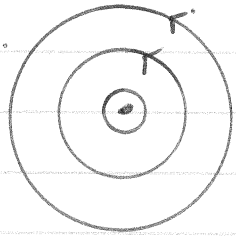
SECTION A.

Q1. a.

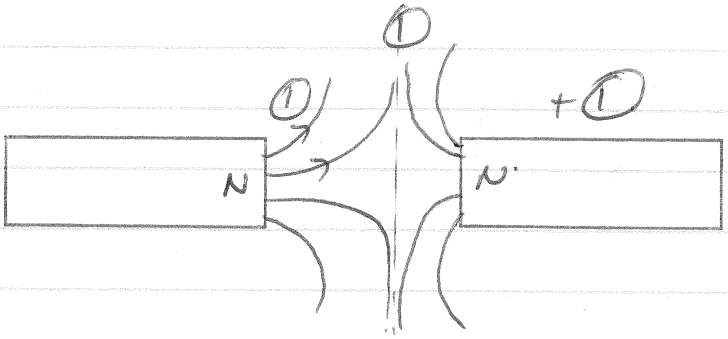


(1)

[2]

b). REPEL. (1)

Q2.



(1) (1) +(1)

[3]

Q3.

$L = 150m$.

$I = 5A$.

$B = 2.5 \times 10^{-5} T$

$F = BIL$

$= 2.5 \times 10^{-5} \times 5 \times 150$

$= 1.88 \times 10^{-2} N$. (2)

[3]

UPWARDS (1)

Q4. $B = 5 \times 10^{-5} T$

$L = 2.45$

$U = 90.0 km\,h^{-1}$

$= 25 ms^{-1}$ (1)

$EMF = BLU$

$= 5 \times 10^{-5} \times 2.45 \times 25$

$= 3.06 \times 10^{-3} V$.

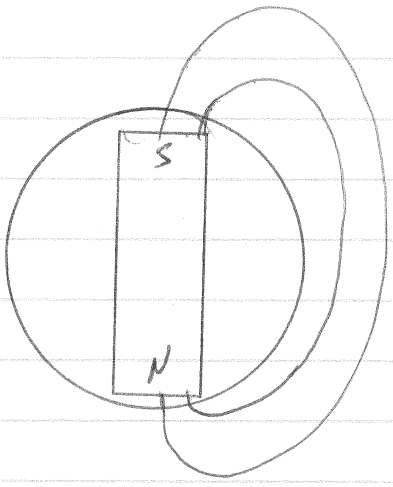
(2) (1)

[4]

NORTH (1)

Q5.

SOUTH (1)



(1) + (2)

[4]

Q6. TOWARDS B. [3]

Q7. $N = 400$.

$A = 15\ cm^2 = 15 \times 10^{-4}\ m^2$ (-1)

$B = 0.8$

$\Delta t = 2.45$.

$$\varepsilon = N \frac{\Delta \Phi}{\Delta t}$$

$$= \frac{N(B.A - B.A)}{\Delta t}$$

$$= \frac{400(0.8 \times 15 \times 10^{-4} - (-0.8 \times 15 \times 10^{-4}))}{2.45}$$ (1)

$$= 3.92 \times 10^{-1}\ V.$$

[3]

SECTION B.

1 a).

$B = 9.08 \times 10^{-3}$.

$N = 25$

$I = 2.20$

$D = 35 \times 10^{-3}$ m.

$L = 55 \times 10^{-3}$ m.

$\tau = F \times d$

$= BIL \times d$.

$= 25 \times 9.08 \times 10^{-3} \times 2.2 \times 35 \times 10^{-3} \times 55 \times 10^{-3}$

$= 9.61 \times 10^{-4}$ N m. [3]

b).

FROM X ANTI CLOCKWISE. [1]

c) ↑ B

↑ N. [2]

↑ I

d). SPLIT RING COMMUTATOR. (1)

OBSCRIPTION (2) [3]

Q2.

a). MOMENTARY CURRENT INCREASE

" FIELD CHANGE. [3]

" INDUCED CURRENT.

b). A → B. [2]

c). $\frac{N_p}{N_s} = \frac{I_s}{I_p}$. A. [1]

d) $\frac{N_p}{N_s} = \frac{V_p}{V_s}$. $V_s = \frac{V_p N_s}{N_p}$

$= \frac{240.50}{300}$ [2]

$= 40$ V.

