30.7 GENERAL SCIENCE (237)

30.7.1 General Science Paper 1 (237/1)

SECTION A: BIOLOGY

1. Transport of food materials/oxygen/carbon IV oxide/hormones/urea/mineral salts;
   Protection/defence;
   Regulation of body temperature; thermoregultion (3 marks)

2. (a) Provides energy; (needed to combine carbon IV oxide/carbon dioxide and water molecules)
   (b) Glucose;
   (c) It is broad with cusps for chewing/crushing/grinding; (3 marks)

3. (a) Arthropoda;Rej Anthropoda, Arthropod
   Insecta; Rej insect
   (b) Carbon IV oxide/carbon dioxide;acc.symbol. (mark the 1st two)
   Water; acc. symbols
   Energy;
   Any two (4 marks)

4. (a) Liver cirrhosis;
   Hepatitis;
   (b) Maintains a constant internal environment for optimal physiological processes;
   (3 marks)

5. Internal volume of the bell jar will increase as pressure decreases; air rushes through glass tube into balloons; the balloons inflate/fill with air; volume & pressure must be mentioned.
   (3 marks)

6. (a) A – Cortex;
   B – Pyramid;- Rej. pyramind
   C – Medulla;
   (b) Urinary bladder; not only bladder (4 marks)

7. (a) Solving environmental problems (e.g. food shortage, poor health, misuse of natural resources) /entry into careers (e.g. public health, medicine, veterinary practices)/development of scientific skills, including planning, observing, recording, classifying and analyzing;

   (b) (i) -Build new cells/repair damaged tissues;
   (ii) -prevent vitamin deficiency diseases/they are coenzymes;
   (iii) -Medium for reactions/solvent/give cells shape/transport/maintaining constant body temperature; (4 marks)

8. (a) Cell membrane;
   Cyloplasm;
   Nucleus;
   (b) Magnification of specimen
   =eye piece lens magnification x objective lens magnification
   =10 x 40
   =x 400; (4 marks)

9. Water would move out of the cell into the surrounding solution/ sodium chloride solution; down a concentration gradient; hence cells shrink/ become plasmolysed; (3 marks)

10. (a) Sugar;
    Amino acids;
    (b) Loss of water from aerial parts of a plant by evaporation; Leaves (3 marks)

SECTION B: CHEMISTRY

11. Add water to dissolve sodium sulphate. √1
Filter to separate lead (II) sulphate as residue and sodium sulphate as filtrate. √1
Evaporate the filtrate to concentrate √½it. Cool to obtain crystals of sodium sulphate √½.
Dry the crystals with filter paper. (3 marks)

12. A – Air Hole√1
B - Jet√1 (2 marks)

13. D, √1Reason is F is basic √½ while D is acidic. √½

14. (a) White solid is formed √1 (2 marks)
(b) $2Mg_{(s)} \rightarrow O_{2(g)} \rightarrow 2MgO_{(s)}$ √1 (2 marks)

15. (a) Gas G is insoluble in water. √1
(b) $Ca_{(s)} + 2H_2O_{(L)} \rightarrow Ca(OH)_{2(aq)} + H_{2(g)}$ √1
(c) G is used as a fuel in balloon √1 hardening of oils/raw materials in production of Hcl. (3 marks)

16. (a) (i) K √1
(ii) H √1
(b) J and L;√1 have the same atomic numbers but different atomic masses. √1 (4 marks)

17. (a) Halogens √1
(b) Trend 1, √1Electrons are being added to the same energy level and yet there is increase in nuclear change√1 making the atomic radius to shrink across the period. √1 (4 marks)

18. (a) N√1
(b) (i) Q√1
(ii) P√1 (3 marks)

19. (a) See the diagram. √1 (electrone on the left side).
(b) The anode becomes smaller. √1
This is because it dissolves. √1 (3 marks)

20. (a) Inability of water to lather easily with soap. √1
(b) (i) $Caco_3$ or $MgCo_3$√1
(ii) It wastes fuel. √1 (3 marks)

21. (a) Calcium Chloride or Calcium Oxide. √1
Iron (III) Chloride is deliquescent. Therefore the drying agent prevents hydration of the salt. √1
(b) Pass Chlorine gas through the apparatus to drive out air. √1 (3 marks)

22. The level of the water will not change since all the oxygen will have been used up. √1 (1 mark)

SECTION C: PHYSICS

23. Volume of 30 drops $= 40 - 25 = 15$ ml $\surd^1$

1 drop $= \frac{15}{30} = 0.5$ ml $\surd^1$

24. Volume $= 25 - 19 = 6$ cm^3 $\surd^1$

$\varphi = \frac{m}{v} = \frac{48}{6} = 8$ g/cm^3 $\surd^1$

25.

