



Name: ..... Class: ..... Adm.No. ....

Index No..... Candidate's Signature.....Date.....



232/2  
**PHYSICS**  
**THEORY**  
**Paper 2**  
**SEPTEMBER 2022**  
 Time: 2 hours

**MANGU HIGH SCHOOL**

**MOCK EXAM 2022**

**PAPER 2**

**Instructions to Candidates**

- Write your name, admission number, class, Index no. and signature in the spaces provided at the top of the page.
- This paper consists of two sections; A and B.
- Answer ALL the questions in the spaces provided.
- Non-programmable silent electronic calculator and KNEC mathematical table may be used
- ALL working MUST be shown clearly
- Candidates should answer the questions in English.

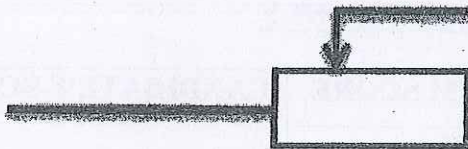
*This paper consists of 12 printed pages. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing  
 Where necessary use  $g = 10 \text{ N/kg}$ , or  $10 \text{ m/s}^2$*

**FOR EXAMINER'S USE ONLY**

SECTION	QUESTIONS	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1 – 13	25	
B	14	9	
	15	9	
	16	9	
	17	12	
	18	9	
	19	7	
		80	

**SECTION A (25 MARKS)**

1. In an experiment to determine the presence of charge on a body, a material to be tested was brought close to the cap of a positively charged electroscope. There was no divergence observed from the leaf of electroscope. State the possible reason for the observation. (1 mark)
2. A cog wheel with 20 teeth is rotated with a stiff card pressing lightly against the teeth. Sound is produced when the rotating teeth strike the card. Calculate the wavelength of sound produced if the wheel makes 20 revolutions per second. (Velocity of sound in air is 330m/s). (2 marks)
3. State any two ways of increasing the size of an image formed by a fixed pinhole camera. (2 mks)
4. Figure 1 shows a symbol representing an electrical device.



**Figure 1**

Name the device represented by the symbol (1 mark)

5. A car battery is rated 40Ah and is expected to supply a constant current for 200 minutes. Determine the amount of current delivered. (2 marks)

6. The figure 2 below show a soft iron plate in a solenoid and a permanent magnet suspended by a spring.

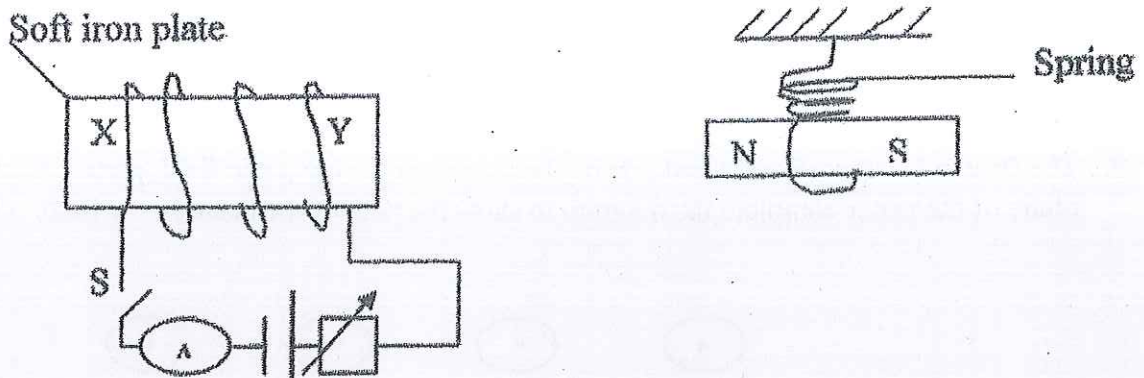


Figure 2

State with reason the behaviour of the magnet when the switch S is closed. (2 mks)

7. Figure 3 shows a cell of e.m.f 1.5V connected with an ammeter, a  $1.5\Omega$  resistor a  $1\Omega$  and switch. A voltmeter is connected across the cell.

