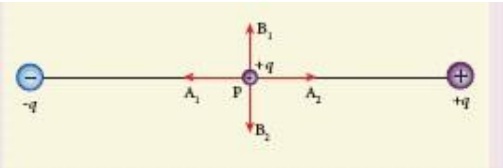
Volume 1 - One Marks Question with Answer Key

12th Standard

Physics

1) Two identical point charges of magnitude –q are fi xed as shown in the fi gure below. A third charge +q is placed midway between the two charges at the point P. Suppose this charge +q is displaced a small distance from the point P in the directions indicated by the arrows, in which direction(s) will +q be stable with respect to the displacement

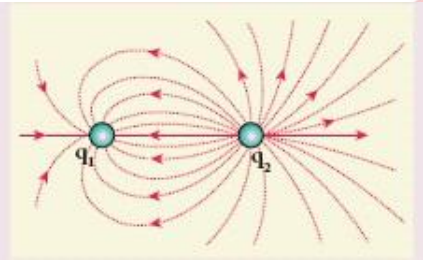


(a) A_1 and A_2 (b) B_1 and B_2 (c) both directions (d) No stable

2) 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

3) What is the ratio of the charges $\left|\frac{q_1}{q_2}\right|$ for the following electric field line pattern?

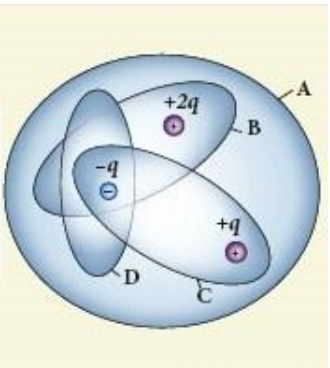


(a) $\frac{1}{5}$ (b) $\frac{25}{11}$ (c) 5 (d) $\frac{11}{25}$

4) An electric dipole is placed at an alignment angle of 30^0 with an electric fi eld of 2×10^5 NC^{-1}. It experiences a torque equal to 8 N m. Th e charge on the dipole if the dipole length is 1 cm is

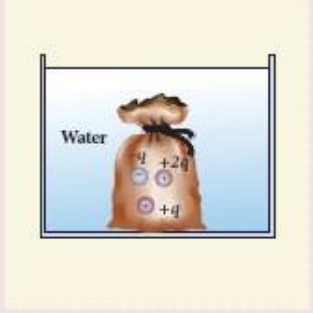
(a) 4 mC (b) 8 mC (c) 5 mC (d) 7 mC

5) Four Gaussian surfaces are given below with charges inside each Gaussian surface. Rank the electric fl ux through each Gaussian surface in increasing order.



(a) D < C < B < A (b) A < B = C < D (c) C < A = B < D (d) D > C > B > A

6) The total electric fl ux for the following closed surface which is kept inside water

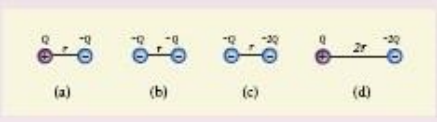


(a) $\frac{80q}{\varepsilon_0}$ (b) $\frac{q}{40\varepsilon_0}$ (c) $\frac{q}{80\varepsilon_0}$ (d) $\frac{q}{160\varepsilon_0}$

7) Two identical conducting balls having positive charges q_1 and q_2 are separated by a center to center distance r. If they are made to touch each other and then separated to the same distance, the force between them will be

(a) less than before (b) same as before (c) more than before (d) zero

8) Rank the electrostatic potential energies for the given system of charges in increasing order.

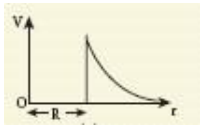


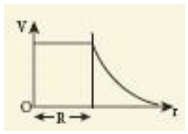
(a) 1 = 4 < 2 < 3 (b) 2 = 4 < 3 < 1 (c) 2 = 3 < 1 < 4 (d) 3 < 1 < 2 < 4

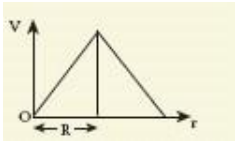
9) An electric field $\vec{E} = 10x\hat{i}$ exists in a certain region of space. Then the potential difference $V = V_o - V_A$, where V_o is the potential at the origin and V_A is the potential at x = 2 m is:

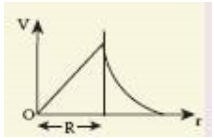
(a) 10 J (b) -20 J (c) +20 J (d) -10 J

10) A thin conducting spherical shell of radius R has a charge Q which is uniformly distributed on its surface. The correct plot for electrostatic potential due to this spherical shell is

(a) 

(b) 

(c) 

(d) 

11) Two points A and B are maintained at a potential of 7 V and -4 V respectively. The work done in moving 50 electrons 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

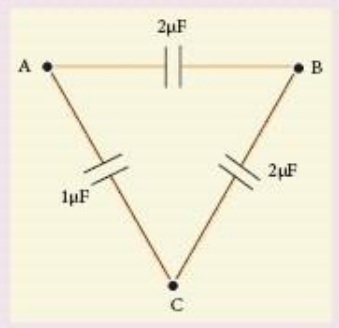
12) If voltage applied on a capacitor is increased from V to 2V, choose the correct conclusion

(a) Q remains the same, C is doubled (b) Q is doubled, C doubled (c) C remains same, Q doubled (d) Both Q and C remain same

13) A parallel plate capacitor stores a charge Q at a voltage V. Suppose the area of the parallel plate capacitor and the distance between the plates are each doubled then which is the quantity that will change?

