Competitive Exams: Physics MCQs (Practice_Test 23 of 35)

1. 125 cm of potentiometer wire balances the emf of a cell and 100 cm of the wire is required for balance is the poles of the cell are joined by a 2 W resistor. The internal resistance of the cell is
   a. 0.25 ohm
   b. 0.50 ohm
   c. 0.75 ohm
   d. 1.25 ohm
2. 200 accumulators are connected in series in two groups of 100 accumulators each, both groups being connected in parallel. The emf of each accumulator is 1.4 V and internal resistance is 0.01W. The entire battery is connected through a rheostat to a dynamo generating 230 V. If the charging current be 30 A, then the rheostat resistance is
   a. 0.10W
   b. 0.5 0W
   c. 1.0 0W
   d. 2.5 W
3. A conducting circular loop is placed in a uniform magnetic field of 0.02 T, with its plane perpendicular to the field. If the radius of the loop starts shrinking at a constant rate of 1.0 mm/s, then the emf induced in the loop, at the instant when the radius is 4 cm, will be
   a. 2.0 mV
   b. 2.5 mV
   c. 5.0 mV
   d. 8.0 mV
4. In an LCR circuit, if V is the effective value of the voltage with VR, VC and VL as the voltages across the resistor, the capacitor and the inductor, then
   a. V = VR + VC + VL

b. V = VR + (VL-VC)

c. V2 = V2R + V2L + V2C

d. V2 = VCR + (VL-VC) 2

5. In the resonant LCR series circuit shown in the figure if we change the value of R; it will

   a. not affect the voltages across the individual components L, C and R

   b. affect the voltages across R but not across L or C

   c. not affect the voltages across R

   d. not affect the voltages across the L, C combination but will affect the voltages across R

6. An LCR circuit of R = 100W is connected to an AC source 100 V, 50 Hz, The magnitude of phase difference between current and voltage becomes 30 ′ when either C is removed or when L is removed. The power dissipated in the LCR circuit is

   a. 50 W

   b. 86.5 W

   c. 100 W

   d. 200 W

7. In a series LCR circuit with an AC. Source of emf 50 V and frequency 50/p Hz, r = 300W, L = 1.0 H and C = 20 mF, the potential difference across the capacitor will be

   a. zero

   b. 10 V

   c. 30 V

   d. 50 V

8. Two similar circular loops of conductor are placed coaxially at some distance. A battery is inserted in the first loop. The current in it changes slightly due to the variation in resistance with temperature. During this period, the two loops

   a. attract

   b. repel

   c. attract or repel depending on the sense of the current

   d. do not exert any force on each other

9. The torque required to hold a small circular coil of 10 turns, 2 × 10 – 4 m2 area and carrying 0.5 A current in the middle of a long solenoid of 103 turns/m carrying 3 A

current; with its axis perpendicular to the axis of the solenoid, is

a. 12p × 10 − 7 N. m

b. 6p × 10 − 7 N. m

c. 4p × 10 − 7 N. m

d. 2p × 10 − 7 N. m

10. The Hall effect in magnetostatics is observed when the direction of

    a. electric field, velocity of electrons and magnetic field are same

    b. electric field, and velocity of electrons is same but the magnetic field is perpendicular to the two

    c. electric field and magnetic field is same but velocity is perpendicular the two

    d. magnetic field and motion of electrons is same nut electric field is perpendicular to the two

11. A radio wave has a maximum electric field intensity of 10 − 4 Vm-10n arrival at a receiving antenna. The maximum magnetic flux density of the magnetic field of such a wave is

    a. zero

    b. 3 × 104 T

    c. 5.8 × 10 − 9 T

    d. 3.3 × 10 − 13 T

12. Consider the following statements regarding a charged particle in a magnetic field:

    a. Starting with zero velocity, it accelerates in a direction perpendicular to the magnetic field.

    b. While deflecting in magnetic field its energy gradually increases

    c. Only the component of magnetic field perpendicular to the direction of motion of the charged particle is effective in deflecting it.

    d. Direction of deflecting force on the moving charged particle is perpendicular to its velocity.

    Of these statements:

    a. 2 and 3 are correct

    b. 3 and 4 are correct

    c. 2,3 and 4 are correct

    d. 1,2 and 3 are correct

13. An electron (mass = 9.1 × 10 – 31 kg; charge = 1.6 × 10 – 19 C) experiences no deflection if subjected to an electric field of 3.2 × 105 V/m, and a magnetic. Field of 2.0 × 10 – 3 W b/m2. Both the fields are normal to the path of electron and to each other. If the electric field is removed, then the electron will revolve in an orbit of radius

    a. 45 m

    b. 4.5 m

    c. 0.45 m

    d. 0.045 m

14. Which of the following statements regarding the operation of the Betatron are correct?

    a. Relativistic effects dominant.

    b. The orbit radius remains constant.

    c. Changing electric field accelerates electrons.

    d. Changing magnetic field accelerates electrons.

    Select the correct answer using the codes given below:

    a. 1,2 and 3

    b. 2 and 3

    c. 1,2 and 4

    d. 1 and 4

15. If an electron has orbital angular momentum quantum number I = 7, then it will have an orbital angular momentum equal to

    a. 7 h

    b. 42 h

    c. -7 h

    d. -56 h