

## 30.4 BIOLOGY (231)

### 30.4.1 Biology Paper 1 (231/1)



1. (a) Cytology;  
(b) Microbiology; (2 marks)
2. (a) Stem;  
(b) (i) Monocotyledonae;  
(ii) Vascular bundles scattered/not arranged in a ring  
(c) Epidermis; (4 marks)
3. (a) Protein synthesis  
(b) Destroys worn out organelles and micro-organism; (2 marks)
4. (a) (i) Root hair cell;  
(ii) D – cell wall;  
E – cell sap vacuole;  
(b) Controls the functioning of the cell; (4 marks)
5. A large surface area for efficient diffusion of gases;  
Moist for gases to diffuse in solution form;  
Thin for efficient diffusion of gases across a short distance; (3 marks)
6. (a) Co-ordinates balance;  
(b) Controls heart beat/blood pressure/breathing rate; (2 marks)
7. Haemolysis – process by which red blood cells take in water till they burst;  
Plasmolysis – loss of water from a plant cell; (2 marks)
8. Chilopoda diplopoda  
A pair of walking legs per segment; 2 pairs of walking legs per segment;  
Body flattened dorsoventrally; Body cylindrical in shape;  
Body divided into head and trunk Body divided into head thorax and trunk; (3 marks)
9. They contain chlorophyll which traps light energy;  
They have grana which increase surface area for photosynthesis;  
The stroma has enzymes for photosynthesis;  
Any two (2 marks)
10. Resistance to diseases;  
Increased yields; (2 marks)
11. (a) Aquatic; (1 mark)  
(b) Large air space/aerenchyma to enhance transpiration;  
Sclereids for mechanical support of leaf;  
Stomata on upper epidermis to enhance transpiration;  
Any two (2 marks)

12. J – Sporangium;  
Absorption of soluble substances;  
Secretion of digestive enzymes; (3 marks)
13. (a) Place or environment in which specified organisms live;  
(b) A natural unit with abiotic and biotic factors; (2 marks)
14. Charcoal in limited supply of air produces carbon (ii) oxide; which combines with haemoglobin forming carboxyhaemoglobin;  
Leading to suffocation/death; (3 marks)
15. X – Starch present;  
Y – Starch absent;  
X – Acts as a control; Y – CO<sub>2</sub> absent absorbed by potassium hydroxide pellets;
16. Emulsification;  
Creating alkaline medium for digestive enzymes; (2 marks)
17. (a) Herbivorous;  
(b) Lack canines on upper Jaw/lack incisors on upper jaws; (1 mark)
18. Animals form water products more rapidly than plants;  
Animal wastes are more toxic than those of plants;  
Animals don't re-use their wastes while plants re-use some of their wastes;  
Any two (2 marks)
19. When temperature is high they dilate; when low they constrict; (2 marks)
20. Higher chances of fertilization;  
Embryo is protected from external environmental conditions; (2 marks)
21. (a) P – sutures;  
(b) (i) Atlas;  
(ii) Hinge joint; (3 marks)
22. (a) Passage of ova;  
(b) Storage of sperms;  
(c) Hold the testis; (3 marks)
23. Absence of nucleus; increase of space for packaging haemoglobin for carrying oxygen.  
Possession of haemoglobin which has high affinity for oxygen;  
Concave shape creates large surface area for combining with oxygen;  
Ability to change shape to enable them pass through capillaries (3 marks)
24. (a) Use and disuse;  
Acquired traits can be passed on to offspring;  
(b) Acquired characteristics cannot be inherited; (3 marks)

25. Overcrowding;  
Accumulation of toxic wastes;  
Limited resources such as nutrients; (3 marks)

26. (a) Provides support;  
Enables plants to grow towards light; Any one  
(b) In search of nutrients  
Anchorage; Any one (2 marks)

