ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

SOLUTION TO WORK SHEET 28

Subject : PHYSICS

07.07.20

CLASS : XII

Topic : Magnetic flux, Faraday's laws and e.m.f, Lenz's law, induced e.m.f in an a.c generator.

Chapter : EM Induction

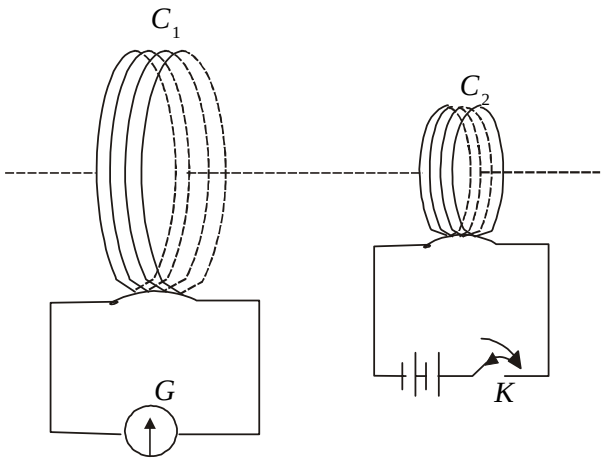
Multiple Choice Question : **1** x **15 = 15**

1. The pioneering experiments of Faraday and Henry have led directly to the development of modern day's

   (a) generator (b) transformer (c) dynamo (d) both (a) and (b)

   Ans : (d) both (a) and (b)

2. When they key K is released, the current C_2 and the resulting magnetic field



   (a) increase from zero to maximum value

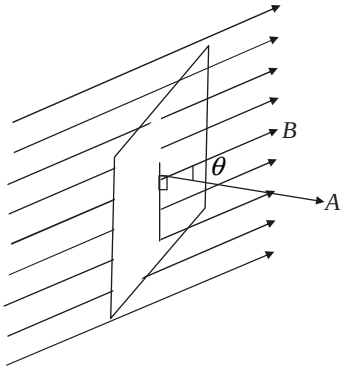
   (b) first increase, then decrease

   (c) remain same

   (d) maximum value to zero

   Ans. (d) maximum value to zero

3. Magnetic flux through a plane of area A placed in a uniform magnetic field B can be written as



   (a) $\phi_B = B \times A$

   (b) $\phi_B = \boldsymbol{B} \times \boldsymbol{A}$

   (c) $\phi_B = B \,.\, A$

   (d) $\phi_B = \mathbf{B} \,.\, \mathbf{A}$

   Ans. (d) $\phi_B = \mathbf{B} \,.\, \mathbf{A}$

4. The net magnetic flux through any closed surface, kept in a magnetic field is

   (a) Zero (b) $\frac{\mu_0}{4\pi}$ (c) $4\pi\mu_0$ (d) $\frac{4\mu_0}{\pi}$ Ans. (a) Zero

5. A circular coil of diameter 21 cm is placed in a magnetic field of induction 10^{-4} T. The magnitude of flux linked with coil when the plane of coil makes an angle 30^0 with the field is

   (a) 1.44 x 10^{-6} Wb (b) 1.732 x 10^{-6} Wb (c) 3.1 x 10^{-6} Wb

   (d) 4.2 x 10^{-6} Wb Ans. (b) 1.732 x 10^{-6} Wb

6. An …… is induced in a coil when magnetic flux through the coil changes with time.
(a) electric current (b) emf (c) both (a) and (b) (d) neither (a) nor (b)
Ans. (c) both (a) and (b)

7. A coil of resistance 400 Ω is placed in a magnetic field. If the magnetic flux ϕ (Wb) linked with the coil varies with time t(s) as $\phi = 50\ t^2 + 4$. Current at 2 s is
(a) 0.5 A (b) 0.1A (c) 2 A (d) 1A Ans. (a) 0.5 A

8. Wire loop is rotated in a magnetic field. The frequency of change of direction of the induced emf is
(a) once per revolution (b) twice per revolution
(c) four times per revolution (d) six times per revolution
Ans. (b) twice per revolution

9. A copper disc of radius 0.1 m is rotated about its centre with 20 rev/s in a uniform magnetic field of 0.1 T with its plane perpendicular to the field. The emf induced across the radius of the disc is
(a) $\frac{\pi}{20}V$ (b $\frac{\pi}{10}V$ (c) 20π mV (d) none of these Ans. (c) 20π mV

10. Which of the following is the fundamental significance of the Faraday's discovery?
(a) a changing magnetic field can exert a force on the stationary charge
(b) a changing magnetic field can exert a force on the neutral particle
(c) a constant magnetic field can exert a force on the stationary charge
(d) a constant magnetic field can exert a force on the neutral particle
Ans (a) a changing magnetic field can exert a force on the stationary charge

11. Which method is used to induce an emf or current in a loop in a AC generator?
(a) a change in the loop's orientation (b) a change in its effective area
(c) both (a) and (b) (d) neither (a) nor (b)
Ans. (c) both (a) and (b)

12. The polarity of induced emf is such that it tends to produce a current which opposes the change in magnetic flux that produced it, is statement of
(a) Faraday's law (b) Lenz's law (c) Fleming's right hand rule
(d) Fleming's left hand rule Ans. (b) Lenz's law

13. A closed loop moves normal to the constant electric field between the plates of a large capacitor. Is the current induced in the loop when it is wholly inside the region between the capacitor. plates?
(a) yes (b) no (c) may be possible (d) may not be possible
Ans. (b) no

14. When the coil is rotated with a constant angular speed ω, the angle θ between the magnetic field vector ***B*** and the area vector A of the coil at any instant t, is
(a) $\theta = AB$ (b) $\theta = At$ (c) $\theta = \omega t$ (d) $\omega = Bt$ Ans. (c) $\theta = \omega t$

15. The instantaneous value of the emf is ……..(given, $\varepsilon_0 = NBA\omega$)
(a) ε_0 sin ωt (b) sin ωt (c) $\varepsilon_0\ \omega$ sin ωt (d) ω sin ωt Ans. (a) ε_0 sin ωt

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