4.4 BIOLOGY (231)

4.4.1 Biology Paper 1 (231/1)

1.(a) Is when the rate of water loss is more than the rate of absorption and the plant droops; 1 mark

(b) The rate of active transport increases with increase intemperature up to the optimum temperature; 1 mark

Further increase in temperature slows down the rate of active transport until it stops because it denatures enzymes; 1 mark

2.(a) Animal cell; 1 mark

(b) - Has cell membrane only/has no cell wall;
- Has numerous small vacuoles;
- Has central nucleus; Max. 2 marks

(c) Consists of many similar cells performing the same function; 1 mark

3.(a) Have mammary glands; have external ears/pinna;
Body covered with fur/hair; Max. 2 marks

(b) Class; 1 mark

4.(a) Lubrication; Protection; 2 marks

(b) Young people are more active; requiring more energy;/
Older people are less active; requiring less energy; 2 marks

5. As the cell gains water by osmosis; the sap/cellvacuole enlarges; pushing the cytoplasm outwards; exerting pressure on the cell wall; Any 3 3 marks

6. $\frac{6000(\mu m)}{55 \text{ (cells)}}$; 109μm; 2 marks

7.(a) Water molecules cling to each other maintaining a continuous column of water/preventing the break of water column; 1 mark

(b) Water molecules cling to the sides of the xylem vessel walls; 1 mark

8. 1(a) - Leaf with serrated margin -- go to 2;
(b) - Leaf with smooth margin -- go to --; 2 marks

9. Presence of myelin sheath for insulation/increases transmission; Axon for transmission of impulses;
Large cell body controls activites of cell; Nerve endings/dendrites receives impulses from

receptors cells;
Node of Ranvier speeds up impulse transmission.

(b) Inner membrane highly folded/cristae to increase S A for attachment of (respiratory) enzymes.

4 marks

10. Cells loosely arranged; to facilitate air circulation;
Cells have moist surfaces; to dissolve respiratory gases;

2 marks

11. Can receive blood from any donor/ universal recepient; 1 mark

12. (a) (i) Arachnida; 1 mark

(ii) Spider/scorpion/tick/mite; 1 mark

(b) Protoctista/protista; 1 mark

13. Autotrophic nutrition; show alternation of generation;
Limited movement;
Limited excretory products/unspecialized respiratory structures;
Localised growth; 2 marks

14. Alcohol/ethanol; Carbon (IV) oxide; Energy/Adenosine Triphosphate; 3 marks

15. - To increase supply of oxygen to the tissues;
- The oxygen is used to oxidize lactic acid (to carbon (IV) oxide, water and energy);

2 marks

16. Protogyny; protandry; Dioecious; Dichogamy;
Self sterility/incompatibility; Heterostyly;
Presence of structures/substances to attract agents of pollination; Max. 3 marks

17. Ovary /Anther; 1 mark

18. - Acrosome/Lysosome contain enzyme to digest membrane of the ovum;
- Numerous mitochondria to provide energy for movement;
- Long tail for faster movement; Max. 2 marks

19. - Embryo not fully developed;
- Chemical inhibitors/presence of abscisic acid;
- Hard/impermeable testa/seed coat;
- Low hormones/low enzymes concentration; Max. 3 marks

20. Genetically acquired beneficial characteristics which occur spontaneously; are perpetuated through reproduction; 2 marks

21.(a) Continents existed as one large Landmass/Pangea/Laurasian and Gondwana Land;
Present continents drifted from it leading to isolation of organisms; organisms in each continent
evolved along different lines hence emergence of new species; 3 marks

(b) Emergence of new life/species/organisms from pre-existing simple forms, gradually over a long period of time, to present complex forms; 1 mark

22.(a) Thigmotropism/Haptotropism; 1 mark

(b) Part of the tendril in contact with support causes migration of auxins to the opposite side; leading to faster cell division/growth on the side not in contact with the support; This causes the tendril to curl around the support;
3 marks

