4.4.2 Biology Paper 2 (231/2)

SECTION A (40 marks)

1. (a)
- Fruit fleshy/juicy/succulent;
- Fruit brightly coloured/large/inclusters;
- Fruit scented has sweet smell/sweet aroma;
- Seeds have tough/hard testa;
- Some seeds have sticky/mucoid secretions;
- Fruits have hooks;

(max 4 marks)

(b) (i) Luteinising hormone:-
stimulates ovulation;
stimulates the development of remains of the graafian follicle into corpus luteum;
stimulate corpus luteum to produce progesterone; (max 2 marks)

(ii) Oestrogen:-
stimulates healing and repair of uterine lining /endometrium following menstruation;
stimulates pituitary gland to secrete luteinising hormone; (2 marks)

2. (a) Carbonic acid/carbaminohaemoglobin/hydrogen carbonate;
(1 mark)

(b) (i) Water;
(ii) Carbonic acid; (1 marks)

Role: catalyses reaction between carbon IV oxide and water to form (weak) carbonic acid; (2 marks)

(c) Prevents accumulation of acidity/maintains pH of blood since hydrogen ions combine with haemoglobim to form Haemoglobinc acids;
Faster; due to the catalytic effect of carbonic anhydrase;
(max 2 marks)

(d) Activates thromboplastin; thrombokinase to neutralize heparin/convert prothrombin to thrombin;
(2 marks)

3. (a) O_2 concentration is higher outside than inside the lenticels; O_2 diffuses into lenticels; then into the cells;
CO_2 concentration is higher inside the lenticels than on the outside CO_2 diffuses out of the lenticels into the atmosphere; (4 marks)

(b) (i) To provide a large surface area/ make them thin; for gaseous exchange/ to reduce diffussion distance for respiratory gases;
(3 mark)

(ii) This increases the volume of the buccal cavity while decreasing the pressure; which forces water to rush into the mouth;

(2 mark)

4. (a) Males have two dissimilar chromosomes X and Y/heterogametic;
Females have two similar chromosomes X and X/homogametic;
Male gamete/sperms have either X or Y chromosome, while all ova have X chromosome;
If a sperm with X fuses with an ovum a female is formed and if a sperm with Y fuses with an ovum a make is formed;

(4 mark)

(b) (i) Sickle-cell trait is heterozygous while sickle cell anaemia is a homozygous condition;

(2 marks)

(ii) People with sickle cell trait are resistant to malaria; because the plasmodium cannot survive in sickle shaped red blood cells.

(2 marks)

5. (a) H - cell body; (1 mark)

(b) – Has nutrients for nourishment of neurons, brain, spinal cord;
– Acts as a shock absorber for protection of spinal cord from mechanical damage;

(2 mark)

(c) Contains myelin sheaths (of neurons which are made up of fats that make it have a shiny white appearance); (1 mark)

(d) Cholinesterase; (1 mark)

Breaks down Acetylcholine; to acetic acid and choline;

(2 marks)

(e) Correct arrow on neurone **1** points towards the grey matter; (1 mark)

SECTION B (40 marks)

