4.8 GENERAL SCIENCE (237)

4.8.1 General Science Paper 1 (237/1)

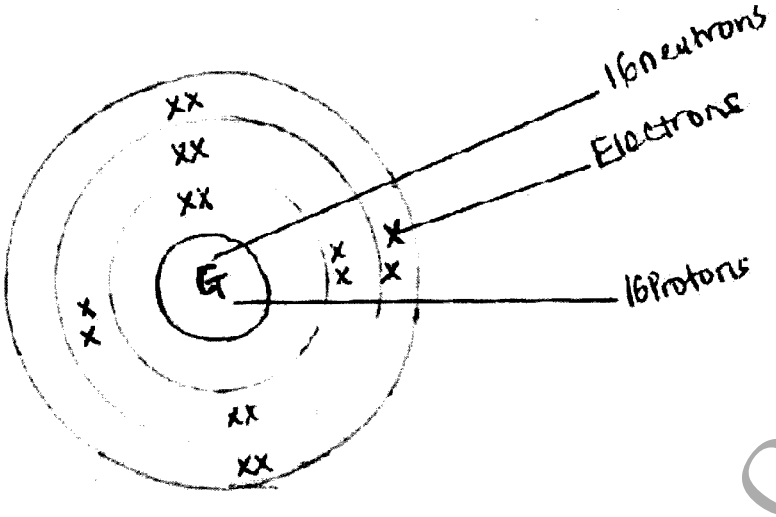
SECTION A: BIOLOGY (34 marks)

1.	- Acts as a transport medium for food substances/waste products (from tissues to excretory organs); - Transport of hormones (to target organs); - Transfer of heat within the body; - Provides medium in which (soluble) substances, ions are transported; 3 x 1	(3 marks)
2.	(a) -Bacterium; -Blue algae; 1 x 1 (b) Phylum – Chordata; Class – Mammalia;	(1 mark) (1 mark) (1 mark)
3.	(a) Mitochondrion; (b) Matrix; (c) (i) Acts as a site for energy synthesis/respiration; (ii) Inner membrane is folded (into infoldings/cristae); to increase surface area for attachment of respiratory enzymes (increasing surface area for respiration);	(1 mark) (1 mark) (1 mark) (2 marks)
4.	- Moist; to dissolve respiratory gases for faster gaseous exchange; - Highly vascularized/supplied with dense network of blood capillaries for efficient transportation of respiratory gases; - Lined with one-cell-thick/ thin epithelia to reduce the diffusion distance; 3 x 1	(3 marks)
5.	- Increased/high temperature (to a given optimum); - Increasing surface area to volume ratio; - Increasing concentration gradient; - Reducing the sizes of diffusing particles/using smaller diffusing particles; 3 x 1	(3 marks)

6.	(a) (i) Sebaceous gland; (ii) Produces sebum which is antiseptic and prevents cracking/drying of the skin/keeps it moist/supple; (b) -Is made up of dead cells to protect inner (delicate) parts from mechanical damage, microbial attacks, desiccation, etc; -Is perforated to allow for elimination of (nitrogenous) wastes; -Lined with hair for insulation/thermoregulation; 2 x 1	(1 mark) (1 mark) (2 marks)
7.	(a) (i) Ureter; (ii) Drains urine into the urinary bladder; (b) - Dialysis; - Kidney transplant; 2 x 1	(1 mark) (1 mark) (2 marks)
8.	- Broad leaf surface; - Thin cuticle; - Lack of/absence of epidermal hair; - Increased number/numerous stomata on the upper leaf surface; 3 x 1	 (3 marks)
9.	Locomotion involves the displacement/movement of the entire body (of organism) from one place/point to another while movement may only be limited to (some) parts of an organism (for instance, roots/shoot) or the entire organism;	(1 mark)
10.	(a) (i) Glucose; (ii) Light energy; Chlorophyll; (Either for J and K) (b) It is oxidized/broken down; to release energy during respiration;	(1 mark) (2 marks) (2 marks)

SECTION B: CHEMISTRY(33 marks)

Qn No.	Responses	Marks
11.(a)	(i) Magnesium carbonate ($MgCO_3$) (ii) Magnesium sulphate solution ($MgSO_4(aq)$) (iii) Carbon(IV) oxide / Carbon(IV) oxide (CO_2)	(1 mark) (½ mark) (½ mark)
(b)	$MgCO_{3(S)} + H_2SO_{4(aq)} \rightarrow MgSO_{4(aq)} + CO_{2(g)} + H_2O_{(l)}$	(1 mark)
12.(a)	• Crush the seeds in a mortar using a pestle; • Continue crushing the seeds while adding acetone / propanone a little at a time; • Decant the resulting solution into an evaporating dish/basin; • Leave the solution in the sun for some time. Propanone evaporates because of its low boiling point. The residue liquid is the oil.	(½ mark) (½ mark) (½ mark) (½ mark)
(b)	(i) Electrostatic precipitation (ii) NaOH (aq) is an alkali hence it absorbs Carbon(IV) oxide from the air. (iii) **D**–Nitrogen. (iv)**E**- used in filling electric light bulbs; -used as an insulator during welding of metals. **(Any 1 correct @ 1mk)**	(1 mark) (1 mark) (½ mark) (½ mark)
13.(a)	Mass number of **G** is 32 Atomic number of **G** is 16	(1 mark) (1 mark)

