GAUTENG DEPARTMENT OF EDUCATION

SENIOR CERTIFICATE EXAMINATION

OCTOBER / NOVEMBER 2005
OKTOBER / NOVEMBER 2005

FUNCTIONAL PHYSICAL SCIENCE SG
(First Paper: Physics)

TIME: 2 hours

MARKS: 150

REQUIREMENTS:

- An approved (non-programmable scientific) calculator. Candidates should supply their own calculators.

INSTRUCTIONS:

- Write your examination number and centre number in the spaces provided on the cover of the **answer book**.
- Answer ALL the questions.
- Answer Question 1 by making a cross (**X**) over the letter A, B, C or D on the **answer sheet** on the **inside cover** of your a**nswer book** to show which letter you have chosen.
- Answer ALL other questions in the **answer book**. Number all answers in accordance with the question paper.
- An information sheet is provided at the end of this question paper. It contains equations and constants. Some of the information may be useful in answering this question paper.
- Rough work may be done at the **back** of the **answer book**.

QUESTION 1
MULTIPLE-CHOICE QUESTIONS

Each question has four possible answers. Choose the letter which in your opinion represents the correct answer and draw a cross (**X**) over the corresponding letter on the **answer sheet** on the **inside cover** of your **answer book**. If more than one cross appears in an answer, NO MARKS will be awarded.

EXAMPLE:

At which temperature does pure ice melt?

A. -4°C
B. 0°C
C. 0 K
D. 4°C

ANSWER:

A	B	C	D

1.1 Which one is FALSE? A way in which the strength of an electromagnet can be altered is to change the _____ .

A. current strength
B. magnetic field strength
C. number of turns
D. type of core

1.2 A line spectrum originates when _____ .

A. a gas under low pressure receives energy
B. light liberates electrons from a metal
C. white light shines through a prism
D. white light moves through a diffraction grid

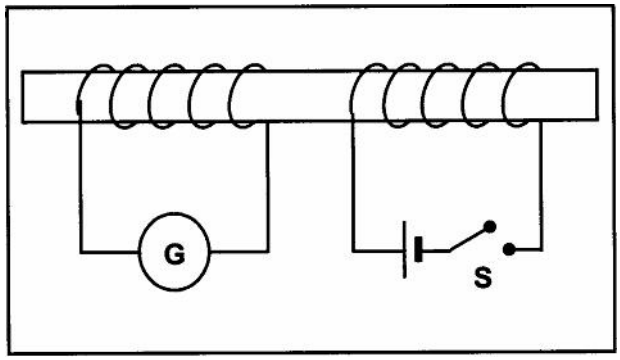
1.3 The function of a resistor in an electrical circuit can be _____.

A. amplification
B. generation of current
C. division of potential
D. rectification

1.4 Which one of the following is an indication of the energy of a sound wave?

A. Wavelength
B. Amplitude
C. Frequency
D. Diffraction

1.5



When switch **S** is closed, the galvanometer shows a deflection. The principle demonstrated here is applied to the _____ .

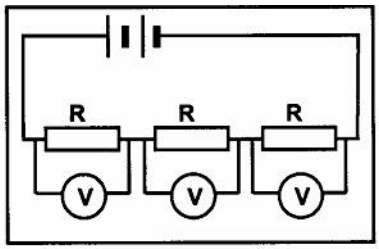
A. electric motor
B. diode
C. transformer
D. electric bell

1.6 Green light that is shone through a 60° prism undergoes _____.

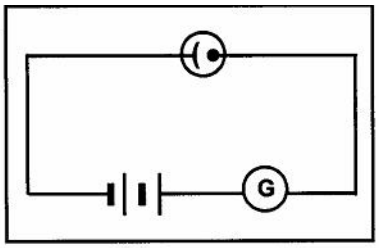
A. dispersion
B. polarisation
C. diffraction
D. refraction

1.7 Which one of the following setups illustrates the photo-electric effect?

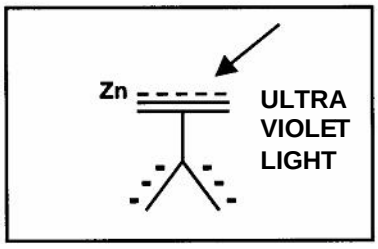
A.



