3.7 GENERAL SCIENCE (237)

3.7.1 General Science Paper 1 (237/1)

SECTION A: BIOLOGY (34 marks)

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

1 (a) What is meant by the term botany? (1 mark)

(b) State **two** rules of binomial nomenclature. (2 marks)

2 (a) Give **one** function for each of the following parts of a light microscope: (2 marks)

(i) mirror;
(ii) rotating nose.

(b) Distinguish between a tissue and an organ system. (2 marks)

3 (a) What is meant by active transport? (1 mark)

(b) Give **one** role of each of the following in plant roots: (2 marks)

(i) active transport;
(ii) osmosis.

4 (a) Name the region of the alimentary canal where amino acids are absorbed. (1 mark)

(b) Other than provision of food, state another importance of photosynthesis to animals. (1 mark)

5 (a) State **two** features of the leaf epidermis that allows light to pass through. (2 marks)

(b) What are the functions of the following minerals in the human body? (2 marks)

(i) Iron.

(ii) Calcium.

6 (a) State **two** environmental conditions that contribute to low rate of transpiration in plants. (2 marks)

(b) Give **one** function of each of the following components of blood: (2 marks)

(i) white blood cells;
(ii) platelets.

7 (a) Name the causative agent of whooping cough. (1 mark)

(b) State what happens to the following structures on the chest cavity during inhalation: (2 marks)

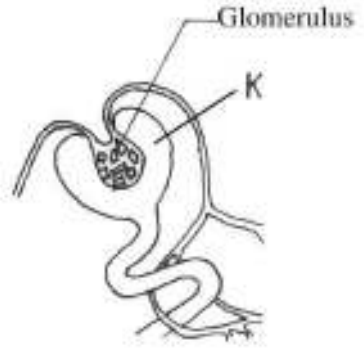
(i) diaphragm;

(ii) rib cage.

8 (a) Name **two** products of anaerobic respiration in plants. (2 marks)

(b) Give **two** adaptations of blood capillaries to their function. (2 marks)

9 The diagram below represents part of a human organ.



(a) Name the structure labelled K. (1 mark)

(b) Explain why contents of K include non excretory substances in a healthy person. (2 marks)

10 (a) Describe how diabetes mellitus occurs. (2 marks)

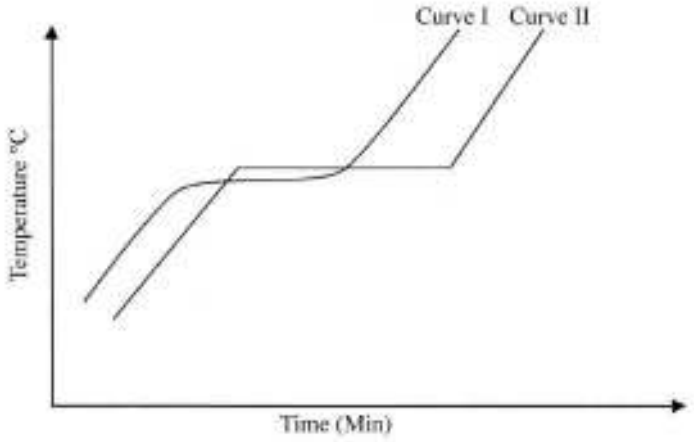
(b) Explain the importance of sweating in regulating human body temperature. (2 marks)

SECTION B: CHEMISTRY (33 Marks)

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

11 A mixture contains ammonium chloride, sodium chloride and sand. Describe how one can separate and recover the substances in the mixture. (3 marks)

