

**Grade 12****2019/20**

The following activities will be done after reading properly your centralized note about magnetism.

1. Read your centralized note about magnetism then prepare a summary note that covers the unit.
 2. Prepare a mind map about magnetism.
 3. Choose the correct answer and write the correct letter on your exercise book.
1. A long wire carries a current of 1 A. Find the magnitude of the magnetic field 2 m away from the wire.
A. 1×10^{-3} T B. 1×10^{-4} T C. 1×10^{-6} T D. 1×10^{-7} T
 2. What is the magnitude of the magnetic field at the core of a 120 turn solenoid of length 0.50m carrying a current of 2A?
A. 2.4×10^{-4} T B. 4.8×10^{-5} T C. 1.2×10^{-6} T D. 6.0×10^{-4} T
 3. Two long, parallel wires carry currents of 20 A and 10 A in opposite directions, as in the Figure below. Which of the following statements must be **true**? (There may be more than one correct statement.)

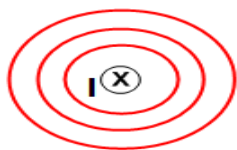


- A. In region I the magnetic field is into the page and is never zero.
 - B. In region II the field is into the page and can be zero.
 - C. In region III it is possible for the field to be zero.
 - D. In region I the magnetic field is out of the page and is never zero.
4. A square and a circular loop with the same area lie in the xy-plane, where there is a uniform magnetic field **B** Pointing at some angle θ with respect to the positive z-direction. Each loop carries the same current, in the same direction. Which magnetic torque is larger?
A. the torque on the square loop B. the torque on the circular loop
C. the torques are the same D. more information is needed
 5. As a charged particle moves freely in a circular path in the presence of a constant magnetic field applied perpendicular to the particle's velocity, the particle's Kinetic energy A. remains constant, B. increases C. decreases
 6. A proton moving in a circular path perpendicular to a constant magnetic field takes $1\mu\text{s}$ to complete one revolution. What would be the magnitude of the magnetic field? A. 0.0651T B. 0.651 T C. 15.36 T D. 1.536 T
 7. Two long bar magnets are aligned so that north poles face each other. The magnets are separated by 1 cm, and a repulsive force between the north poles is 0.04 N. When the separation is increased to 2 cm the force will be
A. 0.010 N B. 0.020 N C. 0.025 N D. 0.40 N
 8. A straight wire of length 20 cm floats in a horizontal perpendicular a magnetic field of 1.5 T when a current of 1.3 A passes through the wire in a perpendicular direction to the magnetic field. Find the mass per unit length of the wire. (The wire is connected to a battery by ultra-light flexible leads.) A. 0.4 kg/m B. 0.2 kg/m C. 20 g/m D. 40 g/m

9. In a circular, 20-turn coil of radius 5 cm is oriented in such a way that its axis makes an angle of 30° with a uniform magnetic field of 0.15 T. What is the torque on the coil when it carries a current of 2.5A?

- A. $1.5 \times 10^{-3} \text{ N.m}$ B. $9.4 \times 10^{-3} \text{ N.m}$ C. $2.9 \times 10^{-2} \text{ N.m}$ D. $5.1 \times 10^{-2} \text{ N.m}$

10. An electric current flows into the page. What is the direction of the Magnetic field?



A. To the bottom of the page.

B. To the top of the page.

C. Clockwise.

D. Counter-clockwise.

11. A measure of the strength of the magnetic field shown visually by how close the lines of flux are to each other is

A. magnetic field

B. magnetic field lines

C. magnetic flux density

D. magnetic force

12. Which one of the following statement is **false** about magnetic field?

A. it is a region where a magnet exerts force

B. it is a scalar quantity

C. it is also known as magnetic flux density

D. Its Si unit is Tesla

13. A bar magnet causes a magnetic field with a strength of 100 mT at an angle of 45° to the region of area 10 cm^2 . How much flux will be contained by in that region of space?

