5.6 GENERAL SCIENCE (237)

5.6.1 General Science Paper 1 (237/1)

SECTION A : BIOLOGY

1. (a) The study of plants; (1 mark)

(b) It gives two names to an organism, generic and specific names; The generic name starts with a capital letter while the specific name starts with a small letter; the names should be underlined / or italicized; (2 marks)

2. (a) (i) Directs/reflect light onto the specimen;
(ii) Places desired objective lens into position; (2 marks)

(b) Tissue - a group of similar cells performing a function;
Organ system - a group of (connected) organs functioning as a unit; (2 marks)

3. (a) Movement of substances against concentration gradient across cell membranes using energy; (1 mark)

(b) (i) Absorption of ions/mineral salts; (1 mark)

(ii) Absorption of water; (1 mark)

4. (a) Small intestines/ileum; (1 mark)

(b) Provision of oxygen; (1 mark)

5. (a) Transparent / have no chlorophyll;

Thin/one cell thick; (2 marks)

(b) (i) Formation of blood; (1 mark)

(ii) Formation of teeth and bones;

- Participates in blood clotting. (1 mark)

6. (a) Low temperature; high humidity/high soil water;

Low wind velocity; low light intensity;
First two correct. (2 marks)

(b) (i) Defence; (1 mark)

(ii) Participates in blood clotting; (1 mark)

7. (a) *Bordetella pertussis* (1 mark)

(b) (i) Diaphragm flattens;

(ii) Rib cage is lifted upwards and outwards. (2 marks)

8. (a) Carbon dioxide; alcohol; energy;

First two correct. (2 marks)

(b) Thin walled to reduce diffusion distance;
Numerous to increase surface area;
Moist to dissolve diffusing substances;

First two correct. (2 marks)

9. (a) K - Bowman's capsule; (1 mark)

(b) Ultrafiltration; forces all small molecules into the Bowman's capsule;
before useful ones can be re-absorbed back again.
(2 marks)

10. (a) Failure of the pancreas to secret enough insulin/
Failure of the liver to convert glucose into glycogen;
leading to excess sugar in the blood; (2 marks)

(b) When it is hot, sweat is produced on the skin;
The sweat uses heat from the body to evaporate thereby cooling the body;
(Latent heat of vaporisation)
(2 marks)

SECTION B : CHEMISTRY (33 marks)

11. Heat the mixture √(½) for ammonium chloride to sublime and collect the sublimate; √(½) .
Add water √(½) to dissolve sodium chloride and decant / filter √(½) to obtain sand as the residue and sodium chloride solution; Evaporate sodium chloride solution to dryness √(½) to obtain sodium chloride crystals. √(½)

OR

Add water, filter off sand, carry out fractional crystallization, to obtain $NaCl_{(s)}$ filter off $NaCl_{(s)}$ evaporate filtrate to dryness to obtain NH_4Cl.
(3 marks)

12. (a) Curve I √(½) ;

Curve I does not have definite temperature change / constant temperature change. √(1)
(1½ marks)

(b) Melting point. √(½) (½ mark)

13. (a) Calcium hydrogen carbonate + Dilute hydrochloric acid → Calcium chloride + Carbon (IV) oxide + Water; √(1) (1 mark)

(b) Sulphuric (VI) acid. √(1) or sulphuric acid (1 mark)

14. (a) Oxygen / O_2 √(1) (1 mark)

(b) Reaction slows down / less production of gas Q √(1)
Manganese (IV) oxide is a catalyst or increases rate of decomposition of hydrogen peroxide. √(1) (2 marks)

(c) Gas Q slightly soluble in water. √(1) (1 mark)

15. (a) White magnesium oxide remains white. √(1) (1 mark)

(b) Hydrogen is below magnesium in the reactivity series hence it can not reduce its oxide. √(1)
OR
Hydrogen is less reactive than magnesium, so it cannot reduce magnesium oxide.
(1 mark)

(c) Hydrogen gas/H_2. √(1) (1 mark)

16. (a)

