# KANAA EDUCATION CENTRE

## 12th PHYSICS ONE MARK (2022-2023)

## LESSON-1

1. Two identical point charges of magnitude –*q* are fixed as shown in the figure 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?
2. Which charge configuration produces a uniform electric field?
3. What is the ratio of the charges *qq*12 for the following electric field line pattern?
4. An electric dipole is placed at an alignment angle of 30o with an electric field of 2 × 105 N C–1. It experiences a torque equal to 8 N m. The charge on the dipole if the dipole length is 1 cm is _____
5. Four Gaussian surfaces are given below with charges inside each Gaussian surface. Rank the electric flux through each Gaussian surface in increasing order.
6. The total electric flux for the following closed surface which is kept inside water
7. Two identical conducting balls having positive charges *q1* and *q2* are separated by a centre to centre distance *r*. If they are made to touch each other and then separated to the same distance, the force between them will be (NSEP 04-05)
8. Rank the electrostatic potential energies for the given system of charges in increasing order.
9. An electric field □*Exi*=10□ exists in a certain region of space. Then the potential difference *V* = *Vo* – *VA*, where *Vo* is the potential at the origin and *VA* is the potential at *x* = 2 m is:
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
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
12. If voltage applied on a capacitor is increased from *V* to 2*V*, choose the correct conclusion.
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?
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**LESSON-2**

1. The following graph shows current versus voltage values of some unknown conductor. What is the resistance of this conductor?
2. A wire of resistance 2 ohms per meter is bent to form a circle of radius 1m. The equivalent resistance between its two diametrically opposite points, A and B as shown in the figure is
3. A toaster operating at 240 V has a resistance of 120 Ω. Its power is
4. A carbon resistor of (47 ± 4.7 ) k Ω to be marked with rings of different colours for its identification. The colour code sequence will be
5. A carbon resistor of (47 ± 4.7 ) k Ω to be marked with rings of different colours for its identification. The colour code sequence will be
6. Two wires of A and B with circular cross section are made up of the same material with equal lengths. Suppose *RA* = 3 *RB*, then what is the ratio of radius of wire A to that of B?
7. A wire connected to a power supply of 230 V has power dissipation *P1*. Suppose the wire is cut into two equal pieces and connected parallel to the same power supply. In this case power dissipation is *P2* . The ratio *P1/P*2 is
8. 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
9. In a large building, there are 15 bulbs of 40 W, 5 bulbs of 100 W, 5 fans of 80 W and 1 heater of 1k W are connected. The voltage of electric mains is 220 V. The maximum capacity of the main fuse of the building will be
10. There is a current of 1.0 A in the circuit shown below. What is the resistance of *P* ?
11. What is the current drawn out from the battery?
12. The temperature coefficient of resistance of a wire is 0.00125 per °C. At 20°C, its resistance is 1 Ω. The resistance of the wire will be 2 Ω at
13. The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of 10 Ω is
14. A piece of copper and another of germanium are cooled from room temperature to 80 K. The resistance of
15. In Joule's heating law, when *R* and *t* are constant, if the *H* is taken along the *y* axis and *I*2 along the x axis, the graph is