(a) Capacitance (b) Charge (c) Voltage (d) Energy density

14) Three capacitors are connected in triangle as shown in the figure. The equivalent capacitance between the points A and C is



(a) 1μF (b) 2μF (c) 3μF (d) $\frac{1}{4}$μF

15) Two metallic spheres of radii 1 cm and 3 cm are given charges of -1 x 10^{-2} C and 5 x 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

16) In a hydrogen atom the electron revolves around the proton in an orbit of 0.53 $\mathring{A}$. The potential produced by the electron on the nuleus is

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

17) The concept of 'Field' was introduced by

(a) Faraday (b) Gauss (c) Maxwell (d) None

18) Two condensers (capacitors) of capacity C_1 and C_2 are connected in parallel. A charge Q given to then is shared. The ratio of the charges Q is

(a) $\frac{C_2}{C_1}$ (b) $\frac{C_1}{C_2}$ (c) $C_1.C_2$ (d) $\frac{1}{C_1 \times C_2}$

19) What will happen if two conducting spheres are separately charged and then brought in contact?

(a) Total charge on the two spheres is conserved (b) The total energy is conserved (c) Both charge and energy are conserved (d) The final potential is the mean of the original potentials.

20) A condenser is charged to a potential of 200V and has a charge of 0.1C. The energy stored in it is

(a) 1 J (b) 2 J (c) 10 J (d) 20 J

21) The unit for electric flux is

(a) $C^2N^{-1}m^{-2}$ (b) Nm^2C^{-2} (c) Nm^2C^{-1} (d) $Nm^{-2}C^{-1}$

22) Two identical metal balls with charges +2Q and -Q are separated by some distance and exerts a force F on each other. They are joined by a conducting wire, which is then removed. The force between them will now.

(a) F/8 (b) F/12 (c) F (d) F/4

23) When three capacitors are joined in series, the total capacitance is

(a) Equal to the sum of the capacitance (b) Greater than the value of the maximum capacitance (c) Less than the value of the mininim capacitance (d) none of the above

24) The concentric spheres of radii R and r have similar charges with equal surface densities (σ). What is the electric potential at their common centre?

(a) $\frac{\sigma}{\varepsilon_0}(R-r)$ (b) $\frac{\sigma}{\varepsilon_0}(R+r)$ (c) $R\frac{\sigma}{\varepsilon_0}$ (d) $\frac{\sigma}{\varepsilon_0}$

25) The electric flux over a sphere of radius 1m is ф. If radius of the sphere were doubled without changing the charge enclosed, electric flux would become

(a) 2ф (b) $\frac{\phi}{2}$ (c) $\frac{\phi}{4}$ (d) ф

26) Van de Graaff generator produces an electrostatic potential difference of_____ volts.

(a) 10^8 (b) 10^9 (c) 10^7 (d) 10^{10}

27) Gauss law is another form of _____.

(a) Newton's law (b) Kepler's law (c) Ohm's law (d) Coulomb's law

28) Which of the following is a scalar quantity?

(a) electric dipole moment (b) electric field intensity (c) electric potential (d) current density

29) The charge of an electron is _____.

(a) 1.6×10^{-19} C (b) 1.6×10^{-91} C (c) 16×10^{-20} C (d) 6.1×10^{-19} C

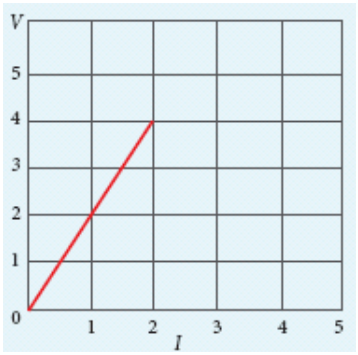
30) The value of $\frac{1}{4\pi\varepsilon_0}$ is _____

(a) $9\times10^9 Nm^2C^{-2}$ (b) $8.85\times10^{-12} N\ m^2\ C^{-2}$ (c) $9\times10^{-9} Nm^2C^{-2}$ (d) $8.85\times10^9 NC^{-2}$

31) The tangent to line of force at any point gives the direction of the _____ at that point.

(a) electric potential (b) electric field (c) electric flux (d) electric field energy

32) Th e following graph shows current versus voltage values of some unknown conductor. What is the resistance of this conductor?



(a) 2 ohm (b) 4 ohm (c) 8 ohm (d) 1 ohm

33) A toaster operating at 240 V has a resistance of 120 Ω. Th e power is

(a) 400 W (b) 2 W (c) 480 W (d) 240 W

34) A carbon resistor of (47 ± 4.7) k Ω to be marked with rings of diff erent colours for its identifi cation. Th e colour code sequence will be

(a) Yellow – Green – Violet – Gold (b) Yellow – Violet – Orange – Silver (c) Violet – Yellow – Orange – Silver (d) Green – Orange – Violet - Gold

35) What is the value of resistance of the following resistor?

(a) 100 k Ω (b) 10 k Ω (c) 1k Ω (d) 1000 k Ω

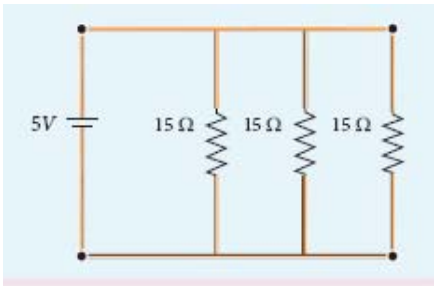
36) A wire connected to a power supply of 230 V has power dissipation P_1. Suppose the wire is cut into two equal pieces and connected parallel to the same power supply. In this case power dissipation is P_2. The ratio $\frac{P_2}{P_1}$ is

(a) 1 (b) 2 (c) 3 (d) 4

37) In India electricity is supplied for domestic use at 220 V. It is supplied at 110 V in USA. If the resistance of a 60W bulb for use in India is R, the resistance of a 60W bulb for use in USA will be

(a) R (b) 2R (c) $\frac{R}{4}$ (d) $\frac{R}{2}$

38) What is the current out of the battery?