Element	No. of protons	No. of electrons	No. of neutron	Atomic Mass
X	12 √(½)	12	12	24 √(½)
Y	8	8 √(½)	8	16 √(½)
Z	8 √(½)	8	10 √(½)	18

(3 marks)

(b) Y and Z are isotopes √(1) (1 mark)

17. (a) Weak acid is one that does not ionize/dissociate completely in aqueous solution. √(1)
(1 mark)

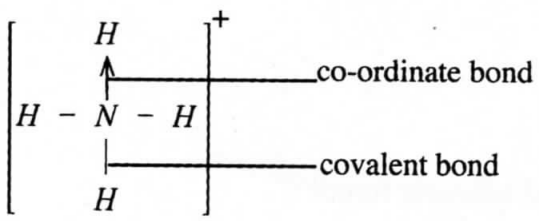
(b) (i) Sodium hydroxide or potassium hydroxide. √(1) (1 mark)

(ii) Sulphuric (VI) acid √(1) or Hydrochloric acid / Nitric (V) acid/Nitric acid or Sulphuric acid. (Accept correct formulae) (1 mark)

18. (a) Ionic bond / Electrovalent √(1). (1 mark)

(b) Covalent bonds √(1)
Co-ordinate / Dative bond √(1) (2 marks)

OR



19. In the molten lead (II) iodide, the ions are mobile √(½) hence conducts electricity √(½)while in solid lead (II) iodide, the ions are at fixed √(½) positions hence does not conduct electricity.√(½) (2 marks)

20. (a) Ionisation energy for R is higher than that of S √(1). R is smaller in size than S √(½) making outer electron in R more difficult to remove since nuclear attraction on outermost electrons in R is higher √(½). (2 marks)

(b) 2.8 √(1) (1 mark)

(c) (i) Group 4 √(½) (½ mark)

(ii) Period 3 √(½) (½ mark)

21. (a)

Salt	Adding water	Heating
Lead (II) carbonate	Does not dissolve √(½)	Forms yellow solid when hot turns reddish-brown solid on cooling √(½)
Lead (II) nitrate	Dissolves to form colourless solution √(½)	Brown fumes produced √(½) Yellow when hot, turns reddish-brown solid on cooling (any one observation)

(2 marks)

(b)
- Making builder's mortar and plaster √(1)
- In agriculture to reduce/prevent too much acidity
- Making bleaching powder
- For detecting Carbon (IV) oxide gas in laboratory
- In softening hard water
- In scrubbing in contact process

(Any 1 correct)

(1 mark)

SECTION C : PHYSICS

22. Volume = 20 - 10

= 10 cm^3 √

Density = $\frac{\text{Mass}}{\text{Volume}}$ √

= $\frac{8}{10}$

= $\underline{0.8\ gcm^{-3}}$ √

23. The forces involved √ are cohesive and adhesive forces √.

The adhesive forces between the water molecules and the metal surface is greater √ than the cohesive forces between water molecules.√

24. Pressure = $h\rho g$ √

= $\frac{640}{1000} \times 1.36 \times 10^4 \times 10$ √

= $87040\ Nm^{-2}$ √

25. The large dust particles are being bombarded by the tiny air particles √ , which are in continuous random motion. √

26. (a) The wire gauze prevents the glass from being heated at one point, √

(b) Since the wire gauze is a good conductor √ it conducts the heat evenly √ to a large area of the glass container.

27.
- It is a good conductor of heat.
- It is visible (opaque).
- It has a wide range of temperature (high boiling point and low freezing point).
- It expands / contracts uniformly.