23. Use of biconcave/concave lens/divergent lens; to diverge the rays and make image be focussed on the retina; 2 marks

24. - Contains antibodies that defend the body from foreign antigens;
- Has white blood cells that produce antibodies/while blood cells engulf antigens;
- Has platelets that initiate blood clotting to prevent excessive bleeding at an open wound/ prevent entry of pathogens;
3 marks

25. - Thin and long to allow for capillarity;
- Walls lignified to strengthen the stem/to prevent collapse of vessels;
- Have bordered pits to allow for exchange of materials;
Max. 2 marks

26.(a) Genes inherited along with the sex chromosomes; 1 mark

(b) Haemophilia; hairy ears/pinna/nose; colour blindness/red green; blue-green colour blindness; Muscular diastrophy; baldness
2 marks

27.(a) Complete metamorphosis - eggs hatch into larvae while in incomplete metamorphosis hatch into nymphs which resemble the adult;

Complete metamorphosis has four stages; egg, larvae, pupa and adult while an incomplete metamorphosis has three stages; egg, nymph and adult. 2 marks

(b) To allow for growth of the insect; 1 mark

28. (a) Ligaments; synovial fluid; synovial membrane; articular cartilage; synovial capsule; a bone with rounded head fitting into a cavity of another bone;
Max. 2 marks

(b) (i) Atlas; (ii) Axis allows movement in all planes; 2 marks

29. - Form joints with the legs to make walking possible; 1 mark
- Provide large surface area for attachment of muscles; 1 mark
- Offers support (to the body weight)

30. Absorption of water; support;
Opening and closing of stomata;
Feeding in insectivorous/plants; 2 marks

4.4.2 Biology Paper 2 (231/2)

1. (a) (i) **B** Seta/stalk; 1 mark
D Rhizoid; 1 mark

(ii) **A** Production of spores/sporulation; 1 mark
C Photosynthesis; 1 mark

(b) (i) Arthropoda; 1 mark

(ii) - Segmented body;
- Jointed appendages;
- Presence of exoskeleton 3 marks

2. (a) **E** Semi circular canals;
F Oval window/Fenestra ovalis/Fenestra vestibuli;
G Cochlea; 3 marks

(b) (i) Lined with hair/secretion of wax/(has glands that secrete wax) to trap foreign bodies;
Hollow/tubular/tube; to direct sound waves to the ear drum/tympanum/tympanic membrane;
(max) (2 marks

(ii) Small/form a lever system/solid; to amplify (sound) vibrations; (2 marks)

(c) Deafness/ absence of pinna/ vertigo/tinnitus; (max) (1 mark

3. (a) (i) Provides energy needed to split water molecules into oxygen and hydrogen/ photolysis;
Provides energy for formation of ATP molecules (which is used in dark stage)
(1 mark)

(ii) Combines with hydrogen ions to make glucose; (1 mark)

(iii) Used to trap light energy; (1 mark)

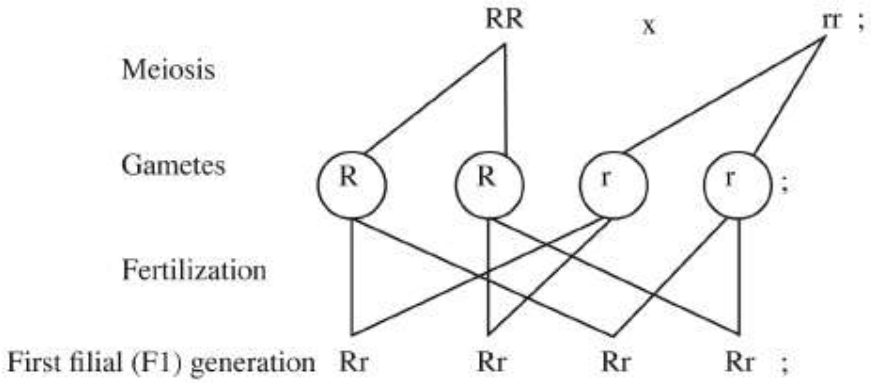
(b) (i) Starch;