27. (a) Failure of homologous chromosomes to segregate during meiosis;  
(b) (i) Down's syndrome/Turner's syndrome/Klinefelter's syndrome; (1 mark)  
(ii) Albinism/single cell anaemia/haemophilia/colour blindness; (1 mark)

28. Arteries have thick muscular walls, veins have thin and less muscular walls;  
Arteries have narrow lumen, veins have wider lumen;  
Arteries have no valves except at junction with heart veins have valves at regular intervals;  
(3 marks)

29. (a) Gymnospermae;  
(b) Needle-like leaves (with waxy cuticle);  
Naked seeds; (3 marks)

30. The inhibition of growth of lateral buds;  
By auxins; produced by the growing apical bud; (3 marks)

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28.4.2 Biology Paper 2 (231/2)

1. (a) Respiration; (1 mark)  
(b) (i) Increase/rise in thermometer reading/temperature; (1 mark)  
(ii) Carbohydrates/starch/glucose in germinating seeds is broken down/oxidised to get energy; some of the energy is released as heat; (which increases temperature reading). (2 marks)  
(c) To kill bacteria/fungi/microorganisms; that would cause decay/decomposition/respiration of the beans; (2 marks)  
(d) To conserve heat/prevent heat loss to surroundings; (1 mark)  
(e) Use similar set-up but with dead and disinfected beans seeds/ use dead disinfected bean seeds/use dry bean seeds; (1 Mark)
2. (a) P Tissue fluid/intercellular/interstitial fluid/space; (1 Mark)  
Q Venule; (1 Mark)  
(b) (i) Glucose, oxygen; (1 Mark)  
(ii) Carbon (iv) Oxide, water; (1 Mark)

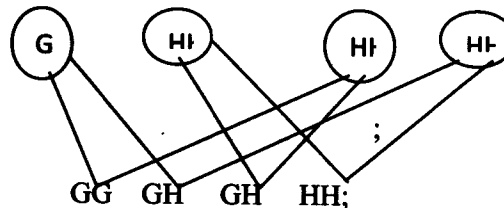
- (c) Blood entering arteriole has a high pressure; the pressure forces water and small solute molecules in blood to go through capillary wall forming tissue fluids; nutrients/oxygen more into the tissue cells by diffusion; (3 marks)
- (d) Red Blood cells/proteins/platelets; (1 Mark)
3. (a) (i) Primary consumers; (1 Mark)  
(ii) Primary/secondary consumers; (any one) (1 Mark)
- (b) Green plants → Caterpillars → Lizards; (2 Marks)  
Decaying leaves → Caterpillars → small insects → Lizards;
- (c) (i) Hawks; (1 Mark)  
(ii) At each trophic level energy is lost as heat in respiration; and during decomposition; lost in defecation/faeces/ waste products or metabolism/excretion; some parts of organism not eaten e.g feathers;
4. (a) X Pupil; any 33 marks  
Y Circular muscles; (2 Marks)
- (b) (i) Dull/dim light/low light intensity; (1 Mark)  
(ii) Circular muscles (in iris) relax; while radial muscles contract; the pupil becomes bigger; allowing more light to enter the eye; (4 marks)  
(iii) Allows one to visualize objects/see under dim light; (1 Mark)

(a) F<sub>1</sub> (Selfed) ;

