



232/2 –

**PHYSICS**

– Paper 2

Nov. 2017 – 2 hours

Name ..... Index Number .....

Candidate's Signature ..... Date .....

**Instructions to candidates**

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of examination in the spaces provided above.
- (c) This paper consists of **two** sections: **A** and **B**.
- (d) Answer **all** the questions in sections **A** and **B** in the spaces provided.
- (e) All working **must** be clearly shown in the spaces provided in this booklet.
- (f) Non programmable silent electronic calculators may be used.
- (g) **This paper consists of 12 printed pages.**
- (h) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
- (i) **Candidates should answer the questions in English.**

**For Examiner's Use Only**

Section	Question	Maximum Score	Candidate's Score
A	1–14	25	
B	15	10	
	16	13	
	17	10	
	18	11	
	19	11	
Total Score		80	



**SECTION A: (25 marks)**

*Answer all the questions in this section in the spaces provided.*

1. State any **two** uses of microwaves. (2 marks)

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2. In a laboratory there are four metals – *tin, nickel, copper and cobalt*. Of these metals, name the metals that are;

(a) magnetic, (1 mark)

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(b) non-magnetic. (1 mark)

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3. State **one** use of echoes. (1 mark)

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4. State what is meant by *polarisation* in simple cells. (1 mark)

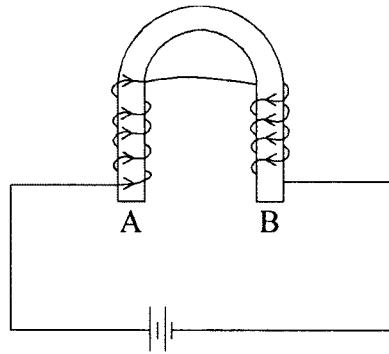
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5. State **two** advantages of using convex mirrors to monitor movements in a large supermarket. (2 marks)

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6. **Figure 1** shows an insulated wire wound on a U-shaped iron core connected to a battery.



**Figure 1**

Determine the polarity of A. (1 mark)

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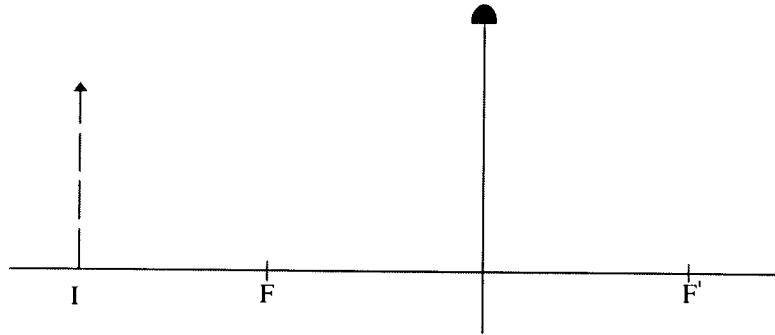
7. Explain how the *greenhouse* gets warm. (2 marks)

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8. Draw a circuit diagram to show a *p-n* junction diode in the forward biased mode. (1 mark)



9. **Figure 2** shows a virtual image I formed by a convex lens.



**Figure 2**

Draw a ray diagram to locate the object. (3 marks)

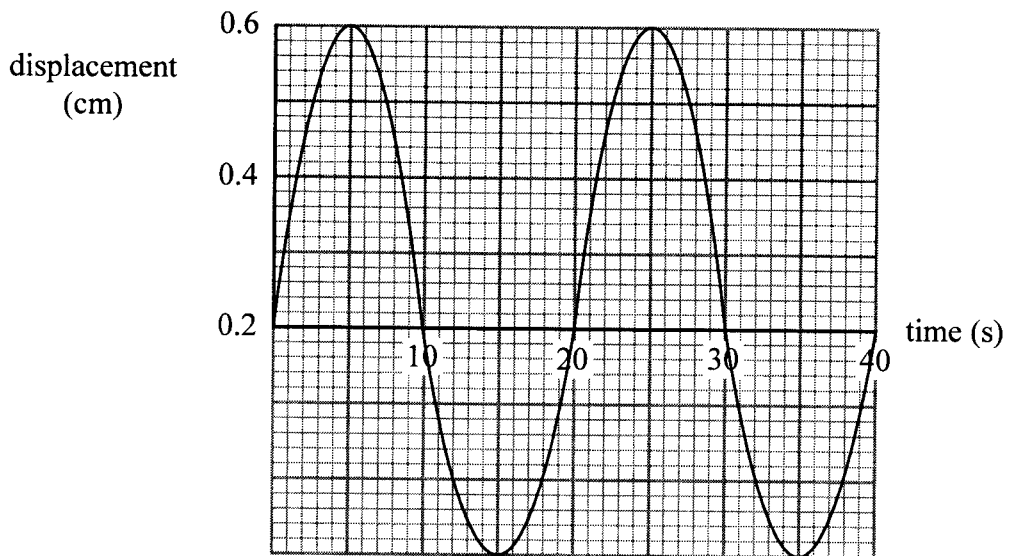
10. Write an equation to show how an element  ${}^A_Z X$  decay to element Y by emitting a beta particle. (1 mark)

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11. Explain what is observed when an uncharged sphere is brought close to a positively charged electroscope. (3 marks)

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12. **Figure 3** shows a transverse wave.



