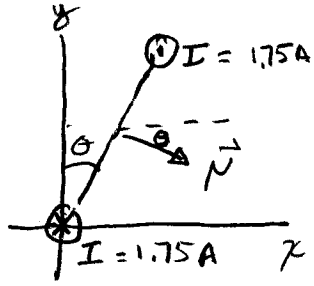
26-52




GIVEN: $N = 50$ TURNS
$\theta = 37°$
$I = 1.75A$
COIL $A = 5cm \times 8cm$
$\vec{B} = 1.5T\hat{j}$

FIND: DIRECTION OF $\vec{\mu}$ WRT $\hat{i}$
$\hat{n}$ (CARTESIAN FORM)
$\vec{\mu}$, $\vec{\tau}$, $U$

$\vec{\mu}$ IS 37° BELOW $\hat{i}$
(-37°)

$$\hat{n} = \cos 37°\,\hat{i} - \sin 37°\,\hat{j} = \boxed{.8\hat{i} - .6\hat{j}}$$

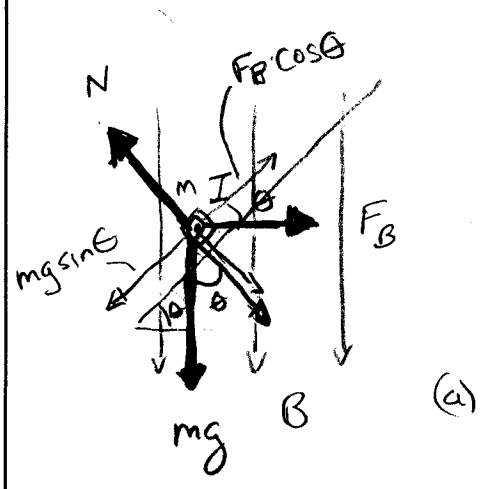
$$\vec{\mu} = NIA\hat{n}$$
$$= (50)(1.75A)(.05m)(.08m)\left[.8\hat{i} - .6\hat{j}\right]$$
$$= \boxed{(.28\hat{i} - .21\hat{j})\ A\cdot m^2}$$

$$\vec{\tau} = \vec{\mu} \times \vec{B} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ .28 & .21 & 0 \\ 0 & 1.5 & 0 \end{vmatrix} = \hat{k}\left(.28A\cdot m^2\right)\left(1.5\,\tfrac{N}{A\cdot m}\right)$$
$$= \boxed{.42\ N\cdot m\,\hat{k}}$$

$$U = -\vec{\mu}\cdot\vec{B} = -(.28\hat{i} - .21\hat{j})A\cdot m^2 \cdot 1.5\hat{j}\ T$$
$$= (.21)(1.5)\ J = \boxed{.315\ J}$$

3-0235 — 50 SHEETS — 5 SQUARES
3-0236 — 100 SHEETS — 5 SQUARES
3-0237 — 200 SHEETS — 5 SQUARES
3-0137 — 200 SHEETS — FILLER
COMET

26 - 75




GIVEN : BAR MASS = m
CURRENT = I OUT OF PAGE
LENGTH = L

B FIELD DOWNWARD
RAILS AT $\theta$ WRT HORIZONTAL

FIND : $B_{min}$ TO KEEP BAR AT REST
a IF $B = 2B_{min}$

(a)

$$F_B \cos\theta = mg\sin\theta$$

$$BIL\cos\theta = mg\sin\theta$$

$$B = \frac{mg\sin\theta}{IL\cos\theta} = \frac{mg}{IL}\tan\theta$$

(DOWNWARD)

(b)

$$B = \frac{2mg}{IL}\tan\theta$$

$$\Sigma F = \frac{2mg}{\cancel{IL}}\overset{\sin\theta}{\cancel{\tan\theta}}\,\cancel{IL}\,\cancel{\cos\theta} - mg\sin\theta = ma$$

$$= 2\cancel{m}g\sin\theta - \cancel{m}g\sin\theta = \cancel{m}a$$

$$a = g\sin\theta \quad \text{(UP THE INCLINE)}$$

3-0235 — 50 SHEETS — 5 SQUARES
3-0236 — 100 SHEETS — 5 SQUARES
3-0237 — 200 SHEETS — 5 SQUARES
3-0137 — 200 SHEETS — FILLER
COMET