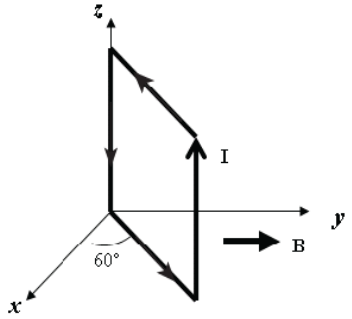
Chapter 28

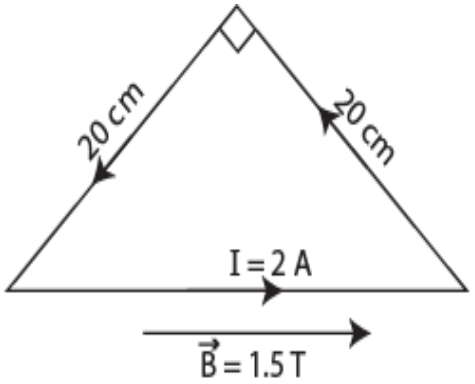
T081

Q5. A particle (mass = 6.0 mg) moves with a speed of 4.0 km/s in a direction that makes an angle of 37° above the positive x axis in the x-y plane. At the instant it enters a magnetic field of ($5.0 \times 10^{-3}\ \hat{i}$) T, it experiences an acceleration of ($8.0\ \hat{k}$) m/s^2. What is the charge of the particle? (Ans: – 4.0 μC)

Q6. A square loop of side 0.20 m consists of 50 closely wrapped turns, each carrying a current of 0.50 A. As shown in Fig 4, the loop is oriented in a uniform magnetic field of 0.40 T directed in the positive y direction. What is the magnitude of the torque on the loop? (Ans: 0.35 N.m)



Q8. Fig 5 shows a loop of wire carrying a current of 2.0 A. The loop has the shape of a right angled triangle with two equal sides, each 20 cm long. A 1.5 T uniform magnetic field is parallel to the hypotenuse. The resultant magnetic force on the two equal sides has a magnitude of:

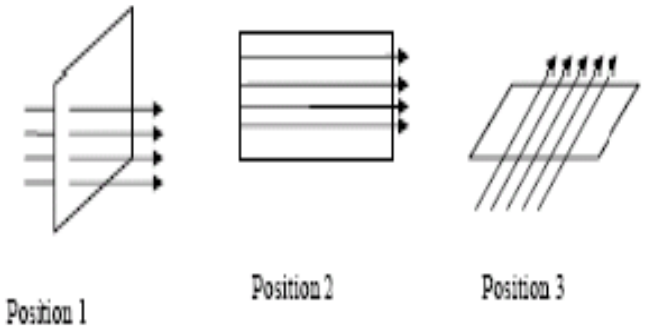


Q9.An ion with a charge of $+4.8\times10^{-19}$ C is in a region where a uniform electric field of 6.0×10^{4} V/m is perpendicular to a uniform magnetic field of 1.8 T. If its acceleration is zero then its speed must be: (Ans: 3.3×10^4 m/s)

T072:

Q18: A 2.0 C charge moves in a uniform magnetic field with a velocity of (2.0 **i** + 4.0 **j**) m/s and experience a magnetic force of 12 N along the +z-axis. The x component of the magnetic field is equal to zero. Determine the y component of the magnetic field? (Ans: +3.0 T)

Q19. A current loop is oriented in three different positions relative to a uniform magnetic field. In position 1 the plane of the loop is perpendicular to the field lines. In position 2 and 3 the plane of the loop is parallel to the field lines as shown in Fig. 1. The torque is maximum in: (Ans: positions 2 and 3)



Q20. A charged particle has a kinetic energy of 10-7 joules and moves in a circular path in a uniform magnetic field. If the magnitude of the magnetic force on the particle is 1.5 x 10-4 N, what is the radius of the circular motion? (Ans: 1.3 mm)

Q21. What is the kinetic energy of an electron that passes in a straight line through perpendicular electric and magnetic fields if E= 4.0 kV/m and B= 8.0 mT ? (Ans: 0.71 eV)