**Figure 3**



Determine the frequency of the wave. (2 marks)

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13. Figure 4 shows three resistors connected in series.

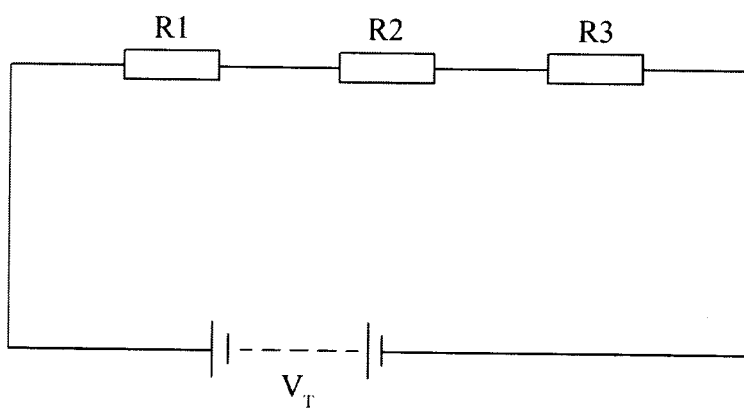


Figure 4

Using Ohm's law, show that the effective resistance is given by the expression:

$RT = R1 + R2 + R3$  (3 marks)

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14. State how heating is achieved in a resistance wire. (1 mark)

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**SECTION B: (55 marks)**

*Answer all the questions in this section in the spaces provided.*

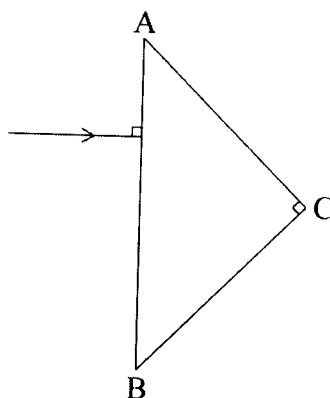
15. (a) **Figure 5** shows the interface between glass and air.



**Figure 5**

Draw on the figure a ray diagram to illustrate the critical angle. (3 marks)

- (b) **Figure 6** shows a ray of light incident at right angles to face AB of a right angled glass prism of refractive index 1.62.



**Figure 6**

- (i) Determine the critical angle of the material. (3 marks)

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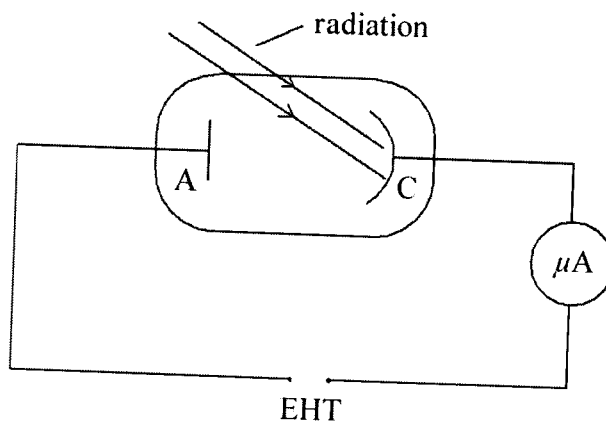
- (ii) Complete the ray diagram to show the path of light until it leaves the prism. (2 marks)

- (c) State any **two** applications of prisms. (2 marks)

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16. (a) **Figure 7** shows a set up that may be used to observe photoelectric effect. A radiation is incident on the cathode. It is observed that the microammeter registers a current.



**Figure 7**

- (i) Explain how the current is produced. (2 marks)
- .....
- .....
- .....
- (ii) State with a reason what must be done for a higher current to be registered. (2 marks)
- .....
- .....
- .....
- (iii) It was observed that for a certain incident radiation, no current was registered. Explain this observation. (2 marks)
- .....
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- .....
- .....



- (b) A monochromatic light of wavelength  $4.50 \times 10^{-7}$  m is incident on a metal surface of threshold frequency  $5.5 \times 10^{14}$  Hz. (Speed of light  $c$  is  $3.0 \times 10^8$  ms<sup>-1</sup> and planks constant  $h$  is  $6.63 \times 10^{-34}$  Js).

