

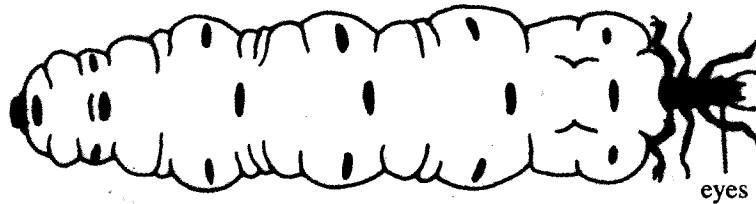
**29.7 GENERAL SCIENCE (237)**

**29.7.1 General Science Paper 1 (237/1)**

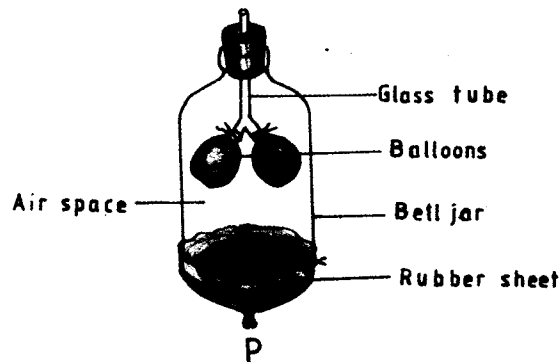
**SECTION A: BIOLOGY (34 marks)**

*Answer all the questions in the spaces provided.*

- 1 State **three** functions of human blood. (3 marks)
- 2 (a) State the role of light in the process of photosynthesis. (1 mark)  
(b) Name the end product of dark reaction in photosynthesis that gives positive result with Benedict's solution. (1 mark)  
(c) How is the human molar tooth adapted to its functions? (1 mark)
- 3 The diagram below represents a certain organism.

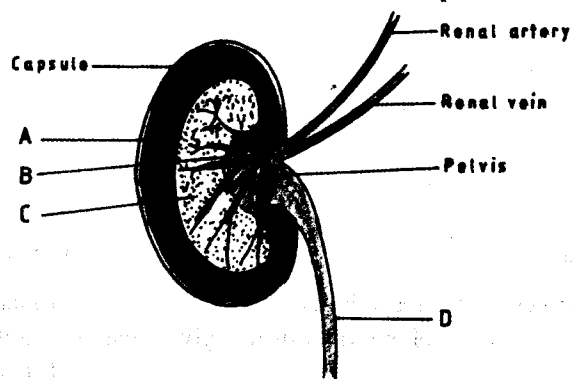


- (a) Name the phylum and class to which the organism belongs. (2 marks)  
Phylum .....
- Class .....
- (b) Give **two** end products of aerobic respiration in animals. (2 marks)
- 4 (a) Name **two** diseases of the liver. (2 marks)  
(b) What is the importance of homeostasis in mammals? (1 mark)
- 5 The diagram below represents a model often used to illustrate a process in human beings.



What would happen if the rubber sheet was pulled down at the point labelled P? (3 marks)

6 The diagram below represents a vertical section of a mammalian organ.



(a) Name the parts labelled A, B and C. (3 marks)

A .....

B .....

C .....

(b) Which organ does the part labelled D lead to? (1 mark)

7 (a) State the importance of biology to humans. (1 mark)

(b) State **one** function of each of the following substances in the human body. (3 marks)

(i) Proteins .....

(ii) Vitamins .....

(iii) Water .....

8 (a) Name **three** structures of a human cheek cell that can be seen under the low power of a light microscope. (3 marks)

(b) Work out the magnification of a specimen seen under a light microscope with an eye-piece lens x 10 and objective lens x 40. (1 mark)

9 Explain what would happen if the epidermal cells of an onion leaf were placed in sodium chloride solution and left for ten minutes. (3 marks)

10 (a) Name **two** materials that are translocated in plants. (2 marks)

(b) What is meant by the term transpiration? (1 mark)

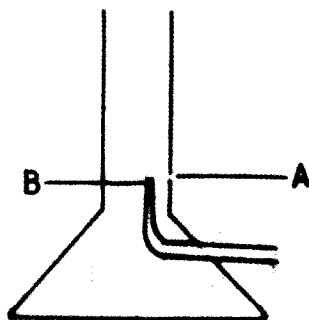
### SECTION B - CHEMISTRY (33 marks)

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

11 Describe how crystals of sodium sulphate can be obtained from a solid mixture of sodium sulphate and lead (II) sulphate.

