SECTION –A

Q.1) Select and write the correct answer.

(i) A charge of 1 C is moving in a magnetic field of 0.5T with a velocity of 10 ms\(^{-1}\). Force experienced by charge is
   a) 5N   b) 11N   c) 0.5N   d) 15N

(ii) Magnetic field is not associated with
   a) a charge in uniform motion   b) an accelerated charge
   c) a decelerated charge   d) a stationary charge

(iii) A charged particle is in motion having initial velocity \(v\) when it enters into a region of uniform magnetic field perpendicular to \(v\). The K.E. of the particle due to magnetic force will
   a) remain unchanged   b) be reduced   c) increase   d) be reduced to zero

(iv) Which of the following is the unit of magnetic induction?
   a) T   b) Wb/m\(^2\)   c) N/Am   d) All of these

Q.2) Answer the following.

(i) State right hand thumb rule.

(ii) Define SI unit of magnetic field.

(iii) State expression for magnetic force in vector form.
SECTION- B

Attempt the following

Q.3) Give reason.
Magnetic force never does any work on moving charges.

Q.4) What is the magnitude of magnetic force per unit length on a wire carrying current of 8A and making an angle of 30° with the direction of a uniform magnetic field of 0.15T ?

Q.5) Consider a square loop of wire loaded with a glass bulb of mass ‘m’ hanging vertically, suspended in air with its one part in a uniform magnetic field ‘B’ with its direction coming out of the plane of the paper. Due to the current ‘I’ flowing through the loop, there is a magnetic force in upward direction. Calculate the current ‘I’ in the loop for which the magnetic force would be exactly balanced by the force on the mass ‘m’ due to gravity.

Q.6) Obtain equation for Lorentz force law.

SECTION-C

Attempt the following

Q.7) Discuss consequences of Lorentz force law

Q.8) A piece of straight wire has mass 20g and length 1m. It is to be levitated using a current of 1A flowing through it and perpendicular to magnetic field ‘B’ in horizontal direction. What must be the magnitude of B?

SECTION- D

Attempt the following

Q.9) Derive an expression for magnetic force acting on a straight current carrying wire, and hence derive an expression for magnetic force for an arbitrarily shaped wire.