Parental genotype

GH X GH

Gametes



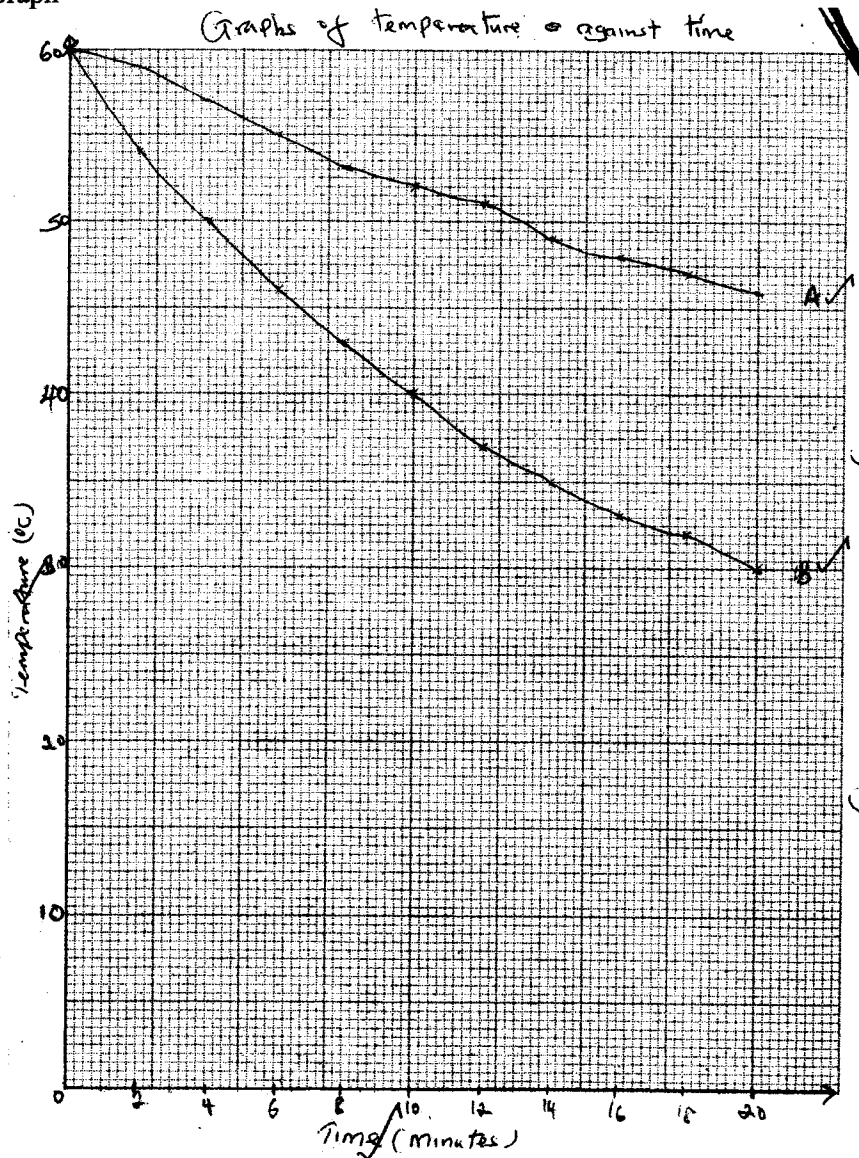
Genotypic ration 1GG:2GH:1HH; = 1:2:1 ; (5 Marks)

(b) 1Black:2 black and white:1 white; = 1:2:1 ; (1 Mark)

(c) (i) Codominance; (1 Mark)

(ii) Blood group inheritance; Acc. blood groups  
Acc. sickle cell trait (1 Mark)

5. (a) Graph



Title

Suitable Scale cover  $\frac{3}{4}$  page

(2 Marks)

Axes

(1 Mark)

Plotting

(1 Mark)

Smooth curves

(2 Marks)

Identification

- (b) (i) A:  $56 - 48.5 = 7.5^\circ\text{C}$   
 $\frac{7.5^\circ\text{C}}{10 \text{ Minutes}} ; = 0.75^\circ\text{C Per Minute}; \pm 0.05$  (2 Marks)
- B:  $48 - 34 = 14^\circ\text{C}$   
 $\frac{14^\circ\text{C}}{10 \text{ Minutes}} ; = 1.4^\circ\text{C Per Minute}; \pm 0.05$  (2 Marks)
- (ii) B has a larger surface area to volume ratio; making it to lose heat to the surrounding faster; (the converse is true) (2 Marks)
- (iii) A rat has larger surface area to volume ratio compared to an elephant; making the rat to lose heat at a faster rate than an elephant; (2 Marks)