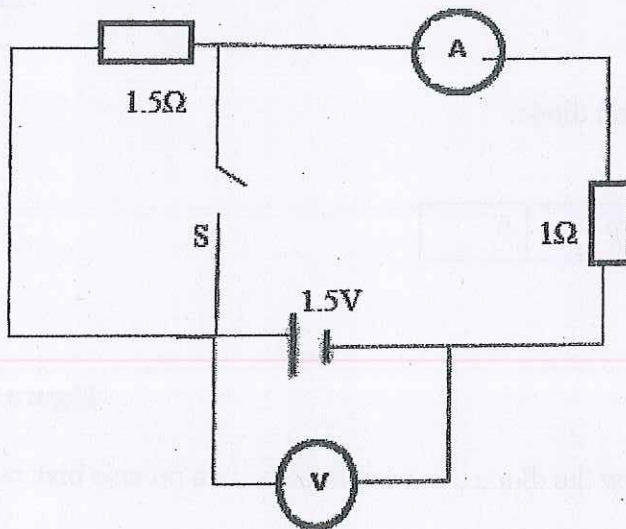


Figure 3

With the switch open, the voltmeter reads 1.25V. Given that the internal resistance of the cell is  $0.5\Omega$ , determine the ammeter reading when switch S is closed. (3 marks)

8. Water waves pass a point in a swimming pool at the rate of 30 crests per 60 seconds. One of the crests was observed to take 2 seconds to travel between 2 points, 6m apart. Determine the wavelength of the water waves. (3 marks)

9. The figure 4 below shows a cathode ray beam entering a magnetic field, perpendicular to the plane of the paper complete the diagram to show the path of the beam in the field. (1 mark)

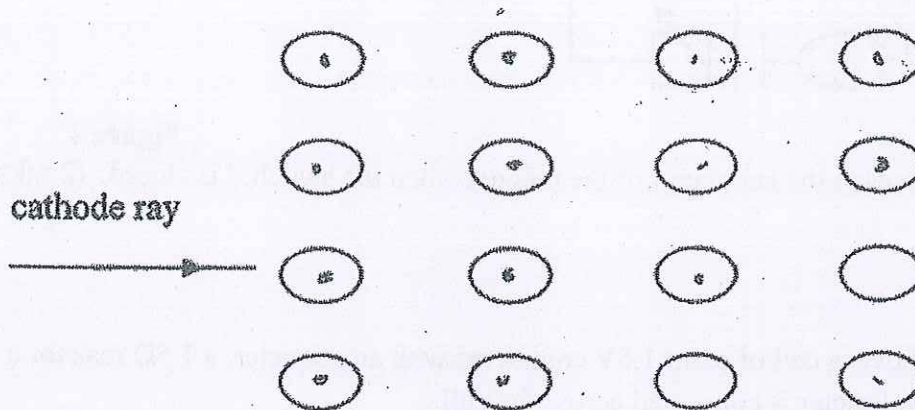


Figure 4

10. The figure 5 below shows a junction diode.

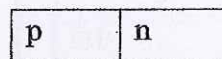


Figure 5

Complete the diagram to show how the diode can be connected in a reverse bias mode. (1 mark)

11. An electric heater rated 240V, 3000W is to be connected to a 240V mains supply, through a 10A fuse. Determine whether the fuse is suitable or not. (3 marks)

12. Two heating coils A and B connected in parallel in a circuit produces power of 36W and 54W respectively. Calculate the ratio of their resistance. (2 marks)

