

**CHOITHRAM SCHOOL MANIKBAGH INDORE**

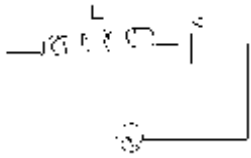
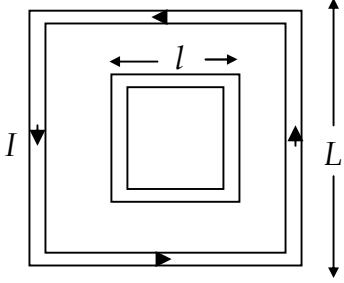
**CLASS XII- Session: 2018-19**

Subject: Physics

Allotment Date: 14/09/18

Assignment No: III

Submission Date: 22/09/18

S.No.	Question	Level	Mark
<b>OBJECTIVE</b>			
Q.1	Show that during the charging of a parallel plate capacitor, the rate of change of charge on each plate equals $\epsilon_0$ times the rate of change of electric flux $\phi_e$ linked with it. What is the name given to the term $\epsilon_0 d \phi_e / dt$ ?	Knowledge	1
Q.2	A jet plane is travelling west at a speed of 450 m/sec. If the horizontal component of earth's magnetic field at that place is $4 \times 10^{-4} T$ and the angle of dip is $30^\circ$ , find the emf induced between the ends of wings having a span of 30m.	Understanding	1
Q.3	What is the power dissipated in an a.c circuit in which voltage and current are given by $V=230 \sin (\omega t- \pi/2)$ and $I=10 \sin \omega t$ ?	Hot	1
<b>SHORT ANSWER TYPE - I</b>			
Q.4	Derive an expression for instantaneous value of induced emf in a coil when it is rotated in a uniform magnetic field at a uniform angular velocity $\omega$ . How does the emf varies when the coil is rotated through an angle $2\pi$ ?	Knowledge	2
Q.5	Find rms value of voltage and current $V=230 \sin (\omega t- \pi/2)$ and $I=10 \sin \omega t$ ?	Understanding	2
Q.6	Calculate the current drawn by the primary coil of a transformer which step down 200 V to 20 V to operate a device of resistance $20 \Omega$ . Assume the efficiency of the transformer to be 80%.	Logical	2
Q.7	Explain series LCR circuit. An inductor L of reactance $X_L$ is connected in series with a bulb B to an a.c source as shown in figure. Briefly explain how does the lightness of the bulb changes when (i) number of turns of the inductor is reduced and (ii) a capacitor of reactance $X_c = X_L$ is included in series in the same circuit.	Hot	2
			
<b>SHORT ANSWER TYPE - II</b>			
Q.8	<p>A small square loop of wire of side <math>l</math> is placed inside a large square loop of wire of side <math>L</math> (<math>\gg l</math>). The loops are coplanar and their centres coincide. What is the mutual inductance of the system?</p> 	Understanding	3

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Q.9	Sunita and her friend visited an exhibition. The policeman asked them to pass through a metal detector. Sunita's friend were initially scared of it. Sunita, however, explained to them the purpose and working of the metal detector. (i) on what principle does a metal detector work? (ii) Why does the detector emit sound when a person carrying any metallic object walks through it? (iii) State any two qualities which Sunita displayed while explaining the purpose of walking through the detector?	Value based	3
Q.10	What is the principle of transformer, explain its working. A rectangular coil of $N$ turns and area of cross section $A$ , is held in time varying magnetic field given by $B = B_0 \sin \omega t$ , with plane of coil normal to the magnetic field. Deduce an expression for the emf in the coil.	MultiConceptual	3
	<b>LONG ANSWER TYPE</b>		
Q.11	What do you mean by power factor of LCR circuit? Power factor of an a.c circuit is 0.5. What will be the phase difference between voltage and current in the circuit and find the expression for average power consumed in an a.c circuit.	Logical	5
Q.12	(a) Can the voltage drop across capacitor or the inductor be more than the applied voltage? Justify. (b) Calculate the current drawn by the primary coil of a transformer which step down 200 V to 20 V to operate a device of resistance $20 \Omega$ . Assume the efficiency of the transformer to be 80%.	Hot	5