(3 marks)

- 12 The diagram below represents a Bunsen burner.



Name the parts labelled:

- (i) A ..... (1 mark)
- (ii) B ..... (1 mark)

- 13 The table below shows  $P^H$  values of solutions C, D, E and F.

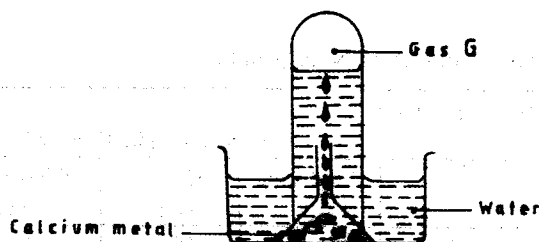
Solution	C	D	E	F
$P^H$ value	10	5	7	13

Select the solution which when reacted with F would produce salt and water. Give a reason. (2 marks)

- 14 Magnesium burns in air with a bright flame.

- (a) State another observation made when magnesium burns in air. (1 mark)
- (b) Write the equation for the reaction that occurs. (1 mark)

- 15 The diagram below represents the set up that was used to prepare and collect gas G.



- (a) Give one property of gas G that enables it to be collected as shown. (1 mark)
- (b) Write the equation for the reaction that produced gas G. (1 mark)
- (c) Give one use of gas G (1 mark)

- 16 The table below gives information about atoms of H, J, K, L and M. Use it to answer the questions that follow:

Atom	Number of Protons	Number of electrons	Number of neutrons
H	5	5	6
J	8	8	10
K	10	10	12
L	8	8	8
M	12	12	12

- (a) Select an atom:
- (i) of an element in group 8 of the periodic table; (1 mark)
- (ii) whose mass is 11. (1 mark)
- (b) Select atoms which represent isotopes of an element. Give a reason. (2 marks)
- 17 (a) Give the general name of the elements in group 7 of the periodic table. (1 mark)
- (b) Below is a representation of trends in atomic radius across a period and down a group.

Trend 1



Trend 2



Which trend represents a period? Explain why the trend chosen occurs.

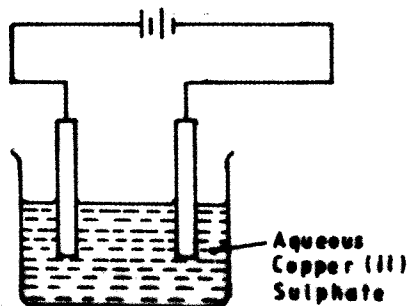
(3 marks)

- 18 The table below gives information about substances N, P, Q and R.

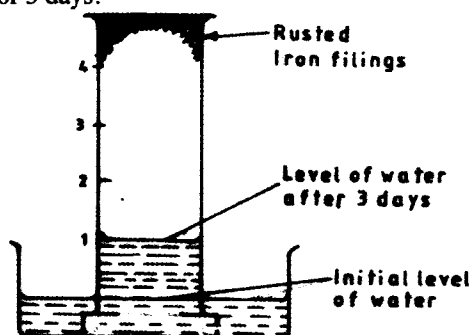
Substance	Melting point (°C)	Boiling point (°C)	Electrical conductivity when		
			Solid state	Molten state	Dissolved in water
N	-115	-85	Poor	Poor	Good
P	801	1467	Poor	Good	Good
Q	98	890	Good	Good	Good
R	-117	78.5	Poor	Poor	Poor

- (a) Select a substance that is likely to be hydrogen chloride. (1 mark)
- (b) Which letter represents a substance that is likely to have:
- (i) metallic bonding; (1 mark)
- (ii) ionic bonding? (1 mark)

- 19 The diagram below represents a set up that was used to show the effect of an electric current on aqueous Copper (II) Sulphate using carbon electrodes.



- (a) On the diagram, label the cathode. (1 mark)
- (b) State and explain the observation made at the anode. (2 marks)
- 20 (a) What is meant by hardness in water? (1 mark)
- (b) A Form IV class discovered that after boiling water in a “Sufuria” for a long time a white deposit forms on the “Sufuria”.
- (i) Write the formula of the compound responsible for the white deposit. (1 mark)
- (ii) Give one disadvantage of the white deposit on the “Sufuria”. (1 mark)
- (b) How would one ensure that the only product formed is iron (III) chloride? (1 mark)
- 22 The diagram below shows the results obtained when wet iron filings in a gas jar inverted over water were left standing for 3 days.



