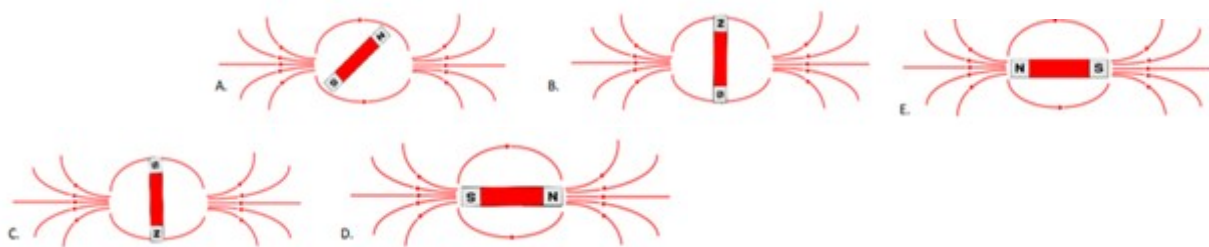


PHYSICS WORK SHEET-4 FOR GRADE-12 (2018E.C)

1. Which of the following magnetic fields is **correct** for a single bar magnet?



2. A bar magnet is divided in two pieces. Which of the following statements is **TRUE**?

- A) The bar magnet is demagnetized.
- B) The magnetic field of each separated piece becomes stronger.
- C) The magnetic poles are separated.
- D) The electric field is created.



3. A straight long wire lying along negative y-axis carries a current of 1A along -y-direction. The magnetic field due to the conductor at a point (50cm, 0, 0) will be point along:

- A) Z-axis
- B) -z-axis
- C) x-axis
- D) -x-axis

4. An induced e.m.f. is produced when a magnet is plunged into a coil. The strength of the induced e.m.f. is independent of:

- A) the strength of the magnet
- B) number of turns of coil
- C) the resistivity of the wire of the coil
- D) speed with which the magnet is moved

5. A coil having 500 sq. loops of side 10 cm is placed normal to magnetic flux which increases at a rate of 1 T/s. The induced emf is:

- A) 0.1 V
- B) 0.5 V
- C) 1 V
- D) 5 V

6. Which one of the following is the best source of magnetic field?

- A) Moving charge
- B) Stationary charge
- C) A wire with no electric current
- D) Non-magnetic materials

7. The north pole of a bar magnet is rapidly introduced into a solenoid at one end (say A). Which of the following statements correctly depicts the phenomenon taking place?

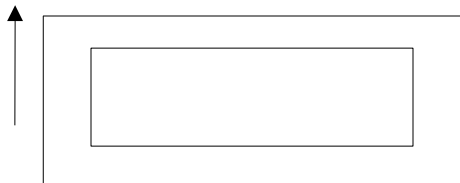
- A) No induced emf is developed.
- B) The end A of the solenoid behaves like a south pole.
- C) The end A of the solenoid behaves like north pole.
- D) The end A of the solenoid acquires positive potential.

8. A square of side L metres lies in the x-y plane in a region, where the magnetic field is given by

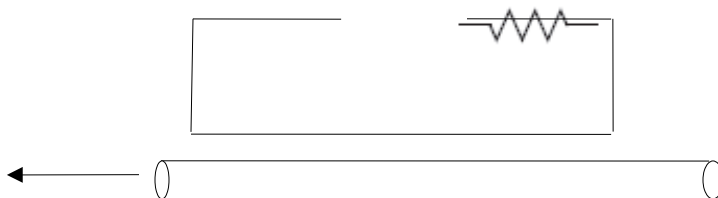
- $\mathbf{B} = B_0(\hat{i} + 3\hat{j} + 4\hat{k})$ T, where B_0 is constant. The magnitude of flux passing through the square is:
- A) $2B_0L^2$ Wb
 - B) $3B_0L^2$ Wb
 - C) $4B_0L^2$ Wb
 - D) $\sqrt{29}B_0L^2$ Wb

