New Syllabus NESA Questions:

1) C

2) D

Past HSC Questions:

2018:

5) B

24)

Question 24 (b)

Criteria	Marks
• Provides correct calculation of magnitude and direction of current	3
• Provides some steps to calculate the magnitude of the current OR • Substitutes into a relevant equation and shows direction of current	2
• Substitutes into a relevant equation OR • Shows direction of current	1

Sample answer:

$I_1 = 20$ A, $I_2 = 20$ A, $I_3 = ?$

$d_1 = 0.3$, $d_2 = 0.75$

$\frac{F_1}{l} = \frac{F_2}{l}$, therefore $\frac{kI_1I_2}{d_1} = \frac{kI_2I_3}{d_2}$

So $\frac{20 \times 20}{0.3} = \frac{20I_3}{0.75}$, thus $I_3 = 50$ A travelling in the same direction as Y.

2017:

16) D

2015:

7) C

9) B

2013:

Question 25 (a)

Criteria	Marks
• Identifies correct direction	1

Sample answer:

To the left
OR
Towards the conductor P

Question 25 (b)

Criteria	Marks
• Demonstrates correct process to calculate the force experienced by Q	3
• Demonstrates logical process to calculate force P or force R on Q	2
• Partial substitution into a relevant equation	1

Sample answer:

$$\frac{F}{l} = \frac{kI_1I_2}{d}$$

Force P on Q

$$F = \frac{2\times10^{-7}\times6\times2}{5\times10^{-3}}$$

$$F = 4.8\times10^{-4}\ \text{N}$$

Force R on Q

$$F = \frac{2\times10^{-7}\times2\times2}{2.5\times10^{-3}}$$

$$F = 3.2\times10^{-4}\ \text{N}$$

$$\text{Total force} = 4.8\times10^{-4}\,\text{N} + 3.2\times10^{-4}\,\text{N}$$

$$\text{Total force} = 8\times10^{-4}\ \text{Newtons}$$

2012:
8) A
17) B

2010:

Question 28

Sample answer:

The magnetic field is into the page.

$$F = BI\ell$$

$$B = \frac{F}{I\ell}$$

$$= \frac{9.8 \times 7 \times 10^{-4}}{0.3 \times 0.2} = 0.114\ldots \text{T}$$

$$= 0.11 \text{ T to 2 sig. fig.}$$

2009:

9) A

Question 23 (a)

Sample answer:

W_2 experiences a force toward W_1

Answers could include:

W_2 experiences a force to the left

Question 23 (b)

Sample answer:

$$F = \frac{k\ I_1\ I_2\ \ell}{d}$$

$$6.9 \times 10^{-4} = \frac{2 \times 10^{-7} \times I^2 \times 2.5}{5 \times 10^{-2}}$$

$$I = \sqrt{\frac{6.9 \times 10^{-4} \times 5 \times 10^{-2}}{2 \times 10^{-7} \times 2.5}}$$

$$I = 8.3 \text{ A}$$

Question 23 (c)

Answers could include:

W_2 experiences a force of attraction to W_1 as the wires carry currents in the same direction. W2 also experiences a force of attraction toward W_3. However this force is smaller as the distance between W_2 and W_3 is larger than between W_1 and W_2. As $F = \frac{kI_1 I_2 \ell}{d}$, force must be smaller as d is larger. As a result the net force on W_2 is one of attraction toward W_1 but it is now reduced in magnitude due to the presence of W_3.

Before 2009 there were no answers given for short answer please use a book like Excel Physics

2008:
6) A

2006:
6) A
7) D

2003:
9) C

2002:
7) A

2001:
14) C