

**AUGUST MONTHLY TEST (2022-23)(SET-2)**  
**PHYSICS (XII)**

M.M=35

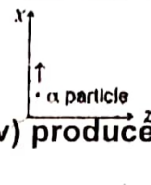
TIME:90 MINS

**General Instructions:**

1. All questions are compulsory.
2. There are 17 questions in total. Questions 1-7 are objective type questions and carry one mark each.
3. Questions 8 -11 carry two marks each. Question 12-16 carry three marks each.
4. Question no.17 is a case based question, carry 5 marks.

Q1. A beam of particles projected along +x-axis, experiences a force due to a magnetic field along the +y-axis. What is the direction of the magnetic field?

- a) Along x axis                      (c) Along y axis  
b) Along z axis                      (d) Along -Z axis



Q2. Biot-Savart law indicates that the moving electrons (velocity  $v$ ) produce a magnetic field  $B$  such that

- (a)  $B \perp v$ .                      (b)  $B \parallel v$ .  
(c) it obeys inverse cube law. (d) it is along the line joining the electron and point of observation.

Q3. The conversion of a moving coil galvanometer into a voltmeter is done by

- (a) introducing a resistance of large value in series.  
(b) introducing a resistance of small value in parallel.  
(c) introducing a resistance of large value in parallel.  
(d) introducing a resistance of small value in series.

Q4. The strength of magnetic field at the centre of circular coil is



- (a)  $\frac{\mu_0 I}{R} \left(1 - \frac{1}{\pi}\right)$                       (b)  $\frac{\mu_0 I}{\pi R}$   
(c)  $\frac{\mu_0 I}{2R} \left(1 - \frac{1}{\pi}\right)$                       (d)  $\frac{\mu_0 I}{2R} \left(1 + \frac{1}{\pi}\right)$

Q5. Domain formation is the necessary feature of

- (a) Diamagnetism                      (b) Paramagnetism                      (c) Ferromagnetism                      (d) All of these.

Q6. At Curie point of ferromagnetic material becomes

- (a) Diamagnetic                      (b) Paramagnetic                      (c) Strongly ferromagnetic                      (d) non-magnetic

Q7. A steel wire of length  $l$  has a magnetic moment  $M$ . It is then bent into a semicircular arc. What is the new magnetic moment?

- (a)  $2M$  (b)  $2M/\pi$                       (c)  $4M/\pi$                       (d) 0

Q8. Current flows through a circular loop. Depict the north and south pole of its equivalent magnetic dipole.

Q9. Define magnetic susceptibility of a material. Name two elements, one having positive susceptibility and the other having negative susceptibility. What does negative susceptibility signify?

Q10. Draw magnetic field lines when a

- (i) diamagnetic,  
(ii) paramagnetic substance is placed in an external magnetic field.  
Which magnetic property distinguishes this behaviour of the field lines due to the two substances?

Q11. Derive an expression for force experienced by a current carrying straight conductor placed in a uniform magnetic field. How can we find the direction of force?

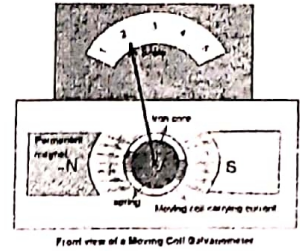
Q12. A galvanometer has a resistance of 100 ohm. A resistance of one ohm is connected across its terminals. What part of the total current flows through the galvanometer? Draw the necessary circuit diagram.

Q13. Find the expression for magnetic field at a point 'P' on the axis of a circular loop of radius  $a$ .

Q14. State and prove Ampere's Circuital law.

Q15. A rectangular loop of sides 25 cm and 10 cm carrying a current of 15 A is placed with its longer side parallel to a long straight conductor 2.0 cm apart carrying a current of 25 A. What is the net force on the loop?

- Q16. Distinguish between diamagnetic and paramagnetic substances in terms of their susceptibility, permeability and nature of magnetism, when placed in a uniform magnetic field.
- Q17. Moving coil galvanometer operates on Permanent Magnet Moving Coil (PMMC) mechanism and was designed by the scientist Darsonval. Moving coil galvanometers are of two types  
 (i) Suspended coil (ii) Pivoted coil type or tangent galvanometer,  
 Its working is based on the fact that when a current carrying coil is placed in a magnetic field, it experiences a torque. This torque tends to rotate the coil about its axis of suspension in such a way that the magnetic flux passing through the coil is maximum. A galvanometer can be converted in ammeter or voltmeter using low and high resistance respectively.



(i) A moving coil galvanometer is an instrument which

- |  |
|--|
| (a) is used to measure emf   |
| (b) is used to measure potential difference  |
| (c) is used to measure resistance  |
| (d) is a deflection instrument that gives a deflection when a current flows through its coil |

(ii) To make the field radial in a moving coil galvanometer

- |   |   |
|---|---|
| (a) number of turns of the coil is kept small | (b) magnet is taken in the form of horse-shoe |
| (c) poles are of very strong magnets          | (d) poles are cylindrically cut               |

(iii) The deflection in a moving coil galvanometer is

- |   |
|---|
| (a) directly proportional to the torsional constant of spring |
| (b) directly proportional to the number of turns in the coil  |
| (c) inversely proportional to the area of the coil            |
| (d) inversely proportional to the current in the coil         |

(iv) In a moving coil galvanometer, having a coil of  $N$ -turns of area  $A$  and carrying current  $I$  is placed in a radial field of strength  $B$ .

The torque acting on the coil is

- |                |               |              |            |
|----------------|---------------|--------------|------------|
| (a) $NA^2B^2I$ | (b) $NAB I^2$ | (c) $N^2ABI$ | (d) $NABI$ |
|----------------|---------------|--------------|------------|

(v) To increase the current sensitivity of a moving coil galvanometer, we should decrease

- |                                 |                                      |
|---------------------------------|--------------------------------------|
| (a) strength of magnet          | (b) the torsional constant of spring |
| (c) number of turns in the coil | (d) area of coil                     |