Q3 a REDUCE % LINE LOSES (1).

b).

$P = 1800\ MW$ $\quad P = UI$

$L = 250\ km.$ $\quad I = \frac{P}{U}$

$R = 5\ OHM.$ $\quad = \frac{1800 \times 10^6}{330 \times 10^3}$

$U = 330KV.$ $\quad = 5454.54\ A$ (1½)

$P_L = I^2 R$

$= (545454)^2 \times 5$ [5]

$= 1.4886 \times 10^8\ W.$ (1½)

$\%\ LOSS = \frac{P_L}{P} \times \frac{100}{1}$

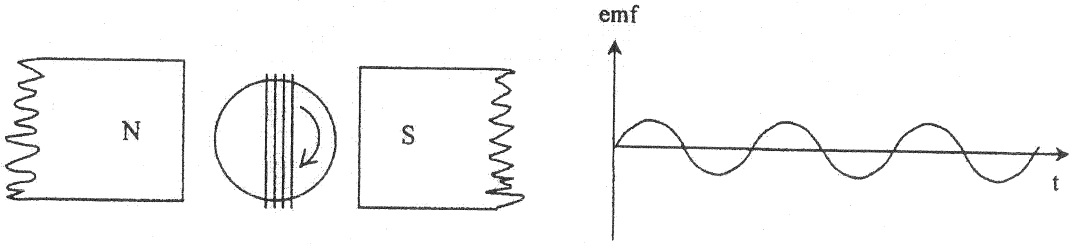
$= \frac{1.488 \times 10^8}{1800 \times 10^6} \times 100$

$= 8.27\ \%.$ (1)

Ans.

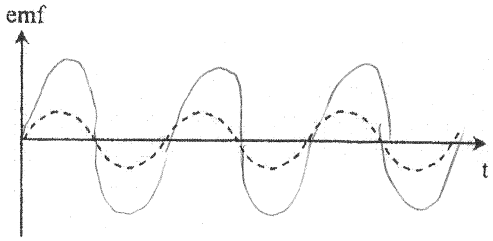
USE THIS SHEET TO ANSWER QUESTION 4. ATTACH IT TO YOUR LINED PAPER

A coil is rotated in a magnetic field as shown. A graph of the voltage (emf) generated is also shown



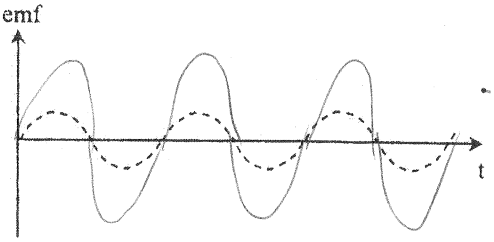
In each of the following cases, sketch (**on the diagrams supplied on a separate sheet**) a graph of the output voltage when the changes indicated are made. Give reasons for your answers. The dotted line represents the voltage before the change has been applied

b) the magnitude of the magnetic field is doubled. (2 marks)



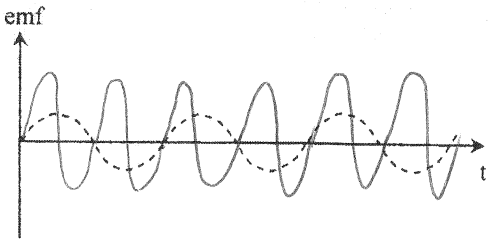
$\varepsilon \propto \frac{\Delta(BA)}{\Delta t}$

b) the number of turns in the coil is doubled. (2 marks)



$\varepsilon \propto N$

c) the rate of rotation of the coil is doubled. (2 marks)



$\varepsilon \propto \frac{\Delta\Phi}{\Delta t}$

$\Delta t \propto T = \frac{1}{f}$