(a) 1A (b) 2A (c) 3A (d) 4A

39) The temperature coefficient of resistance of a wire is 0.00125 per °C. At 300 K, its resistance is 1 Ω. The resistance of the wire will be 2 Ω at

(a) 1154 K (b) 1100 K (c) 1400 K (d) 1127 K

40) 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

41) 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

42) In Joule's heating law, when I and t are constant, if the H is taken along the y axis and I2 along the x axis, the graph is

(a) straight line (b) parabola (c) circle (d) ellipse

43) 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

44) Temperature co-effieient of resistance for metals is

(a) constant (b) positive (c) zero (d) negative

45) An electron gun in a TV shoots out a beam of electrons. The obeam current is lOll A. The charge that strikes the screen in I minute is

(a) $+600\mu C$ (b) $-600\mu C$ (c) $+10\mu C$ (d) $-10\mu C$

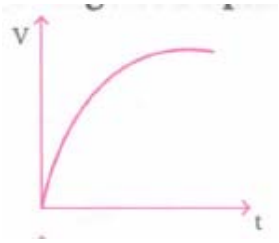
46) If the specific resistance of a potentiometer wire is 10^{-7} Om and current flowing through it . is 0.1 amp, cross - sectional area of wire is 10^{-6} m^2, then potential gradient will be

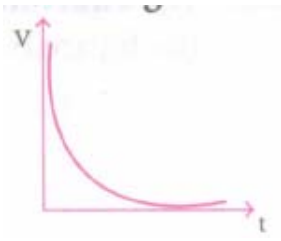
(a) 10^{-2} v/m (b) 10^{-4} v/m (c) 10^{-6} v/m (d) 10^{-8}v/m

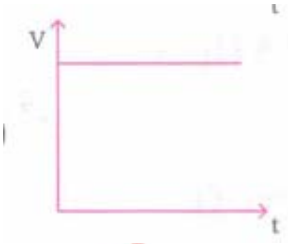
47) The potential gradient of the potentiometer wire depends on

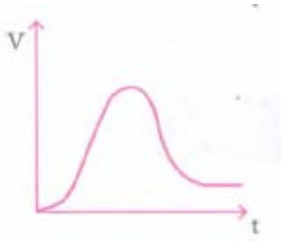
(a) only on the current that flows | (b) only on the resistance per unit length of the wire | (c) both the above mentioned | (d) none ofthe above

48) An ideal cell is connected to a capacitor through a voltmeter. The reading V of the voltmeter is plotted against time. Which of the following best represents the resulting curve?

(a) 

(b) 

(c) 

(d) 

49) The heating element that does not oxidize readily is an alloy of metals made of

(a) Nickel and Iron | (b) Nickel and Chromium | (c) copper and Manganin | (d) Nickel and Copper

50) Which material is having a small value of temperature coefficient of resistance?

(a) copper (b) constantan or manganin (c) nichrome (d) both b & c

51) Calculate the mobility of a free electron in an electric field of 10^{+2}N/C.

(a) $10^{-4}m^2V^{-1}s^{-1}$ (b) $10^{-5}m^2V^{-1}s^{-1}$ (c) $10^{-3}m^2V^{-1}s^{-1}$ (d) $10^{5}m^2V^{-1}s^{-1}$

52) In a potentiometer a cell of emf 1.5 V balances at a length of 270 cm. If another cell balances at 360 cm for the same current its emf will be

(a) 1 V (b) 2 V (c) 3 V (d) 0.75 V

53) When the diameter of a conductor is doubled its resistance_____

(a) decreases twice | (b) decreases four times | (c) decreases sixteen times | (d) increases four times

54) The specific resistance of silicon is_____

(a) 0.46 (b) $10X10^{-8}$ (c) 3200 (d) 2300

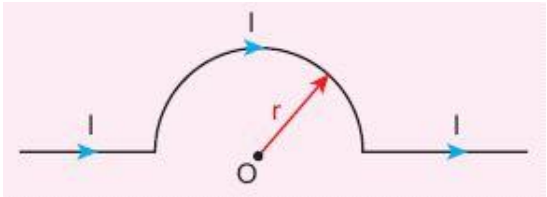
55) Germanium and silicon are the examples of_____

(a) insulators (b) conductors (c) semi insulators (d) semiconductors

56) Kirchhoff's I law is a consequence of_____

(a) law of conservation of energy | (b) law of conservation of charges | (c) law of conservation of currents | (d) law of conservation of voltages

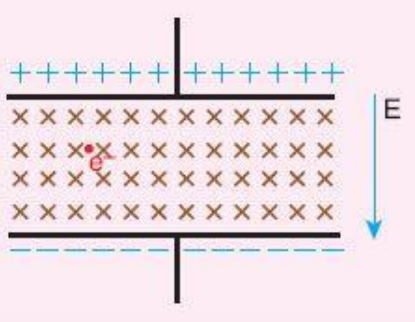
57) The magnetic fi eld at the center O of the following current loop is



(a) $\frac{\mu_\circ I}{4r}\otimes$ (b) $\frac{\mu_\circ I}{4r}\odot$ (c) $\frac{\mu_\circ I}{2r}\otimes$ (d) $\frac{\mu_\circ I}{2r}\odot$

58) An electron moves straight inside a charged parallel plate capacitor of uniform charge density σ. Th e time taken by the electron to cross the parallel plate capacitor when the

plates of the capacitor are kept under constant magnetic fi eld of induction $\vec{B}$is



(a) $\varepsilon_\circ \frac{eIB}{\sigma}$ (b) $\varepsilon_\circ \frac{IB}{\sigma I}$ (c) $\varepsilon_\circ \frac{IB}{e\sigma}$ (d) $\varepsilon_\circ \frac{IB}{\sigma}$