13. The figure 6 below show a conductor carrying electric current place between two magnetic poles.

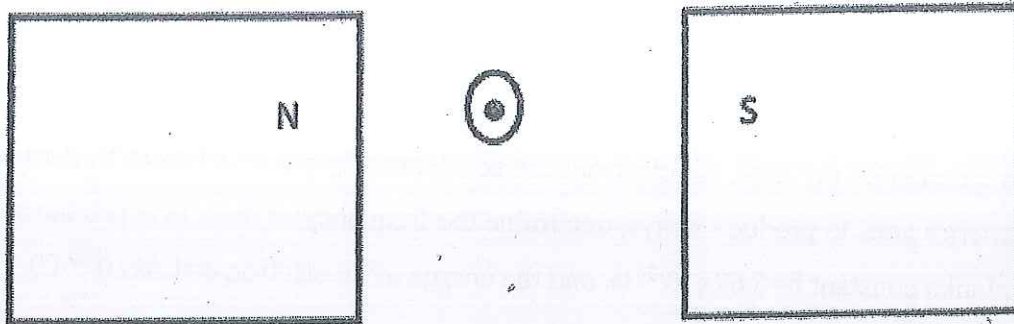


Figure 6

Complete the diagram by sketching the magnetic field and also show the direction of the force on the conductor. (2 marks)

**SECTION B (55 MARKS)**

14. (a) Figure 7 shows parts of a simple x-ray tube.

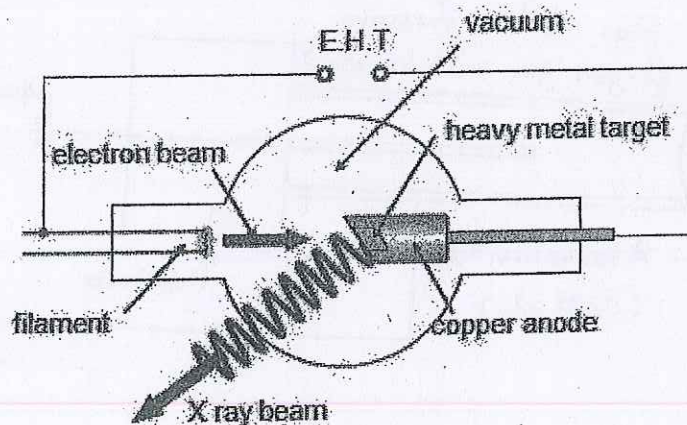


Figure 7

- (i) Explain how the beam of x-ray is produced. (3 marks)
  
- (ii) State how the current and voltage from the Extra High Tension (E.H.T) source can be used to:
  - (I) Increase the intensity of x-ray beam produced. (1 mark)

(II) Decrease the strength of the x-ray beam produced

(1 mark)

(iii) Tungsten is an example of element used as metal target. State the property that enables it to be used as a target. (1 marks)

b) In a certain X ray tube, the electrons are accelerated by a p.d of 12000 V. Assuming that all the energy goes to produce x rays, determine the frequency of the x rays produced (take planks constant  $h=6.62 \times 10^{-34} \text{ Js}$ , and the charge of an electron  $e=1.6 \times 10^{-19} \text{ C}$ ) (3marks)

15. (a) The figure 8 below shows a diagram of a Geiger Muller tube connected to a power supply and a pulse counter.

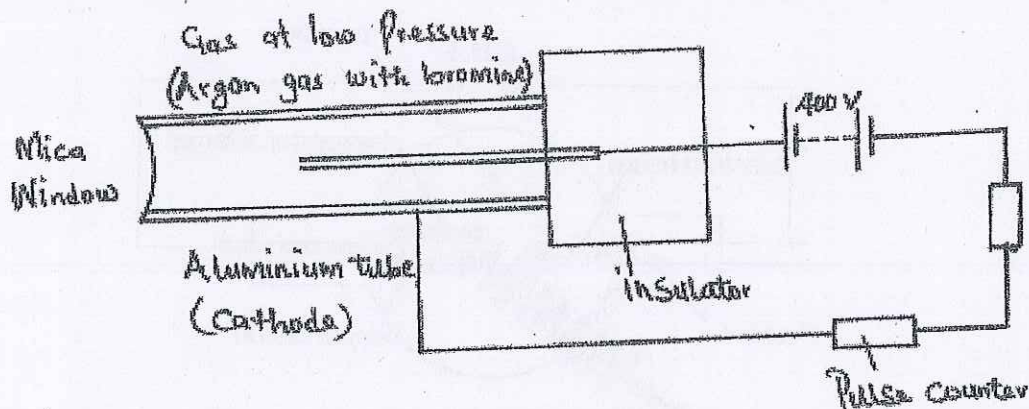


Figure 8

(i) State why should the argon gas be at low pressure. (1mark)