(ii) Protein; (2 marks)

(c) (i) Lack of vitamin B1/thiamine; (1 mark)

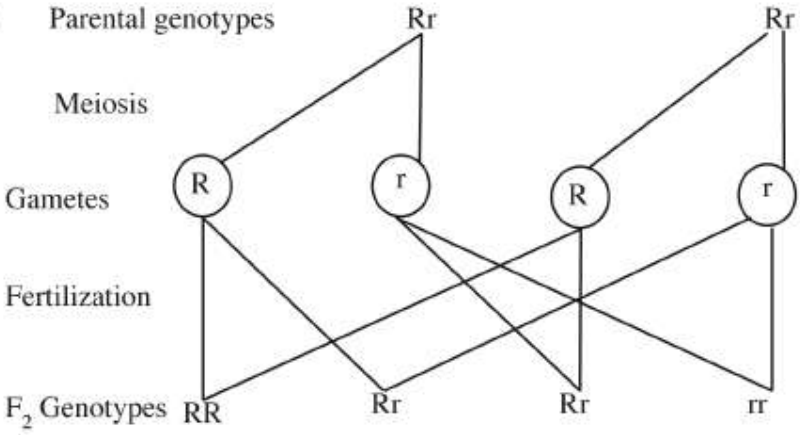
(ii) - Stunted growth;
- Paralysis of legs/arms/limbs/damage to peripheral nerves;
- Heart failure
- Swelling of feet/oedema
- Gastrointestinal disturbances/loss of appetite/sonstipation/diarrhoea/vomiting;
- Weight loss/muscle wasting
- Pale skin (2 marks)

4. (a) Parental phenotypes Smooth Wrinkled



(3 marks)

(b) Parental genotypes Rr Rr



(1 mark)

(i) Genotypic ratio 1 : 2 : 1 ;
(1 mark)

(ii) Phenotypic ratio 3 smooth coats : 1 wrinkled coat;
(1 mark)

(c) The total number of wrinkled seeds.

1/4 x 14,640 = 3660 ; (2 marks)

5. (a) (i) **H** - It is long/wide/broad/flat; to provide a large surface area for attachment of muscles;
- Has facets; for articulation with sacrum; (2 marks)

(ii) **J** Has flexible cartilage; which allows for widening of the (female) pelvic girdle when giving birth/to absorb shock.
(2 marks)

(b) Allows passage of blood vessels/nerves/ and muscles; (1 mark)

(c) (i) Femur; 1 mark
(ii) Ball and socket; 1 mark

(d) Coccyx; 1 mark

6. (a) See graph on page 5.

(b) (i) No change in population/population is constant; mice still maturing/have not given birth;
(2 marks)

(ii) Slow/gradual population growth; few mice have reached sexual maturity;
(2 marks)

(iii) Faster/rapid rate of population growth/exponential;
Many mice sexually matured/reproducing/enough food/space/no competition/ birth rate higher than death/no diseases: (2 marks)