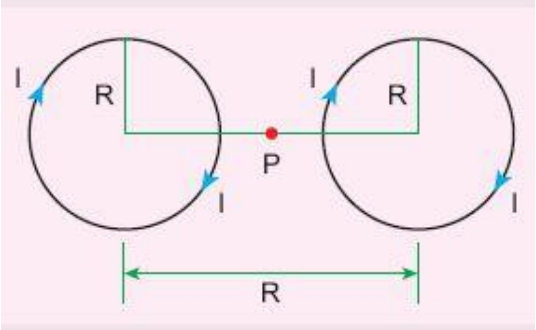
59) Th e force experienced by a particle having mass m and charge q accelerated through a potential diff erence V when it is kept under perpendicular magnetic field $\vec{B}$ is

(a) $\sqrt{\frac{2q^3BV}{m}}$ (b) $\sqrt{\frac{q^3B^2V}{2m}}$ (c) $\sqrt{\frac{2q^3B^2V}{m}}$ (d) $\sqrt{\frac{2q^3BV}{m^3}}$

60) Th ree wires of equal lengths are bent in the form of loops. One of the loops is circle, another is a semi-circle and the third one is a square. Th ey are placed in a uniform magnetic fi eld and same electric current is passed through them. Which of the following loop confi guration will experience greater torque ?

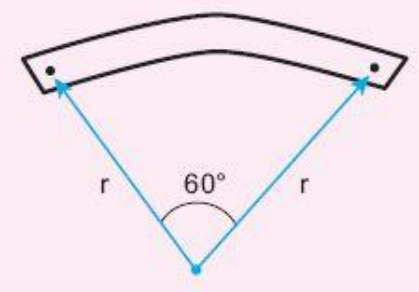
(a) circle (b) semi-circle (c) square (d) all of them

61) Two identical coils, each with N turns and radius R are placed coaxially at a distance R as shown in the fi gure. If I is the current passing through the loops in the same direction, then the magnetic field at a point P which is at exactly at $\frac{R}{2}$ distance between two coils is



(a) $\frac{8N\mu_\circ I}{\sqrt{5}R}$ (b) $\frac{8N\mu_\circ I}{5^{\frac{3}{2}}R}$ (c) $\frac{8N\mu_\circ I}{5R}$ (d) $\frac{4N\mu_\circ I}{\sqrt{5}R}$

62) A bar magnet of length l and magnetic moment M is bent in the form of an arc as shown in figure. The new magnetic dipole moment will be

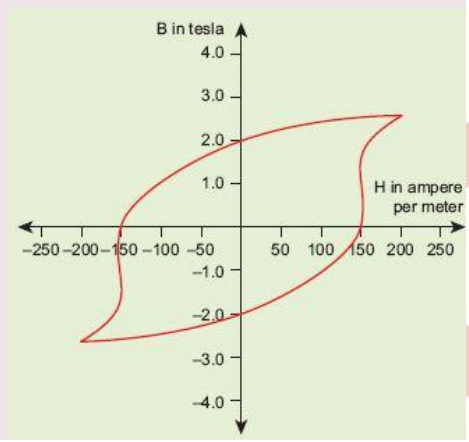


(a) M (b) $\frac{3}{\pi}m$ (c) $\frac{2}{\pi}m$ (d) $\frac{1}{2}m$

63) A non-conducting charged ring of charge q, mass m and radius r is rotated with constant angular speed ω. Find the ratio of its magnetic moment with angular momentum is

(a) $\frac{q}{m}$ (b) $\frac{2q}{m}$ (c) $\frac{q}{2m}$ (d) $\frac{q}{4m}$

64) The BH curve for a ferromagnetic material is shown in the figure. The material is placed inside a long solenoid which contains 1000 turns/cm. The current that should be passed in the solenonid to demagnetize the ferromagnet completely is



(a) 1.00 m A (milli ampere) (b) 1.25 mA (c) 1.50 mA (d) 1.75 mA

65) Two short bar magnets have magnetic moments 1.20 Am^2 and 1.00 Am^2 respectively. They are kept on a horizontal table parallel to each other with their north poles pointing towards the south. They have a common magnetic equator and are separated by a distance of 20.0 cm. The value of the resultant horizontal magnetic induction at the mid-point O of the line joining their centers is (Horizontal components of Earth's magnetic induction is 3.6 x 10^{-5} Wb m^{-2})

(a) 3.60 × 10^{-5} Wb m^{-2} (b) 3.5 × 10^{-5} Wb m^{-2} (c) 2.56 × 10^{-4} Wb m^{-2} (d) 2.2 × 10^{-4} Wb m^{-2}

66) The vertical component of Earth's magnetic field at a place is equal to the horizontal component. What is the value of angle of dip at this place?

(a) 30° (b) 45° (c) 60° (d) 90°

67) A flat dielectric disc of radius R carries an excess charge on its surface. The surface charge density is σ. The disc rotates about an axis perpendicular to its plane passing through the center with angular velocity ω. Find the magnitude of the torque on the disc if it is placed in a uniform magnetic field whose strength is B which is directed perpendicular to the axis of rotation

(a) $\frac{1}{4}\sigma\omega\pi BR$ (b) $\frac{1}{4}\sigma\omega\pi BR^2$ (c) $\frac{1}{4}\sigma\omega\pi BR^3$ (d) $\frac{1}{4}\sigma\omega\pi BR^4$

68) A simple pendulum with charged bob is oscillating with time period T and let θ be the angular displacement. If the uniform magnetic field i switched ON in a direction perpendicular to the plane of oscillation then

(a) time period will decrease but θ will remain constant (b) time period remain constant but θ will decrease (c) both T and θ will remain the same (d) both T and θ will decrease

69) A current carrying conductor is associated with

(a) electric field (b) magnetic field (c) electro magnetic (d) all these

70) When the current flowing in a circular coil is doubled and the number of turns of the coil in it is halved, the magnetic field at its centre will become

(a) four times (b) same (c) half (d) double

71) The deflection in a galvanometer falls from 50 to 20 divisions when 12Ω shunt is applied. The galvanometer resistance is

(a) 18Ω (b) 36Ω (c) 24Ω (d) 30Ω

72) The deflection in moving coil galvanometer is reduced to half when it is shunted with a 40Ω coil. The resistance of the galvanometer is

(a) 60Ω (b) 10Ω (c) 40Ω (d) 20Ω

73) According to Joule's heating effect the law of time is

(a) $H \propto T^2$ (b) $T \propto H^2$ (c) both (a) and (b) (d) $\frac{H}{t}$ =constant

74) Electric iron box and electric heater works on the principle of

(a) heating effect of current (b) heating effect of voltage (c) heating effect of power (d) heating effect of emf

75) In which of the following pairs of metals of the thermocouple, the emf is maximum?

