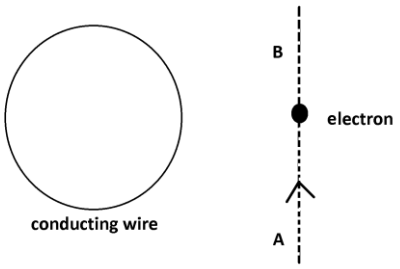
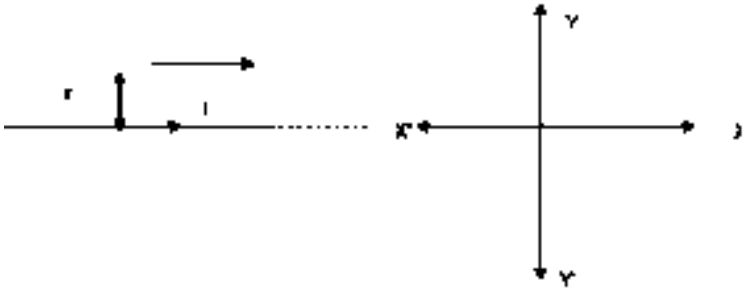
INDIAN SCHOOL MUSCAT – SENIOR SECTION – DEPARTMENT OF SCIENCE

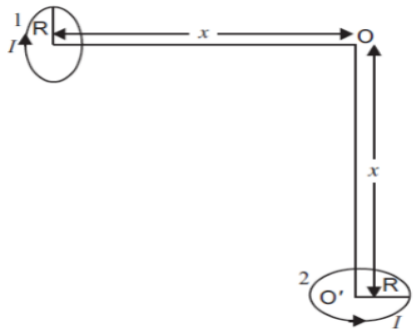
QUESTION BANK PHYSICS – CLASS XII (2019 – 20)

S.NO	SECTION-A
1	A ferromagnetic material is heated above its curie temperature. Which one is a correct statement? (a) ferromagnetic domains are perfectly arranged (b) ferromagnetic domains become random (c) ferromagnetic domains are not influenced d) ferromagnetic material changes in to a diamagnetic substance
2	When the distance between the charged particles is halved, the force between them becomes (a) One fourth (b) half (c) double four times
3	A free charged particle enters a region of magnetic field at right angles. The particle undergoes a change in (a) Speed (b) Energy (c) Direction of motion (d) None of these
4	A galvanometer can be converted in to an ammeter by connecting (a) A low resistance in series (b) A high resistance in parallel (c) A low resistance in parallel **(d)** A high resistance in series
5	A vertical straight conductor carries a current vertically upwards. A point *P* lies to the east of it at a small distance and another point *Q* lies to the west at the same distance. The magnetic field at P is (a) Greater than at *Q* (b) Same as at *Q* (c) Less than at *Q* (d) Greater than or less than at *Q* depending upon the strength of the current
6	An areophane flying horizontally with a velocity of 360 km/h. The distance between the tips of the wings is 50 m. If the vertical component of earth's magnetic field is 4×10^{-4} T. The induced emf is (a) Zero (b) 2 μF (c) 2 mV (d) 2 V
7	An electron moves along the line AB, which lies in the same plane as a circular loop of conducting wires

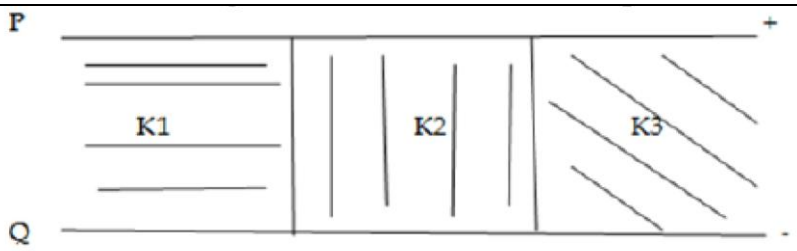
	as shown in the diagram. What will be the direction of current induced if any, in the loop? (a) No current will be induced (b) The current will be clockwise (c) The current will be anticlockwise (d) The current will change direction as the electron passes by 
8	At magnetic poles of earth, angle of dip is (a) zero (b) 45^0 (c) 90^0 **(d)** 180^0
9	Capacitance of a parallel plate air capacitor depends on (a) Thickness of conducting plates (b) Charge on the conducting plates (c) Length of each conducting plate (d) Distance of separation between the conducting plates
10	A bulb and a capacitor are connected in series to a source of alternating current. If its frequency is increased,while keeping the voltage of the source constant,then (a) bulb will give more intense light (b) bulb will give less intense light (c) bulb will give light of same intensity as before (d)bulb will stop radiating light
11	Lenz's law is a consequence of the law of conservation of (a) Induced current (b) Charge (c) Induced emf **(d)** Energy
12	In a conductor 4 C charge flows for 2 s. The value of electric current will be (a) 4 V (b) 4 A (c) 2 A **(d)** 2 V

