O. P. JINDAL SCHOOL, SAVITRI NAGAR

Periodic Test – I (Round – II) Set - B

2024 – 2025

Class - XII **Max.Marks : 20**

Subject: Physics **Max.Time: 1 Hr.**

General Instructions: ***All questions are compulsory.***

1 Two coils are placed closed to each other. The mutual inductance of the pair of coils depends upon
(a) the rate at which currents are changing in the two coils.
(b) relative position and orientation of two coils. 1
(c) the material of the wires of the coils.
(d) the currents in the two coils.

2 Speed of electromagnetic wave related to electric field and magnetic field vector in vacuum.

(a) $c = \frac{E_0}{B_0}$ (b) $c = \frac{B_0}{E_0}$

(c) $c = E_0 B_0$ (d) $c = \frac{1}{\sqrt{E_0 B_0}}$

3 If an AC voltage is applied to an LCR circuit, which of the following is true?
(a) I and V are out of phase with each other in R.
(b) I and V are in phase in L while in C, they are out of phase. 1
(c) I and V are out of phase in both C and L.
(d) I and V are out of phase in L and in phase in C.

4 Choose the correct statement.
(a) A capacitor can conduct a dc circuit but not an inductor.
(b) In a dc circuit the inductor can conduct but not a capacitor. 1
(c) In dc circuit both the inductor and capacitor cannot conduct.
(d) The inductor has infinite resistance in a dc circuit.

5 Lenz's law of electromagnetic induction is as per law of conservation of
(a) energy. (b) momentum angular. 1
(c) charge. (d) electromotive force.

6 Speed of electromagnetic wave related to electric field and magnetic field vector in vacuum.

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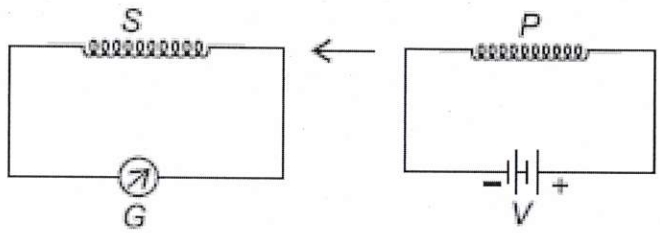
7 (i) When primary coil P is moved towards secondary coil S (as shown in the figure below) the galvanometer shows momentary deflection. What can be done to have larger deflection in the galvanometer with the same battery?

(ii) State the related law.



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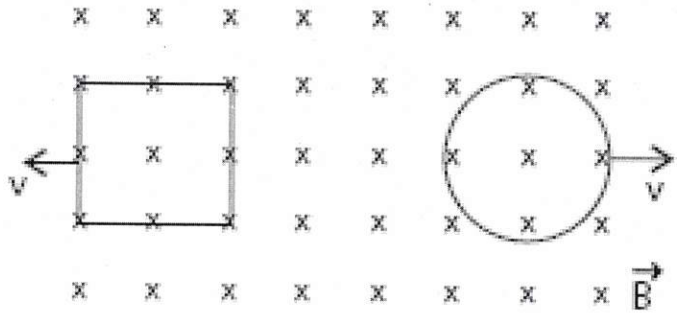
OR

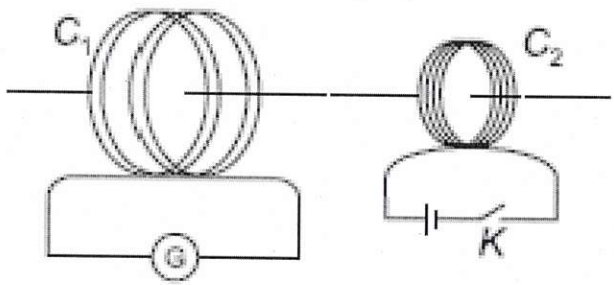
A rectangular loop and a circular loop are moving out of a uniform magnetic field to a field-free region with a constant velocity v as shown in the figure. Explain in which loop do you expect the induced emf to be constant during the passage out of the field region. The magnetic field is normal to the loops.



8 A current is induced in coil C_1 due to the motion of current carrying coil C_2.

(a) Write any two ways by which a large deflection can be obtained in the galvanometer G.

(b) Suggest an alternative device to demonstrate the induced current in place of a galvanometer.



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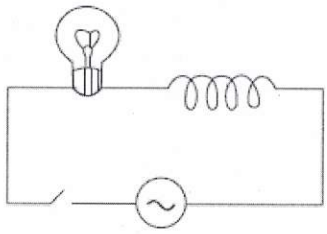
9 A light bulb and an open coil inductor are connected to an ac source through a key as shown in the figure.



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The switch is closed and after sometime, an iron rod is inserted into the interior of the inductor. The glow of the light bulb (a) increases; (b) decreases; (c) is unchanged, as the iron rod is inserted. Give your answer with reason. What will be your answer if ac source is replaced by a dc source?

10 An em wave travelling through a medium has electric field vector.
$Ey = 4 \times 105 \cos (3.14 \times 108\ t - 1.57\ x)$ N/C. Here x is in m and t in s.
Then find: (i) wavelength, (ii) frequency, (iii) direction of propagation, (iv) speed of wave, (v) refractive index of medium, and (vi) amplitude of magnetic field vector. 3

11 Explain with the help of a labelled diagram the underlying principle and working of a step-up transformer. Why cannot such a device be used to step-up dc voltage? 3

12 Answer the following:
(a) Name the em waves which are suitable for radar systems used in aircraft navigation. Write the range of frequency of these waves.
(b) If the earth did not have atmosphere, would its average surface temperature be higher or lower than what it is now? Explain. 3
(c) An em wave exerts pressure on the surface on which it is incident. Justify.

OR

Arrange the following electromagnetic waves in the order of their increasing wavelength:
(a) γ-rays (b) Microwaves (c) X-rays (d) Radio waves
How are infrared waves produced? What role does infrared radiation play in (i) maintaining the Earth's warmth, and (ii) physical therapy?