(a) Fe-Cu (b) Cu-Zn (c) Pt-Ag (d) Sb-Bi

76) In the following thermocouple, the direction of the thermo electric current at the hot junction is from

(a) Sb to Bi (b) Ni to Fe (c) Fe to Cu (d) Zn to Pt

77) For a given thermocouple for a given cold junction temperature, the inversion is 220°C. When the cold junction temperature is increased by 20°C, then the inversion temperature is

(a) 200°C (b) 220°C (c) 240°C (d) 110°C

78) Two T.G's having reduction factor K_1 and K_2 are connected series and give deflections $\theta_1$and θ_2 respectively. Then $K_1 : K_2$

(a) $\theta_1 : \theta_2$ (b) $\tan\theta_1 : \tan\theta_2$ (c) $\theta_2 : \theta_1$ (d) $\tan\theta_2 : \tan\theta_1$

79) Ampere's circuital law is another form of

(a) Tangent law (b) Biot-Savart law (c) Ampere's Swimming rule (d) End rule

80) The minimum value of orbital magnetic moment of revolving electron in an atom is called

(a) Angular momentum (b) Bohr magneton (c) Gyromagnetic ratio (d) Planck's constant

81) The direction of magnetic dipole moment is _____

(a) from South pole to (b) from North to (c) from East to (d) from West to

North pole South pole West East

82) An α-particle enters a magnetic field of 1T with a velocity 10^6 m/s in a direction perpendicular to the field. The force on α-particle is

(a) 1.6×10^{-13}N (b) 6.4×10^{-13}N (c) 4.8×10^{-13}N (d) 3.2×10^{-13}N

83) Two parallel wires carrying same current in the opposite direction will experience _____

(a) an attractive (b) magnetic force (c) electric force (d) repulsive force

84) In a circuit a voltmeter should be connected in _____

(a) series (b) parallel (c) series or parallel (d) non of the above

85) At the junction of an electric circuit the accumulation of charges is _____

(a) positive maximum (b) negative maximum (c) zero (d) moderate

86) Thomson effect for _____ is zero.

(a) Ag (b) Pt (c) Au (d) Pb

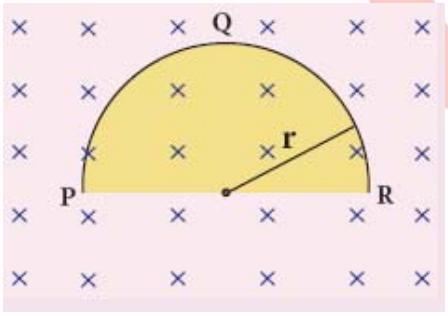
87) Force on unit length of two parallel wires carrying equal current kept apart by 3m in air is 2×10^{-7} N, then the current in each wire is _____

(a) 1A (b) 3A (c) $\sqrt{3}$A (d) $\sqrt{2}$A

88) The voltage sensitivity of a galvanometer can be increased by _____

(a) increasing the current (b) increasing the couple per unit twist of the suspension wire (c) increasing the number of turns of the coil (d) increasing the magnetic induction

89) A thin semi-circular conducting ring (PQR) of radius r is falling with its plane vertical in a horizontal magnetic fi eld B, as shown in the fi gure.



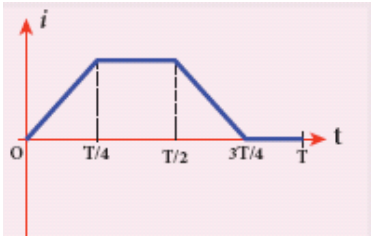
The potential diff erence developed across the ring when its speed v, is

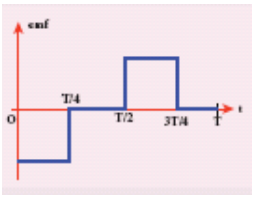
(a) Zero (b) $\frac{Bv\pi r^2}{2}$ and P is at higher potential (c) πrBv and R is at higher potential (d) 2rBvand R is at higher potential

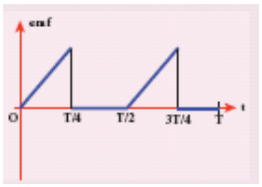
90) Th e fl ux linked with a coil at any instant t is given by $\Phi_B = 10t^2 - 50t + 250$. The induced emf at t = 3s is

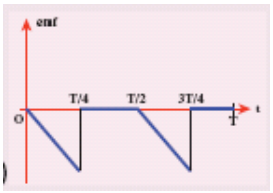
(a) −190 V (b) −10 V (c) 10 V (d) 190 V

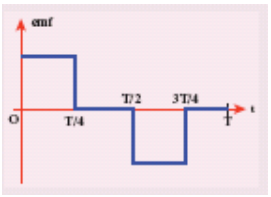
91) Th e current i fl owing in a coil varies with time as shown in the fi gure. Th e variation of induced emf with time would be



(a) 

(b) 

(c) 

(d) 

92) A circular coil with a cross-sectional area of 4 cm2 has 10 turns. It is placed at the centre of a long solenoid that has 15 turns/cm and a cross-sectional area of 10 cm2. The axis of the coil coincides with the axis of the solenoid. What is their mutual inductance?