(any two correct)

28. Clockwise moment = Anticlockwise moment √

$30 \times x = 50(2 - x)$ √

$30x = 100 - 50x$

$80x = 100$

$x = 1.25m$ √

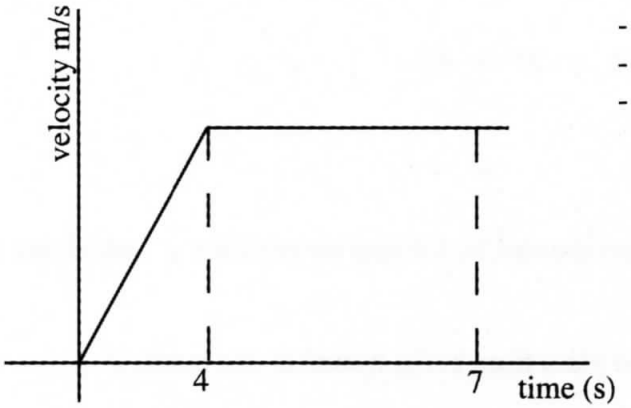
29. The Center of gravity is raised √ thus reducing the stability √ of the block.

30. $F = Kx$ $K = \frac{25}{0.4}$

$F = \frac{25}{0.4} \times 0.96$ √

= 60N √

31.



- labelled axis √
- accelerating for first 4 seconds √
- uniform velocity between 4 seconds and 7 seconds √

32.
- The reaction force from the supporting surface. √
- Nature of the surfaces in contact. √

33. Potential √ ⟶ kinetic √ ⟶ sound/heat

34. (a) The sphere that floated was hollow while the other one was a solid sphere.

(b) The floating sphere experienced an upthrust equal to its own weight. √
The sinking sphere experienced an upthrust lower than its own weight. √

5.6.2 General Science Paper 2 (237/2)

SECTION A : BIOLOGY

1. (a)

Disease	Causative Agent	Symptoms
Gonorrhoea	*Neiseria gonorrhea;*	Itching of urethra / yellowish discharge /pain when urinating / vaginal odour; (2 marks)
Candidiasis	*Candida albicans;*	Itching and burning sensation of genital organs / white discharge from the vagina; (2 marks)

2. (a) (i) Ovary - produces eggs / ova ; and female hormones;

First one correct. (1 mark)

(ii) Uterus - where the embryo develops;
Contraction of the walls aids in the expulsion of the developed foetus during birth / parturition;

First one correct. (1 mark)

(iii) Cowper's gland - secrets an alkaline fluid that neutralizes the acidity along the urethra;

(1 mark)

(b) Attachment of the blastocyst to the walls of the uterus; by the villi.

(1 mark)

3. A - Pericarp fused with testa;
B - Position of plumule;
C - Position of radicle;

(3 marks)

4. (a) The fusion of nucleus of male gamete / sperm with the nucleus of female gamete / ovum; to form a zygote;

(2 marks)

(b) In a discontinuous growth, the organism shows a number of periods of rapid growth followed by long periods when no growth occurs; e.g. Growth shown by arthropods; (an example of an arthropod like locust, crab etc).

(2 marks)

5. (a) Variation - the differences in traits that occur among members of the same species;

(1 mark)

(b) (i) Haploidy - Chromosome numbers that are half of the full complement;

(1 mark)

(ii) Genotype - refers to the genes that an organism contain / have for a particular trait. Genetic composition of an organism. (1 mark)

(iii) Dominance - refers to the genes that determine the expression of the genetic trait in offspring;
State where genes express/supress other genes.
(1 mark)

6. Blood transfusion; plant / animal breeding; crime detection, disputed parentage (2 marks)

7. (a) (i) Niche - the position that an organism occupies in a habitat / a functional description of a species role in a community / an expression of the range of all the factors that influence whether a species has all the resources it needs and whether it can carry out all the activities necessary for survival and reproducing;
(1 mark)

(ii) Carrying capacity - the maximum population / number of organisms of a particular speies that can be sustained by a given supply of resources; in an environment.
(1 mark)

(b) Special creation - life was brought into existence / created by a supreme being / God; life was created in perfect forms and have remained unchanged over time;
(2 marks)

8. Sensory neurone - it has a cell body; situated off the axon.
Has receptor dendrites; located in the sensory organ.
Has long dendron and short axon;
Has myelin sheath; with nodes.
First three correct. (3 marks)