Given that the wet iron filings were in excess, what would be the effect of leaving the set up to stand for a further 3 days? (1 mark)

### SECTION C - PHYSICS (33 marks)

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

- 23 When thirty(30) drops of a liquid were released from a burette, the liquid level changed from the 25 ml mark to the 40 ml mark. Determine the volume of each drop. (2 marks)
- 24 A measuring cylinder contained 19.00 cm<sup>3</sup> of water. After some iron nails of mass 48 g were submerged into the water, the total volume was 25.0 was cm<sup>3</sup>. Determine the density of iron. (3 marks)
- 25 A uniform metre rule pivoted at the 30 cm mark, was balanced by a weight of 2 N suspended from the 5 cm mark. Determine the mass of the metre rule. (take  $g = 10\text{N/kg}$ ) (3 marks)

26 A student, looking through a microscope focussed on smoke in an illuminated smoke cell, observed bright specks moving in random motion. Explain why the specks moved this way. (2 marks)

27 A bimetallic strip is made by riveting together two strips of different metals E and F. When hot, the strip is straight as shown in figure 1a. When it is allowed to cool to room temperature, the strip bends as shown in figure 1b.

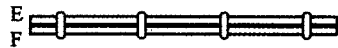


Figure 1 (a)

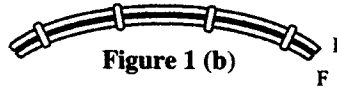


Figure 1 (b)

Explain the cause of the bending.

(2 marks)

28 Figure 2, shows a paper windmill on a vertical axis and a candle placed below.

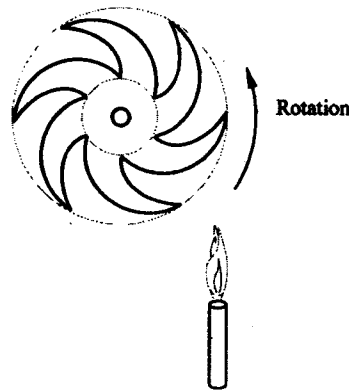


Figure 2

State with a reason what happens to the paper windmill when the candle is lit.

(2 marks)

29 (a) Figure 3, shows a pin being pushed into a block of wood using a thumb.

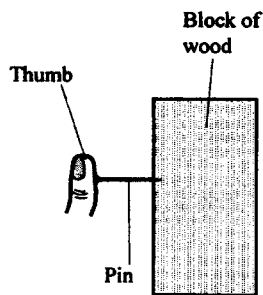
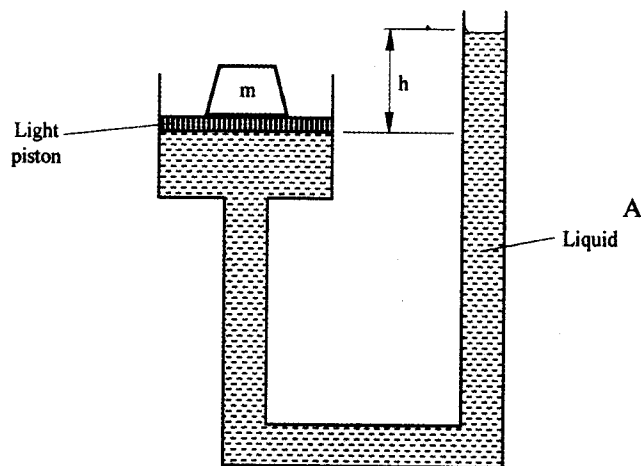


Figure 3

Explain why the pin penetrates the wood and not the thumb.

(2 marks)

- (b) **Figure 4**, shows a mass  $m$  balanced on a light piston by a column  $h$  of liquid A.