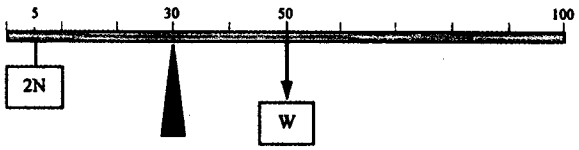


Figure 1

W x 20=2 x25 $\surd^1$

$W = \frac{2 \times 25}{20} = 2.5$ N $\surd^1$

W = mg

$M = \frac{2.5}{10} = 0.25$ kg $\surd^1$

26. Smoke particles are hit randomly $\surd^1$ by the molecules of air $\surd^1$ moving randomly.

27. F. contracts more than $\surd^1$ E hence becomes shorter $\surd^1$ than E.

28. The wind mill rotates, air around the flame becomes less dense $\surd^1$ when heated and rises pushing the wind mill.

29. (a) The cross-sectional area of the tip of the pin $\surd^1$ is much smaller than the pin head.
Hence for the same force of the thumb, pressure is higher $\surd^1$ at the pin point.

(b) Pressure in liquids = φhg
For constant pressure, $\surd^1$ when h increases φ must decrease since g is constant.

30. (a) L=1.8 mm

(b) Wire will be longer $\surd^1$ than the original length because the force had exceeded the elastic limit.

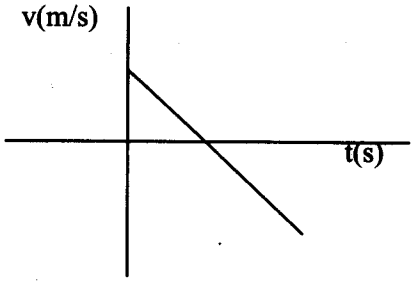


Figure2

$\surd^1$ V starts at a point drops down to zero and to negative.

$\surd^1$ straight line of negative gradient.

31. $40 - 5 = 35$ = resultant force.

from $f = Ma$

$35 = 5a$ $\surd^1$

$a = \frac{35}{5} = 7$ m/s2. $\surd^1$

32. (a) (i) Greatest height = 10m. $\surd^1$

(ii) $mgh = P.E$ $\surd^1$

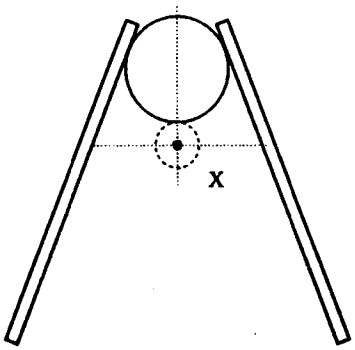
$M = \frac{20}{100} = 0.2$ kg $\surd^1$

(b) Kinetic energy at heighest point = O.

33. $W = u = 6000$ N $\surd^1$

A floating body displaces its own weight of the fluid in which it floats. $\surd^1$

34. (a)



Allow approximate value of X

Figure 3

(b) Increase the wheel base $\surd^1$/ base area.