12 The curves below were obtained by a student after heating two solid substances.



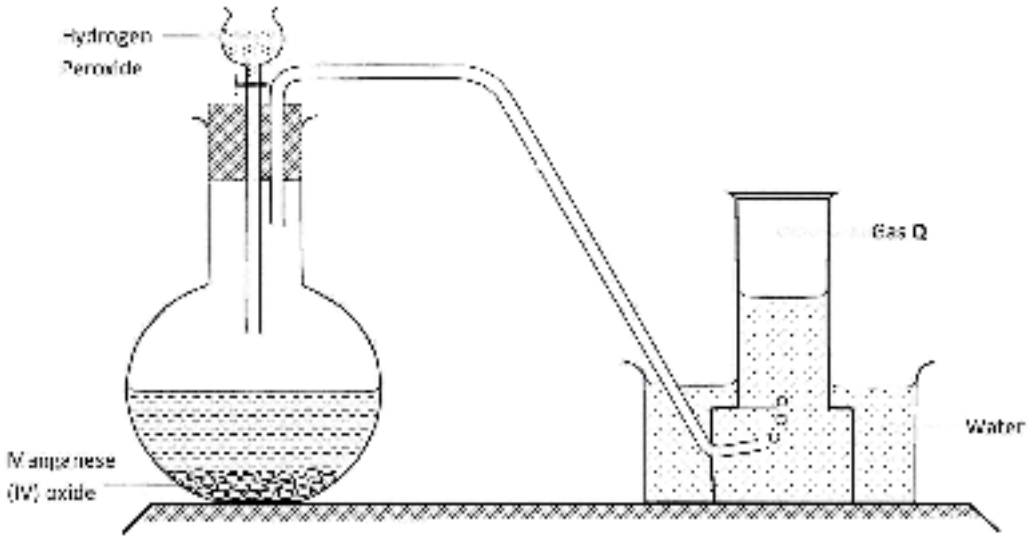
(a) Which curve represents an impure substance? Explain. ($1\frac{1}{2}$ marks)

(b) What property of the substances was used to determine their purity? ($\frac{1}{2}$ marks)

13 (a) Write a word equation for the reaction between dilute hydrochloric acid and calcium hydrogen carbonate. (1 mark)

(b) Name the acid which is commonly used in car batteries. (1 mark)

14 The diagram below shows how gas Q is prepared in the laboratory.

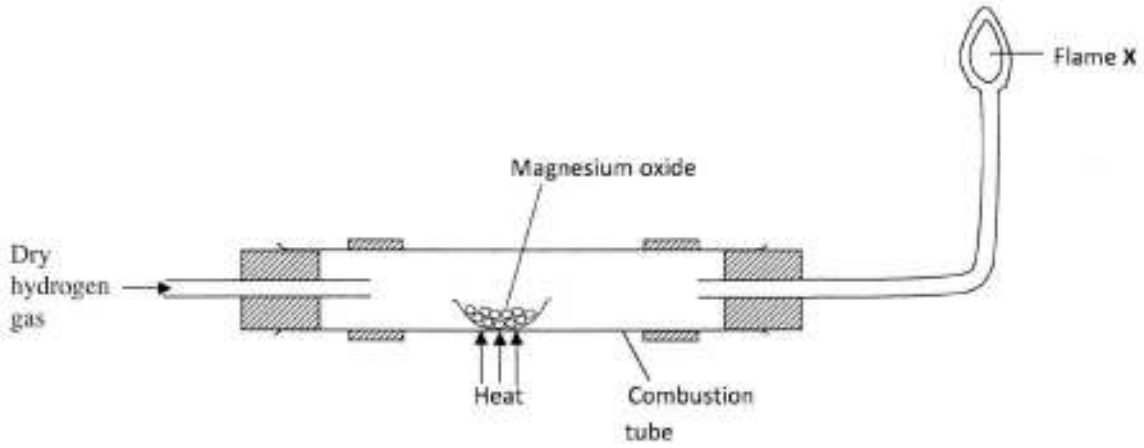


(a) Identify gas Q. (1 mark)

(b) If manganese (IV) oxide was removed, what would be the effect on the reaction progress? Explain. (2 marks)

(c) State **one** property of gas Q that enables it to be collected as shown in the diagram. (1 mark)

15 The diagram below illustrates an experiment where dry hydrogen gas is passed over heated magnesium oxide



(a) State the observation that is made in the combustion tube. (1 mark)

(b) Explain the observation made in (a) above. (1 mark)

(c) What substance burns at flame X? (1 mark)

16 (a) Study the table below and fill in the blank spaces. The letters do not represent the actual symbols of the elements. (3 marks)