A. $7.1 \mu\text{T}$

B. $71 \mu\text{T}$

C. 71 mT

D. $0.71 \mu\text{T}$

14. Which one of the following materials has a tendency to align themselves in the same direction as the applied magnetic field?

A. diamagnetic and paramagnetic

B. ferromagnetic and diamagnetic

C. diamagnetic

D. paramagnetic and ferromagnetic

15. Which one of the following is the **correct** arrangement of Earth's magnetism and Earth's geographic pole?

A. the geographic North Pole is the South pole of the magnet

B. the geographic South Pole is the South pole of the magnet

C. the geographic North Pole is the North pole of the magnet

D. the geographic East Pole is the West pole of the magnet

16. Three charged particles, electron, proton, and alpha particle are moving in a region of equal magnetic field and the same path. Which one can have greatest translational momentum?

A. proton

B. electron

C. alpha particle

D. electron and proton

17. An electron and a proton are released in a region of magnetic field along a circular path. Which particle has greater angular velocity?

A. electron

B. proton

C. equal

D. first electron then proton

18. (i) A charged particle is moving perpendicular to a magnetic field in a circle with a radius r . The magnitude of the magnetic field is increased. Compared with the initial radius of the circular path, is the radius of the new path

(a) decrease, (b) increase, or (c) equal in size?

(ii) An identical particle enters the field, with perpendicular to , but with a higher speed v than the first particle. Compared with the radius of the circle for the first particle in the same magnetic field, is the radius of the circle for the second particle

(a) decrease, (b) increase, or (c) equal in size?

A. increase, decrease

B. decrease, increase

C. equal, equal

D. increase, increase

19. What is the magnetic force on a charged particle of + 4 C moving with a velocity of $2(\hat{i} + 4\hat{j} + 6\hat{k})$ m/s in a region of magnetic field $\hat{i} \cdot \hat{j}$ T?

- A. $3\hat{i} - \hat{j}$ N B. $6\hat{k}$ C. $-6\hat{k}$ N D. $-3(\hat{i} + \hat{j})$ N

20. A charged particle is entered in a velocity selector where there is a combined electric field 54 kN/C and magnetic field 6 mT. What is the velocity of the electron?

- A. 324 m/s B. 0.1 m/s C. 324 km/s D. 9000 km/s

21. The torque on a current loop in a region of magnetic field does not depend on

- A. area of the loop B. angular velocity
C. the current D. orientation of the loop

22. A current carrying conductor of mass 5 g and length 10 cm carrying a current of 20 A is placed in a perpendicular magnetic field of 2 mT. How fast will the magnetic force accelerate this wire?

- A. 0.8 m/s^2 B. 8 m/s^2 C. 0.08 m/s^2 D. 80 m/s^2

23. What is the contribution to the magnetic field at a point that is a perpendicular distance 10 cm from a current element of length 10 cm, where the current through the element is 3 A?

- A. 3 mT B. 2.5 mT C. $3 \mu\text{T}$ D. $2.5 \mu\text{T}$

24. Two current carrying conductors each having a length L carries a current of 2 A and 4 A in opposite direction respectively are a distance r apart. What is the force between the two wires? The unit (Ampere) A^2 exists in the result.

- $\frac{2 \mu_0 L}{\pi r}$ attractive $\frac{4 \mu_0 L}{\pi r}$ repulsive $\frac{8 \mu_0 L}{\pi r}$ repulsive $\frac{\mu_0 L}{\pi r}$ attractive

25. What is the magnetic field of a toroid radius 5 cm with 1000 turns that carries a current of 10 A?

- A. 5 mT B. 10 mT C. 20 mT D. 40 mT

26. A conductor that carries a current of 8 A has a radius of 8 mm. What is the magnetic field inside the conductor at a distance 2 mm from its center?