9. A loop, made of straight edges has six comers at A (0, 0, 0), B (L, 0, 0) C (L, L, 0), D (0, L, 0), E (0, L, L) and F (0, 0, L). A magnetic field $\mathbf{B} = B_0 (\hat{i} + \hat{k})$ T is present in the region. The flux passing through the loop ABCDEFA (in that order) is:
 A) $B_0 L^2$ Wb. B) $2B_0 L^2$ Wb. C) $\sqrt{2}B_0 L^2$ Wb. D) $4B_0 L^2$ Wb.
10. When a magnetic flux changes from 20Wb to 50Wb in 3sec.through a coil of 50 turns then induced emf will be: A) 500V B) 400V
 C) 300V D)200V
11. Which of the following does not affect the magnitude of the induced emf in electromagnetic induction?
 A) Magnetic field strength C) Resistance of coil
 B) Speed of coil. D) Number of turns in the coil.
12. Which device uses the principle of electromagnetic induction for its operation?
 A) AC generator C) Cathode ray tube
 B) Moving coil meter D) Light emitting diode
13. The magnetic flux ϕ (in Wb) linked with a coil is related to time t (in s) as $\phi = 5At^2 + Bt - 2C$. The SI-unit of A and B are respectively: A) Wb s^2 , Wb s B) Wb s^{-2} , Wb s C) Wb s^{-1} D) Wb s^{-2}
14. An electromagnet becomes stronger when:
 A) Current decreases C) Soft iron core is removed
 B) Number of turns decreases D) Current increases
15. The device that uses magnetism to convert electrical energy into mechanical energy is:
 A) Generator B) Transformer C) Motor D) Battery
16. An electromagnet differs from a permanent magnet because it:
 A) Has no poles C) Can be switched on and off
 B) Works without electricity D) Is always stronger
17. The magnetic field around a straight current-carrying wire is:
 A) Radial from the wire C) Parallel lines along the wire
 B) Concentric circles around the wire D) Random in all directions
18. A circular coil is placed in a magnetic field directed into the page. If the field strength increases, the induced current will be:
 A) Clockwise B) Counterclockwise C) Zero D) Alternating
19. A conducting ring is placed near a solenoid carrying increasing current. The ring will:
 A) Move toward solenoid C) Remain stationary
 B) Move away from solenoid D) Rotate

20. Two rectangular loops of wire lie in the plane of this paper as shown in fig. below. If the current I in the outside loop is cw and increases with time, which one of the following statements is correct about the current induced in the inner wire?
- A) A current is induced in the inner loop in the cw direction.
 - B) A current is induced in the inner loop in the ccw direction.
 - C) It is zero



21. Earth's magnetic field protects us from:
- A) Cosmic rays
 - B) gamma rays
 - C) Uv light
 - D) sound waves
22. Which of the following devices uses the principle of electromagnetic induction?
- A) Electric fan
 - B) Transformer
 - C) Electric heater
 - D) Solar panel
23. A coil of 50 turns and area 0.02 m^2 is placed in a magnetic field perpendicular to the plane of the coil. The magnetic field changes uniformly from 0 T to 0.5 T in 0.1 s. Find the induced EMF.
24. What is the direction of the current induced in the resistor when the current in long, straight wire as shown in the figure decreasing rapidly to zero?
- A) CW direction
 - B) Anti clock wise direction
 - C) Up ward direction
 - D) Down wards direction



25. The magnetic field around a long straight current-carrying conductor is:
- A) Radial and uniform
 - B) Circular and concentric
 - C) Uniform and straight
 - D) Non-existent
26. Which of the following devices uses the principle of a magnetic field generated by electric current?
- A) Transformer
 - B) Electric motor
 - C) Electromagnet
 - D) All of the above
27. If the magnetic field produced by a current-carrying solenoid is directed outward, then the current flows in the solenoid in which direction?
- A) Clockwise
 - B) Counterclockwise
 - C) Parallel to the solenoid
 - D) Perpendicular to the solenoid
28. Which of the following describes the relationship between the magnetic field strength and the distance from a current-carrying wire?
- A) The magnetic field strength increases as the distance from the wire increases.

B) The magnetic field strength decreases as the distance from the wire increases.

C) The magnetic field strength is unaffected by the distance from the wire.

D) The magnetic field strength is directly proportional to the square of the distance from the wire.

29. A magnetic field can be produced by all the following EXCEPT:

A) Moving electric charge
carrying wire

C) A coil of current-

B) Permanent magnets

D) Static electric charge

30. The Earth's magnetic field can be used for all the following EXCEPT:

A) Compass navigation
location in space

C) Determining the Earth's

B) Generating electricity through magnetism
from solar radiation

D) Protecting the Earth

31. Lenz's Law states that:

A) The induced current will always oppose the change in the magnetic flux

B) The induced current will always amplify the change in magnetic flux

C) The induced current will be in the same direction as the applied current

D) The induced current depends on the size of the coil

32. The induced emf in a coil is directly proportional to:

A) The number of turns in the coil
coil

C) The area of the

B) The rate of change of magnetic flux

D) All of the above

33. A coil with 50 turns is placed in a magnetic field. If the magnetic flux is changing at a rate of 0.02 Wb/s , what is the induced emf in the coil?