Atoms of Elements	Number of Protons	Number of Electrons	Number of Neutrons	Atomic mass
X	-	12	12	-
Y	8	-	8	-
Z	-	8	-	18

(b) Which atoms are isotopes of an element? (1 mark)

17 Acids and bases are categorised as either strong or weak.

(a) What is meant by the term weak acid? (1 mark)

(b) Give **one** example of each of the following:

(i) strong alkali; (1 mark)

(ii) strong acid. (1 mark)

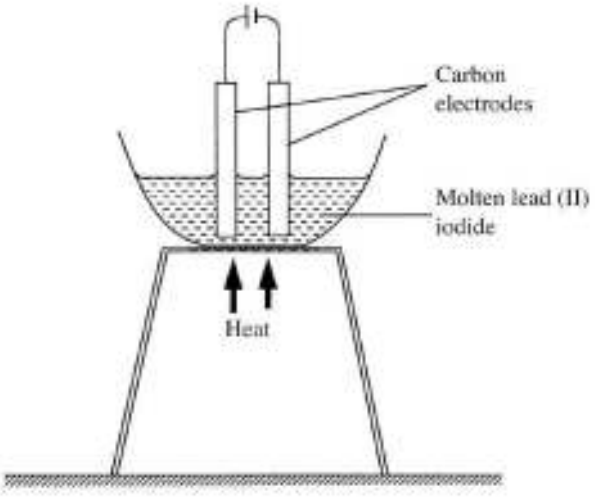
18 The electronic configurations of P and U (not actual symbols of elements) are shown below. Use the information to answer the questions that follow.

P 2.8.2
U 2.6

(a) What type of bond would be formed between P and U? (1 mark)

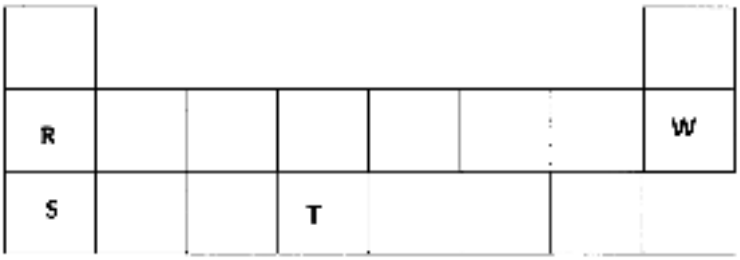
(b) Identify the type of bonds found in ammonium ion (NH_4^+). (2 marks)

19 The diagram below represents a set-up that was used to electrolyse molten lead (II) iodide. Use the diagram to answer the question that follows.



Why was molten lead (II) iodide used instead of solid lead (II) iodide. (2 marks)

20 The table below is a section of the periodic table. Use it to answer the questions that follow. The letters do not represent the actual symbols of the elements.



(a) How do the ionisation energies of R and S compare? Explain. (2 marks)

(b) Write the electronic configuration of **W**. (1 mark)

(c) To which group and period does element **T** belong?

(i) Group ..... ($\frac{1}{2}$ mark)

(ii) Period ..... ($\frac{1}{2}$ mark)

21 (a) A student put lead (II) carbonate and lead (II) nitrate in separate test tubes and performed the tests as shown in the table below. Complete the table by giving the expected observations.

Salt	Adding Water	Heating
Lead (II) carbonate		
Lead (II) nitrate		

(2 marks)

(b) State **one** use of calcium hydroxide. (1 mark)

SECTION C: PHYSICS (33 marks)

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

22 **Figure 1** shows a burette containing some liquid after 8 g of the liquid was drained out. If the level of the liquid was initially at the 10 cm^3 mark, determine the density of the liquid. (3 marks)

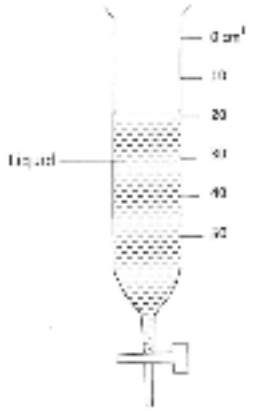


Figure 1

23 When a drop of water is placed on a clean metal surface, it wets the surface. Explain this observation in terms of the forces involved. (3 marks)

24 **Figure 2** shows a simple mercury barometer set up in a physics laboratory.

