NEET : CHAPTER WISE TEST-5

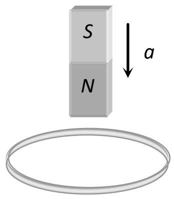
SUBJECT :- PHYSICS DATE……………………………………………………

CLASS :- 12th NAME……………………………………………………

CHAPTER :- ELECTRO MAGNETIC INDUCTION SECTION……………………………………………

(SECTION-A)

1. A metallic ring is attached with the wall of a room. When the north pole of a magnet is brought near to it, the induced current in the ring will be



(A) First clockwise then anticlockwise
(B) In clockwise direction
(C) In anticlockwise direction
(D) First anticlockwise then clockwise

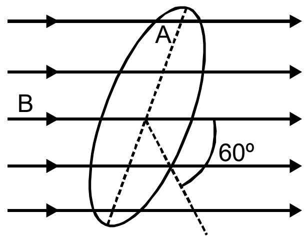
2. The magnetic flux linked with a coil is given by an equation ϕ (in *webers*) = $8t^2 + 3t + 5$. The induced e.m.f. in the coil at the fourth second will be
(A) 16 *units* (B) 39 *units*
(C) 67 *units* (D) 145 *units*

3. The current flowing in two coaxial coils in the same direction. On increasing the distance between the two, the electric current will
(A) Increase
(B) Decrease
(C) Remain unchanged
(D) The information is incomplete

4. A coil having 500 square loops each of side 10 *cm* is placed normal to a magnetic flux which increases at the rate of 1.0 *tesla/second*. The induced e.m.f. in volts is
(A) 0.1 (B) 0.5 (C) 1 (D) 5

5. According to Faraday's law of electromagnetic induction
(A) The direction of induced current is such that it opposes the cause producing it
(B) The magnitude of induced e.m.f. produced in a coil is directly proportional to the rate of change of magnetic flux
(C) The direction of induced e.m.f. is such that it opposes the cause producing it
(D) None of the above

6. The figure represents an area A = $0.5 m^2$ situated in a uniform magnetic field B = 2.0 weber/m^2 and making an angle of 60° with respect to the magnetic field. The value of the magnetic flux through the area would be equal to-

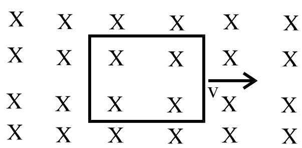


(A) 2.0 weber (B) $\sqrt{3}$ weber
(C) $\frac{3}{2}$ weber (D) 0.5 weber

7. A solenoid is 1.5 *m* long and its inner diameter is 4.0 *cm*. It has three layers of windings of 1000 turns each and carries a current of 2.0 *amperes*. The magnetic flux for a cross-section of the solenoid is nearly
(A) 2.5×10^{-7} *weber*
(B) 6.31×10^{-6} *weber*
(C) 5.2×10^{-5} *weber*
(D) 4.1×10^{-5} *weber*

8. Faraday's laws are consequence of conservation of
(A) Energy
(B) Energy and magnetic field
(C) Charge
(D) Magnetic field

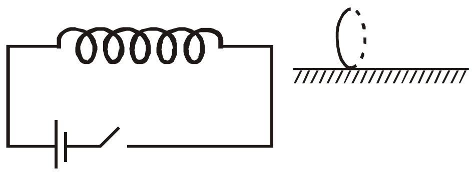
9. A conducting square loop of side l and resistance R moves in its plane with a uniform velocity v perpendicular to one of its sides. A uniform and constant magnetic field B exists perpendicular to the plane of the loop in fig. The current induced in the loop is -



(A) Blυ/R clockwise
(B) Blυ/R anticlockwise
(C) 2Blυ/R anticlockwise
(D) zero

10. The north pole of a magnet is brought near a metallic ring. The direction of the induced current in the ring will be
(A) Clockwise
(B) Anticlockwise
(C) Towards north
(D) Towards south

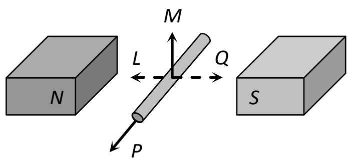
11. Fig. shows a horizontal solenoid connected to a battery and a switch. A copper ring is placed on a frictionless track, the axis of the ring being along the axis of the solenoid. As the switch is closed, the ring will



(A) remain stationary
(B) move towards the solenoid
(C) move away from the solenoid
(D) move towards the solenoid or away from it depending on
which terminal (positive or negative) of the battery is connected to the left end of the solenoid.