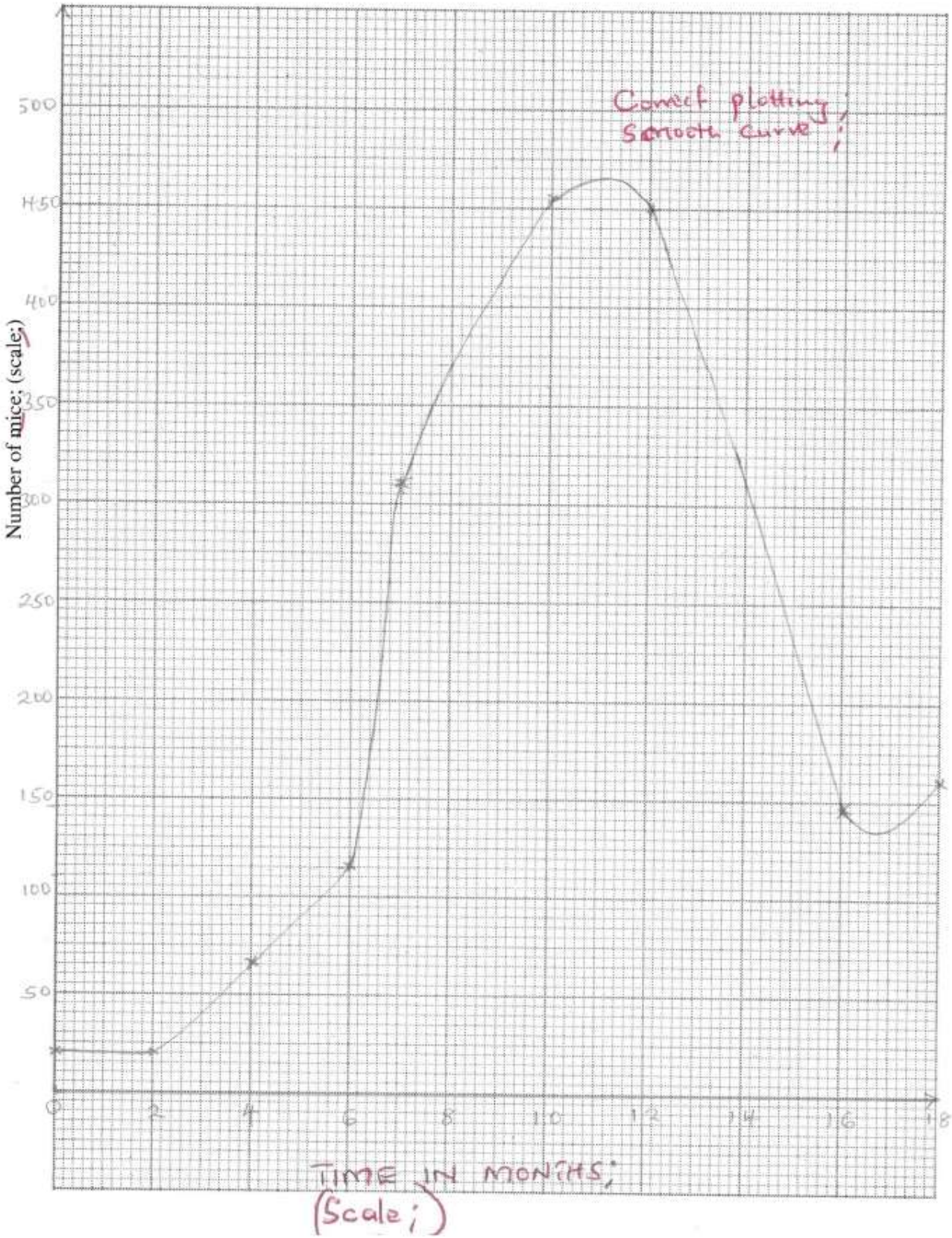
(iv) Population decline;
Competition is high / food is limiting / space is limiting/accumulation of toxic waste/disease (outbreak) deathrate higher than birth rate.
(2 marks)

(c) (i) 6 and 8 ; (1 mark)

(ii) 310 - 115 = 195 mice per month;
(2 marks)

(d) Population would increase; (1 marks)

(e) Food; space ; cage size; water;
(max) (2 marks)



7. (a) When a blood vessel is cut/injured platelets/thrombocytes/damaged tissue/wound is exposed to the air; they release thrombokinase/thromboplastin ; an enzyme that activates the conversion of prothrombin; to thrombin; in the presence of calcium ions; vitamin K/ phylloquinone ; is needed for the formation of prothrombin; Thrombin converts (soluble blood protein) fibrinogen ; into (the fibrous form) fibrin; which forms a mesh / network across the wound; The clot so formed prevents excessive bleeding; and entry of disease agents/pathogens/micro-organisms/microbes;

Max 10 marks

(b) Many to provide a large surface area; across which large amounts of gases diffuse; moist surfaces; to dissolve respiratory gases; so as to diffuse. Made of a thin membrane/epithelium/one cell thick wall ; to reduce diffusion distance; Highly vascularized; to carry away oxygen; and bring in carbon (IV) oxide; creating a steep diffusion gradients. (10 marks)

8. (a) Regulation of blood sugar ; when blood sugar is below normal/90 mg/100 cm^3 glucagon ; triggers the conversion of glycogen to glucose in the liver ; the glucose is released into the blood stream. When blood sugar is in excess above normal/10 mg/100 cm^3, insulin; causes the liver to convert glucose excess to glycogen ; which is stored.