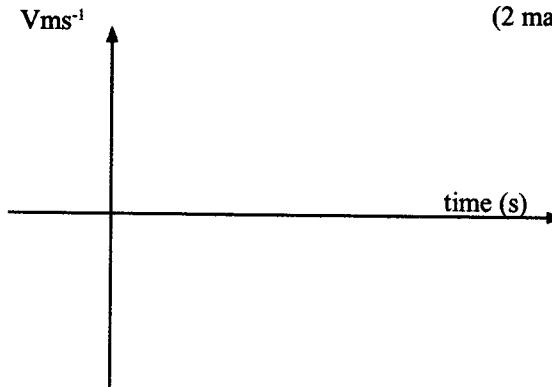
**Figure 4**

When the liquid was replaced by another liquid B, the value of  $h$  increased while the position of  $m$  remained the same. State the reason why liquid B must have a lower density than liquid A. (1 mark)

- 30 A thin copper wire was stretched by loading it with increasing forces and the extension in millimeters measured. The results obtained are shown in the table below.

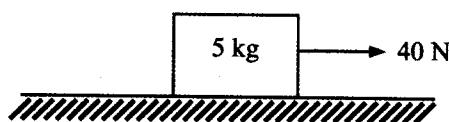
Force (N)	0	5	10	15	20	25
Extension (mm)	0	0.6	1.2	L	2.4	4.2

- (a) Determine the value of L in the table. (1 mark)
- (b) State with a reason what is observed on the length of the wire when all the weights are removed. (2 marks)
- 31 A ball was projected vertically upwards. On the axes in **figure 5**, sketch a graph of velocity against time during its flight. (2 marks)



**Figure 5**

- 32 **Figure 6**, shows a force of 40N acting on a body of mass 5 kg. The frictional force on the body is 5N.

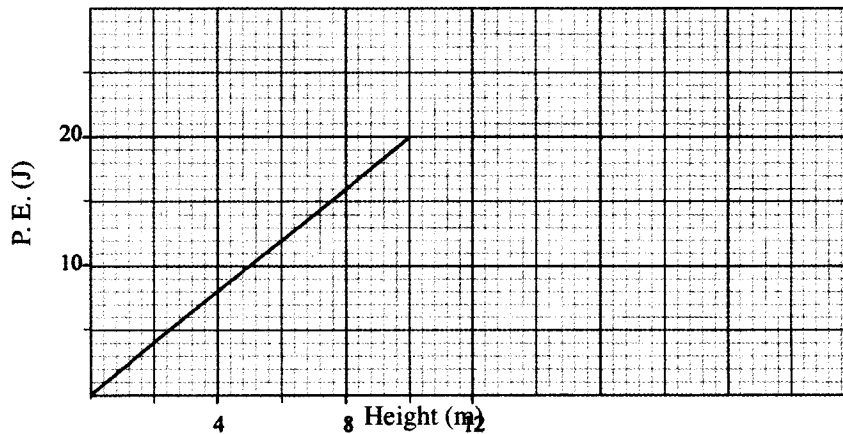


**Figure 6**

Determine the acceleration of the body.

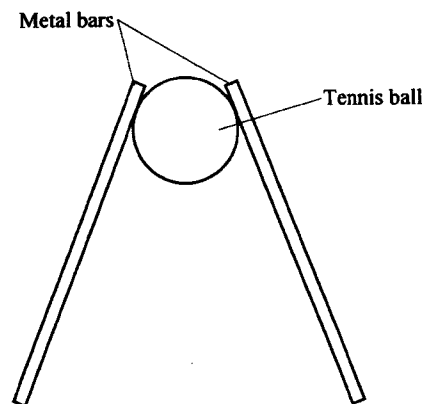
(3 marks)

- 33 The graph in **figure 7**, shows how the potential energy of a ball varies with the height of the ball above the ground, when it is thrown vertically upwards.



**Figure 7**

- (a) Use the graph to:
- find the greatest height reached; (1 mark)
  - calculate the mass of the ball. (2 marks)
- (b) State the kinetic energy of the ball at the highest point. (1 mark)
- 34 A cube of wood of weight 6000 N floats on water. State with a reason the weight of the water displaced. (2 marks)
- 35 (a) **Figure 8**, shows a light tennis ball attached to two identical metal bars. Mark with X the approximate position of the centre of gravity of the set up. (1 mark)



**Figure 8**

- (b) A certain model of a lorry has its centre of gravity 1.5 m above the ground. State how the model can be improved to increase its stability with the centre of gravity remaining at the same height. (1 mark)