- (c) (i) Insulation/insulate against heat loss; (to surrounding); (1 Mark)

(ii) Subcutaneous fat layer / adipose tissue;  
Fur / hair;

(2 Marks)

(d) Are active always; (even under very cold conditions)  
Are able to escape from predators/search for mates/food; (because they are active always)  
Can survive in a wide variety of habitats: (both cold and hot) WTTE

6. Pollen grains land onto the stigma; and adhere to it as a result of the stigma cells secreting a sticky substance; It absorbs nutrients; and germinates forming a pollen tube; The pollen tube grows down the style to the ovary; deriving nourishment from surrounding tissues; The pollen tube has tube nucleus at the tip; and generative nucleus immediately behind it; As the tube grows downwards into the ovary the generative nucleus divides mitotically; to give rise to two nuclei; which represent the male gametes; The pollen tube penetrates the ovule/embryo sac through the micropyle/chalazassa; After the pollen tube enters the embryo sac, the tube/vegetative nucleus breaks down; leaving a clear passage for the entry of the male nuclei; which enter the embryo sac; where one fuses with the egg cell nucleus; to form a diploid zygote; which develops into an embryo; The other male nucleus fuses with the two polar nuclei; to form a triploid nucleus /primary endosperm nucleus; Which becomes endosperm; This type of fertilization is called double fertilization;

(22 Marks)

Max. 20 Marks

7. Movement of fish in water is by swimming; It involves forward movement and control of the body position in water; Scales overlapping backwards/mucus/streamlined body shape reduces resistance/friction to enhance forward movement; Forward movement (propulsion) is caused by the tail; The tail is (almost half the length of the body of the fish) to enable it create enough force (to enable the fish to push forward); Propulsion is achieved when the tail pushes sideways against the water; Sideways movements is brought about by muscles arranged in segmented blocks/myotomes on both sides of vertebral column; The muscles contract alternately causing the vertebral column to swing sideways; When muscle blocks on the right relax and those on the left contract; the body bends to the left side; When the muscles of the left relax and those on the right contract; the body bends to the right; The fish uses its fins to control the position of its body in water; During forward movement paired fins/pectoral and pelvic fins lie flat on the body surface to reduce resistance/friction; To change direction the fish uses the paired fins; Paired fins are also used by fish to change its level in water/control/prevent pitching; The fish spreads out the pectoral and pelvic fins at 90° to the body; to enable it to brake; Fish can also use the swim bladder to change its level in water; When the bladder fills up with air the fish becomes lighter/more buoyant; making it to rise in water; When the air leaves the bladder the fish becomes heavier; making it to sink deeper in the water; water currents may cause the sideways swaying of the body of the fish/ yawing; Dorsal and ventral fins prevent rolling/yawing;

(25 Marks)

Max. 20 Mark

### 30.4.3 Biology Paper 3 (231/3)

1. (a)

	Procedure	Observations	Conclusion
Iodine test	Add (a few drops of) iodine (to liquid in the beaker);	No change in colour/Brown/yellow /orange colour of iodine retained;	Starch absent;
Benedict's test	(To 2 ml of the liquid from the beaker),(2 ml of) Benedict's solution is added. The mixture is heated/boiled/ warmed in a water bath;	The solution acquires a brick red colour; Yellow/orange/brown/ reddish brown. NB. Colour sequence must be correct	Reducing sugar is present;

(6 marks)

(b)

	Procedure	Observations	Conclusion
Iodine test	Add (a few drops of) iodine (to contents of visking tubing);	Solution acquires a blue black colour/blue/black/bluish Black colour;	Starch present;
Benedict's test	(To 2 ml of the liquid from the beaker), (2 ml of) Benedict's solution is added. The mixture is heated/boiled/warmed in water bath;	The solution acquires a yellow/orange/brown/reddish brown colour;	Reducing sugar is present;

(2 marks)

Observations and conclusion that is repeated to be awarded once in (a) and (b).