9. (a) Geotropism - roots move towards source of water;
Plants get anchored in the soil;
First one correct.
(1 mark)

(b) Auxins - promote / initiates growth; adventitious root development; causes apical dominance;
Prevent ageing / *senescence*;
Responsible for tropic movements;
First two correct. (2 marks)

10. Importance of support and movement in plants.
- At cellular level, like growth of pollen tube to bring about fertilization;
- At organ level such as tropic movements for survival value;
- Enable plants to get resources from the environment such as light / water nutrients;
- For escape to avoid harmful stimuli such as temperature;
- Bearing of leaves, fruits

First three correct. (3 marks)

SECTION B : CHEMISTRY (33 marks)

11. (a) But-l-ene. √(1)/butene (1 mark)

(b) Bormine water. √(½)
Acidified potassium manganate (VII). √(½) /$KMnO_4$ (1 mark)

(c) Ripening of fruits.
Manufacture of plastics.
Manufacture of detergents
Manufacture of ethan-1, 2-diol
Manufacture of ethanol through hydrolysis

(Any 2 correct.) (2 marks)

12. (a) haematite √(½)
magnetite √(½) (1 mark)

(b) Coke in the furnace burns in the hot air to form carbon (IV) oxide √(1).
Carbon (IV) oxide √(1) rises to the middle of the furnance and reacts with more coke to form carbon (II) oxide √(1). Carbon (II) oxide/ coke reduces the Iron (III) oxide to the Iron metal and carbon (IV) oxide. √(1) (3 marks)

(c) Making Agricultural implements, nails, sheets, ornaments and horse-shoes. (1 mark)

(Any 1 correct.)

13. (a) X - Dry Sulphur (IV) oxide / dry SO_2 √(½)/sulphur dioxide
Y - Oleum √(½) / $H_2S_2O_7$ (1 mark)

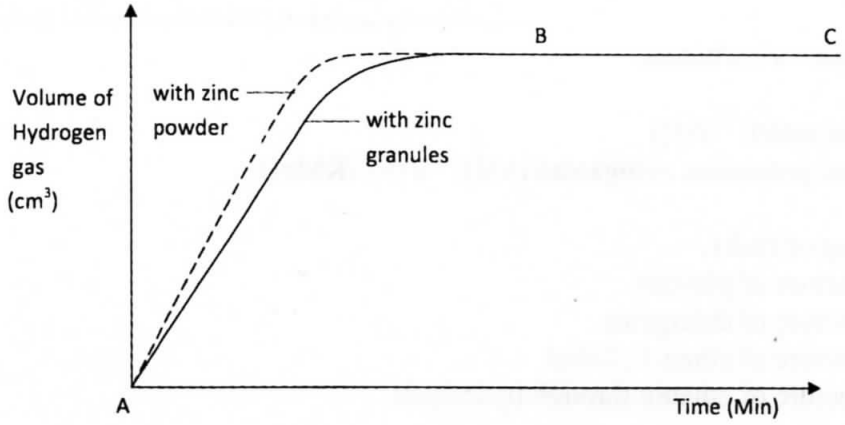
(b) Vanadium (V) oxide / Vanadium Pentoxide √(1) (1 mark)
or Platinum/platinised asbestos.

(c) Dissolving SO_3 in water is an exothermic reaction √(1) that makes the acid to vaporise √(1).

(2 marks)

14. (a) The reaction is over √(1) since all the zinc √(1)granules have been used up. (2 marks)

(b) On the graph √(1) (1 mark)



½ mark for rise in volume
½ mark for flattening at the same level

(c) The rate of reaction will be √(1) slower. (1 mark)

15. (a) Potassium manganate (VII)/$CaOCl_2$ √(1) (1 mark)

(b) To remove the more soluble fumes of hydrogen √(1)chloride gas produced by the acid. (1 mark)

(c) The moist blue litmus paper turns red. √(½)

The red litmus paper is then bleached. √(½) (1 mark)

16. (a) B / NH_3√(1)