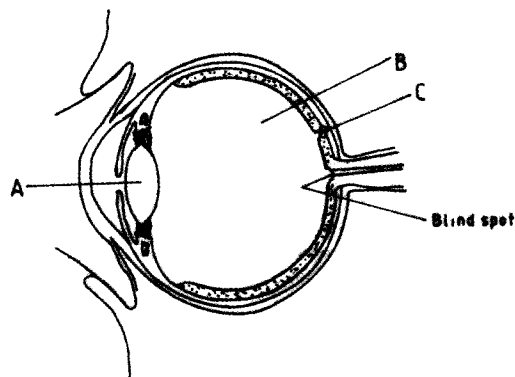
## 29.7.2 General Science Paper 2 (237/2)

### SECTION A: BIOLOGY (34 marks)

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

- 1 (a) State **one** survival value of positive phototropism to a plant. (1 mark)
- (b) State **two** functions of the human ear. (2 marks)
- 2 (a) What is meant by the term community as used in biology? (1 mark)
- (b) Explain how the following adaptations reduce transpiration in xerophytes.
- (i) Sunken stomata: (2 marks)
- (ii) Thick cuticle. (1 mark)
- 3 (a) State the conditions necessary for germination. (3 marks)
- (b) Distinguish between complete metamorphosis and incomplete metamorphosis. (2 marks)
- 4 State the method of transmission for each of the following diseases:
- (a) cholera; (1 mark)
- (b) malaria. (1 marks)
- 5 Explain the term survival of the fittest as used in biology. (2 marks)
- 6 State **three** functions of the human placenta. (3 marks)
- 7 (a) What is meant by the following:
- (i) genetic counselling; (1 mark)
- (ii) genetic engineering. (1 mark)
- (b) In a family of four children, the father has blood group A while the mother has blood group B. One of the children has blood group O. State the genotypes of the:
- (i) father; (1 mark)
- (ii) mother; (1 mark)
- (iii) child with blood group O. (1 mark)
- 8 State **three** ways by which support is important to plants. (3 marks)

9 The diagram below represents a section of the human eye.



(a) Name the parts labelled A and B. (2 marks)

A .....

B .....

(b) What is the importance of the part labelled C in vision? (1 mark)

10 (a) Name **one** hormone secreted by the ovary that controls the menstrual cycle. (1 mark)

(b) State **two** roles of the hormone named in (a) above. (2 marks)

(c) Give **one** difference between mitosis and meiosis. (1 mark)

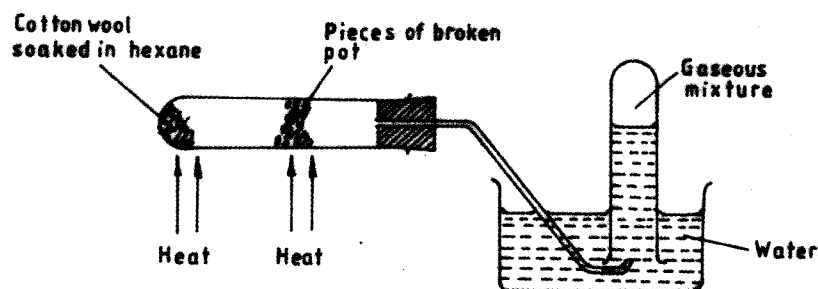
### SECTION B: CHEMISTRY (33 marks)

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

11 (a) State Charles' law. (1 mark)

(b) A given mass of a gas has a volume of  $350\text{cm}^3$  at  $298\text{K}$ .  
What would be its temperature when the volume is increased to  $402.5\text{cm}^3$ . (2 marks)

12 In a laboratory experiment, hexane was heated and passed over strongly heated pieces of broken pot, as shown in the diagram below.