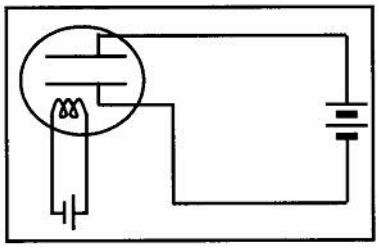
B.



C.



D.



1.8 Which one of the following components serves as an amplifier in an electric circuit?

A. A diode
B. A resistor
C. A transformer
D. A triode

1.9 A triangular prism splits white light into different colours. Which characteristic of the frequency of the light causes the split? Light of different frequencies _____ .

A. differs in intensity
B. has different amplitudes
C. is directly proportional to its wavelengths
D. moves at different speeds through glass

1.10 A vibrator with frequency 50 Hz generates waves with a wave length of 20 cm in a string. Which one of the following expressions gives the speed of the waves in m/s?

A. 50/0,2
B. 5/20
C. (50)(0,2)
D. (5)(20)

1.11 Jenna irradiates a certain metal with various radiations. It is found that only one of the radiations liberates photo-electrons. Which one of the following is the most likely radiation?

A. Green light
B. Blue light
C. Red light
D. Yellow light

1.12 For a certain transformer Vp > Vs. Then _____ .

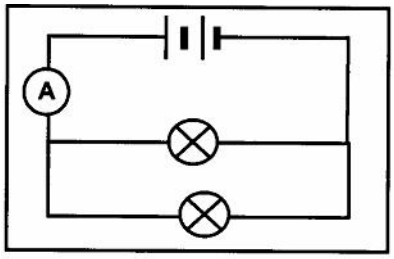
A. lp < ls
B. NpNs = NsVs
C. Np < Ns
D. NpVs < NsVp

1.13 Two wave patterns which both originate from accelerating charges are _____ .

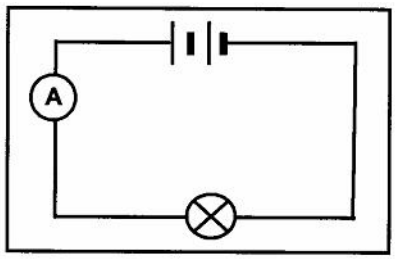
A. alternating current and water waves
B. electromagnetic waves and alternating current
C. alternating current and sound waves
D. electromagnetic waves and sound waves

1.14 The bulbs in the circuits below are identical. Which reading is the biggest on the ammeter in the following circuit?

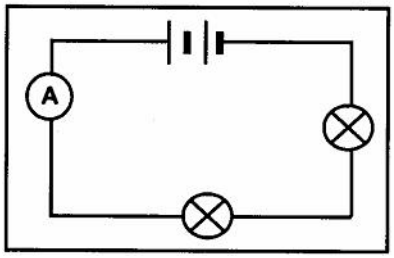
A.



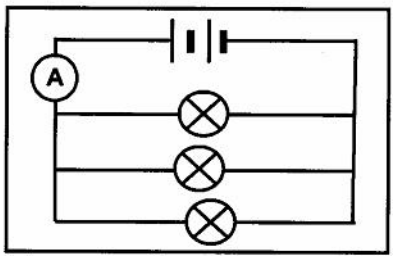
C.



B.



D.