30.7.2 General Science Paper 2 (237/2)

SECTION A: BIOLOGY (34 marks)

1. (a) Enables a plant to expose its shoot/leaves to light (for photosynthesis); (1 mark)

(b) Hearing;
Balance/posture; (2 marks)

2. (a) All organisms that live and interact within a particular habitat; (1 mark)

(b) (i) Accumulates moisture in the sub-stomatal air spaces leading to reduced diffusion gradients;

(ii) Increases the diffusion distance; (2 marks

3. (a) Water;
Oxygen;
Optimum temperature/warmth; (3 marks)

(b) Complete metamorphosis – distinct development stages are egg, larva pupa and adult;
Incomplete metamorphosis – developmental stages are egg, nymph and adult in which the nymph resembles the adult but is small and sexually immature; (2 marks)

4. (a) Ingestion of contaminated food/water; (mark)

(b) Bites by female anopheles mosquito carrying malaria parasites: (1 mark)

5. Individuals with advantageous variations; and selected for hence they survive and reproduce;
(2 marks)

6. Allows passage of dissolved food substances from the mother to the foetus;
Allows passage of oxygen from the mother's blood to the foetus;
Allows passage of antibodies from the mother's blood to the foetus;
Allows passage of metabolic waste products from the foetus' blood to the mother;
(; ; ; ; any three) (3 marks

7. (a) (i) Genetic counseling – giving hereditary information for informed decision making; (1 mark)
(ii) Genetic engineering – the alteration/manipulation of the structure of DNA by man for beneficial use; (1mark)
(b) (i) Father – AO;
((ii) Mother – BO;
(iii) Child - OO; (3 marks)

8. To obtain resources from the environment (e.g light, water and nutrients);
In support of heavy load of their own mass, including animals that climb or live on them;
To withstand forces in the environment (e.g gravity, air currents/wind/storms);
Approriate positioning of parts for photosynthesis, pollination and dispersal;
(;;; any three) (3 marks)

9. (a) A – Lens;
B – Vitreous humour; (2 marks)
(b) Is where the image is formed; (1 mark)

10. (a) Oestrogen/progesterone; (1 mark)
(b) Oestrogen – repair and healing of uterine wall;
- stimulates anterior pituitary gland to secrete Luteinising hormone;/

Progesterone - thickening of the uterine wall
- Inhibits production of FSH/LH; (2 marks)

(c)

Mitosis	**Meiosis**
Two daughter cells are produced	-Four daughter cells are produced;
Occurs in somatic/body cells	-Occurs in reproductive cells;
Daughter cells are diploid (2n)	-Daughter cells re haploid(n);

(Any one, fully contrasted) (1 mark)

SECTION B: CHEMISTRY (33 Marks)

11. (a) The volume of a fixed mass of a gas is directly proportional to its absolute temperature at constant pressure;

(b)

$$\frac{V1}{T1} = \frac{V2}{T2}$$

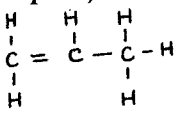
$$T_2 = \frac{V_2 T_1}{V_1} = \frac{402.5 \times 298}{35};$$

=342.7k;

12. (a) Cracking;

(b) acting as a catalyst;

(c) Propene;



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13. (a) It form acid rain;
Acid rain kills organism/corrodes
Metallic structures;

(b) (i) Oxygen;

(ii) to separate NO_2 from Oxygen;

14. R.f.m. of Na_2CO_2=(2 x 23 +12 x 1 +12 x 3)=106g
Weigh 106g of sodium hydroxide;
Dissolve it in distilled water and top it up to make 1 litre of solution;

15. (a) The heat change when one mole of a substance is formed from it's constituent elements at standard conditions;

(b) (i) -46.2 KJ/mole;

(ii) -the yield of ammonia will reduce;
-increase in temperature favours the reverse reaction which is the formation of hydrogen and nitrogen. (This is because reaction for formation of ammonia is exothermic);

16. (a) $CH_{4(g)} + 20_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(l)}$;

(b) 1 mole of methane ≡ 16g
16g CH_4 gives 890.4 KJ
36g CH_4 gives $\frac{890.4 \times 36}{16}$;

=2003.4KJ;

17. (a) The existence of an element in more than one form but in the same physical state;

(b) Layers are held by weak vander waals forces which make them slide over one another hence leave a mark on paper;

18. (a) $MgCO_{3(s)} + 2HCl_{(aq)} \rightarrow MgCl_{(aq)} + H_2O_{(l)} + CO_{2(g)}$

(b) R.M.M. of $MgCO_3 \equiv 84$

R.M.M. of $CO_2 \equiv 44$ } Both must be correct

Moles of MgCO3 = $\frac{8.4}{84}$ = 0.1

Moles of CO_2 = 0.1

Mass of CO_2 produced = 0.1 x 44
= 4.4g

19. Endothermic reactions are those in which heat energy is absorbed from the surroundings while exothermic reactions are those in which heat is released to the surroundings;

20. (a) Aluminium, Carbon, Iron. (2 marks
(if order is wrong but carbon is in the middle (1 mark)

(b) Oxygen produced at the anode reacts with the anode, thus depleting it;

(c) Aluminium is a good conductor of heat;

SECTION C: PHYSICS (33 marks)

21.