Ammonia gas (RMM 17) is less dense √(½)than hydrogen chloride gas/hydrochloric acid gas (RMM = 36.5) and hence diffused faster. √(½) (2 marks)

(b) In glass tube A, the universal indicator turned Red, √(½) while in glass tube B, the universal indicator turned green. √(½) (1 mark)

17. (a) (i) M: Carbon (IV) oxide (CO_2)√(½), N: Carbon (II) oxide (CO)√(½). (1 mark)
@ ½ mark

(ii) To allow in air. √(1) (1 mark)

(b) It brings about defforestration. √(1)
global warming / Green house effect

(1 mark)

(Any 1 correct.)

(c) - Easier to store √(1)/it is less bulky
- Amount of energy produced per unit amount is higher in kerosene than charcoal. √(1) i.e. Kerosene has high heating value than charcoal.

- It is a cleaner fuel compared to charcoal.
  (any 2 correct) (2 marks)

18.

$$RFM = \frac{mass\,(g)}{No.\ of\ moles}$$

$$RFM = \frac{25}{0.25} \quad \surd(1/2)$$

$= 100 \ \surd(1/2)$

$x + 60 = 100 \ \surd(1/2)$

$x = 40 \ \surd(1/2)$

(2 marks)

19. RFM of $Mg(NO_3)_2 = 148 \ \surd(1/2)$

0.5 mole of $Mg(NO_3)_2 = 0.5 \times 148$

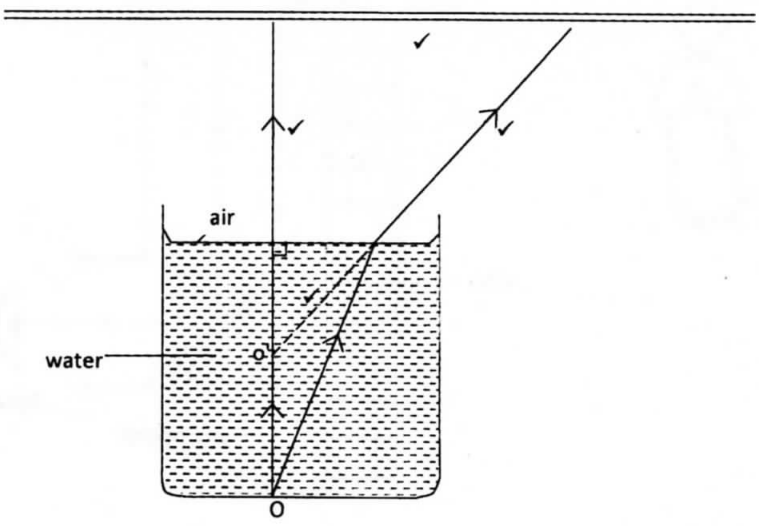
$= 74\ g \ \surd(1/2)$

Weigh 74 g of magnesium nitrate and place it in 500 cm^3 beaker. $\surd(1/2)$ Add about 400 cm^3 of distilled water and stir to dissolve $Mg(NO_3)_2$. $\surd(1/2)$ Transfer solution to a litre volumetric flask $\surd(1/2)$. Rinse beaker and pour the solution into the volumetric flask. Top up the remaining volume with distilled water upto the mark. $\surd(1/2)$

(3 marks)

SECTION C : PHYSICS

20.



21. Any acquired charge flows through the body. √

22. During charging process both Oxygen and hydrogen gas are given off. √
The two can become explosive if exposed to a naked flame. √

23. The bar is a magnet if any of √ it ends is repelled by the magnet North or South poles. √

24. (a) Waves in which the vibration of the particles is always perpendicular to the direction of the wave travel. √

(b) (i) - 0.75 m

(ii) $f = \frac{1}{T}$

$\frac{1}{0.4}$ = 2.5 Hz.

