charged wire
5. Derive Electrostatic potential energy of a dipole in a uniform electric field

II. Answer the following 5×2=10
1.Derive Electrostatic potential at a point due to an electric dipole
2. Derive the Electric field due to a uniformly charged spherical shell

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SAIVEERA ACADEMY – PEELAMEDU
REVOLUTION FOR LEARNING
12TH PHYSICS CURRENT ELECTRICITY TEST

Marks ;95
Time ; **2hrs**

I.Choose the correct answers **10×1=10**

1. A toaster operating at 480W has a resistance of 120 Ω. The voltage is
a) 400 W b) 240V c) 480 W d) 240 W

2. The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of 10 Ω is
a) 0.2 Ω b) 0.5 Ω c) 0.8 Ω d) 1.0 Ω

3.. A piece of copper and another of germanium are cooled from room temperature to 80 K. The resistance of
a) each of them increases
b) each of them decreases
c) copper increases and germanium decreases
d) copper decreases and germanium increases

4.The material through which charges flow easily
a) quartz b) mica c) germanium d) copper

5.When n resistors of equal resitances (R) are connected in series , the effective resistances is
a) n/R b) R/n c) 1/nR d) nR

6.The color codes found in carbon resistors are yellow , violet and orange .The value of resistance is
a) 56KΩ b) 65KΩ c) 47 KΩ d) 76 KΩ

7.Resitance of a metal wire of length 10cm is 2Ω .If the wire is stretched uniformly to 50 cm , the resistance is
a) 40 Ω b) 10 Ω c) 5 Ω d) 50 Ω

8.When the diameter of a conductor is doubles , its resistance
a) decreases twice b) decreases four time c) increases two times d) increases four times

9.The unit of mobility is
a) m^2s^{-1} b) $m^2\ Vs^{-1}$ c) $m\,Vs^{-1}$ d) $m^2\ V^{-1}s^{-1}$

10.The resistivity of a copper is 2×10^{-8} Ωm . The conductivity of it is …….mho m^{-1}
a) 5×10^{-7} b) 5×10^{8} c) 5×10^{9} d)5×10^{6}

II.Answer the following question **15×2=30**

1. What are ohmic and non ohmic devices?
2. Define temperature coefficient of resistance.
3. What is electric power and electric energy?
4.Derive the expression for power P=VI in electrical circuit. Write down the various forms of expression for power in electrical circuit.
5.State Joule's law of heating.
6.How does any material become positive charge and why positive ion will not give rise to current.

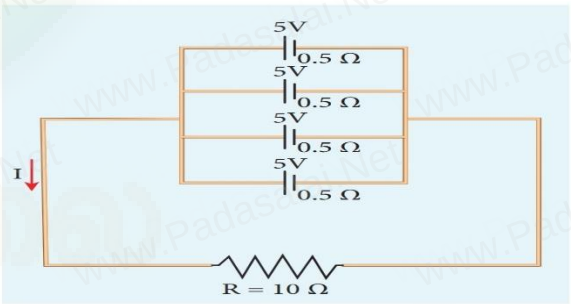
7.What are the types of material based on resistivity & denote which one will have lowest , highest resistivity
8.Why repairing electrical connection with wet skin is dangerous
9.What is carbon resistor and write down tolerance values for gold, silver and colourless
10.Why α is positive for conductors and negative for semiconductor
11.Define thermistor
12.Why trippers is advantage over fuse
13.The resistance of a nichrome wire at 0 ^{0}C is 10 Ω. If its resistance at boiling point of water is 14 Ω. Find its temperature coefficient of resistance
14. A copper wire of 10^{-6} m^2 area of cross section, carries a current of 2 A. If the number of electrons per cubic meter is 8×10^{28}, calculate the current density and average drift velocity.
15. In a potentiometer arrangement, a cell of emf 1.25 V gives a balance point at 35 cm length of the wire. If the cell is replaced by another cell and the balance point shifts to 63 cm, what is the emf of the second cell?

III.Answer the following question **10×3=30**

1.Define drift velocity and current density and derive the relation between them
2.Define following terms i. current ii . mobility iii.conductivity
3.Define resistivity and derive their various forms
4.Define internal resistance and its determination using voltmeter
5.What is potentiometer and write about its principle
6.Write about comparison of emf of two cells using potentiometer
7.Define peltier effect , Thomson effect ; positive and negative Thomson effect with examples
8.Define thermoelectric effect , seeback effect and its application
9. An electric heater of resistance 10 Ω connected to 220 V power supply is immersed in the water of 1 g. How long the electrical heater has to be switched on to increase its temperature from 30°to70°C. (The specific heat of water is s = 4200 J kg^{-1})

From the given circuit

10.find i) Equivalent emf ii)Equivalent internal resistance iii) Total current iv) Potential difference across each cell v) Current from each cell



IV.Answer the following question **5×5=25**

1.Derive resistances of resistors in series and parallel
2.Derive cells in series and parallel
3.Define kirchoff's two rule and explain about Wheatstone's bridge
4.Measurement of internal resistance of a cell by potentiometer
5.Write about application of Joule's law of heating