(a) 7.54 μH (b) 8.54 μH (c) 9.54 μH (d) 10.54 μH

93) A step-down transformer reduces the supply voltage from 220 V to 11 V and increase the current from 6 A to 100 A. Then its efficiency is

(a) 1.2 (b) 0.83 (c) 0.12 (d) 0.9

94) In an electrical circuit, R, L, C and AC voltage source are all connected in series. When L is removed from the circuit, the phase difference between the voltage and current in the circuit is $\frac{\pi}{3}$. Instead, if C is removed from the circuit, the phase difference is again $\frac{\pi}{3}$. The power factor of the circuit is

(a) 1/2 (b) $1/\sqrt{2}$ (c) 1 (d) $\sqrt{3}/2$

95) In a series RL circuit, the resistance and inductive reactance are the same. Then the phase difference between the voltage and current in the circuit is

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{6}$ (d) zero

96) In a series resonant RLC circuit, the voltage across 100 Ω resistor is 40 V. The resonant frequency ω is 250 rad/s. If the value of C is 4 μF, then the voltage across L is

(a) 600 V (b) 4000 V (c) 400 V (d) 1 V

97) An inductor 20 mH, a capacitor 50 μF and a resistor 40 Ω are connected in series across a source of emf v = 10 sin 340 t. The power loss in AC circuit is

(a) 0.76 W (b) 0.89 W (c) 0.46 W (d) 0.67 W

98) The instantaneous values of alternating current and voltage in a circuit are $i = \frac{1}{\sqrt{2}} sin(100\pi t)$ A and v= = $\frac{1}{\sqrt{2}} sin\left(100\pi t + \frac{\pi}{3}\right) V$. The average power in watts consumed in the circuit is

(a) $\frac{1}{4}$ (b) $\frac{\sqrt{3}}{4}$ (c) $\frac{1}{2}$ (d) $\frac{1}{8}$

99) In an oscillating LC circuit, the maximum charge on the capacitor is Q. The charge on the capacitor when the energy is stored equally between the electric and magnetic fields is

(a) $\frac{Q}{2}$ (b) $\frac{Q}{\sqrt{3}}$ (c) $\frac{Q}{\sqrt{2}}$ (d) Q

100) $\frac{20}{\pi^2}H$inductor is connected to a capacitor of capacitance C. The value of C in order to impart maximum power at 50 Hz is
(a) 50 μF (b) 0.5 μF (c) 500 μF (d) 5 μF

101) The unit henry can also be written as
(a) VS A^{-1} (b) Wb A^{-1} (c) Ωs (d) all

102) An emf of 12V is induced when the current in the coil changes at the rate of 40 A S^{-1}. The coefficient of self induction of the coil is
(a) 0.3 H (b) 0.003 H (c) 30 H (d) 4.8 H

103) The magnitude of the induced emf in a conductor depends on the
(a) flux density of the magnetic field (b) amount of flux cut (c) amount of flux linkages (d) rate of change of flux

104) In Fleming's right hand rule, the forefinger represents the direction of
(a) motion of the conductor (b) magnetic field (c) induced current (d) induced emf

105) A phenomenon in which a varying current in one coil induces an emf in the neighbouring coil is
(a) mutual induction (b) self induction (c) electrostatic induction (d) electromagnetic induction

106) In three phase AC generator the three coils are fastened rigidly together and are displaced from each other by an angle
(a) 90° (b) 180° (c) 120° (d) 360°

107) AC generator works on the principle of
(a) self induction (b) mutual induction (c) electromagnetic induction (d) none of these

108) In a single phase dynamo, the direction of the induced current is given by _____
(a) Faraday's laws (b) Maxwell's equations (c) Einstein's equation (d) Fleming's right hand rule

109) In an a. c. dynamo, the induced current is _____ in nature.
(a) alternating (b) increasing (c) decreasing (d) constant

110) An alternator produces voltage waves equal to the number of _____ used.
(a) slip rings (b) windings (c) magnetsbrushes (d) brushes

111) In a transformer, eddy current loss is minimized by using
(a) laminated core made of muemetal (b) laminated core made of stelloy (c) shell type core (d) thick copper wire

112) For an ideal transformer _____
(a) $E_pI_p = E_sI_s$ (b) $E_pE_s = I_p$ (c) $E_pE_s = I_s$ (d) $I_pI_s = E_sI_s$

113) Copper loss is energy loss in the form of _____
(a) light (b) heat (c) sound (d) hysteresis

114) Flux loss can be minimized using _____ core.
(a) laminated (b) shell-type (c) perforated (d) sheet-type

115) A power of 11,000 W is transmitted at 220 V. The current through line wires is
(a) 50 A (b) 5 A (c) 500 A (d) 0.5 A

116) RMS value of AC is _____ times its peak value
(a) 0.707 (b) 7.07 (c) 1.414 (d) 14.14

117) The phase difference between VL and Vc is _____
(a) 2π (b) π/2 (c) π/4 (d) π

118) When the frequency of an a.c, circuit increases the capacitive reactance offered by capacitor connected in the circuit
(a) increases (b) decreases (c) remains the same (d) becomes zero

119) In LCR circuit when $K_L = X_c$ (at resonance) the current _____
(a) is zero (b) is in phase with the voltage (c) leads the voltage (d) lags behind the voltage

120) The instantaneous current in an AC circuit containing a pure inductor is $i = I_o \sin\omega t$, The instantaneous emf is: The
(a) $e = E_o \sin\left(\omega t + \frac{\pi}{2}\right)$ (b) $e = E_o \sin\left(\omega t - \frac{\pi}{2}\right)$ (c) $e=E_o\sin(\omega t - \pi)$ (d) $e = E_o\sin$

121) The dimension of $\frac{1}{\mu_0\varepsilon_0}$ is
(a) $[LT^{-1}]$ (b) $[L^2T^{-2}]$ (c) $[L^{-1}T]$ (d) $[L^{-2}T^2]$

