16/4/21
Fri

Home Assignment -

1. A cyclotron is a type of particle acceleration invented by Ernest O. Lawrence in 1928-1930 at the university of California Berkeley, and patended in 1932. A cyclotron Cyclotron accelerates charged particle are held to a spinal trajectory by a static magnetic field and accelerated by a rapidly varying (radio frequency) electric field and ~~accelerated~~ Lawrence was awarded 1939 Nobel Prize in physics for this invention.

Cyclotrons were the most powerful particle acceleration technology untill the 1950s when they were supense ded by the Synchrotron and are still used to produced particle beams in physics and nuclear medicine. The largest single-magnet cyclotron was the 4.67m (184in) Synchrocyclotron built between 1940 and 1946 by Lawrence at the university of California Berkeley which could acelenate protons to 730 mega electron volts (MeV). Close to 1500 cyclotrons are used in nuclear medicine worldwide for the production of radionuclides.

Choose the correct answer for the following question

1. Cyclotrons is used to acelenate.

(a) Some kind of changed particle.
(b) Any kind of changed particle.
(c) both changed and neutral particle.
(d) none of there.

Ans- (a) Same kind of changed particle.

2. The fonie that accelenates the pantide in the cyclotnon i's

(a) Only electnostatic fonie.
(b) only magnetic fonie.
(c) both electnostatic and magnetic fonie called lonentz fonie.
(d) none of these.

Ans (c) Both electnostatic anef magnetic fonie called lonentz fonie.

3. Choose the connect option.

(a) Conductor shields any change within it fnom electnic fielef creafeef outside the conductor.

(b) a conefuctor shielef any change within fnom magnetic fielef creafeef outsicle the conductor.

(c) a conefuctor shielef any change within it fnom both electnic and magnetic field cneateef outsicle the conductor.

(d) none of these.

Ans (a) Conductor shields any change within it fnom electnic fielef creafeef outside the conductor.

4. Inside a dee.

(a) The pantide's speeef changes.
(b) The pantide's velocity changes.
(c) The pantide velocity does not change.
(d) The pantide's kinetic enongy changes.

Ans
1

5. What is the formula for maximum speed attained by a charge particle in a cyclotron.

(a) $V_{max} = \frac{qBR}{m}$

(b) $V_{max} = \frac{mBR}{q}$

(c) $V_{max} = \frac{qR}{Bm}$

(d) None of these.

Ans (c) $V_{max} = \frac{qR}{Bm}$.

6. In a cyclotron -

(a) any speed can be obtained by a charge particle by chosing suitable dee radius.

(b) maximum speed attained by a charge particle is limited by the relative variation of mass with speed.

(c) Electrons are best particle to be accelerated

(d) None of these.

Ans (b) Maximum speed attained by a charged particle is limited by the relativistic variation of mass with speed.

2. A galvanometer is an electromechanical measuring instrument for electric current. Early galvanometers were uncalibrated but improved version called ammeters were calibrated and could measure the flow of current and more precisely. A galvanometer works by deflecting a pointer in response to an electric current flowing through a coil in a constant magnetic field. Galvanometers came from the observation first noted by Hans Christian Oersted in 1820 that a magnetic compass's needle deflect when near a wire having electric current. They were the first instrument used to detect and measure small amount of current. Andre-Marie Ampere, who gave mathematical expression to Oersted's discovery, named the instrument after the italian electricity researcher Luigi Galvani. Galvanometer have been essential for the development of science and technology in many field. For example, in the 1800s they enabled long-range communication through submarine cables, such as the earliest Transatlantic telegraph cables, and were essential to discovering the electrical activity of the heart and brain by their fine measurement of current.

Choose the connect answer of the following question.

1. Galvanometer was named after

(a) Italian electricity researcher Luigi Galvani
(b) Italian electricity researcher Luigi Galvani who discovered galvanometer.
(c) Italian electricity researcher Luigi Galvani who discovered that a current carrying conductor produce magnetic field.
(d) none of these.

Ans- (a) Italian electricity researcher Luigi Galvani.

2. Galvanometer is used

(a) to detect and measure small electric current.
(b) to detect but not to measure small electric current.
(c) to measure any amount of electric current
(d) none of these.

Ans (a) to detect and measure small electric current.

3. Choose the connect option for current sensitivity of galvanometer

(a) $S_i = \frac{\theta}{I} = \frac{NBA}{C}$.

(b) $S_i = \frac{\theta}{I} = \frac{NB}{CA}$.

(c) $S_i = \frac{\theta i}{e} = \frac{C}{NBA}$

(d) none of these.

Ans (a) $S_i = \frac{\theta}{i} = \frac{NBA}{C}$.

4. Increasing the current sensitivity.

(a) Surely increases the voltage Sensitivity.
(b) may not changes the voltage sensitivity.
(c) never changes the voltage Sensitivity
(d) none of these.

Ans- (c) never changes the voltage Sensitivity.

5. Choose the correct option for design formula of galvanometer.

(a) $i = \left(\frac{C}{BNA}\right)\theta$

(b) $i = \left(\frac{IA}{BN}\right)\theta$

(c) $i = \frac{C}{BNA\theta}$

(d) none of there.

Ans (d) none of these.

6. In the galvanometer the radial magnetic field makes the magnetic torque.

(a) directly proportional to $\sin\theta$.
(b) Independent of θ
(c) Zero
(d) none of these.

Ans (c) zero.