- A. $10 \mu\text{T}$ B. $25 \mu\text{T}$ C. $50 \mu\text{T}$ D. $100 \mu\text{T}$

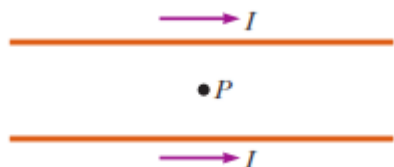
27. The magnetic field strength of a solenoid can be increases with

- A. decrease of length B. decrease of the number of turns
C. decrease of current D. by removing the iron core

28. A charged particle is traveling through a uniform magnetic field. Which of the following statements are **true** of the magnetic field?

- A. It increases the kinetic energy of the particle.
B. It exerts a force on the particle that is parallel to the field.
C. It exerts a force that is perpendicular to the direction of motion.
D. It exerts a force on the particle along the direction of its motion.

29. Two long, parallel wires each carry the same current as in the Figure below.



What is the total magnetic field at the point P midway between the wires?

- A. zero B. directed into the page
C. directed out of the page D. directed to the left

30. Which one of the following statement is **true** about Earth's magnetic field? it diminishes with

- A. $1/R$ on the Earth's surface and diminishes by a factor $1/R^2$ in outer space
B. $1/R^2$ on the Earth's surface and diminishes by a factor $1/R^3$ in outer space

C. $1/R$ on the Earth's surface and diminishes by a factor $1/R^3$ in outer space

D. $1/R^2$ on the Earth's surface and diminishes by a factor $1/R$ in outer space

31. An electron moves in the plane of this paper toward the top of the page. A magnetic field is also in the plane of the page and directed toward the right. The direction of the magnetic force on the electron is

A. toward the top of the page,

B. toward the bottom of the page

C. toward the left edge of the page

D. upward out of the page

32. A wire carries a current of 2 A, a straight section of the wire is 80 cm long and lies along the x - axis within a uniform magnetic field 10 T along the z - axis. What is the magnetic force on the section of the wire?

A. $16\text{ N } \hat{j}$

B. $-16\text{ N } \hat{j}$

C. $8\text{ N } \hat{j}$

D. $-8\text{ N } \hat{j}$

Grade 12**2019/20**

The following activities will be done after reading properly your centralized note about electromagnetic induction and AC circuits.

1. Read your centralized note about electromagnetic induction and AC circuits then prepare a summary note that covers the unit.
2. Prepare a mind map about electromagnetic induction and AC circuits.
3. Choose the correct answer and write the correct letter on your exercise book.
 1. A current of 5 A is flowing at 220 v in the primary coil of a transformer. If the voltage produced in the secondary coil is 2200 v and 50 % of power is lost, then the current in the secondary will be
A. 2.5 A B. 5 A C. 0.25 A D. 0.5 A
 2. For a series LCR circuit at resonance, which statement is **false**?
A. Peak energy stored by a capacitor = peak energy stored by an inductor
B. Average power = apparent power
C. Wattless current is zero
D. Power factor is zero
 3. In a series resonant R-L-C circuit, the voltage across R is 100 v and the value of $R = 1000 \Omega$. The capacitance of the capacitor is $2 \times 10^{-6} \text{ F}$; angular frequency of AC is 200 rad/ s. Then the P.D. across the inductance coil is _____.
A. 250 v B. 400 v C. 100 v D. 40 v
 4. There is a uniform magnetic field directed perpendicular and into the plane of the paper. An irregular shaped conducting loop is slowly changing into a circular loop in the plane of the paper. Then _____.
A. AC is induced in the loop.
B. no current is induced in the loop.
C. current is induced in the loop in the anti-clockwise direction.
D. current is induced in the loop in the clockwise direction.
 5. An inductance of $220/\pi \text{ mH}$, a capacitance of $10^{-3}/\pi \text{ F}$ and a resistance of 10Ω are connected in series with an a.c. source 220 v, 50 Hz. The phase angle of the circuit is
A. $1/3 \pi$ B. $1/2 \pi$ C. $1/4 \pi$ D. $1/6\pi$
 6. Which of the following statements can be true for a resistor connected in a simple series circuit to an operating AC generator?
A. $P_{av} = 0$ and $i_{av} = 0$ B. $P_{av} = 0$ and $i_{av} > 0$
C. $P_{av} > 0$ and $i_{av} = 0$ D. $P_{av} > 0$ and $i_{av} > 0$
 7. The capacitive reactance in an AC circuit increases when the capacitance is
A. increased B. decreases
C. remain the same D. needs additional information.
 8. The average power delivered by a generator in a series RLC circuit has its maximum value when the
A. inductive reactance equals the capacitive reactance.
B. inductive reactance less than the capacitive reactance.
C. inductive reactance greater than the capacitive reactance.
D. resistance is less than the capacitive reactance.
 9. A bar magnet is falling through a loop of wire with constant velocity with the north pole entering first. Viewed from the same side of the loop as the

