Class 12 Physics · Chapter 4: Moving Charges and Magnetism

Worksheet · 20 marks · about 40 minutes · based on NCERT

Name _____ Class and section _____ Date _____

Scan for the free Class 12 Physics test

1. A proton goes round a circle in a uniform magnetic field. The work done on it by the magnetic force during half a revolution is [1]

(a) zero
(b) $qvB \times \pi r$
(c) $qvB \times 2r$
(d) $\tfrac{1}{2}mv^2$

2. The tesla, the SI unit of magnetic field, is equivalent to [1]

(a) $N\,C^{-1}\,m\,s^{-1}$
(b) $N\,A\,m^{-1}$
(c) $N\,A^{-1}\,m^{-1}$
(d) $J\,A^{-1}$

3. With ε_0 the permittivity and μ_0 the permeability of free space, and c the speed of light in vacuum, the product $\varepsilon_0\mu_0$ equals [1]

(a) $1/c$
(b) c^2
(c) $1/c^2$
(d) c

4. In a cyclotron the oscillator works at 12 MHz. The magnetic field needed for protons to go round in step with it is ($e = 1.6 \times 10^{-19}$ C, mass of proton $= 1.67 \times 10^{-27}$ kg) [1]

(a) 0.13 T
(b) 0.79 T
(c) 1.6 T
(d) 0.39 T

5. A short element of a wire carries a steady current. By the Biot–Savart law, its magnetic field is zero at a point that lies [1]

(a) on the line of the element itself
(b) on the perpendicular bisector of the element
(c) at 45° to the element
(d) anywhere at a large distance

6. A straight conductor 40 cm long carrying 2.5 A is placed in a uniform magnetic field of 0.20 T. (a) What is the largest force it can experience, and how must it lie for this? (b) At what angle to the field must it lie for the force to be 0.10 N? [2]

7. At a place the horizontal component of the earth's field is 3.5×10^{-5} T, pointing from south to north. A vertical wire carries 5.0 A upwards. Find the magnitude and direction of the force on each metre of the wire due to this component. [2]

8. A small circular current loop hangs in a uniform magnetic field, free to turn. When is it in (a) stable equilibrium, (b) unstable equilibrium? Give the reason for each. [2]

Every question original, written from NCERT, checked by a second reviewer · photocopy freely for your class

9. Two long straight parallel wires A and B are 10 cm apart and carry 4.0 A and 6.0 A in the same direction. Using $\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1}, find (a) the magnitude of the resultant field at the mid-point between them, (b) the point on the line joining them where the resultant field is zero. [3]

10. A rectangular loop of sides a and b carries a current I in a uniform magnetic field B. The normal to the loop makes an angle θ with B, and the sides of length b are perpendicular to B. Show that the net force on the loop is zero and that the torque on it is IAB sin θ, where A = ab. [3]

11. A galvanometer of resistance 30 Ω gives full-scale deflection for 4.0 mA. Find (a) the shunt that converts it into an ammeter of range 0 to 1.0 A, (b) the resistance of this ammeter, (c) the series resistance that converts it into a voltmeter of range 0 to 6.0 V. [3]