25.
- Density √
- Pressure √
- Humidity/temperature

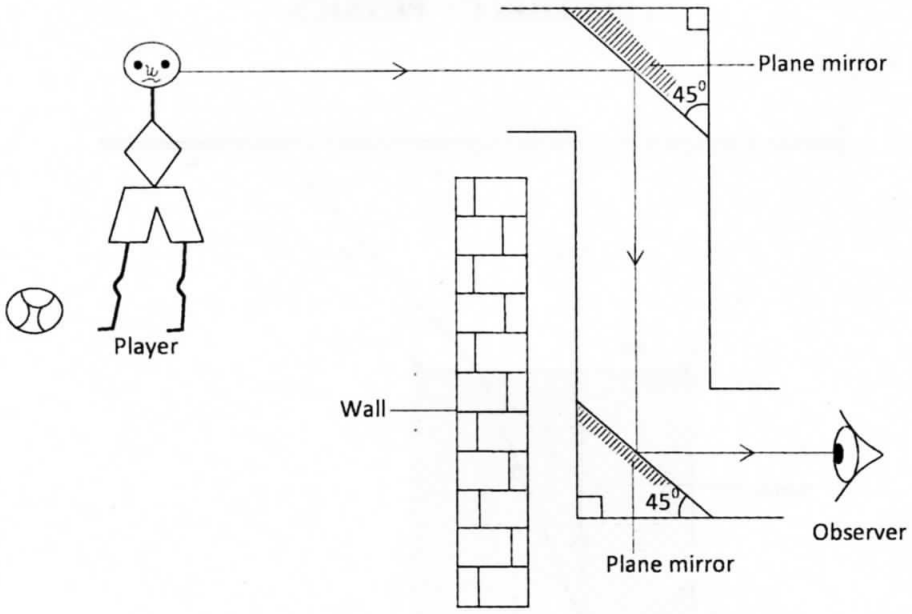
(any 2 correct)

26. (a) All the current passing through resistor passes through the ammeter.

(b) 2.4 V

27. Coil B has higher resistance than A.

28. (a) (i)



(b) The ray successively passes through the tube (Ray is parallel to the walls of the tube). √

29.

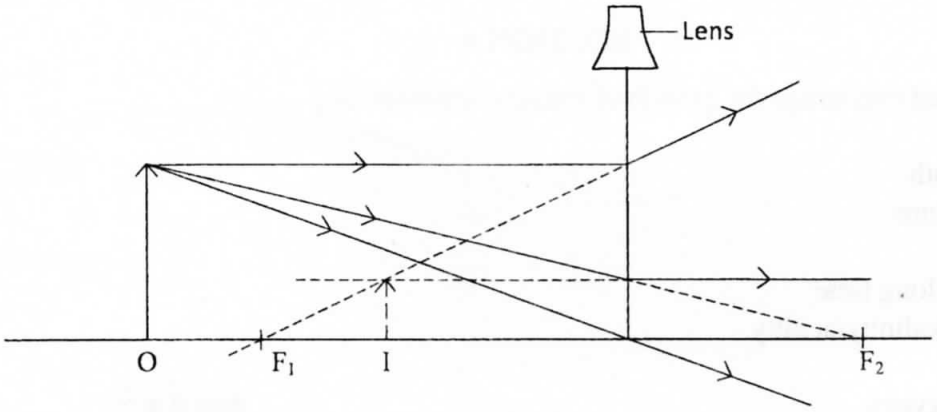


Figure 6

30. Hand x-rays have higher penetration power than soft x-ray. √

Hard x-rays are produced at higher accelerating voltage than soft x-ray. √

Hard x-rays have shorter wave length than soft x-rays. √

(any correct two)

31. - Accelerating the electrons. √

- Focusing the electrons into a fine beam. √

32. $E = Pt$ √

$= \frac{75}{1000} \times 4 \times 7$ √

$=$ 2.1 Kilowatt - hours √

33. Pure silicon is doped with a trivalent element. √ This results in the three valency electrons of the impurity pairing with electrons of silicon √ and thus leaving a hole in the structure. √

34. 50g → 25g → 12.5g → 6.5g √

Three half lifes = 30 hrs √

Half-life = 10 hrs √