122) If the amplitude of the magnetic fi eld is 3×10^{-6} T, then amplitude of the electric fi eld for a electromagnetic waves is
(a) 100 Vm^{-1} (b) 300 V m^{-1} (c) 600 V m^{-1} (d) 900 V m^{-1}

123) Which of the following are false for electromagnetic waves
(a) transverse (b) mechanical waves (c) longitudinal (d) produced by accelerating charges

124) Consider an oscillator which has a charged particle and oscillates about its mean position with a frequency of 300 MHz. Th e wavelength of electromagnetic waves produced by this oscillator is
(a) 1 m (b) 10 m (c) 100 m (d) 1000 m

125) Th e electric and the magnetic field, associated with an electromagnetic wave, propagating along X axis can be represented by
(a) $\vec{E} = E_0\hat{j}$ and $\vec{B} = B_0\hat{k}$ (b) $\vec{E} = E_0\hat{k}$ and $\vec{B} = B_0\hat{j}$ (c) $\vec{E} = E_0\hat{i}$ and $\vec{B} = B_0\hat{j}$ (d) $\vec{E} = E_0\hat{j}$ and $\vec{B} = B_0\hat{i}$

126) In an electromagnetic wave in free space the rms value of the electric fi eld is 3 V m^{-1}. The peak value of the magnetic field is
(a) 1.414×10^{-8} T (b) 1.0×10^{-8} T (c) 2.828×10^{-8} T (d) 2.0×10^{-8} T

127) If the magnetic monopole exists, then which of the Maxwell's equation to be modified?.
(a) $\oint \vec{E}.d\vec{A} = \frac{Q_{enclosed}}{\epsilon_0}$ (b) $\oint \vec{E}.d\vec{A}=0$ (c) $\oint \vec{E}.d\vec{A} = \mu_0 I_{enclosed} + \mu_0 \epsilon_0 \frac{d}{dt}\oint \vec{E}.d\vec{A}$ (d) $\oint \vec{E}.d\vec{l} = -\frac{d}{dt}\Phi_B$

128) A radiation of energy E falls normally on a perfectly refl ecting surface. Th e momentum transferred to the surface
(a) $\frac{E}{c}$ (b) $2\frac{E}{c}$ (c) Ec (d) $\frac{E}{c^2}$

129) Which of the following is an electromagnetic wave?
(a) α - rays (b) β - rays (c) γ - rays (d) all of them

130) Which of the following is NOT true for electromagnetic waves?
(a) it transport energy (b) it transport momentum (c) it transport angular momentum (d) in vacuum, it travels with different speeds which depend on their frequency

131) A magnetic field is produced by
(a) a changing electric field (b) a moving charge (c) both of them (d) none of them

132) Accelerated charges would produce
(a) sound waves (b) ɣ-rays (c) magnetic waves (d) electromagnetic waves

133) The phase difference between electric and magnetic field vectors in the electromagnetic waves?
(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) π (d) zero

134) The wavelength of electromagnetic wave produced by Hertz experiment was
(a) 6mm (b) 60m (c) 6000 mm (d) 60 cm

135) The velocity of light is maximum in
(a) Diamond (b) Water (c) Vacuum (d) Glass

136) If V_g, V_x' V_m are speeds of gamma rays, X rays and microwaves respectively in vacuum, then
(a) $V_g < V_x < V_m$ (b) $V_g > V_k > V_m$ (c) $V_g > V_x < V_m$ (d) $V_g = V_x = V_m$

137) The sun's outer layer is called _____.
(a) chromosphere (b) exosphere (c) Photosphere (d) stratosphere

138) _____discovered electromagnetic induction.
(a) Faraday (b) Maxwell (c) Ampere (d) Hertz

139) Electromagnetic waves are _____ in nature .
(a) parallel (b) transverse (c) longitudinal (d) Uni-directional

140) The speed of electromagnetic waves in free space is _____ m/s
(a) 3×10^{-18} (b) 6.2×10^{5} (c) 3×10^{8} (d) 5×10^{2}

141) The relation between velocity of light, permeability and permittivity of free space in_____.
(a) $C^2 = \frac{1}{\mu_0 \varepsilon_0}$ (b) $C = \frac{1}{\mu_0 \varepsilon_0}$ (c) $\mu_0 = \varepsilon_0 c$ (d) $\varepsilon_0 = \mu_0 c$

142) The frequency of electromagnetic radiation Hertz produced was _____ Hz.
(a) 10^8 (b) 5×10^7 (c) 3×10^8 (d) 6×10^5

143) ɣ-rays are produced by _____.
(a) radio active nuclei (b) high energy electrons (c) incandescent solids (d) electronic devices

144) _____ are used to study crystal structure in solids.
(a) UV rays (b) IR rays (c) X-rays (d) Gamma rays

145) _____ are used as a diagnostic tool in medicine.
(a) visible light (b) UV rays (c) X-rays (d) Gamma rays

146) Gamma rays are used in the treatment of _____
(a) cancer (b) AIDS (c) Polio (d) TB

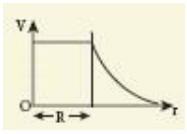
147) Forged documents are detected through _____.
(a) X-rays (b) UV-rays (c) IR-rays (d) microwaves

148) Carbon arc produces _____ spectrum.
(a) characteristic (b) line (c) band (d) continuous

149) _____ spectra are used for making dyes
(a) continuous emission (b) band emission (c) band absorption (d) line spectra

150) The spectrum obtained from the photosphere of the sun is of _____ type.
(a) band spectra (b) line spectra (c) continuous emission spectra (d) non-linear spectra

****

1) (b) B_1 and B_2
2) (c) uniformly charged infinite plane
3) (d) $\frac{11}{25}$
4) (b) 8 mC
5) (a) D < C < B < A
6) (b) $\frac{q}{40\varepsilon_0}$
7) (c) more than before
8) (a) 1 = 4 < 2 < 3
9) (b) -20 J
10) (b) 