SAIVEERA ACADEMY
PEELAMEDU -8098850809
Physics Ist lesson full test

Marks:70
Time: 1hr30min

Choose the best answers **15×1=15**

1.The electrostatic force between point charges in a medium $\varepsilon_\gamma = 6$ is 0.3 N. The force between them in vaccum is
(a) 20 N (b).5N (c) 1.8 N (d)2N

2.The number of electric lines of force originating from 1C is
(a) 1.12×10^{11} (b)1.6×10^{-19}
(c)6.625×10^{18} (d)8.85×10^{12}

3.If a point lies at a distance x from the midpoint of the dipole , the electric potential at this potential is directly proportional to (a) $1/x^2$ (b) $1/x^3$ (c) $1/x^4$ (d) $1/x$

4.Which of the following is scalar
(a)dipole moment (b)electric force (c)electric field (d) electric potential

5.Three capacitors of capacitances each C are connected in series. The effective capacitance is (a)C/3 (b)3/C (c)3C (d).3C

6.Torque on a dipole in a uniform electric field is maximum when angle between $\vec{P}$ and $\vec{E}$
(a)0^0 (b)90^0 (c)45^0 (d)60^0

7.A capacitor of capacitances 6μF is connected to 100V battery. The energy stored in capacitor is
(a)30J (b)3J (c)0.03J (d)0.06J

8.The electric flux of charge 8.85μC over a hollow sphere is
(a)1×10^6 (b).8×10^{12} (c)0.885×10^{16} (d)0.885×10^{11}

9.The unit of capacitance is
(a)henry (b)tesla (c)coulomb volt (d) farad

10.Polar molecule is
(a)O_2 (b)H_2 (c)N_2O (d)N_2

11.Greater the radius of conductor ……is the charge density
(a)larger (b)zero (c)infinity (d)smaller

12.The unit of molecular polarizability is
(a)$C^2N^{-1}m$ (b) C^{-1} Nm2 (c) $C^2N^{-1}m^{-2}$ (d) $C^{-1}Vm^2$

13.The value of relative permittivity is 1 in (a)water (b)glass (c)mica (d)air

14.The ratio of electric potential at point 10cm and 20 cm from centre of a dipole along its axial line is
(a)1:2 (b)2:1 (c)1:4 (d)4:1

15.Which of the following is not dielectric
(a)antimony (b)oil (c)ebonite (d)mica

Answer any 6 questions . Q.no 24 is compulsory **6×2=12**

16.Define capacitance and its unit
17.Define corona discharge or action of points
18.Why it is safe to sit in a bus than under a tree during lightning or thunder?
19.Prove that energy stored in a capacitor is $q^2/2C$
20.What does a dipole experience when kept in uniform and non uniform field
21.Explain principle of superposition

22.Difference between polar and non polar molecule
23.An infinite lines produces a field of 9×10^4 NC^{-1} at a distance of 2 cm. Calculate linear charge density.
24.Two point charges 9e and 1e are kept at a distance of 16cm.At what point between these charges should a third charge q to be placed so that it remains in equilibrium

Answer any 6 questions Q.no 33 is compulsory 6×3=18

25.Obtain the expression for capacitance for a parallel plate capacitor
26.Discuss the various properties of conductors in electrostatic equilibrium
27.Derive capacitances of capacitors connected in series and parallel
28.Define electric field and its various aspects
29.Difference between gravitational and electrostatic force
30.What are the properties of electric lines of force
31.What are the applications of capacitors
32. Dielectric strength of air is 3×10^6 V m^{-1}. Suppose the radius of a hollow sphere in the Van de Graff generator is R = 0.5 m, calculate the maximum potential difference created by this Van de Graaff generator.
33. Two conducting spheres of radius r_1 = 8 cm and r_2 = 2 cm are separated by a distance much larger than 8 cm and are connected by a thin conducting wire as shown in the figure. A total charge of Q = +100 nC is placed on one of the spheres. After a fraction of a second, the charge Q is redistributed and both the spheres attain electrostatic equilibrium. **(a)** Calculate the charge and surface charge density on each sphere. **(b)** Calculate the potential at the surface of each sphere

Answer the following questions 5×5=25

34.i. Explain in detail the principle ,construction and working of a Van de Graaff generator

Or

ii. How do we determine the electric field due to a continuous charge distribution? Explain.

35.i. Explain in detail the effect of a dielectric placed in a parallel plate capacitor.

Or

ii. Explain in detail how charges are distributed in a conductor, and the principle behind the lightning conductor.

36.i. Calculate the electric field due to a dipole on its axial line and equatorial plane.

Or

ii. Write any two applications of gauss law

37.i.Derive an expression for electrostatic potential due to an electric dipole. Or

ii. Explain dielectrics in detail and how an electric field is induced inside a dielectric.

38.i. Obtain the expression for electric field due to an uniformly charged spherical shell.

Or

ii.Derive an expression for the torque experienced by a dipole due to a uniform electric field. Derive an expression for electrostatic potential due to a point charge.