NAME _____

STUDENT No. _____

SECTION No. _____

1 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   26 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   51 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   76 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   101 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

2 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   27 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   52 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   77 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   102 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

3 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   28 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   53 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   78 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   103 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

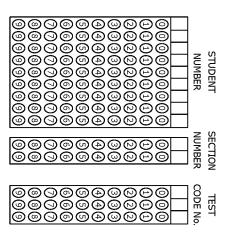**Q1.** A particle with a charge of $+5.59 \times 10^{-7}$ C is moving in a magnetic field $\vec{B} = (0.772 \text{ T})\hat{\imath}$ at an instant with velocity $\vec{v} = (3.14 \times 10^4 \ m/s)\hat{\imath} + (-2.86 \times 10^6 \ m/s)\hat{\jmath}$. What is the force, in Newtons, exerted on the particle by the magnetic field?

A) 1.23
B) -1.23
C) -1.36
D) 1.36
E) 1.83

$$\vec{F_B} = q \vec{v} \times \vec{B}$$
$$= q(v_x \hat{\imath} + v_y \hat{\jmath}) \times B_x \hat{\imath}$$
$$= q v_y B_x (-\hat{k}) = (5.59 \times 10^{-7})(-2.86 \times 10^6)(0.772)(-\hat{k})$$
$$= 1.23 \hat{k}$$

Q2. A proton moves in a circle of radius 4.05 cm in a 0.862 T magnetic field. What value of electric field, in the unit 10^6 V/m, could make its path a straight line? The proton charge is 1.6×10^{-19} C, and the proton mass is 1.67×10^{-27} kg.

A) 2.88
B) 3.60
C) 2.34
D) 1.79
E) 1.24

$$r = \frac{mv}{|q|B} \Rightarrow v = \frac{r|q|B}{m}$$
$$E = vB = \frac{r|q|B}{m} B = \frac{(4.05 \times 10^{-2})(1.6 \times 10^{-19})(0.862)^2}{1.67 \times 10^{-27}} = 2.88 \ \frac{MV}{m}$$

23 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   48 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   73 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   98 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   123 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

24 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   49 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   74 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   99 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   124 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

25 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   50 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   75 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   100 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ   125 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