12. Lenz's law is expressed by the following formula (here e = induced e.m.f., ϕ = magnetic flux in one turn and N = number of turns)
(A) $e = -\phi \frac{dN}{dt}$
(B) $e = -N \frac{d\phi}{dt}$
(C) $e = -\frac{d}{dt}\left(\frac{\phi}{N}\right)$
(D) $e = N \frac{d\phi}{dt}$

13. An electric potential difference will be induced between the ends of the conductor shown in the diagram, when the conductor moves in the direction



(A) *P* (B) *Q* (C) *L* (D) *M*

14. An aeroplane in which the distance between the tips of wings is 50 *m* is flying horizontally with a speed of 360 *km/hr* over a place where the vertical components of earth magnetic field is $2.0 \times 10^{-4} weber/m^2$. The potential difference between the tips of wings would be
(A) 0.1 *V*
(B) 1.0 *V*
(C) 0.2 *V*
(D) 0.01 *V*

15. A coil of area 80 *square cm* and 50 turns is rotating with 2000 *revolutions per minute* about an axis perpendicular to a magnetic field of 0.05 *Tesla*. The maximum value of the e.m.f. developed in it is
(A) $200\pi\, volt$
(B) $\frac{10\pi}{3} volt$
(C) $\frac{4\pi}{3} volt$
(D) $\frac{2}{3}$ volt

16. A rectangular coil of 300 turns has an average area of average area of $25\ cm \times 10\ cm$. The coil rotates with a speed of 50 *cps* in a uniform magnetic field of strength $4 \times 10^{-2} T$ about an axis perpendicular of the field. The peak value of the induced e.m.f. is (in volt)
(A) 3000π
(B) 300π
(C) 30π
(D) 3π

17. The current passing through a choke coil of 5 henry is decreasing at the rate of 2 *ampere/sec*. The e.m.f. developing across the coil is
(A) 10 *V*
(B) – 10 *V*
(C) 2.5 *V*
(D) – 2.5 *V*

18. A solenoid has 2000 turns wound over a length of 0.30 *metre*. The area of its cross-section is $1.2 \times 10^{-3} m^2$. Around its central cross section, a coil of 300 turns is wound. If an initial current of 2 Flowing A in the solenoid is reversed in 0.25 *sec*, then the e.m.f. induced in the coil is
(A) $6 \times 10^{-4} V$
(B) $4.8 \times 10^{-3} V$
(C) $6 \times 10^{-2} V$
(D) 48 *mV*

19. Two coils of self inductance L_1 and L_2 are placed closer to each other so that total flux in one coil is completely linked with other. If M is mutual inductance between them, then
(A) $M = L_1 L_2$
(B) $M = L_1 / L_2$
(C) $M = \sqrt{L_1 L_2}$
(D) $M = (L_1 L_2)^2$

20. The average e.m.f. induced in a coil in which the current changes from 2 *ampere* to 4 *ampere* in 0.05 *second* is 8 *volt*. What is the self inductance of the coil ?
(A) 0.1 *H*
(B) 0.2 *H*
(C) 0.4 *H*
(D) 0.8 *H*

21. A coil and a bulb are connected in series with a dc source, a soft iron core is then inserted in the coil. Then
(A) Intensity of the bulb remains the same
(B) Intensity of the bulb decreases
(C) Intensity of the bulb increases
(D) The bulb ceases to glow

22. The mutual inductance between a primary and secondary circuits is 0.5 *H*. The resistances of the primary and the secondary circuits are 20 *ohms* and 5 *ohms* respectively. To generate a current of 0.4 *A* in the secondary, current in the primary must be changed at the rate of
(A) 4.0 *A/s* (B) 16.0 *A/s*
(C) 1.6 *A/s* (D) 8.0 *A/s*

23. A metal rod of length L is placed normal to a magnetic field and rotated in a circular path with frequency f. The potential difference between it ends will be -
(A) $\pi L^2 Bf$ (B) BL/f
(C) $\pi L^2 B/f$ (D) fBL

24. Which of the following is not an application of eddy currents
(A) Induction furnace
(B) Galvanometer damping
(C) Speedometer of automobiles
(D) *X*-ray crystallography

25. If the length and area of cross-section of an inductor remain same but the number of turns is doubled, its self-inductance will become -
(A) half (B) four times
(C) double (D) one-fourth

