PART A: MULTIPLE CHOICE (10 MARKS)

1	2	3	4	5	6	7	8	9	10
d	b	d	b	c	c	d	a	a	b

PART B: MATCH (5 MARKS)

1	2	3	4	5
E	F	H	D	G

PART C: SHORT ANSWER (25 MARKS)

Answer questions 1 to 3 in the space provided. Answer questions 4 and 5 on the back of this sheet.

{6} 1. When a bar magnet is plunged into a coil of 300 turns at a steady speed of 15 cm/s, the maximum induced potential difference is 25 mV.

(a) How fast should the bar magnet be inserted into the coil to produce a maximum induced potential difference of 30 mV?

$V \propto v$

$\frac{V_1}{V_2} = \frac{v_1}{v_2}$

$\frac{25 mV}{30 mV} = \frac{15 cm/s}{v_2}$

$v_2 = 18 cm/s$

(b) If the bar magnet is being inserted at a steady speed of 15 cm/s, how many turns should be present in the coil to provide a maximum induced potential difference of 45 mV?

$V \propto N$

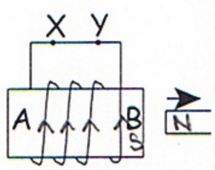
$\frac{V_1}{V_2} = \frac{N_1}{N_2}$

$\frac{25 mV}{45 mV} = \frac{300}{N_2}$

$N_2 = 540$ turns

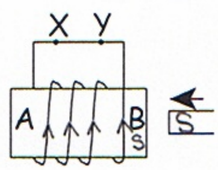
{4} 2. For each of the inducing actions predict whether the induced current will flow from X through the helix to Y, or from Y through the helix to X.

(a)



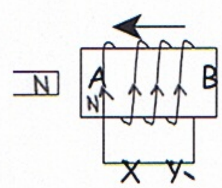
Current: X-Y

(b)



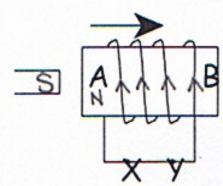
Current: X-Y

(c)



Current: X-Y

(d)



Current: Y-X

{3} 3. Complete the following chart (< or >) for a <u>step-down transformer</u>.

Primary Coil	< or >	Secondary Coil
N_P	>	N_S
V_P	>	V_S
I_P	<	I_S

4. A transformer consists of a primary coil of 200 turns and a secondary coil of 2000 turns. The secondary potential difference and current are 30.0 V and 0.700 A.

{3} (a) What is the primary potential difference?

{3} (b) What is the primary current?

{1} (c) What kind of transformer is it?

{5} 5. Electric energy is generated at a potential difference of 20 kV. It is supplied to a nearby town that requires power of 1.00 MW. The transmission line along which it flows has a resistance of 0.50 Ω. What is the energy loss (in kW) due to heat in the line if the energy is transmitted at 500 kV?

SPH3U-4 PART C QUIZ#4

4.) $N_p = 200$ turns
$N_s = 2000$ turns
$V_s = 30.0V$
$I_s = 0.700A$

a) $\frac{N_p}{N_s} = \frac{V_p}{V_s}$ ✓

$\frac{200}{2000} = \frac{V_p}{30.0}$

$V_p = 3.00V$ ✓✓

b) $\frac{N_p}{N_s} = \frac{I_s}{I_p}$ ✓

$\frac{200}{2000} = \frac{0.700}{I_p}$

$I_p = 7.00A$ ✓✓

c) ∵ $V_p < V_s$ ✓

∴ step-up transformer

5.) $P = 1.00 MW$
$= 1.00 \times 10^6 W$
$R = 0.50 \Omega$ ✓
$V_{Transmit} = 500 kV$
$= 500 \times 10^3 V$

current in line

$I = \frac{P}{V} = \frac{1.00 \times 10^6}{500 \times 10^3}$ ✓

$I = 2.0 A$ ✓

power loss

$P_{loss} = I^2R$ ✓
$= (2.0)^2(0.50)$

$P_{loss} = 2.0W$ ✓