Determine

- (i) the work function of the metal surface, (3 marks)

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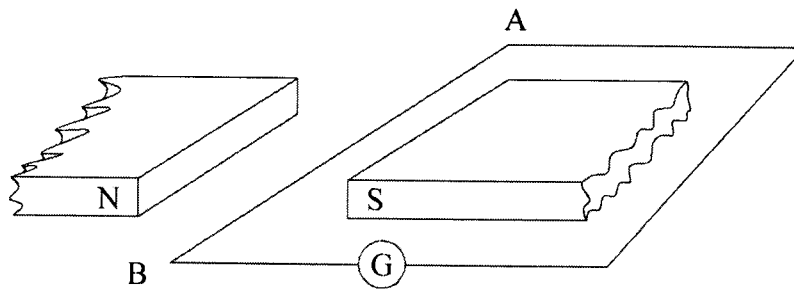
- (ii) average kinetic energy of the emitted photoelectrons. (4 marks)

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17. (a) **Figure 8** shows a conductor AB connected to a galvanometer and placed between two permanent magnets.



**Figure 8**

- (i) Conductor AB is moved perpendicular to the magnetic field. State and explain the observation made on the galvanometer. (3 marks)

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- (ii) State the effect of moving the conductor faster. (1 mark)

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- (b) A transformer is used to step down 240 V to 12 V for use in an electric appliance operating at 0.5 A. If the primary coil has 600 turns, determine the;

- (i) number of turns in the secondary coil, (3 marks)

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- (ii) current in the primary coil. (3 marks)

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18. (a) State **two** factors that affect the capacitance of a parallel plate capacitor. (2 marks)

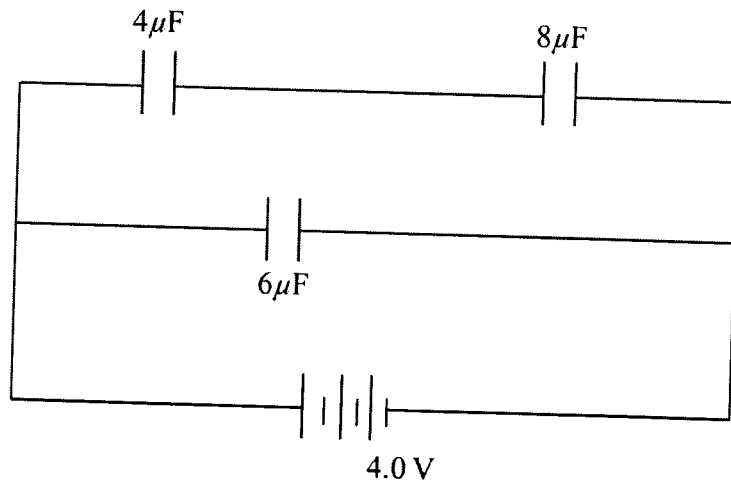
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- (b) **Figure 9** shows an electric circuit in which three capacitors are connected across a power supply. (2 marks)



**Figure 9**

Determine the;

- (i) total capacitance, (4 marks)

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- (ii) quantity of charge stored on the  $8\mu\text{F}$  capacitor. (3 marks)

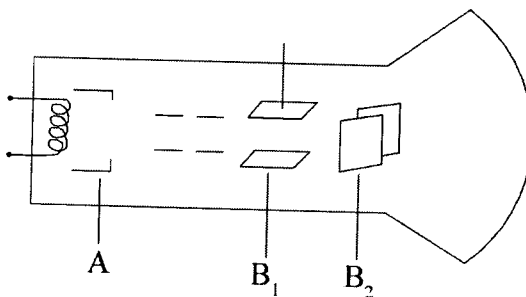
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19. (a) **Figure 10** shows a block diagram of a cathode ray oscilloscope (CRO).



**Figure 10**

- (i) State the names of the parts labelled  $B_1$  and  $B_2$ . (2 marks)

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- (ii) State and explain the function of the part marked A. (3 marks)

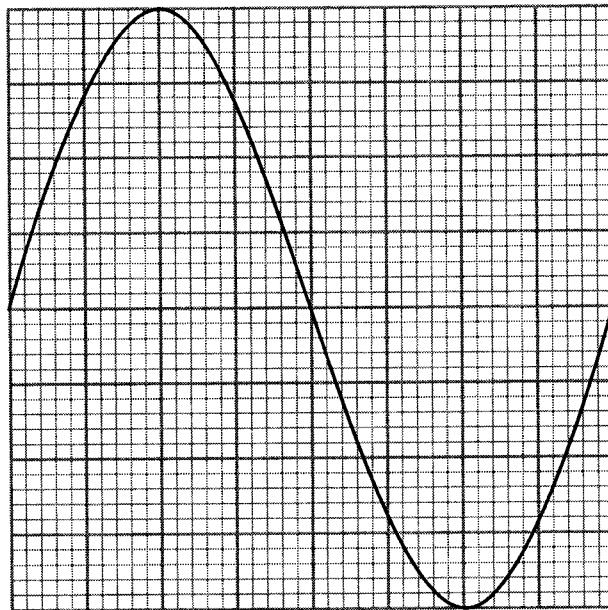
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- (b) **Figure 11** shows a trace of a signal observed on the screen of a CRO. The time-base setting is  $20 \text{ mscm}^{-1}$ .



**Figure 11**

Determine the frequency of the signal. (4 marks)

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- (c) Explain why tungsten is used as a target in an x-ray tube. (2 marks)

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