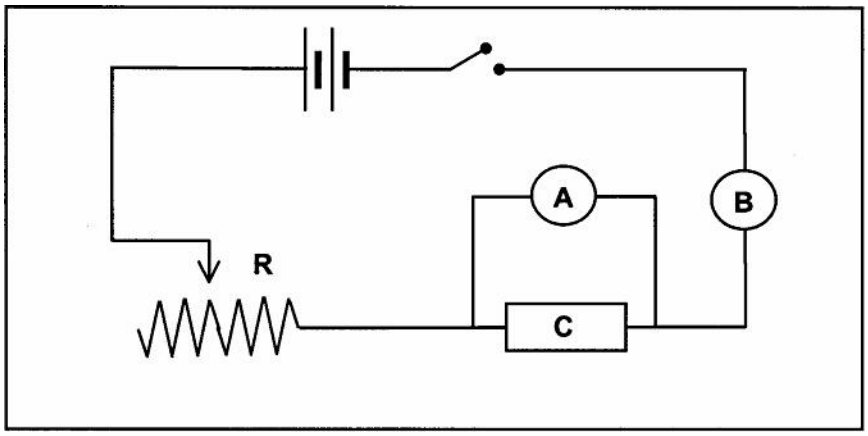
1.15 A line spectrum indicates _____ .

A. high-frequency radiation
B. quantised energy
C. interference
D. polarisation

15x3=**[45]**

QUESTION 2
OHM'S LAW

2.1 Study the following circuit, then answer the questions that follow.



2.1.1 Which type of meter (ammeter or voltmeter) is connected into this circuit at **A** which relates to the confirmation of Ohm's law? (2)

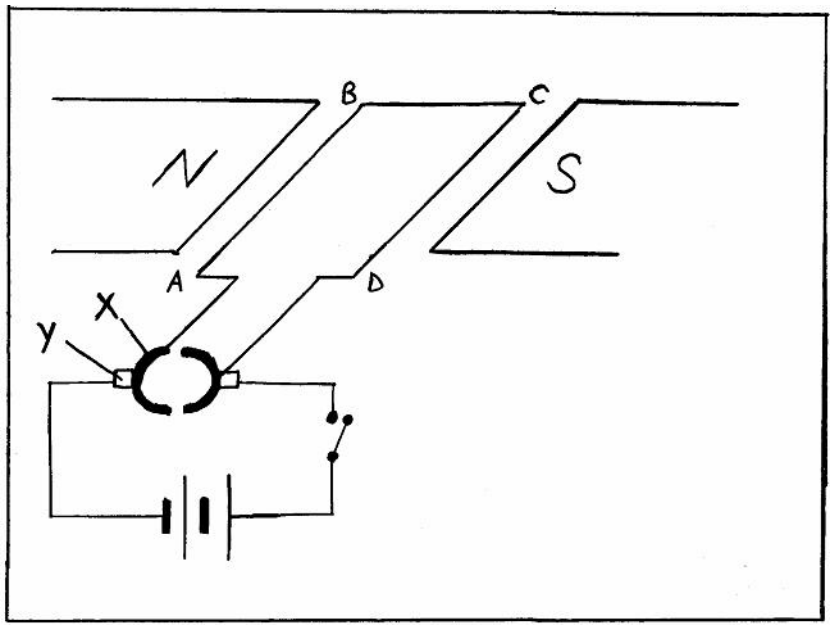
2.1.2 What does **C** represent in this circuit? (2)

2.1.3 What will be the effect on the current strength, if the slide contact of the rheostat **R** is moved to the right? (2)

2.1.4 Why is it necessary to include **R** in the circuit? (2)
[8]

QUESTION 3
THE MAGNETIC EFFECT OF AN ELECTRIC CURRENT

3.1 A current-bearing conductor loop is placed in a magnetic field as indicated in the diagram below. The switch is closed.