6. (a) Scale 2x1 mark

Identity of axes 2x1 mark

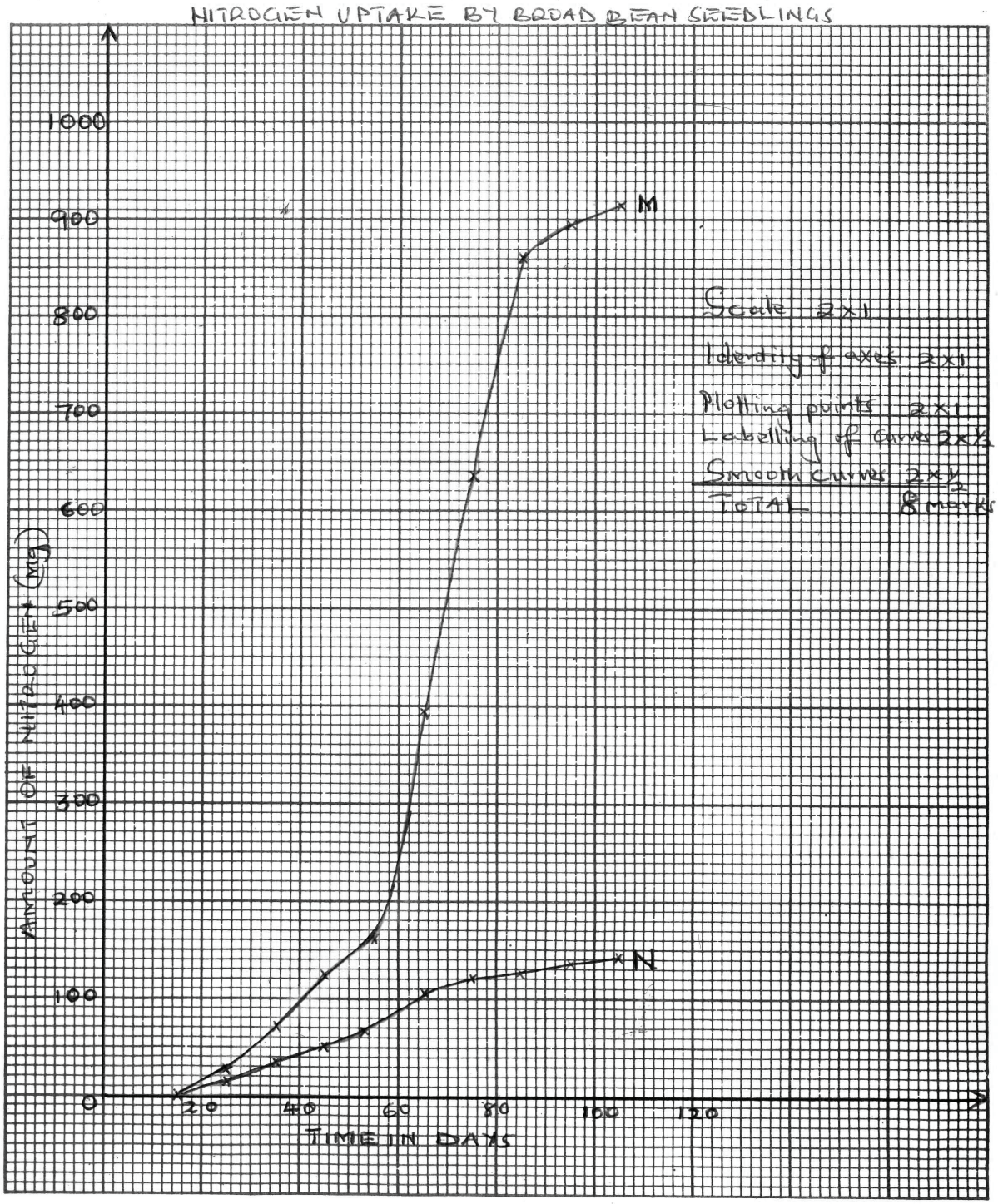
Plotting of points 2x1 mark

Labelling of curves 1 mark $(\frac{1}{2} \times 2)$

Smooth curves 1 mark $(\frac{1}{2} \times 2)$

(b) At 65 = 395; $\frac{860-395}{20}$ $\frac{465}{20}$; = 23.25 ± 1 mg/day
At 85 = 860

(2 marks)



(c) (i) The higher the carbon (IV) oxide content in air, the higher the nitrogen uptake and vice versa;

(1 mark)

(ii) More Carbon (IV) oxide in the air makes the seedlings to photosynthesize more; hence more amino acids/protein; are formed in the dark stage; formation of amino acids/protein requires nitrogen;

(max 3 marks)

(d) (i) The concentration of nitrogen would remain constant;

(1mark)

(ii) Despite decline in CO_2; the nitrogen already absorbed/taken up by the plant will still remain;

(3 marks)

(iii) Lightning;
By free-living bacteria/micro organisms;
By Rhizobium (in root nodules of legumes);

(3 marks)

7. (a) (i) Reactions in photosynthesis are catalysed by enzymes; at optimum temperature photosynthesis proceeds faster;
Below optimum temperature the rate of photosynthesis decreases because enzymes are inactivated by the low temperatures / above optimum the rate of photosynthesis decreases because enzymes are denatured;

(2 marks)

(ii) Chlorophyll traps energy from sunlight for photosynthesis;
The higher the chlorophyll concentration the higher the rate of photosynthesis and vice versa;

(2 marks)

(b) **In the mouth;**
Food is chewed; to increase surface area for enzyme activity/saliva contains salivary amylase;
Saliva mixes with food and provides an alkaline medium; for amylase enzymes;
Salivary amylase acts on starch and converts them to maltose;
In duodenum;
Food is mixed with bile; and pancreatic juice;
Bile provides alkaline medium; for activity of duodenal enzymes; and neutralizes acidic chyme from the stomach;
Pancreatic juice contains pancreatic amylase; which converts starch to maltose;
In the Ileum;
Epithelial cells in Ileum secrete ***succus entericus***; which contains enzymes;
sucrase; which acts on sucrose and converts it to fructose and glucose;
Lactase; which acts on lactose and converts it to galactose and glucose;
Maltase; acts on maltose and converts it to glucose;

max 16 marks

8. (a)
- Diffusion of Carbon (IV) Oxide; and oxygen; through stomata and lenticels;
- Some wastes are stored in tissues in non-toxic form e.g. calcium oxalate;
- Some of these tissues or organs drop off from plants e.g. leaves, flowers, fruits and bark of caffeine, nicotine, quinine;
- Some wastes are released by transpiration through stomata and lenticels such as water vapour;
- Others are released by guttation through hydathodes as water;
- Others are released by exudation. (max 4 marks)

(b) When body temperature is lowered below normal;
arterioles in the skin constrict;
blood is diverted to a shunt system;
less blood flows to the skin/less heat is lost;
when body temperature is raised above normal;
arterioles in the skin dilate;
more blood flows to the skin;
more heat is lost by convection and radiation;

when body temperature is lowered below normal:
erector-pilli muscles contract, hair stands erect;
more air is trapped, air is a bad conductor;
and insulates the body against heat loss;
when body temperature is raised above normal:
erector-pilli muscles relax, hair lies on skin;
less air is trapped, more heat is lost;

when body temperature is lowered below normal:
less fluids are absorbed by sweat glands;
less sweating, less vaporisation of water;
when body temperature is raised above normal:
sweat glands are more stimulated and more sweat is produced;
water in sweat evaporates and takes up heat from the body;
body is cooled/body temperature is lowered;

(max 20)