3. Direction: In each of the following question read the two statement and choose if.

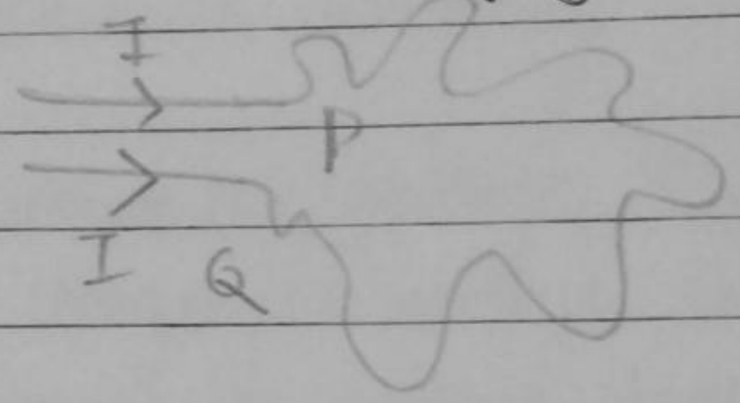
(A) both assertion and Reason are true and the reason is the correct explanation of the assertion.
(B) Both assertion and reason are true but reason is not a correct explanation of the assertion.
(c) Assertion is true but the reason is false.
(d) Both assertion and reason is false.

1. Assertion: Moving coil galvanometer used phusphor-bronze wire for suspension.
Reason: The phosphor-bronze wire has a small couple per unit twist.

Ans (a) Both assertion and reason are true and the reason is the correct explanation of the assertion.

2. Assertion: A wire bent into an irregular shape with the point P and Q fixed. If a current I is passed through the wire, then the area enclosed by the irregular portion of the wire decreases.

Reason- Opposite current carrying wire repel each other.



Ans (a) Both assertion and reason are true and reason is the correct explanation of the assertion.

Every current element on the irregular shape wire having Symmetric element carrying current in opposite direction is causing repulsion and hence the area enclosed by the wire increases.

3. Assertion: When a magnetic dipole is placed in a non-uniform magnetic field, only a torque acts on the dipole.

Reason: Force would also act on dipole if magnetic field were uniform.

Ans (d) Both assertion and reason are false.

4. Assertion: If the resistance of shunt of an ammeter is increased, the range of ammeter is reduced.

Reason: If the series resistance of a voltmeter is increased, the range of voltmeter is increased.

Ans (b) Both assertion and reason are true but reason is not a correct explanation of the assertion.

5. Assertion: Galvanometer cannot as such be used as an ammeter to measure the value of the current in a given circuit.

Reason: Galvanometer gives a full-scale deflection for a current of the order of micro ampere.

Ans (a) Both assertion and reason are true and reason is the correct explanation of the assertion.

Galvanometer is a very sensitive device, it gives a full scale deflection for current of the order of micro-ampere. Also for measuring current the galvanometer has to be connected in series and as it has a large resistance. This will change the value of the current in the circuit. To overcome these difficulties one attaches a small resistance called shunt resistance is parallel with the galvanometer.

4. Multiple choice Question (MCQ).

1. A sensitive galvanometer like a moving coil galvanometer can be converted into an ammeter or a voltmeter by connecting a proper resistance to it. which of the following statement is true?

(a) a voltmeter is connected in parallel and current through it is negligible.

(b) an ammeter is connected in parallel and potential difference across it is small.

(c) a voltmeter is connected in series and potential difference across it is small.

(d) an ammeter is connected in series in a circuit and the current through it is negligible.

Ans (d) an ammeter is connected in series in a circuit and the current through it is negligible.

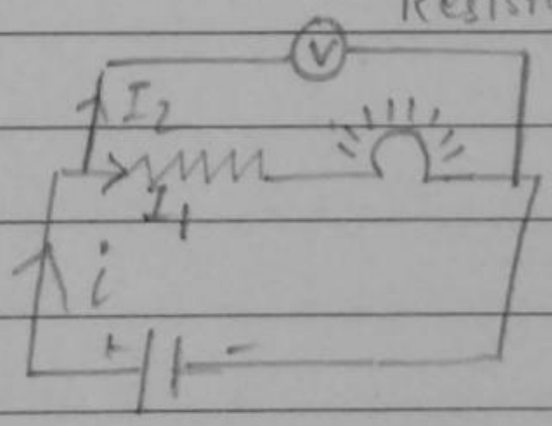
A galvanometer can be converted into a voltmeter by connecting a high resistance in series with it, while it can be converted into ammeter by connecting a low resistance in its parallel.
Ammeter is always connected in series with the source and current through it is always maximum, so. statement is wrong.

2. The resistance of an ideal voltmeter is

(a) zero
(b) 100 Ω
(c) infinity
(d) 500 Ω.

Ans (c) infinity.

A voltmeter is always used in parallel in circuit to get a accurate value of voltage across some element. the resistance of voltmeter is kept very high so that it can draw minimum ~~current~~ amount of current from circuit and hence can measure accurate voltage.



3. Two identical galvanometer are converted into an ammeter and a milliammeter. Resistance of the shunt of milliammeter through which the current passes through will be -

(a) more
(b) equal
(c) less
(d) zero.

Ans (c) more-

Greater the shunt, smaller the range of ammeter. The shunt is connected in parallel with the galvanometer. The shunt of greater resistance will draw less current and the current passing through coil of galvanometer will be more.

4. Choose the connect option for design formula of galvanometer

(a) $i = \left(\frac{C}{BNA}\right)\theta$.

(b) $i = \left(\frac{CA}{BN}\right)\theta$.

(c) $i = \left(\frac{C}{BNAQ}\right)$

(d) none of them.

Ans (d) none of these.

5. Choose the connect option for current sensitivity of galvanometer.

(a) $S = \frac{\theta}{i} = \frac{NBA}{C}$

(b) $Si = \frac{\theta}{i} = \frac{NB}{CA}$.

(c) $Si = \frac{\theta}{\theta} i = \frac{C}{NBA}$

(d) none of the.

Ans (a) $S_i = \frac{\Theta}{i} = \frac{NBA}{C}$.