(1mark)

(ii) State the purpose of the bromine gas in the tube. (1mark)

(1mark)

(iii) Suggest one way of increasing the sensitivity of the tube

(1 mark)

(iv) Find the value of a and b in the following equation.

(2 marks)

$${}_{92}^{234}\text{U} \rightarrow {}_b^a\text{X} + 2\alpha$$

a.....b.....

b) The figure 9 below shows a PN junction diode used in a rectifier.

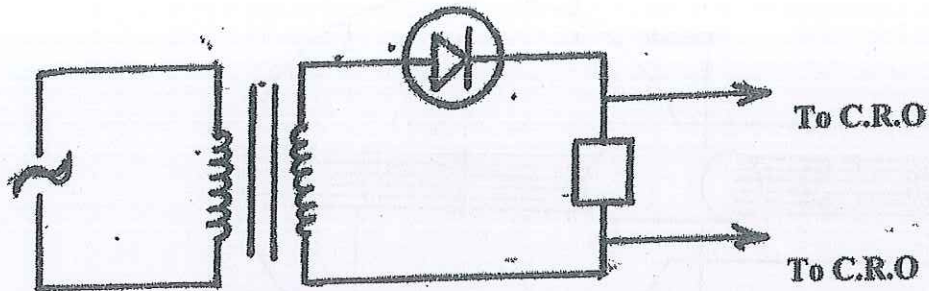


Figure 9

i) Describe how the rectification is achieved

(3 marks)

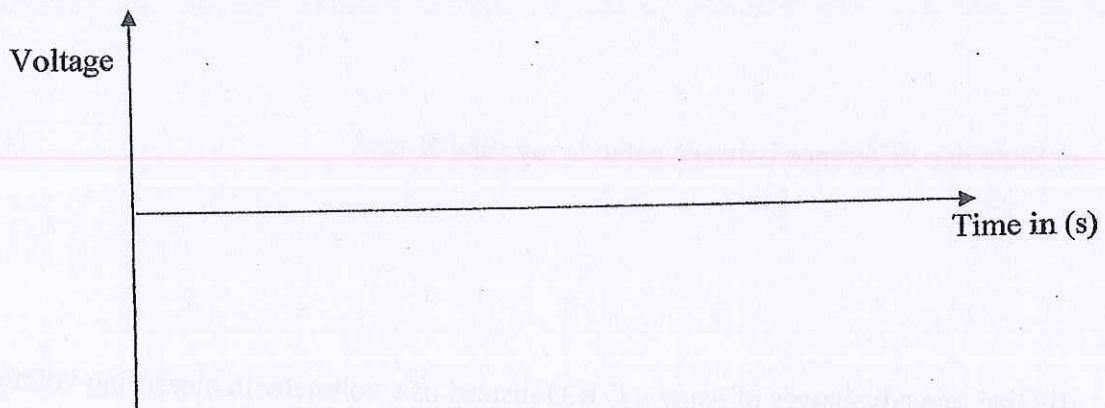
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ii) In the space provided below, sketch the output signal displayed on the CRO during the rectification process. (1 mark)