13	Six identical cells , each of emf of 6 volt, are connected in parallel. The net emf across the battery is (a) 6 V (b) 36 V (c) 0 V (d) 12V
14	The angle between the magnetic meridian and geographical meridian is called (a) Angle of dip (b) Angle of declination (c) Magnetic moment **(d)** Intensity of magnetization
15	The material of permanent magnet has (a) High rententivity, low coercivity (b) low rententivity, high coercivity (c) low rententivity, low coercivity **(d)** high rententivity, high coercivity
16	The phase angle between emf and current in LCR series ac circuit is (a) 0 to $\pi/2$ (b) $\pi/2$ (c) 0 **(d)** Π
17	The ratio of the forces between two small spheres with constant charge (i) in air (ii) in a medium of dielectric constant *K* is (a) 1:*K* (b) *K*:1 (c) $1:K^2$ (d) $K^2:1$
18	The strength of the magnetic field at a point *r* near a long straight current carrying wire is *B*. The field at a distance *r*/2 will be. (a) *B*/2 (b) *B*/4 (c) 2*B* (d) 4*B*
19	The unit of pole strength is (a) Am^2 (b) Am (c) A^2/m

	(d) A^2/m^2
20	Torque acting on electric dipole moment $\vec{p}$ placed in a uniform electric field $\vec{E}$ is (a) $\vec{p} \times \vec{E}$ (b) Zero (c) $\vec{E} \times \vec{p}$ **(d)** $\vec{p}.\vec{E}$
	SECTION-B
21	A cell of emf*E* and internal resistance *r* is connected across a variable resistor *R*. Plot a graph showing variation of terminal voltage *V*of the cell versus the current *I*. Using the plot, show how the emf of the cell and its internal resistance can be determined.
22	(i) Name the three elements of the earth's magnetic field. (ii) Where on the surface of the earth is the vertical component of the earth's magnetic field is zero? **(OR)** (i) State Curie's law of magnetism. (ii) State any two characteristics of paramagnetic substance.
23	A particle of mass *m* and charge *q* is in motion at speed *v* parallel to a long straight conductor carrying current *I* as shown below. Find magnitude and direction of electric field required so that the particle goes undeflected.  **(OR)** Two small identical circular coils marked 1 and 2 carry equal currents, are placed with their geometric axes perpendicular to each other as shown in the figure. Derive an expression for the resultant magnetic field at O