3.1.1 Name and explain this phenomenon. (3)

3.1.2 Name the parts in the diagram at

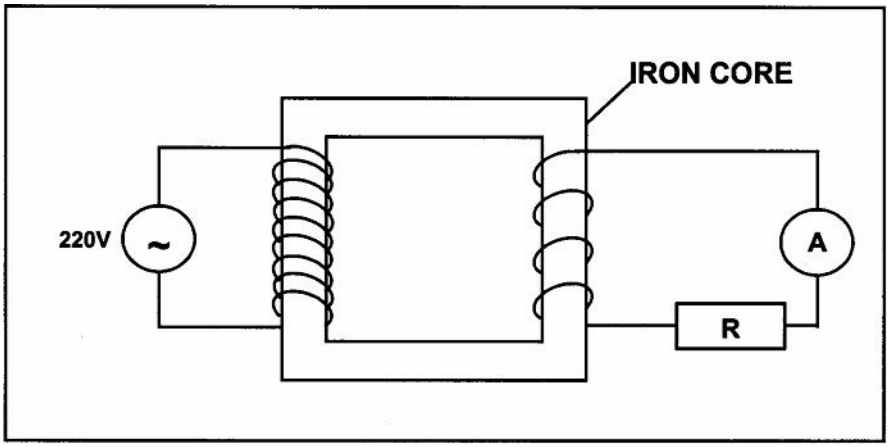
a) **X**. (2)
b) **Y**. (2)

3.1.3 In which direction will the conductor **AB** rotate? (Into the paper or out from the paper?) (2)

3.1.4 Name THREE factors that influence the speed of rotation of the conductor loop. (6)
[15]

QUESTION 4
TRANSFORMERS

4.1 Zanda wants to build a transformer that could change a potential difference of 220 V to 12 V.



4.1.1 The magnitude of current in the primary coil is 15 A. Determine the reading on the ammeter in the secondary coil. (4)

4.1.2 What type of transformer is this? (2)

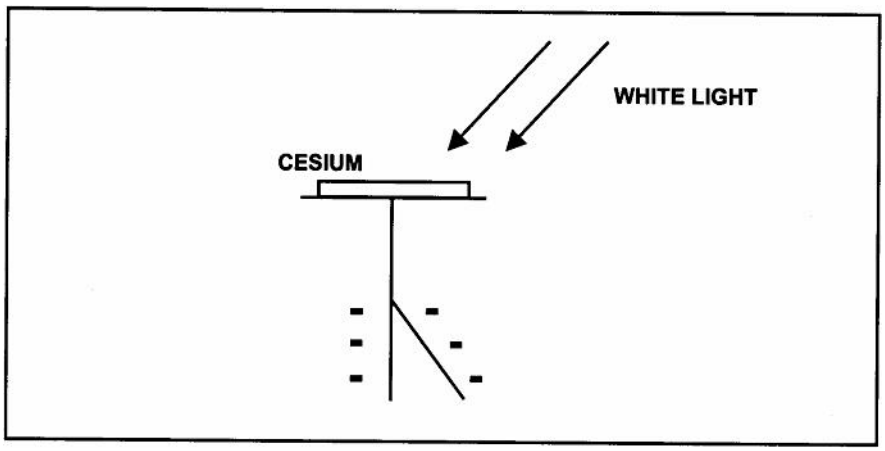
4.1.3 Determine the resistance of **R** in the secondary coil. (4)

4.1.4 Determine the number of turns on the secondary coil when there are 367 turns on the primary coil. (4)

4.1.5 Explain why the iron core should be laminated. (3)
[17]

QUESTION 5
ELECTRONS IN THE ATOM

5.1 A negatively charged electroscope with a clean cesium plate on top is shown in the sketch below.

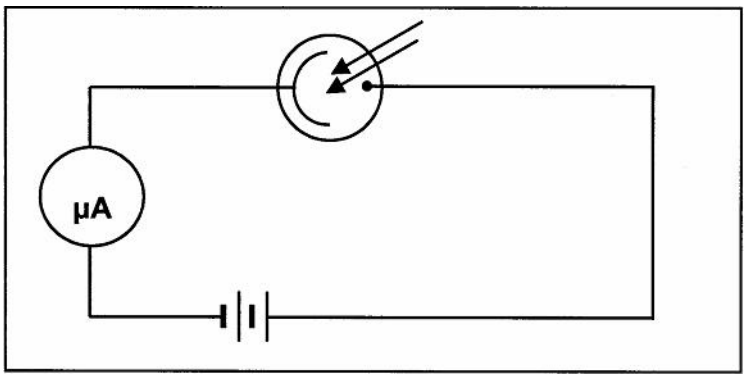


5.1.1 The electroscope discharges. Explain why this happens. (2)

5.1.2 Explain your answer to Question 5.1.1. (3)

5.1.3 What is this phenomenon called? (2)

5.2 A photo-cell is irradiated with low-intensity blue light. The micro-ammeter shows a small reading. When the photo-cell is irradiated with low-intensity red light, no reading is observed.