16. The figure 10 below shows a cathode ray tube

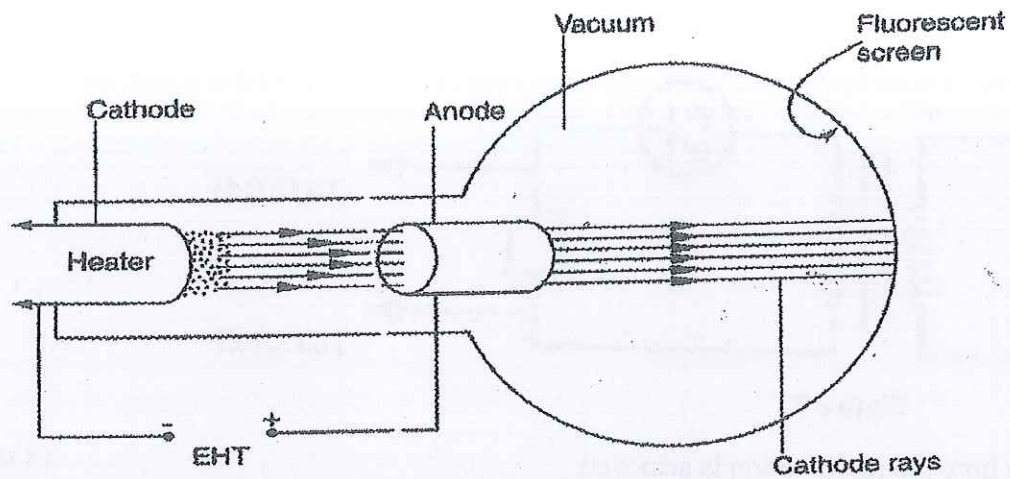


Figure 10

- a) State how the intensity of the fluorescence on the screen can be increased. (1 mark)
- b) State the effect of having air in the tube instead of a vacuum (2 marks)
- c) State one difference between cathode rays and X-rays (1 mark)
- d) Give one advantages of using a C.R.O instead of a voltmeter in measuring voltages (1 mark)



g) The figure 11 below shows an a.c. voltage. If the Y-gain control reads 10V/cm and the time base reads 5 milliseconds/cm

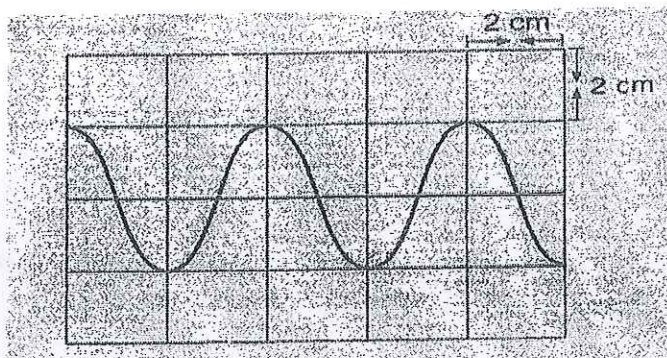


Figure 11

Calculate:

i) The frequency of the alternating voltage (2 marks)

ii) Peak to peak voltage of the alternating voltage (2 marks)

17. (a)(i) It is observed that when ultra-violet radiation is directed onto a clean zinc plate connected to the cap of a negatively charged leaf electroscope, the leaf falls. Explain this observation (2 marks)

(ii) Explain why the leaf of the electroscope does not fall when infra-red radiation is directed onto the zinc plate (1 mark)

b) State the effect on the electrons emitted by the photoelectric effect when:

(i) The intensity of incident radiation is increased (1 mark)

(ii) The frequency of the incident radiation is increased

(1 mark)

c) Light of wavelength  $4.3 \times 10^{-7} \text{m}$  is incident on two different metal surfaces, nickel and potassium. (Take speed of light as  $3.0 \times 10^8 \text{ms}^{-1}$  and planks constant  $h$  as  $6.63 \times 10^{-34} \text{Js}$ ).

(i) Determine the energy of the incident radiation.

(2 marks)

(ii) If the work function of nickel is  $8.0 \times 10^{-19} \text{J}$  and that of potassium is  $3.68 \times 10^{-19} \text{J}$ , state with a reason from which of the two metals the given light will eject electrons.  
(2 marks)

(iii) Determine the velocity of the emitted electrons from the metal surface in b(ii).