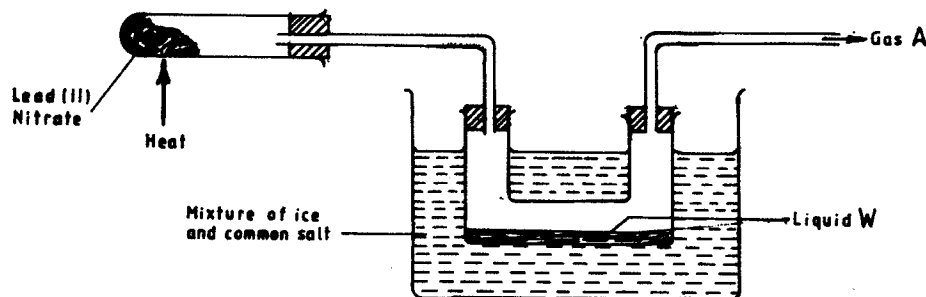


(a) Name the type of reaction which occurred in the heated boiling tube. (1 mark)

(b) Why are the pieces of broken pot used? (1 mark)

(c) One of the products in the gaseous mixture is propane. Draw and name the other product in the mixture. (2 marks)

- 13 (a) Explain why nitrogen (IV) Oxide causes pollution to the environment. (2 marks)
- (b) The figure below represents the set up that was used to prepare nitrogen (IV) Oxide.



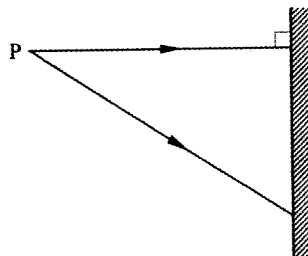
- (i) Write a chemical equation for the above reaction that gives nitrogen (IV) Oxide. (1 mark)
- (ii) What is the role of the mixture of ice and common salt? (1 mark)
- 14 Describe how 1M Sodium Carbonate solution can be prepared. (3 marks)  
(Na = 23.0, C = 12.0, O = 16.0)
- 15 (a) What is meant by molar heat of formation of a substance? (1 mark)
- (b) In the industrial production of ammonia, hydrogen and nitrogen react as shown in the equation below:  
 $3\text{H}_{2(g)} + \text{N}_{2(g)} \rightleftharpoons 2\text{NH}_{3(g)}; \Delta H = -92.4 \text{ kJ}$
- (i) What is the molar heat of formation of ammonia in kilojoules? (1 mark)
- (ii) Explain the effect of increasing the temperature of the reaction, on the yield of ammonia. (2 marks)
- 16 Methane is a fuel. When one mole of methane is burnt in air, 890.4 kJ of energy is released.
- (a) Write an equation for the complete combustion of methane. (1 mark)
- (b) Calculate the energy released when 36g of methane were burnt completely in air. (Relative molecular mass of methane = 16) (2 marks)
- 17 Graphite and diamond are allotropes of carbon.
- (a) What is meant by allotropy? (1 mark)
- (b) Explain why graphite is used in making pencil leads. (1 mark)
- 18 8.4g of magnesium carbonate were reacted with excess dilute hydrochloric acid.
- (a) Write the equation for the reaction. (1 mark)
- (b) Calculate the mass of the gas produced. (Mg = 24.0, C = 12.0, O = 16.0) (3 marks)
- 19 Distinguish between endothermic and exothermic reactions. (2 marks)
- 20 (a) Aluminium metal is extracted from its oxide by the electrolytic method while iron is extracted by reduction method using carbon. Arrange the elements, aluminium, iron and carbon in the order of reactivity starting with the most reactive. (2 marks)

- (b) During the extraction of aluminium by electrolysis, the mass of the anode decreases.  
Give a reason. (1 mark)
- (c) Give **one** reason why aluminium is used in making sauce pans. (1 mark)

**SECTION C: PHYSICS (33 marks)**

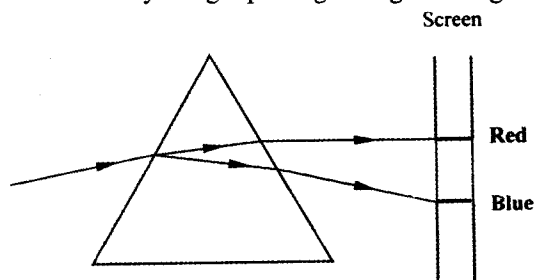
*Answer all the questions in this section in the spaces provided.*

- 21 **Figure 1** shows a pin P placed in front of a plane mirror. Two rays of light are drawn from the pin to the mirror.