A) 0.02 V

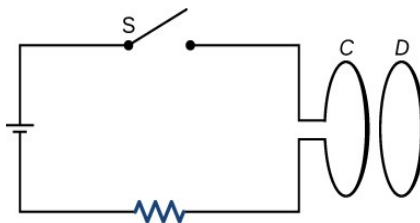
B) 1.0 V

C) 0.5 V

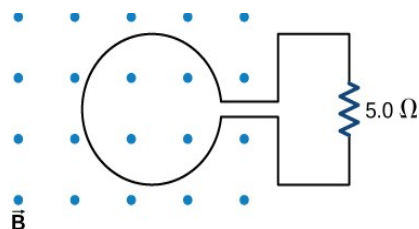
D) 0.1

V

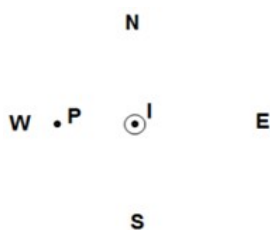
34. The circular conducting loops shown in the accompanying figure are parallel, perpendicular to the plane of the page, and coaxial. When the switch S is closed, what is the direction of the current induced in D?



35. The magnetic flux through the loop shown in the accompanying figure varies with time according to $\Phi_m = 2 \sin(120\pi t)$, where Φ_m is in millimeters. What are the direction and magnitude of the current through the $5.00\text{-}\Omega$ resistor at $t=0$? (2pts)

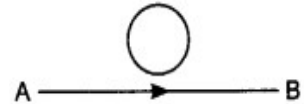


36. A magnet is moved towards a coil (i) quickly (ii) slowly, then the induced e.m.f. is:
 A) larger in case (i) C) equal to both the cases
 B) smaller in case (i) D) larger or smaller depending upon the radius of the coil
37. A vertical wire carries an electric current out of the page. What is the direction of the magnetic field at point P located to the west from the wire? A) West B) North C) East D) South



38. When a magnet is pulled away from a coil, the induced current produces:
 A) repulsion B) no field C) attraction D) heat only
39. A conducting ring is placed near a solenoid carrying increasing current. The ring will:
 A) move toward solenoid C) remain stationary
 B) move away from solenoid D) rotate
40. A transformer has 400 turns in the primary coil and 100 turns in the secondary coil. If the primary voltage is 200 V, what is the secondary voltage? A. 500 V B. 50 V C. 100 V D. 800 V
41. A uniform magnetic field is given by $\mathbf{B} = b t \mathbf{k}$, where $b = 0.35 \text{ T/s}$. Find the current in conducting loop with area 240 cm^2 and resistance $0.2\ \Omega$ that lies in x-y plane. In what direction is the current, as viewed from the positive z-axis?

13. The current flow from A to B is as shown in the figure. The direction of the induced current in the loop is:



- A) clockwise. B) anticlockwise. C) straight line. D) no induced e.m.f. produced

A magnet is moved towards a coil (i) quickly (ii) slowly, then the induced e.m.f. is

- (a) larger in case (i)
 (b) smaller in case (i)
 (c) equal to both the cases
 (d) larger or smaller depending upon the radius of the coil

A uniform magnetic field is given by $\mathbf{B} = \mathbf{B}_0 e^{-bt} \hat{k}$, where $B_0 = 10 \text{ T/s}$ and $b = 20 \text{ s}^{-1}$. A square conducting loop with area 240 cm^2 and a resistance 0.2Ω that lies in the x-y plane. What is the magnitude of the induced emf in the loop at $t=0$?

- A) 4.8V B) 0.24V C) 0.96V D) 4.8eV

22. Based on question number-21 above, what are the magnitude and direction of the induced current through the loop, as viewed from the positive z-axis?

- A) 0.96A, CW B) 0.96A, CCW C) 24A, CW D) 24A, CCW

A coil with 50 turns is placed in a magnetic field. If the magnetic flux is changing at a rate of 0.02 Wb/s, what is the induced emf in the coil?

- A) 0.02 V B) 1.0 V C) 0.5 V D) 0.1 V

A coil having 500 sq. loops of side 10 cm is placed normal to magnetic flux which increases at a rate of 1 T/s. The induced emf is

- (a) 0.1 V
(b) 0.5 V
(c) 1 V
(d) 5 V

1. The magnetic field through the loop as shown in figure increases according to the relation:

$\phi_B = (6t^2 + 7t)$, where ϕ_B is in Weber and t is in seconds.

- a) What the magnitude of the induced emf in the loop when t=2seconds?
b) What is the direction of current through R?

- A) CW direction B) CCW direction C) Up
D) Down

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