Production of heat energy ; by increasing the rate of metabolic activities;

Excretion of bile pigments ; produced due to breakdown of worn out red blood cells; Deamination/removal of amino group of excess amino acids to form urea; and detoxication/poisonous/toxic substances;

(Max 10 marks)

(b) Sweat glands excrete urea; excess water; and salts; hence maintaining salt & water balance in the blood. Evaporation of sweat; cools the body due to loss of latent heat of vaporization; when the body temperature rises ; blood vessels in the skin vasolidate; allowing more blood to flow near the skin surface; thus heat is lost to the environment by radiation/convection. The erctor pili mucle relaxes hair flattens ; in a hot environment reducing insulation; hence heat is lost from the body by radiation/ convection; to the environment.

(max 10 marks)

4.4.3 Biology Paper 3 (231/3)

1. (a) (i) Sternum; (1 mark)

(ii) The internal intercostal muscles relax; pulling the ribs upwards; and outwards;
This increases the volume of the rib cage while pressure decreases;
Forcing air into the lungs;
(5 marks)

(b) (i) Anterior/dorsal view; (1 mark)

(ii) Name - Neural canal; (1 mark)

Function - Passage of the spinal cord. (1 mark)

(iii) **V**: It is thick and solid; for bearing the weight of the body (back) (2 marks)

S: It is long; to provide a large surface area for attachment of muscles;
(2 marks)

(c) (i) Image width = 9.8 cm;

(ii) Magnification = $\frac{\text{Image length / width}}{\text{Actual length / width}}$;

$= \frac{9.8 \pm 0.1}{4.6 \pm 0.1}$

Mg = × $\frac{2.13}{}$;

(iii) Actual length AB = $\frac{10.4 \pm 0.1}{2.13}$;

= 4.8826 cm ;

(5 marks)

3.

1. (a) Simple leaves ..... go to 2;
   (b) Compound leaves ..... go to 4;

2. (a) Leaves net-veined/reticulate ..... go to 3;
   (b) Leaves parallel veined ..... *Commelinaceae*;

3. (a) Leaves with serrated margins ..... *Malvaceae*;
   (b) Leaves with smooth (entire) margins ..... *Nystaginaceae*;

4. (a) Leaves opposite ..... go to 5;
   (b) Leaves alternate ..... *Bignoniceae*;

5. (a) Leaves pinnate ..... *Papilionaceae*;
   (b) Leaves trifoliate ..... *Compositae*;

(10 marks)

Food Substance Tested	Procedure	Observation	Conclusion
1. Reducing sugars	· Put 2 cm ^{3} of C in a test tube; · Add equal volume of Benedict's Solution. · Put in a hot water bath/heat/ warm/boil;	No colour change/ blue colour remains/ colour of Benedict's solution remains/ persists;	Reducing sugars absent;
2. Reducing sugar	· Put 2 cm ^{3} of C in a test tube; · Add a few drops of dilute hydrochloric acid. · Place the test tube in a hot water bath for 3 minutes; · Remove the test tube and cool in cold water. · Add $(NaH)_2CO_3$ drop by drop until fizzing stops · Add 2 cm ^{3} of Benedict's Solution. · Place the test tube in a hot water bath/heat/warm/boil;	Colour changes to green / yellow / orange / brown;	Reducing sugars present;
3. Proteins	· Put 2 cm ^{3} of C in a test tube; · Add an equal amount of sodium hydroxide solution and shake. · Add copper sulphate drop by drop, shaking well after each addition;	Colour changes to purple/violet/mauve;	Proteins present;