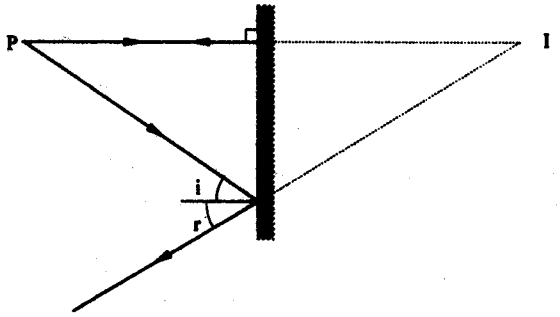

Figure 1

22. Virtual, upright and diminished. (1) (any correct)

23. Different colours are refracted differently. (1)
Blue is refracted more than red.(1)

24. $V = \frac{600}{2}$ =30m/s (1)

$V = \lambda f$ (1)

300 =λ 1000

λ= 0.3m (1)

25. (a) V = IR (1)
=1.5 x 5
=7.5V

(b) V =10 – 7.5
=2.5V (1)
R =$\frac{2.5}{1.5}$ =1.67 ohms (1)

26. Lead (IV) oxide OR lead dioxide.

27. Z is south pole (1) since it points southwards.
Bring the unmarked magnet close to Y, and observe the end where (1) repulsion occurs to conform the polarity as north.

28. -amount of current. (1)
-resistance of the coil (1)

29. By increasing the accelerating voltage. (1)

30.

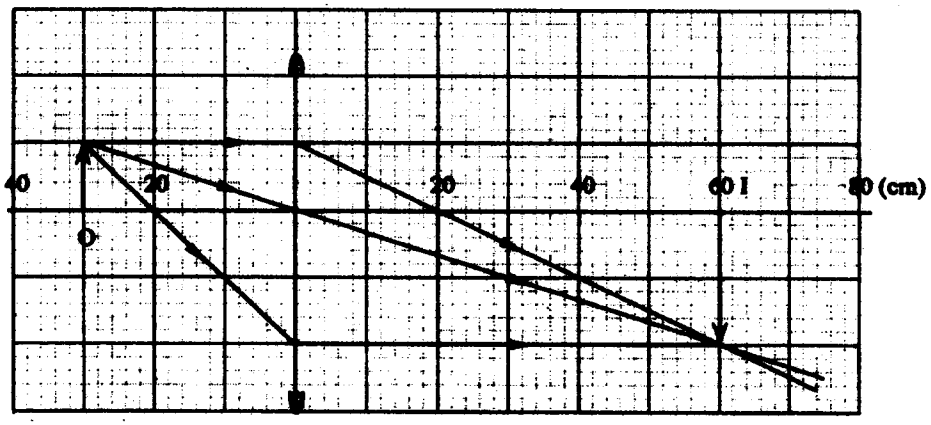

Figure 2

31. - the bulb will not light. (1)
- the pin junction is reverse biased. (1)

32. Unlike charges attract (1), when they touch the negative charges move to the conductor to neutralize (1) it. Since positive charges are more, the conductor charges the sphere positively and repels (1) it.

33. Student is nearer one cliff. (1)
The first echo is a reflection from the (1) nearest cliff and the second echo is a reflection from the furthest cliff.

34. Energy = P x t (1)
$=60 \times 10^{-3} \times 5 \times 6$
$= 1.8$ Kwh (1)

35. $100 \xrightarrow[150s]{(1)} 50 \xrightarrow[150s]{(1)}$ 25 after 300 seconds count rate is 25 counts/sec.