26. When the current changes from +2A to –2A in 0.05s, an emf of 8V is induced in a coil. The coefficient of self induction of the coil is :
(A) 0.2 H (B) 0.4H
(C) 0.8H (D) 0.1H

27. An electric motor operates on a 50 *volt* supply and a current of 12*A*. If the efficiency of the motor is 30%, what is the resistance of the winding of the motor
(A) 6Ω (B) 4Ω
(C) 2.9Ω (D) 3.1Ω

28. In transformer, core is made of soft iron to reduce
(A) Hysteresis losses
(B) Eddy current losses
(C) Force opposing electric current
(D) None of the above

29. A loss free transformer has 500 turns on its primary winding and 2500 in secondary. The meters of the secondary indicate 200 *volts* at 8 *amperes* under these conditions. The voltage and current in the primary is
(A) 100 *V*, 16 *A* (B) 40 *V*, 40 *A*
(C) 160 *V*, 10 *A* (D) 80 *V*, 20 *A*

30. Two conducting loops of radi R_1 and R_2 are concentric and are placed in the same plane. If $R_1 >> R_2$, the mutual inductance M between them will be directly proportional to-
(A) $\frac{R_1}{R_2}$ (B) $\frac{R_2}{R_1}$
(C) $\frac{R_1^2}{R_2}$ (D) $\frac{R_2^2}{R_1}$

31. A transformer connected to 220 *volt* line shows an output of 2 *A* at 11000 *volt*. The efficiency is 100%. The current drawn from the line is
(A) 100 *A* (B) 200 *A*
(C) 22 *A* (D) 11 *A*

32. A transformer is used to
(A) Change the alternating potential
(B) Change the alternating current
(C) To prevent the power loss in alternating current flow
(D) To increase the power of current source

33. The primary winding of transformer has 500 turns whereas its secondary has 5000 turns. The primary is connected to an ac supply of 20 *V*, 50 *Hz*. The secondary will have an output of
(A) 200 *V*, 50 *Hz* (B) 2 *V*, 50 *Hz*
(C) 200 *V*, 500 *Hz* (D) 2 *V*, 5 *Hz*

34. A step-up transformer has transformation ratio of 3 : 2. What is the voltage in secondary if voltage in primary is 30 *V*
(A) 45 *V* (B) 15 *V*
(C) 90 *V* (D) 300 *V*

35. In a transformer, the number of turns in primary coil and secondary coil are 5 and 4 respectively. If 240 *V* is applied on the primary coil, then the ratio of current in primary and secondary coil is
(A) 4 : 5 (B) 5 : 4
(C) 5 : 9 (D) 9 : 5

(SECTION-B)

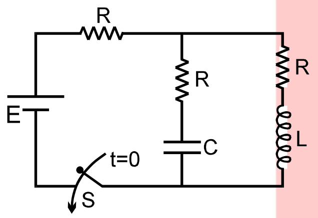
36. A long solenoid has 500 turns. When a current of 2 A is passed through it, the resulting magnetic flux linked with each turn of the solenoid is 4×10^{-3} Wb. The self-inductance of the solenoid is

(A) 2.5 H (B) 2.0 H
(C) 1.0 H (D) 4.0 H

37. Two coaxial solenoids are made by winding thin insulated wire over a pipe of cross-sectional area A =10cm^2 and length = 20 cm. If one of the solenoids has 300 turns and the other 400 turns, their mutual inductance is ($\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1}) :

(A) $4.8\pi \times 10^{-4}$ H (B) $4.8\pi \times 10^{-5}$ H
(C) $2.4\pi \times 10^{-4}$ H (D) $2.4\pi \times 10^{-5}$ H

38. In the circuit shown in figure, switch S is closed at t = 0. Then:



(A) after a long time interval potential difference across capacitor and inductor will be equal.
(B) after a long time interval charge on capacitor will be E C.
(C) after a long time interval current in the inductor will be E /R.
(D) after a long time interval current through battery will be same as the current through it initially.

