

Class: XIIth **Subject: PHYSICS**

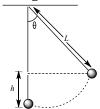
DPP No.: 4 Date:

Topic :-Electro Magentic

1. The figure shows certain wire segments joined together to form a coplanar loop. The loop is placed in a perpendicular magnetic field in the direction going into the plane of the figure. The magnitude of the field increases with time. I_1 and I_2 are the currents in the segments ab and cd. Then,



- a) $I_1 > I_2$
- b) $I_1 < I_2$
- c) I_1 is in the direction ba and I_2 is in the direction cd
- d) I_1 is in the direction ab and I_2 is in the direction dc
- 2. A simple pendulum with bob of mass m and conducting wire of length L swings under gravity through an angle 2 θ . The earth's magnetic field component in the direction perpendicular to swing is *B.* Maximum potential difference induced across the pendulum is



- a) $2 BL \sin\left(\frac{\theta}{2}\right) (gL)^{1/2}$ b) $BL \sin\left(\frac{\theta}{2}\right) (gL)$ c) $BL \sin\left(\frac{\theta}{2}\right) (gL)^{3/2}$ d) $BL \sin\left(\frac{\theta}{2}\right) (gL)^2$

- 3. Two circular coils have their centres at the same point. The mutual inductance between them will be maximum when their axes
 - a) Are parallel to each other

b) Are at 60° to each other

c) Are at 45° to each other

- d) Are perpendicular to each other
- 4. A wire of length 1 m is moving at a speed of $2ms^{-1}$ perpendicular to its length and in a homogenous magnetic field of 0.5 T. The ends of the wire are joined to a circuit of resistance 6 Ω . The rate at which work is being done to keep the wire moving at constant speed is
 - a) $\frac{1}{12}$ W
- b) $\frac{1}{6}$ W
- c) $\frac{1}{2}$ W
- d)1W

5. A metal conductor of length 1 m rotates vertically about one of its ends at angular velocity 5 rad/s. If the horizontal component of earth's magnetic field is 0.2×10^{-4} T, then the emf developed between the ends of the conductor is a) 5 μV b) 5 mV c) 50 µV d)50 mV If in a coil rate of change of area is $\frac{5 \ metre^2}{milli \ second'}$, current becomes 1 amp form 2 amp in 2 × 10⁻³ sec magnetic field is 1 tesla, then self inductance of the coil is d) 10 H c) 20 H a) 2H b) 5 H 7. The north pole of a long bar magnet was pushed slowly into a short solenoid connected to a galvanometer. The magnet was held stationary for a few seconds with the north pole in the middle of the solenoid and then withdrawn rapidly. The maximum deflection of the galvanometer was observed when the magnet was a) Moving towards the solenoid b) Moving into the solenoid c) At rest inside the solenoid d) Moving out of the solenoid 8. Which of the following is constructed on the principle of electromagnetic induction a) Galvanometer b) Electric motor c) Generator d) Voltmeter 9. A highly conducting ring of radius R is perpendicular to and concentric with the axis of a long solenoid as shown in fig. The ring has a narrow gap of width d in its circumference. The solenoid has cross sectional area A and a uniform internal field of magnitude B_0 . Now beginning at t = 0, the solenoid current is steadily increased so that the field magnitude at any time t is given by $B(t) = B_0 + \alpha t$ where $\alpha > 0$. Assuming that no charge can flow across the gap, the end of ring which has excess of positive charge and the magnitude of induced e.m.f. in the ring are respectively Area d) Y, $\pi R^2 \alpha$ b) X, $\pi R^2 \alpha$ c) Y, $\pi A^2 \alpha$ a) X, $A\alpha$

10. A copper disc of radius 0.1 m is rotated about its centre with 20 $\text{rev}-\text{s}^{-1}$ 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) 10π mV

11. Two conducting circular loops of radii R_1 and R_2 are placed in the same plane with their centres coinciding. If $R_1 \gg R_2$, the mutual inductance M between them will be directly proportional to

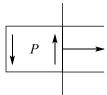
a) R_1/R_2

b) R_2/R_1

c) R_1^2/R_2

d) R_2^2/R_1

12. A movable wire is moved to the right crossing an anti-clock-wise induced current, figure. The direction of magnetic induction in the region P points



a) To the right

b) To the left

c) Up the paper

- d) Down into the paper
- 13. The transformation ratio in the step-up transformer is
 - a) One
 - b) Greater than one
 - c) Less than one
 - d) The ratio greater or less than one depends on the other factors
- 14. Two coils *A* and *B* having turns 300 and 600 respectively are placed near each other, on passing a current of 3.0 ampere in A, the flux linked with A is 1.2×10^{-4} weber and with B it is 9.0×10^{-5} weber. The mutual inductance of the system is

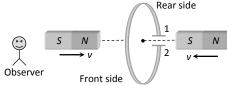
 - a) $2 \times 10^{-5} henry$ b) $3 \times 10^{-5} henry$
- c) $4 \times 10^{-5} henry$
- d) $6 \times 10^{-5} henry$

- 15. Faraday's laws are consequence of conservation of
 - a) Energy

b) Energy and magnetic field

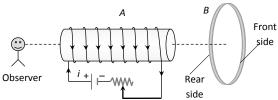
c) Charge

- d) Magnetic field
- 16. The oscillating frequency of a cyclotron is 10 MHz. If the radius of its dees is 0.5 m, the kinetic energy of a proton, which is accelerated by the cyclotron is
 - a) 10.2 MeV
- b) 2.55 MeV
- c) 20.4 MeV
- d) 5.1 MeV
- 17. The magnetic flux across a loop of resistance 10Ω is given by $\phi = 5t^2 4t + 1$ weber. How much current is induced in the loop after 0.2 sec
 - a) 0.4 A
- b) 0.2 A
- c) 0.04 A
- d) 0.02 A
- 18. The resistance and inductance of series circuit are 5Ω and 20H respectively. At the instant of closing the switch, the current is increasing at the rate 4A/s. The supply voltage is
 - a) 20 V
- b) 80 V
- c) 120 V
- d) 100 V
- 19. The north and south poles of two identical magnets approach a coil, containing a condenser, with equal speeds from opposite sides. Then



- a) Plate 1 will be negative and plate 2 positive
- b) Plate 1 will be positive and plate 2 negative
- c) Both the plates will be positive
- d) Both the plates will be negative

20. An aluminium ring *B* faces an electromagnet *A*. The current *I* through *A* can be altered



- a) Whether I increases or decreases, B will not experience any force
- b) If *I* decreases *A* will attract *B*
- c) If *I* increases, *A* will attract *B*
- d) If I increases, A will repel B