(b)	Electronic configuration of 2.8.6  P = e^- n = 16 E.C. 2.8.6	(1½ marks) (½ mark)
14(a)	**J**-Lead(II) iodide	(1 mark)
(b)	Precipitation / double decomposition	(1mark)
15(a)	Copper is used in electrical appliances due to its good electrical conductivity because of presence of delocalized electrons.	(1 mark)
(b)	Sodium chloride is an ionic compound in which the ions are immobile when in the solid state hence it does not conduct heat and electricity.	(2 marks)
16 (a)	K, M, L, N →Decreasing reactivity	(2 marks)
(b)	Competition for combined oxygen / reduction	(1 mark)
17(a)	Group VIII elements are inert since the highest occupied energy level is completely filled with electrons thus electronically stable.	(1 mark)

(b)	Magnesium has a giant metallic structure in which the positive nucleus are immersed in a sea / cloud of electrons while silicon has a giant atomic structure in which the atoms are joined by strong covalent bonds hence silicon is harder than Magnesium metal hence the high melting point.	(½ mark) (½ mark) (1 mark) (½ mark) (½ mark)
18(a)	(i) **P** -Anode (ii) **Q** - Cathode	(½ mark) (½ mark)
(b)	-Brown fumes at the electrode **P** / anode; -grey pellets at electrode **Q** / cathode;	(½ mark) (½ mark)
19.	Ion-exchange process: - Hard water is passed through a column filled with a complex sodium compound (sodium permuttit) / ion exchanger; - The Ca^{2+} and Mg^{2+} ions in the hard water are precipitated and remains in the column while the sodium ions from the column comes out with the water hence becoming soft.	 (1 mark) (1mark)
20.(a)	Gas **R** – Hydrogen (H_2)	(½ mark)
(b)	When a few drops of Phenolphthalein indicator are added to the resulting solution, the solution changed/turned pink. This is because Calcium reacted with water to form Calcium hydroxide which is alkaline hence the pink colour.	(½ mark) (½ mark)
(c)	Magnesium reacts with air to form a layer of Magnesium oxide which has to be removed before it can react with water.	(1 mark) (½ mark)
21.(a)	Copper(II) nitrate / $Cu(NO_3)_2$	(1 mark)
(b)	Nitrogen(IV) oxide / NO_2	(1 mark)

SECTION C: PHYSICS (33 marks)

22. To avoid eating contaminated food. ✓ (1) — (1 mark)

23. 2.3 cm ✓ (1) — (1 mark)

24.

Quantity	Unit	Symbol and Unit
Mass	Kilogram✓ ½	- Kg✓ ½
Weight✓ ½	Newton	- N✓ ½

(2 marks)

25. The rate of doing work. ✓ (1) — 1 marks

26. B ✓

Atmospheric pressure is higher at the foot of the mountain hence the milk gets into the straw much more easily. ✓ (1) — (2 mark)

27. The intermolecular forces very weak. ✓ (1)

hence molecules move randomly in all directions. ✓ (1) — (2 marks)

28. (a) In the afternoon it is hotter than in the morning. ✓ (1) hence rails expand more reducing the gaps. ✓ (1) — (2 marks)

(b) To prevent the liquid from flowing back to the bulb. ✓ (1) — (1 mark)

29. Water above the coil was heated by convection currents; ✓ while below the coil water is heated by conduction but water is a poor conductor of heat. ✓ (1) — (2 marks)

30. Sum of clockwise moments = sum of anticlockwise moments. ✓ (1)

$40x = 32 \times 2.5$ ✓ (1)

$x = \frac{32 \times 2.5}{40}$

$= 2.0$m✓ (1) — (3 marks)

31. (c) Neutral ✓ (1) — (1 mark)

(d) The wider the supporting base the more stable the object is ✓ (1) — (1 mark)

32. (a) Force beyond which the extension is not proportional to the applied force. ✓ (1) — (1 mark)

	(b) $F = Ke$ ✓ $1.5k = 30$ ✓ $k = 20\ Ncm^{-1}$ ✓ or $2000\ Nm^{-1}$	(3 Marks)
33.	AB – vehicle moves with uniform velocity. ✓ (1) BC – vehicle decelerates uniformly until it comes to rest. ✓ (1) CD – vehicle moves in the opposite direction with increasing velocity. ✓ (1)	(3 marks)
34.	(a) Resistance to change the state of motion of a body. ✓ (1) (b) By striking there is friction between the matchstick and the matchbox ✓ (1) friction causes/generates heat. ✓ (1)	(1 mark) (2 marks)
35.	(a) A floating body displaces its own weight of the fluid in which it floats. ✓ (1) (b) When in air the upward force (upthrust) is negligible ✓ (1) when in water the object experiences an upthrust ✓ (1) hence when in water the net downward force is less than when ✓ (1) in air (when only the weight acts on the body)	(1 mark) (3 marks)