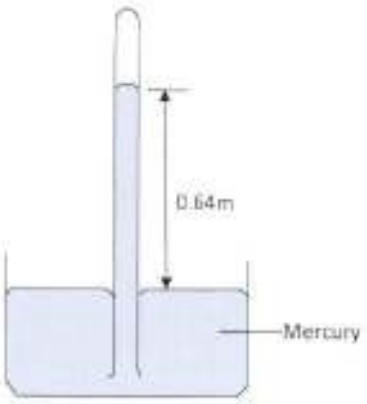


Figure 2

The height of the mercury column is 0.64 m. Given that the density of mercury is 13600 kgm^{-3} and acceleration due to gravity, g is 10 ms^{-2}, determine the atmospheric pressure in Nm^{-2}.

(3 marks)

25 A student in a room observed a beam of sunlight entering into the room from a hole on the roof. The student noted that dust particles illuminated by the beam were moving in random motion. Explain how this motion was caused. (2 marks)

26 **Figure 3** shows a glass container being used to heat a liquid. The wire gauze is placed between the container and the flame.

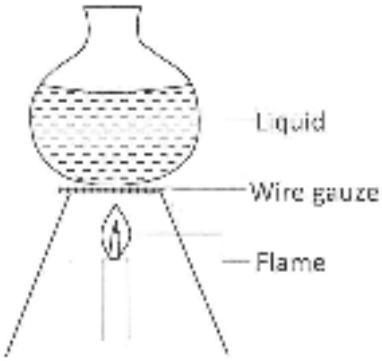


Figure 3

Explain how the wire gauze prevents the glass container from cracking.

(3 marks)

27 State **two** properties of mercury that make it a suitable liquid for use in thermometers.

(2 marks)

28 **Figure 4** shows a uniform plank of length 4 m and of weight 50 N. It is pivoted at a distance x from one end and balanced horizontally by a weight of 30 N.

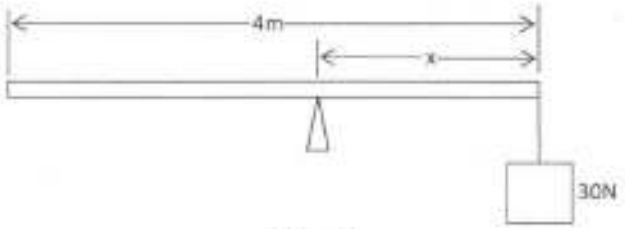


Figure 4

Determine the value of x. (3 marks)

29 **Figure 5** shows a block of wood with a hollow part. The block is resting on a horizontal bench.

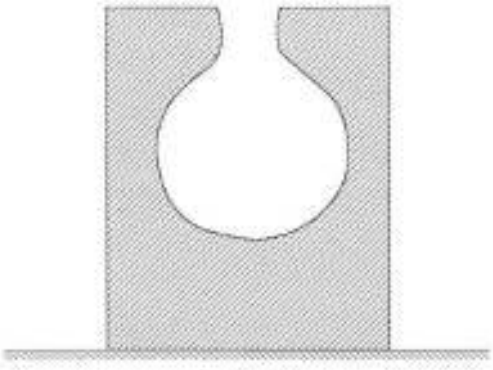


Figure 5

Explain the effect on the stability of the block when sand is used to fill the hollow section. (2 marks)

30 An object of weight 25 N extends a spring by 0.4 cm. Determine the weight of an object that would extend the spring by 0.96 cm. (3 marks)

31 A car starts from rest and accelerates uniformly for 4 seconds. It attains a velocity of 15 ms^{-1} and maintains it for 3 seconds. Sketch a velocity time graph for the motion of the car within the 7 seconds. (3 marks)

32 A body is pulled along a horizontal surface at a constant velocity. State **two** factors that affect friction between the body and the surface. (2 marks)

33 State the energy changes that take place as a building block drops from the top of a building to the ground. (2 marks)

34 Two copper spheres A and B of the same size are placed in a container. Sphere A is hollow while B is solid. When the container is filled with water, it is observed that A floats while B sinks. Explain this observation. (2 marks)