18 July 2021

Home Assignment

1)(i) Cyclotron is used to Accelerate

Ans (a) some kind of charged particles.

Explain: Cyclotron accelerate some kind of charged particles because it only accelerate positively charged particles, because electrons cannot be accelerated due to increase in their energy their velocity increases to a very large extent. and neutron being electrically neutral, cannot be accelerated.

The force that accelerates the particles in the cyclotron is

(a) ~~both electrostatic and magnetic forces called lorentz force~~.

(ii) The force that accelerates the particle in the Cyclotron is

Ans (c) Both electrostatic and magnetic force called Lorentz force.

(iii) choose the correct option.

Ans (a) ~~Inside~~ a ~~free~~ conductor shields any charge within it forces electric fields created outside the conductors.

(iv) Inside a dee

Ans (a) ~~The particle's speed changes~~.

(a) The particle's Kinetic energy changes.

(v) What is the formula for maximum Speed attained by a charged particle in a Cyclotron

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

explain:

Thus, the Lorentz force provides the necessary Centripetal force.

$$mv^2/r = qvB$$

$$v = qBr/m.$$

The maximum velocity of charged particle is acquired when it moves in a orbit of greatest radius

So, $V_{max} = qBr/m$

(vi) In a Cyclotron

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

Explain Variation balances the relativistic mass increase, ~~increase in~~ resulted in Static magnetic field and accelerated by a rapidly varying electric field. So, the maximum amount of speed attained are ~~is~~ limited because of variation in balancing the relativistic variation of mass with speed.

2) (i) Galvanometer was named after.

Ans (a) Italian electricity researcher Luigi Galvani.

(ii) Galvanometer is used

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

explain:

A galvanometer works by deflecting a pointer in response to an electric current flowing through a coil in a constant magnetic field. point of deflection is minimum in galvonometer so, it measure small amounts of current.

(iii) Choose the correct option for current sensitivity of galvanometer.

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

(iv) Increasing the current sensitivity

Ans (e) never changes the voltage sensitivity.

explain: current sensitivity can be increased by increasing the number of terms of the coil. Since, voltage sensitivity decreases with increase in resistance of the coil, the effect of increase in number of terms is nullified in the case of voltage sensitivity. Hence, there is no increase in voltage sensitivity.

(v) choose the correct option for design formula of galvanometer.

Ans (d) none of these.

(vi) In the galvanometer the radial magnetic field makes the magnetic torque.

Ans (c) Zero

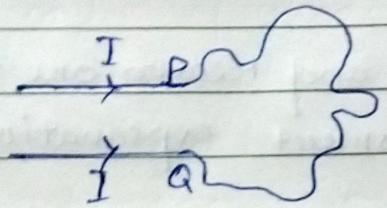
explain: The radial magnetic field is applied to a moving coil galvanometer to produce a constant torque on the coil. With the help of the radial magnetic field, the angle between the peane of the coil and the magnetic field is maintained Zero in all the orientation of the coil.

3)(i) Assertion: Moving coil galvanometer uses phosphor-bronze wires for suspension.

Reason: The phosphor-bronze wires 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.

(ii) A wire bent into an irregular shape with the points P & Q fixed. If a current I is passed through the wire, then the area enclosed by the irregular portion of the wire increases.
Reason: Opposite currents carrying wires repel each other.



Ans (a) Both Assertion and Reason are true and reason is the correct expeanation of the assertion.

Explain:
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.

(iii) 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 & Reason are false.

(iv) 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 ~~increa~~ increased, the range of voltmeter ~~of~~ is increased.

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

(v) Assertion: Galvanometer cannot as such be used an 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 are true and Reason is the correct explanation of the assertion.
Explain: Galvanometer is very sensitive device, 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 are attached a small resistance ~~Shunt~~

4(i) 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?

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

explain

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 with the source and current through it is always maximum, ~~so that it is low~~

(ii) The resistance of an ideal voltmeter is

Ans (e) infinity.

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

(iii) Two identical galvanometers are converted into an ammeter and a milliammeter. Resistance of the shunt of milliammeter through which the current passes through coil be

Ans (c) more.

explain:
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 & the current passing through coil of galvanometer will be more.

(iv) Choose the correct option for design formula of galvanometer

Ans (d) none of these.

(v) Choose the correct option for current sensitivity of galvanometer.

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

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