11) (a) 8.80×10^{-17} J
12) (c) C remains same, Q doubled
13) (d) Energy density
14) (b) 2μF
15) (a) 3×10^{-2} C
16) (d) 27.2 V
17) (c) Maxwell
18) (b) $\frac{C_1}{C_2}$
19) (a) Total charge on the two spheres is conserved
20) (c) 10 J

21)
(c) Nm^2C^{-1}

22)
(a) F/8

23)
(b) Greater than the value of the maximum capacitance

24)
(a) $\frac{\sigma}{\varepsilon_0}(R-r)$

25)
(d) ϕ

26)
(c) 10^7

27)
(d) Coulomb's law

28)
(c) electric potential

29)
(a) 1.6×10^{-19} C

30)
(a) $9x10^9Nm^2C^{-2}$

31)
(b) electric field

32)
(a) 2 ohm

33)
(c) 480 W

34)
(b) Yellow – Violet – Orange – Silver

35)
(a) 100 k Ω

36)
(d) 4

37)
(c) $\frac{R}{4}$

38)
(a) 1A

39)
(d) 1127 K

40)
(b) 0.5 Ω

41)
(d) copper decreases and germanium increases

42)

(a) straight line

43)

(b) n^2: 1

44)

(b) positive

45)

(b) $-600\mu C$

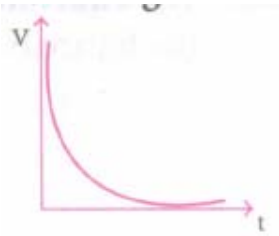
46)

(a) 10^{-2} v/m

47)

(c) both the above mentioned

48)

(b) 

49)

(b) Nickel and Chromium

50)

(d) both b & c

51)

(b) $10^{-5}m^2V^{-1}s^{-1}$

52)

(b) 2 V

53)

(d) increases four times

54)

(d) 2300

55)

(d) semiconductors

56)

(b) law of conservation of charges

57)

(a) $\frac{\mu_\circ I}{4r} \otimes$

58)

(d) $\varepsilon_\circ \frac{IB}{\sigma}$

59)

(c) $\sqrt{\frac{2q^3B^2V}{m}}$

60)

(a) circle

61)

(b) $\frac{8N\mu_{\circ}I}{5^{\frac{3}{2}}R}$

62)

(b) $\frac{3}{\pi}m$

63)

(c) $\frac{q}{2m}$

64)

(b) 1.25 mA

65)

(c) 2.56×10^{-4} Wb m^{-2}

66)

(b) 45°

67)

(d) $\frac{1}{4}\sigma\omega\pi BR^4$

68)

(c) both T and θ will remain the same

69)

(b) magnetic field

70)

(b) same

71)

(a) 18Ω

72)

(c) 40Ω

73)

(d) $\frac{H}{t}$ =constant

74)

(a) heating effect of current

75)

(d) Sb-Bi

76)

(b) Ni to Fe

77)

(a) 200°C

78)

(d) $\tan\theta_2 : \tan\theta_1$

79)

(b) Biot-Savart law

80)

(b) Bohr magneton

81)

(a) from South pole to North pole

82)

(d) 3.2×10^{-13}N

83)

(d) repulsive force

84)

(b) parallel

85)

(c) zero

86)

(d) Pb

87)

(c) $\sqrt{3}$A

88)

(d) increasing the magnetic induction

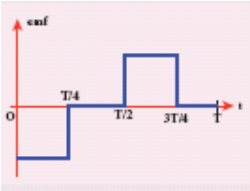
89)

(d) 2rBvand R is at higher potential

90)

(b) −10 V

91)

(a) 

92)

(a) 7.54 μH

93)

(b) 0.83

94)

(c) 1

95)

(a) $\frac{\pi}{4}$

96)

(c) 400 V

97)

(c) 0.46 W

98)

(d) $\frac{1}{8}$

99)

(a) $\frac{Q}{2}$

100)

(d) 5 μF

101)

(d) all

102)

(a) 0.3 H

103)

(d) rate of change of flux

104)

(b) magnetic field

105)

(a) mutual induction

106)

(c) 120°

107)

(c) electromagnetic induction

108)

(d) Fleming's right hand rule

109)

(a) alternating

110)

(b) windings

111)

(b) laminated core made of stelloy

112)

(a) $E_pI_p = E_sI_s$

113)

(b) heat

114)

(b) shell-type

115)

(a) 50 A

116)

(a) 0.707

117)

(d) π

118)

(b) decreases

119)

(b) is in phase with the voltage

120)

(a) $e = E_o \sin\left(\omega t + \frac{\pi}{2}\right)$

121)

(b) $[L^2T^{-2}]$

122)

(d) 900 V m^{-1}

123)

(c) longitudinal

124)

(a) 1 m

125)

(b) $\vec{E} = E_0\hat{k}$ and $\vec{B} = B_0\hat{j}$

126)

(a) 1.414×10^{-8} T

127)

(b) $\oint \vec{E}.d\vec{A}$=0

128)

(b) $2\frac{E}{c}$

129)

(c) γ - rays

130)

(d) in vacuum, it travels with different speeds which depend on their frequency

131)

(c) both of them

132)

(d) electromagnetic waves

133)

(d) zero

134)

(c) 6000 mm

135)

(c) Vacuum

136)

(d) $V_g=V_x=V_m$

137)

(a) chromosphere

138)

(a) Faraday

139)

(b) transverse

140)

(c) 3 X 10^8

141)

(a) $C^2 = \frac{1}{\mu_0 \varepsilon_0}$

142)

(b) $5x10^7$

143)

(b) high energy electrons

144)

(c) X-rays

145)

(c) X-rays

146)

(a) cancer

147)

(b) UV-rays

148)

(d) continuous

149)

(c) band absorption

150)

(c) continuous emission spectra