	
24	(i) Electric filed lines are always normal to the surface of a conductor. Why? (ii) In a type of charge configuration, electric field at a point is (a) inversely proportional to the distance from the point (b) inversely proportional to the square of distance from the point. Identify the type of charge configuration in each case.
25	Two conducting wires X and Y of same diameter but different materials are joined in series across a battery. If the number density of electrons in X is twice that in Y, find the ratio of drift velocity of electrons in the two wires.
26	An electric dipole of length 10 cm having charges $\pm 6 \times 10^{-3}$ C placed at 30° with respect to a uniform electric field experiences a torque of magnitude $6\sqrt{3}$ Nm . Find magnitude of electric field.
27	A series LCR circuit with R = 20 Ω, L = 1.5 H and C = 35 μF is connected to a variable frequency 200 V ac supply. When the frequency of the supply equals the natural frequency of the circuit , what is the average power transferred to the circuit in one complete cycle?
	SECTION-C
28	State Gauss's theorem in electrostatics. Apply this theorem to obtain an expression for the electric field at a point due to an infinitely long uniformly charged straight wire of linear charge density λ Cm-1
29	Define mutual inductance between a pair of coils. Derive an expression for the mutual inductance of two long coaxial solenoids of same length wound one over the other. **(OR)** Define the term self-inductance of a coil. Obtain the expression for the magnetic energy stored in an inductor of self-inductance L to build up a current I through it.
30	A coil of inductance 0.5 H and resistance 100 Ω is connected to a 240 V, 50 Hz ac supply. (a) What is the maximum current in the coil? (b) What is the time lag between voltage maximum and current maximum? **(OR)** An inductor 200 mH, a capacitor 100 μF and a resistor 10 Ω are connected in series to an ac source of 100 V, having variable frequency. (a) At what frequency of the applied voltage will the power factor of the circuit be 1? (b) What will be the current amplitude at this frequency?

	Calculate the Q- factor of the circuit.
31	(i) Show diagrammatically the behavior of magnetic field lines in the presence of (a) Paramagnetic and (b) diamagnetic substance. Explain this distinguishing feature. (ii) Why is the core of a transformer made of soft iron?
32	(i) Deduce the expression for the energy stored in a parallel plate capacitor C having charges +Q and - Q on its plates. (ii) A metal plate is introduced between the plates of a charged parallel plate capacitor. What is the effect on the capacitance of the capacitor? Give reason.
33	Establish the relation between electric current and drift velocity in metallic conductor.
34	(i) Plot a graph showing the variation of inductive reactance with change in frequency of ac source. Give reason for your answer. (ii)When an ac source is connected across an ideal inductor , show on graph the nature of variation of voltage and current over one complete cycle.
	SECTION-D
35	(i) Draw a schematic sketch of a cyclotron. Explain clearly the role of crossed electric and magnetic field in accelerating the charge. Hence derive the expression for the kinetic energy acquired by the particles. (ii) An alpha particle and a proton are released from the center of the cyclotron and made to accelerate. Can both be accelerated at the same cyclotron frequency? Give reason to justify your answer. **(OR)** (i) With the help of a diagram explain the principle and working of a moving coil galvanometer. (ii) What is the importance of a radial magnetic field and how is it produced? Define current sensitivity. Name any two factors on which the current sensitivity of a galvanometer depends
36	(i) A parallel plate capacitor, each with plate area *A*, separation between the plate is *d*, is charged to a potential difference *V*. The battery used to charge remains connected, and a dielectric slab of dielectric constant k is now placed between the plates, what change if any will take place in (a) charge on the plates (b) electric field intensity between the plates (c) capacitance of capacitor. Justify your answer in each case (ii) Two parallel plates P and Q are kept at a distance *d* apart. Area of each plate is *A*. The space between them is filled with three dielectric slabs of identical size having dielectric constants *K1*, *K2*, and *K3* as shown in the following figure. Find the effective capacitance of the combination.

		
	(OR)	
	(i)	Deduce the expression for the electric potential due to an electric dipole at any point on its axis.
	(ii)	Write two characteristics of equipotential surfaces.
	(iii)	Draw the equipotential surfaces due to (a) an electric dipole (b) an electric field that is uniformly increasing in magnitude along z direction.
37	(i)	State the principle on which AC generator works.
	(ii)	Draw a labelled diagram and explain its working. Write the expression for the emf generated in the coil in terms of speed of rotation.
	(iii)	Can the current produced by the ac generator be measured with a moving coil galvanometer?
	(OR)	
	(i)	Write Faraday's law of electromagnetic induction. Express it mathematically.
	(ii)	A conducting rod of length l with one end pivoted, is rotated with a uniform angular speed ω in a vertical plane, normal to a uniform magnetic field B. Deduce expression for the emf induced in this rod. If resistance of rod is R, what is the current induced in it?
	End of the Question Paper	