5.2.1 What will happen with the reading on the micro-ammeter when red light of high intensity is used? (2)

5.2.2 Explain your answer to Question 5.2.1. (4)

5.2.3 How can the reading on the micro-ammeter be increased? (2)

5.3 5.3.1 Explain what is meant by **thermionic emission**. (2)

5.3.2 Name ONE application of this principle in daily life. (2)
[19]

QUESTION 6
WAVES

6.1 Tony generates waves in a ripple tank. The waves have a speed of 0,9 m/s and a wavelength of 30 mm.

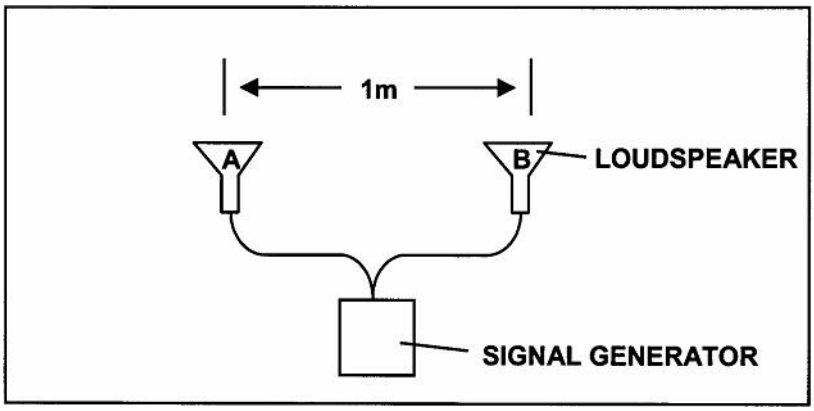
6.1.1 Calculate the frequency of these waves. (4)

6.1.2 What is the period of these waves? (2)

6.1.3 When the waves move to shallower water the speed changes to 0,5 m/s.

a) What is the frequency of these waves? (2)
b) Calculate the wavelength of these waves. (4)

6.2 Two speakers are connected to a signal generator and placed one metre apart as shown in the diagram.



6.2.1 What would you hear when passing slowly from **A** to **B** in front of the loudspeakers? (4)

6.2.2 What is this phenomenon called? (2)

6.2.3 Which characteristic of sound is confirmed by this phenomenon? (2)
[20]

QUESTION 7
LIGHT, COLOUR AND SPECTRA

7.1 Observe the light irradiated by a mercury-vapour lamp.

7.1.1 How would you indicate that this light is not monochromatic? (3)

7.1.2 Is the spectrum of this light continuous? How would you confirm this? (3)

7.1.3 What is this kind of spectrum called? (1)

7.1.4 Name ONE application of the principle demonstrated above. (2)

7.1.5 How would you indicate that this light is not polarised? (3)
[12]

QUESTION 8
ELECTRONICS

8.1 8.1.1 Draw a neat diagram indicating the connection of a galvanometer **G** and a resistor **R** to form a voltmeter. (2)

8.1.2 Does this resistor **R** have to have a big or small magnitude? (2)

8.1.3 Explain your answer to Question 8.1.2. (3)

8.1.4 How should this formed voltmeter be connected in a circuit? (2)

8.2 8.2.1 Give another name for a solid-state triode. (1)

8.2.2 Name ONE use of a solid-state triode. (1)

8.2.3 Draw the symbol for a solid-state triode. (3)
[14]

TOTAL: 150