PANCHSHEEL PUBLIC SCHOOL

10+2 Senior Secondary School (Recognised & Affiliated to C.B.S.E.)

Jaitpur, Badarpur, New Delhi-110044

Class-XII

Subject- Physics **Mid term Revision test** **M.M.-50**

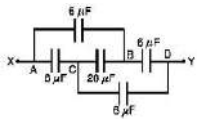
Very Very short answer type questions (1*10=10) Attempt any 10

Q1. Some charge is being given to a conductor. Then, it's potential

(a) is maximum at the surface. (b) is maximum at the centre.
(c) remains the same throughout the conductor.
(d) is maximum somewhere between the surface the and centre.

Q2. What is the effective capacitance between X and Y?

(a) 24 µC
(b) 18 µC
(c) 12 µC
(d) 6 µC



Q3.An electron moves along the line AB, which lies in the same plane as a circular loop of conducting wires as shown in 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 direct ion as the electron crosses the loop.

Q4. The phase difference between the alternating current and e.m.f. is $\pi/2$. Which of the following cannot be the constituent of the circuit?
(a) C alone (b) L alone (c) L,C (d) R, L

Q5. Whenever a magnet is moved either towards or away from a conducting coil, an e.m.f. is induced, the magnitude of which is independent of

(a) the strength of the magnetic field.

(b) the speed with which, the magnet is moved.

(c) the number of turns in the coil. (d) the resistance of the coil

Q6. Which of the following is not the property of light?

(a) It requires a material medium for propagation.

(b) It can travel through vacuum.

(c)It involves transportation of energy. (d) It has finite speed.

Q7. The magnetic flux linked with a coil (in Wb) is given by the equation:

$\Phi = 5\ t^2 + 5t + 16$. The induced e.m.f. in the coil in the fourth second will be

(a) 10V (b) 108 V (c) 45 V (d) 210

Q8. If number of turns, area and current through a coil are given by n, A and I respectively, then its magnetic moment is given by

(a) nIA (b) n^2IA (c) nIA^2 (d) None of these.

Q. 9) Given below are two statements labelled as STATEMENT-1 and STATEMENT-2

Statement 1 : An induced emf appears in any coil in which the current is changing.

Statement 2 : Self induction phenomenon obeys Faraday's law of induction.

(a) Statement -1 is false, Statement-2 is true

(b) Statement -2 is true, Statement-2 is true; Statement -2 is a correct explanation for Statement-1

(c) Statement -1 is true, Statement-2 is true; Statement -2 is not a correct explanation for Statement-1

(d) Statement -2 is true, Statement-2 is false

Q. 10 Given below are two statements labelled as STATEMENT-1 and STATEMENT-2

Statement - 1 : A capacitor blocks direct current in the steady state.

Statement - 2 : The capacitive reactance of the capacitor is inversely proportional to frequency f of the source of emf.

(a) Statement -1 is false, Statement-2 is true

(b) Statement -1 is true, Statement-2 is true; Statement -2 is a correct explanation for Statement-1

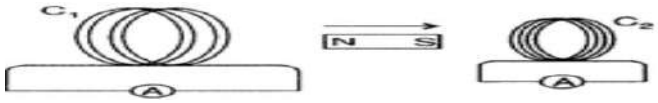
(c) Statement -1 is true, Statement-2 is true; Statement -2 is not a correct explanation for Statement-1

(d) Statement -1 is true, Statement-2 is false

Very Short answer type questions(2 Marks each)

Q. 13) Find the condition under which the charged particles moving with different speeds in the presence of electric and magnetic field vectors can be used to select charged particles of a particular speed. **Q.14)** Show that magnetic energy required to build up the current I in a coil of self-inductance L is given by L*I*^2.

Q. 15) A magnet is quickly moved in the direction indicated by an arrow between two coils C_1 and C_2 as shown in the figure. What will be the direction of induced current in each coil as seen from the magnet? Justify your answer.



Q. 16) How does the electric flux due to a point charge enclosed by a spherical Gaussian surface get affected when its radius is increased? Show on a plot the nature of variation of the Electric field (E) and potential (V), of a (small) electric dipole with the distance (r) of the field point from the centre of the dipole.

Q. 17) Explain the term 'drift velocity' of electrons in a conductor. Hence obtain the expression for the current through a conductor in terms of 'drift velocity'

Short answer type questions (5×3=15) (any 5)

Q. 18) Describe briefly, with the help of a circuit diagram, how a potentiometer is used to determine the internal resistance of a cell.
Q. 19) Derive the expression for the electric potential at any point along the axial line of an electric dipole.
Q. 20) (i) State Faraday's law of electromagnetic induction.
(ii)Predict the directions of induced current in metal rings 1 and 2 when current I in the wire is steadily decreasing?
Q. 21) An ammeter of resistance 0.80 Ω can measure current upto 1.0 A.
(i) What must be the value of shunt resistance to enable the ammeter to measure current upto 5.0A?
(ii) What is the combined resistance of the ammeter and the shunt?

Case study Question

Q22. Drift velocity is the average uniform velocity acquired by conduction of electrons inside a Metallic conductor on applying an external electric field. Due to this drift of electrons there is A net transfer of charge across the cross section of the conductor resulting in an electric current Flow. The drift velocity is given by, $V_d = eE\tau/m$,where τ , known as relaxation time, is the mean value of time between two successive collisions of an electron with ions in the conductor. Drift velocity per unit electric field is called the mobility of electron. Mobility, $\mu = V_d/E = e\tau/m$. In terms of current, Drift velocity is $I = nAeV_d$.

(i)How does mobility of free electrons in a conductor is related to relaxation time?

(ii)The drift velocity of the electrons in a copper wire of length 2 m under the application of potential difference of 200 V is 0.5Ms-1. Calculate their mobility (in $m^2 V^{-1-1}$).Define the mobility of free electrons in a metal. Give its expression in terms of charge e, mass M and relaxation time τ .

(iii) Drift speed of electrons, when 1.5 A of current flows in a copper wire of cross section 5 mm^2, is v . If the electron density in copper is $9*10^{28}$ /m^3 . then what will be the value of v in mm/s is Close to (Take charge of electron to be 1.6*10^-19C)

Long Answer type questions

Q23. (a) What is impedance?
(b)A series LCR circuit is connected to an ac source having voltage $V = V_o \sin \omega t$. Derive expression for the impedance, instantaneous current and its phase relationship to the applied voltage.
(c) Find the expression for resonant frequency.

OR

(a) An ac source of voltage $V = V_o \sin \omega t$ is connected to a series combination of L, C and R. Use the phasor diagram to obtain expressions for impedance of the circuit and phase angle between voltage and current. Find the condition when current will be in phase with the voltage.

What is the circuit in this condition called?

(b) In a series LR circuit $X_L = R$ and power factor of the circuit is P_1. When capacitor with capacitance C such that $X_L = X_C$ is put in series, the power factor becomes P_2.
Calculate P_1 & P_2**.**

Q. 26) (a) Define the SI unit of capacitance.

(b) Derive an expression for the energy stored in a parallel plate capacitor.

(c)Two identical capacitors of 12 pF each are connected in series across a battery of 50 V. How much electrostatic energy is stored in the combination ? If these were connected in parallel across the same battery, how much energy will be stored in the combination?

OR

(a) State the two Kirchhoff's laws.

(b) Show that the 'resistivity', of the material of a wire, is' inversely proportional to the 'relaxation time' for the 'free electrons' in the metal.

(c) In the circuit shown in the figure, find the current through each resistor.