39. In an inductor of inductance *L* = 100 *mH*, a current of $I = 10A$ is flowing. The energy stored in the inductor is

(A) 5 *J* (B) 10 *J*
(C) 100 *J* (D) 1000 *J*

40. An e.m.f. of 15 *volt* is applied in a circuit containing 5 *henry* inductance and 10 *ohm* resistance. The ratio of the currents at time $t = \infty$ and at *t* = 1 *second* is

(A) $\frac{e^{1/2}}{e^{1/2}-1}$ (B) $\frac{e^2}{e^2-1}$
(C) $1-e^{-1}$ (D) e^{-1}

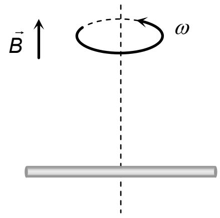
41. Two conducting circular loops of radii R_1 and R_2 are placed in the same plane with their centres coinciding. If $R_1 >> R_2$, the mutual inductance *M* between them will be directly proportional to

(A) R_1/R_2 (B) R_2/R_1
(C) R_1^2/R_2 (D) R_2^2/R_1

42. Two coils have a mutual inductance 0.005 *H*. The current changes in the first coil according to equation $I = I_0 \sin\omega t$, where $I_0 = 10A$ and ω = 100 π *radian/sec*. The maximum value of e.m.f. in the second coil is

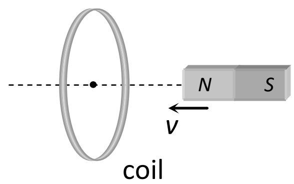
(A) 2π (B) 5π (C) π (D) 4π

43. A conducting rod of length 2*l* is rotating with constant angular speed ω about its perpendicular bisector. A uniform magnetic field $\vec{B}$ exists parallel to the axis of rotation. The e.m.f. induced between two ends of the rod is



(A) $B\omega l^2$ (B) $\frac{1}{2}B\omega l^2$
(C) $\frac{1}{8}B\omega l^2$ (D) Zero

44. In the following figure, the magnet is moved towards the coil with a speed *v* and induced *emf* is *e*. If magnet and coil recede away from one another each moving with speed *v*, the induced *emf* in the coil will be

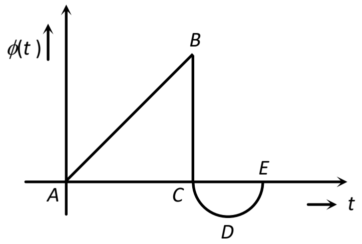


(A) *e* (B) 2*e*
(C) *e*/2 (D) 4*e*

45. When two co-axial coils having same current in same direction are bring towards each other, then the value of current in both coils :

(A) increases
(B) decreases
(C) first increases and then decreases
(D) remain same

46. The graph Shows the variation in magnetic flux $\phi(t)$ with time through a coil. Which of the statements given below is not correct



(A) There is a change in the direction as well as magnitude of the induced emf between *B* and *D*
(B) The magnitude of the induced emf is maximum between *B* and *C*
(B) There is a change in the direction as well as magnitude of induced emf between *A* and *C*
(D) The induced emf is zero at *B*

47. In a coil of area $10\ cm^2$ and 10 turns with a magnetic field directed perpendicular to the plane and is changing at the rate of 10^8 *gauss/second*. The resistance of the coil is 20 *ohm*. The current in the coil will be

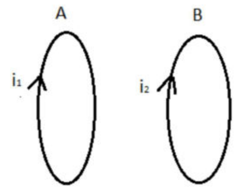
(A) 5 *amp* (B) 0.5 *amp*
(C) 0.05 *amp* (D) $5 \times 10^8\ amp$

48. **Assertion :** When two coils are wound on each other, the mutual induction between the coils is maximum.
Reason : Mutual induction does not depend on the orientation of the coils.
(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(B) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(C) If assertion is true but reason is false.
(D) If the assertion and reason both are false.

49. A copper disc of radius 0.1 *m* is rotated about its centre with 10 revolutions per second in a uniform magnetic field of 0.1 *Tesla* with its plane perpendicular to the field. The e.m.f. induced across the radius of disc is

(A) $\frac{\pi}{10} V$ (B) $\frac{2\pi}{10} V$
(C) $\pi \times 10^{-2} V$ (D) $2\pi \times 10^{-2} V$

50. Two coaxial identical circular current carrying loops are shown in figure currents in them are in the same directions. Now match the following two columns.



Column I
I. Current i_1 is increased
II. Current i_2 is increased
III. Loop -1 is moved towards loop – 2
IV. Loop - 2 is moved away from loop – 1
Column I
a. Loops will attract each other
b. Loops will repel each other
c. Current i_1 will increase
d. Current i_2 will increase
(A) I – a, II – b, III – c,d IV – d
(B) I – a, II – b, III – c IV – d
(C) I – a, II – b,c, III – d, IV – a,d
(D) I – c, II – a,c III – b IV – c,d