magnet, as the north pole approaches the loop, what is the direction of the induced current?

- A. clockwise
- B. zero
- C. counterclockwise
- D. along the length of the magnet

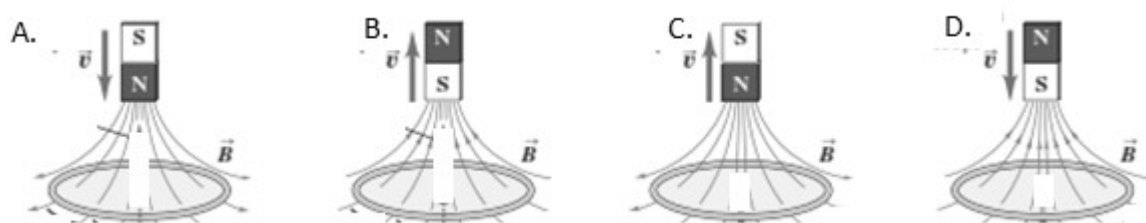
10. Among the following one **cannot** produce an induced emf?

- A. a solenoid placed in a uniform magnetic field
- B. a current carrying conductor that cut across a magnetic field lines
- C. a coil of wire rotating in a region of magnetic field
- D. the North Pole of a magnet moving towards a solenoid

11. In a certain solenoid the number of turns and the current are doubled, by what factor the energy stored increases?

- A. by 4
- B. by 8
- C. by 16
- D. by 12

12. Consider a bar magnet moves along the axis of a conducting loop as shown in the figure below.



What is the direction of the induced current in each case respectively?

- A. clockwise, clockwise, anticlockwise, anticlockwise
- B. anticlockwise, anticlockwise, clockwise, clockwise
- C. anticlockwise, clockwise, anticlockwise, clockwise
- D. clockwise, anticlockwise, clockwise, anticlockwise

13. A series circuit consisting of a resistor, an inductor, and a capacitor connected to an AC generator. the instantaneous voltage of the source equal to

- A. the sum of the maximum voltages across the elements,
- B. the sum of the instantaneous voltages across the elements
- C. the sum of the rms voltages across the elements
- D. the voltage in any one of the appliances

14. A $600\ \Omega$ resistor, a $5\ \mu\text{F}$ capacitor, and a $0.8\ \text{H}$ inductor are connected in series with a $240\ \text{V}$, $50\ \text{Hz}$ rms source. Then which one of the following is approximately **true**? Take: Its capacitive reactance is $531\ \Omega$, its inductive reactance is $301\ \Omega$, also the square root of $412,900$ is $643\ \Omega$.

- A. its impedance is $1174\ \Omega$
- B. its phase angle is $\arctan 0.933$
- C. its resonance frequency is $25.4\ \text{Hz}$
- D. its average power is $86.4\ \text{W}$

15. The magnetic field intensity in a coil of wire area $4\ \text{cm}^2$ connected to a resistor of $2\ \Omega$ is given by the expression: $B(t) = 3t^2 + 5$ Tesla, where t is in seconds and B is in Tesla. Then which one of the following is correct at 2 seconds?

- A. the rate of change of magnetic flux is $48\ \text{Wb}$
- B. the induced emf in the circuit is $48\ \text{V}$
- C. the current in the circuit is $24\ \text{A}$
- D. the power in the resistor is $11.5\ \mu\text{W}$