**Figure 1**

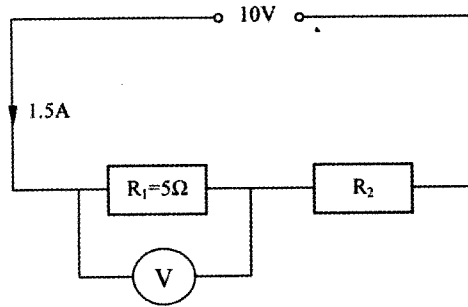
- (a) Show on the diagram the paths followed by the rays after reflection by the mirror. (2 marks)
- (b) Locate the position of the image I formed by the mirror. (1 mark)
- 22 State the nature of the image formed when an object is placed in front of a convex mirror. (1 mark)
- 23 **Figure 2** shows a ray of light passing through a triangular prism to a screen.



**Figure 2**

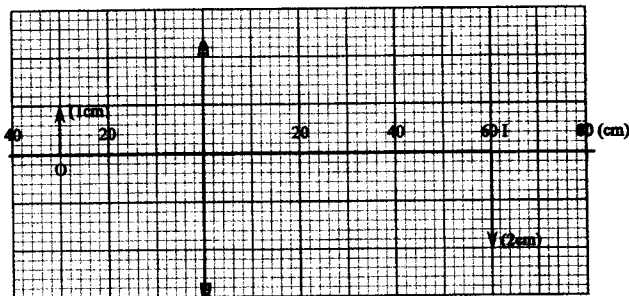
- Explain why the colours are dispersed. (2 marks)
- 24 A wave of frequency 1000Hz travels a distance of 600m in 2 seconds. Determine its wavelength. (3 marks)

- 25 **Figure 3** shows a power supply passing current through two resistors connected in series.



**Figure 3**

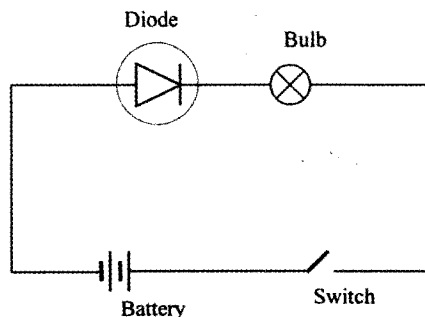
- (a) Calculate the potential difference  $V$  across  $R_1$ . (2 marks)
- (b) Determine the resistance  $R_2$ . (2 marks)
- 26 Name the substance formed at the positive electrode when a lead-acid cell is charged. (1 mark)
- 27 A bar magnet  $YZ$  is suspended freely so that it is able to rotate on a horizontal plane. It turns until end  $Z$  points southwards. Explain how the suspended magnet can be used to identify the north pole of another unmarked magnet. (2 marks)
- 28 State **two** factors which affect the heating of a coil by an electric current. (2 marks)
- 29 State how the penetrating power of the X-rays produced in an X-ray tube can be increased. (1 mark)
- 30 **Figure 4** shows the image  $I$  of the object  $O$  produced by a converging lens.



**Figure 4**

- (a) On the figure, construct a ray diagram to show how the image is formed. (2 marks)
- (b) Use the ray diagram to determine the focal length of the lens. (1 mark)

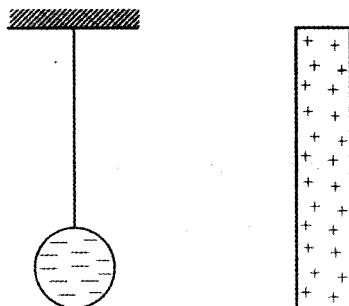
- 31 **Figure 5** shows a P-n-junction diode connected in series with a torch bulb, a switch and a battery.



**Figure 5**

State with reason whether the bulb will light when the switch is closed. (2 marks)

- 32 **Figure 6** shows a negatively charged sphere suspended by an insulating thread. At a distance away from the sphere is a positively charged conductor which has more charge than the sphere. (2 marks)



**Figure 6**

When the conductor is brought near the sphere, the sphere is first attracted to the conductor but after they touch, it is repelled. Explain this observation.

- 33 A student standing between two cliffs claps the hands and hears two echoes one after the other. Explain why the echoes are heard at different times. (2 marks)
- 34 A room uses five bulbs for lighting. Each bulb is rated 240V, 60W. Determine the energy in kWh consumed by the bulbs in 6 hours. (3 marks)
- 35 The count rate of a radio active substance is initially 100 counts per second. Given that the half life of the substance is 150 seconds. Determine the count rate after 300 seconds. (2 marks)