(Take the mass of an electron as  $9.1 \times 10^{-31} \text{kg}$ ).

(3 marks)

18. a) i) State the meaning of the term critical angle as applied in refraction of light. (1 mark)

ii) The figure 12 shows a ray of light incident on a glass-air interface.

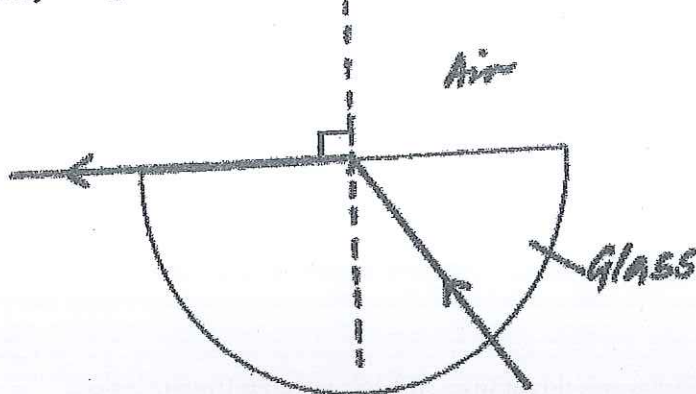


Figure 12

- (I) Show on the diagram the critical angle,  $c$ . (1 mark)
- II) Given that the refractive index of the glass is  $n_g$ , and that the critical angle  $c = 42^\circ$ , determine the value of  $n_g$ . (3 marks)

- (b) The figure 13 shows an experimental set up consisting of a mounted convex lens  $L$ , cardboard screen with cross-wires at the centre, a plane mirror, a metre rule and a candle.

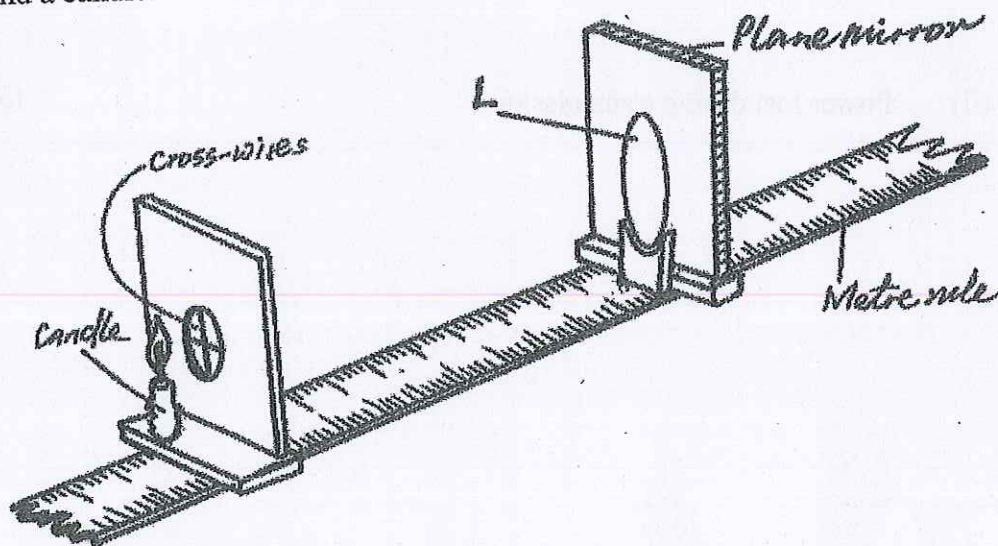


Figure 13

Describe how the set-up may be used to determine the focal length,  $f$ , of the lens.  
(4 marks)

19. a) State one advantage of high voltage transmission. (1mark)

(b) A generator produces 150kw at a voltage of 5kV. The voltage is stepped up to 60kV and transmitted through cables of resistance  $15\Omega$  to a step-down transformer in a substation. If both transformers are 80% efficient, calculate the:

(i) Current through the transmission cables. (3marks)

(ii) Power lost during transmission. (3marks)