(c) The visking tubing is semi-permeable/selectively permeable; allowing (the small) reducing sugar molecules to diffuse/move pass through; but (not the large molecule of) starch; (3 marks)

- NB.
- (i) spelling of reagents must be correct.
  - (ii) Quantities of reagents and test materials if stated must bear correct units e.g. ml/cm<sup>3</sup>
  - (iii) Procedure for Iodine to be awarded once in (a) and (b) Procedures, observations and conclusion for Benedict's Test to be awarded once in (a)/or (b).
  - (iv) Award if student refers to Iodine as solution E, Benedict's solution as solution F and contents of visking tubing as L.
  - (v) Deny all marks if student writes a wrong food substance in the Test column e.g. Non-reducing sugar.

2. (a) <b>String</b>	<b>Chamber</b>	<b>Blood vessel</b>	
Blue	right ventricle;	pulmonary artery;	
Green	left ventricle;	(branches of) aorta;	
Cream 1	right auricle/atrium	vena cava;	
Cream 2	left auricle/atrium;	pulmonary vein	(8 marks)

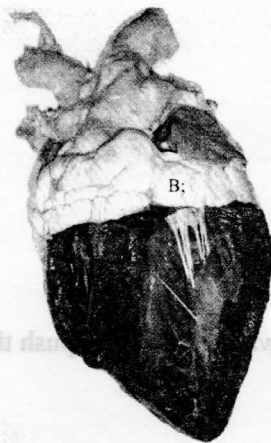
(b) (Inter-ventricular) Septum; (1 mark)

(c) 4 is thicker than 5, because the latter (forms the wall of the chamber that) pumps blood to the lungs and 4 (forms the wall of the chamber that) pumps blood to all the other parts of the body; Distance be compared i.e. longer if the parts are not named. (1 mark)

- (d) X Vein(s);  
Reason: It has thin walls/ less muscular walls;  
Y Artery(Arteries);  
Reason: It has thick walls/more muscular walls; (4 marks)



(e)

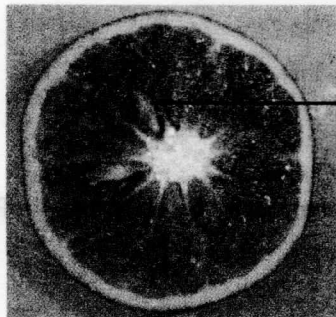


NB: (i) Accept any point of the region marked.  
 (ii) Labelling rules to be adhered to e.g. continuous line, no arrow head to structure.  
 (1 mark)

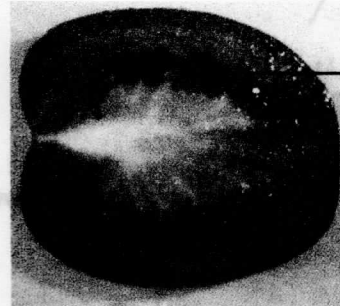
- (a) **Q** Marginal;  
**R** Axial/axile/central;  
**S** Central;

(3 marks)

(b)



Seed;



Seed;

(2 marks)

- (c) 6 Epicarp/Exocarp;  
 7 Seed; Acc cotyleone(s)  
 8 Edocarp;  
 9 Mesocarp;  
 10 Remain of flower stalk/pedice/fruit stalk;

(5 marks)

(d) **Q** Self (dispersal)/self explosive/explosion (mechanisms/explosive mechanism/self Dispersed);

Reason Presence of sutures/lines of weakness/dehiscence (along which it splits);

**T** By animal(s)/animal dispersed;

Reason The fruit is fleshy succulent/brightly coloured/fleshy mesocarp (and animals eat and drop the seed on another place far away from the mother plant);

(4 marks)