Subject: Self-Attempt Date:

1a) $F = BIL \sin\theta$

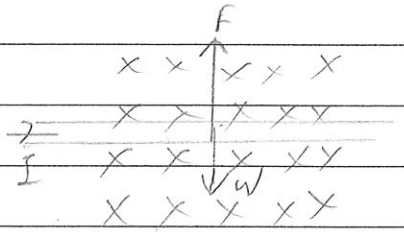
$= 0.15 \times 10 \times 2$

$= 3.0N$

1b) $F = BIL \sin\theta$

$= 0.15 \times 10 \times 2 \times \sin 45°$

$= 2.12N$ (3s.f)



1c) Angle = 0°

2) $F = BIL \sin\theta$

$0.050 \times 9.81 = 0.2 \times 0.5 \times I$

$I = 4.91A$ (3s.f)

3a) $B = \mu_0 n I$

$= (4\pi \times 10^{-7})(5)(1.5)$

$= 9.42 \times 10^{-6} T$ (3s.f)

3b) $B \propto V_H$

$\frac{B_S}{B_C} = \frac{V_{HS}}{V_{HC}}$

$B_C = \frac{B_S(V_{HC})}{V_{HS}}$

$= \frac{(0.94 \times 10^{-3})(1.1)}{9.8}$

$= 1.055 \times 10^{-4} T$

$I = \frac{(1.055 \times 10^{-4})(2\pi)(\frac{1}{100})}{4\pi \times 10^{-7}}$

$= 5.3 A$

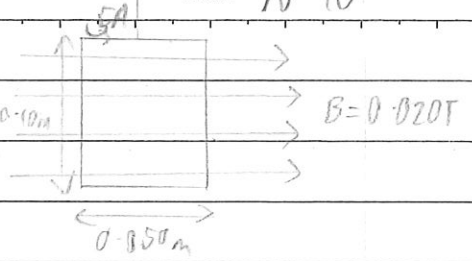
1b) The ferrous core can concentrate magnetic field lines. (high permeability)
The ferrous core is easily magnetised or demagnetised - ability to strengthen flux density.

Subject: Date: N=10

2) $F = NBIL \sin\theta$

$= 10 \times 0.020 \times 5.0 \times 0.1$

$= 0.1\ N$



$\tau = Fd$

$= 0.1 \times 0.05$

$= 5 \times 10^{-3}\ Nm$

3a) $NBIL = mgx$

$NBIL^2 = mgx$

$B = \frac{mgx}{NIL^2}$

3bi) No change in x. $x = \frac{BNL^2I}{mg} = \frac{B(2N)L^2}{mg}\left[\frac{\varepsilon A}{p(2.0)}\right]$

3bii) x is halved. $x' = \frac{BN(\frac{L}{2})^2}{mg}\left(\frac{\varepsilon A}{p(\frac{1}{2})}\right)$

$= \frac{x}{2}$

4a) $F = kx$

$(0.010)(9.81) = k(0.5)$

$k = 0.1962\ Nm^{-1}$

$F = BIL \sin\theta$

$(0.1962)(0.03) = B\left(\frac{24}{12}\right)(0.05)$

$B = 0.1589\ T$ (3s.f)

5) The two sides of the foil will repel each other as current in them is flowing in opposite directions, inducing magnetic fields that are parallel to each other.