## LESSON-3

1. The magnetic field at the centre O of the following current loop is
2. An electron moves in a straight line inside a charged parallel plate capacitor of uniform charge density σ. The time taken by the electron to cross the parallel plate capacitor undeflected when the plates of the capacitor are kept under constant magnetic field of induction *B* is
3. A particle having mass *m* and charge *q* accelerated through a potential difference *V*. Find the force experienced when it is kept under perpendicular magnetic field □*B*.
4. A circular coil of radius 5 cm and 50 turns carries a current of 3 ampere. The magnetic dipole moment of the coil is nearly
5. A thin insulated wire forms a plane spiral of $N = 100$ tight turns carrying a current $I = 8$ m A (milli ampere). The radii of inside and outside turns are $a = 50$ mm and $b = 100$ mm respectively. The magnetic induction at the centre of the spiral is
6. Three 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. They are placed in a uniform magnetic field and same electric current is passed through them. Which of the following loop configuration will experience greater torque ?
7. Two identical coils, each with *N* turns and radius *R* are placed coaxially at a distance *R* as shown in the figure. If *I* is the current passing through the loops in the same direction, then the magnetic field at a point P at a distance of *R*/2 from the centre of each coil is
8. A wire of length *l* carrying a current *I* along the Y direction is kept in a magnetic field given by .The magnitude of Lorentz force acting on the wire is
9. A bar magnet of length *l* and magnetic moment *pm* is bent in the form of an arc as shown in figure. The new magnetic dipole moment will be
10. A non-conducting charged ring carrying a charge of *q*, mass *m* and radius *r* is rotated about its axis with constant angular speed ω. Find the ratio of its magnetic moment with angular momentum is
11. 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
12. Two short bar magnets have magnetic moments 1.20 Am2 and 1.00 Am2 respectively. They are kept on a horizontal table parallel to each other with their north poles pointing towards 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 centres is (Horizontal components of Earth's magnetic induction is 3.6 × 10–5 Wb m–2 )

**13.** 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?

**14.** 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 centre 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

15. The potential energy of magnetic dipole whose dipole moment is kept in uniform magnetic field

## LESSON -4

**1.** An electron moves on a straight line path XY as shown in the figure. The coil *abcd* is adjacent to the path of the electron. What will be the direction of current, if any, induced in the coil?

**2.** A thin semi-circular conducting ring (PQR) of radius r is falling with its plane vertical in a horizontal magnetic field B, as shown in the figure.

**3.** The flux linked with a coil at any instant t is given by . The induced emf at t = 3 s is

**4.** When the current changes from +2A to −2A in 0.05 s, an emf of 8 V is induced in a coil. The co-efficient of self-induction of the coil is

**5.** The current *i* flowing in a coil varies with time as shown in the figure. The variation of induced emf with time would be

**6.** 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?

**7.** In a transformer, the number of turns in the primary and the secondary are 410 and 1230 respectively. If the current in primary is 6A, then that in the secondary coil is

**8.** 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

**9.** 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 _3. Instead, if C is removed from the circuit, the phase difference is again _3. The power factor of the circuit is

**10.** 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

**11.** 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

**12.** 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

**13.** The instantaneous values of alternating current and voltage in a circuit are

The average power in watts consumed in the circuit is

**14.** 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

**15.** H inductor is connected to a capacitor of capacitance C. The value of C in order to impart maximum power at 50 Hz is

## LESSON-5

**1.** The dimension of is

**2.** If the amplitude of the magnetic field is 3 × 10−6 T, then amplitude of the electric field for a electromagnetic waves is

**3.** Which of the following electromagnetic radiations is used for viewing objects through fog

**4.** Which of the following is false for electromagnetic waves

**5.** Consider an oscillator which has a charged particle oscillating about its mean position with a frequency of 300 MHz. The wavelength of electromagnetic waves produced by this oscillator is

**6.** The electric and the magnetic fields, associated with an electromagnetic wave, propagating along negative X axis can be represented by

**7.** In an electromagnetic wave travelling in free space the rms value of the electric field is 3 V m−1. The peak value of the magnetic field is

**8.** If the magnetic monopole exists, then which of the Maxwell's equation to be modified?.

**9.** An e.m. wave is propagating in a medium with a velocity _ _ *vv i*= . The instantaneous oscillating electric field of this e.m. wave is along +*y*-axis, then the direction of oscillating magnetic field of the e.m. wave will be along:

**10.** Fraunhofer lines are an example of _____ spectrum.

**11.** Which of the following is an electromagnetic wave?

**12.** Which one of them is used to produce a propagating electromagnetic wave?.

**13.** If $E = E_o \sin[106\, x - \omega t]$ be the electric field of a plane electromagnetic wave, the value of $\omega$ is

**14.** Which of the following is NOT true for electromagnetic waves ?

**15.** The electric and magnetic fields of an electromagnetic wave are