3.6.2 Physics Paper 2 (232/2)

SECTION A: (25 marks)

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

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

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)
   (b) non-magnetic. (1 mark)

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

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

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

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

![Figure 1](image)

Determine the polarity of A. (1 mark)

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

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](image)

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)

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

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

![Figure 3](image)

Determine the frequency of the wave. (2 marks)
13. **Figure 4** shows three resistors connected in series.

![Figure 4](image)

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

\[ R_T = R_1 + R_2 + R_3 \]

(3 marks)

14. State how heating is achieved in a resistance wire.

(1 mark)

**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](image)

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)

(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)

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)
(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 $3.0 \times 10^8$ m/s and plank’s constant h is $6.63 \times 10^{-34}$Js*).

Determine

(i) the work function of the metal surface, \hspace{1.0cm} (3 marks)

(ii) average kinetic energy of the emergent photoelectrons. \hspace{1.0cm} (4 marks)

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

![Figure 8](image.jpg)

(i) Conductor AB is moved perpendicular to the magnetic field. State and explain the observation made on the galvanometer. \hspace{1.0cm} (3 marks)

(ii) State the effect of moving the conductor faster. \hspace{1.0cm} (1 mark)

(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, \hspace{1.0cm} (3 marks)

(ii) current in the primary coil. \hspace{1.0cm} (3 marks)

18. (a) State two factors that affect the capacitance of a parallel plate capacitor. \hspace{1.0cm} (2 marks)
(b) **Figure 9** shows an electric circuit in which three capacitors are connected across a power supply. (2 marks)

![Circuit Diagram]

**Figure 9**

Determine the:

(i) total capacitance, (4 marks)

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

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

![Block Diagram]

**Figure 10**

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

(ii) State and explain the function of the part marked A. (3 marks)
(b) **Figure 11** shows a trace of a signal observed on the screen of a CRO. The time-base setting is 20 mscm⁻¹.

![Figure 11](chart)

Determine the frequency of the signal. (4 marks)

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