BIOLOGY Paper 2 MARKING SCHEME

**MARCH/APRIL - 2023**

**SECTION A – (40 MARKS)**

***Answer All Questions In This Section In The Spaces Provided.***

1. (a) Anaerobic respiration / fermentation;

(b) To remove dissolved oxygen gas;

(c) To avoid denaturing of yeast cells;

(d) To prevent entrance of oxygen in the glucose solution;

(e) Formation of white precipitate;

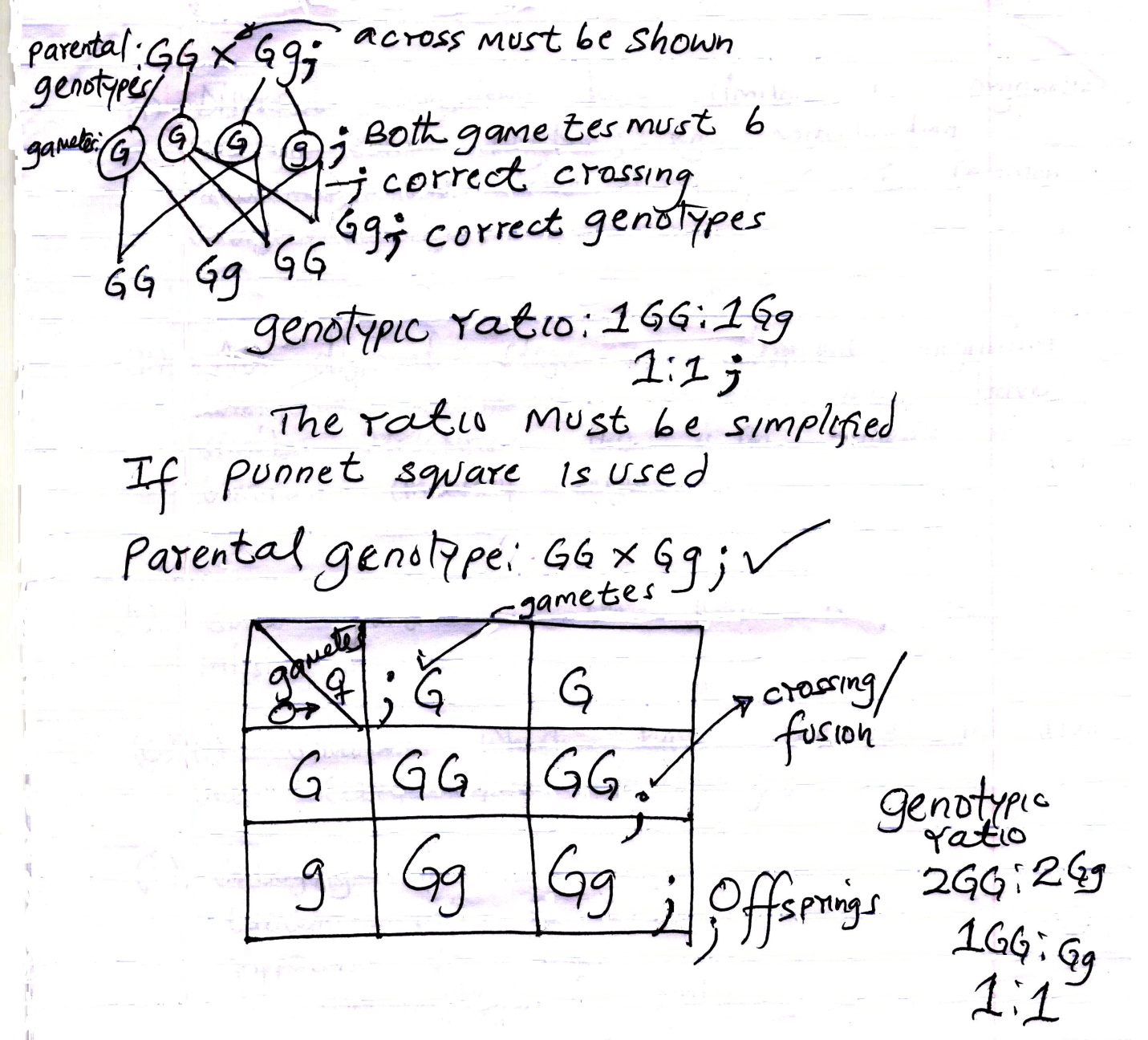
Formation of bubbles;

(f) Increase in temperatures; due to heat energy production during the anaerobic respiration;

(g) Use boiled yeast on glucose;

1. (a)

(i)



(ii) All offspring have green grains**/**green coloured grains;

(b) Genetic manipulation to produce desired characteristics/identify desirable genes, alter, isolate and transfer to another organisms;

(c) A situation where offsprings**/**progeny show characteristics which are superior to either of the parental stock;

1. (a) (i) Different organisms have similar cell organelles serving same function; e.g. Mitochondria, ribosomes, DNA. This is a proof of common embryonic origin;

(ii) At different stage of different organism development, different embryos will have similar structure; this is an evidence of common ancestral origin.

(b) Some parts of the fossil may be missing;

(c) (i) Structures which have reduced in size and ceased from functioning;

(ii) Coccyx in man

Caecum in man

Appendix in man

Mammary glands in males

Nictitating eye membrane in man

1. (a) (i) Phloem tissue**/**phloem; Reject if wrongly spelt

(ii) Translocation; a(i)and a(ii)are tied deny (ii) for function if a different structure is named in a(i) which is not phloem. If a(i) is blank and function is correct award.

b)

* Supply nutrients to the sieve tube element;
* Supply energy for translocation due to presence of numerous mitochondria to generate energy for translocation;
* Regulates activities of tube cells**/**elements;

**NB:** accept first two only

c) Sugars**/**glucose;

* + - Amino acids;
    - Hormones e.g. auxins;
    - Oils**/**lipids;
    - Resins;
    - Vitamins; Accept first two only

d) Explain the role of Xylem in plant nutrition;

* Transport water from the roots to the leaf for photosynthesis are a raw material;
* Contain walls which are lignified to expose leaves for trapping sunlight energy for photosynthesis;

(a) (i) Absorb oxygen;

(ii) To find out if light is necessary for germination;

(b) (i) At 40C - temperatures below optimum; enzymes are inactive hence little germination;

At 600C – high temperatures above optimum; denatures enzymes / killed cells / protoplasm hence no germination;

At 350C – Optimum temperatures hence highest percentage of germination;

(ii) Some seeds are not viable;

(c) Water

(i) Activates enzymes, hence allowing them hydrolyze food;

(ii) Medium of chemical reaction;

1. (a) (ii) 42 hours;

(iii) M – 1220 ± 20 = 1200 – 1240 = 680 ± 40

N – 540 ± 20 = (520 – 560) Ranges between

(520 – 560); 680 – 720;

*Method;*

*Answer;*

(iv) Population (growth) decreases /Acc reduce;

High temperatures kill micro organisms / denature enzymes;

(v) Death rate (of the micro organisms) is higher than the rate of multiplication; due to exhaustion of nutrients / depletion of nutrients;

* Accumulation of toxic wastes/wastes;
* Shortage of oxygen;
* Overcrowding/ shortage of space;

NB: Award for observation first then reasons (3 marks)

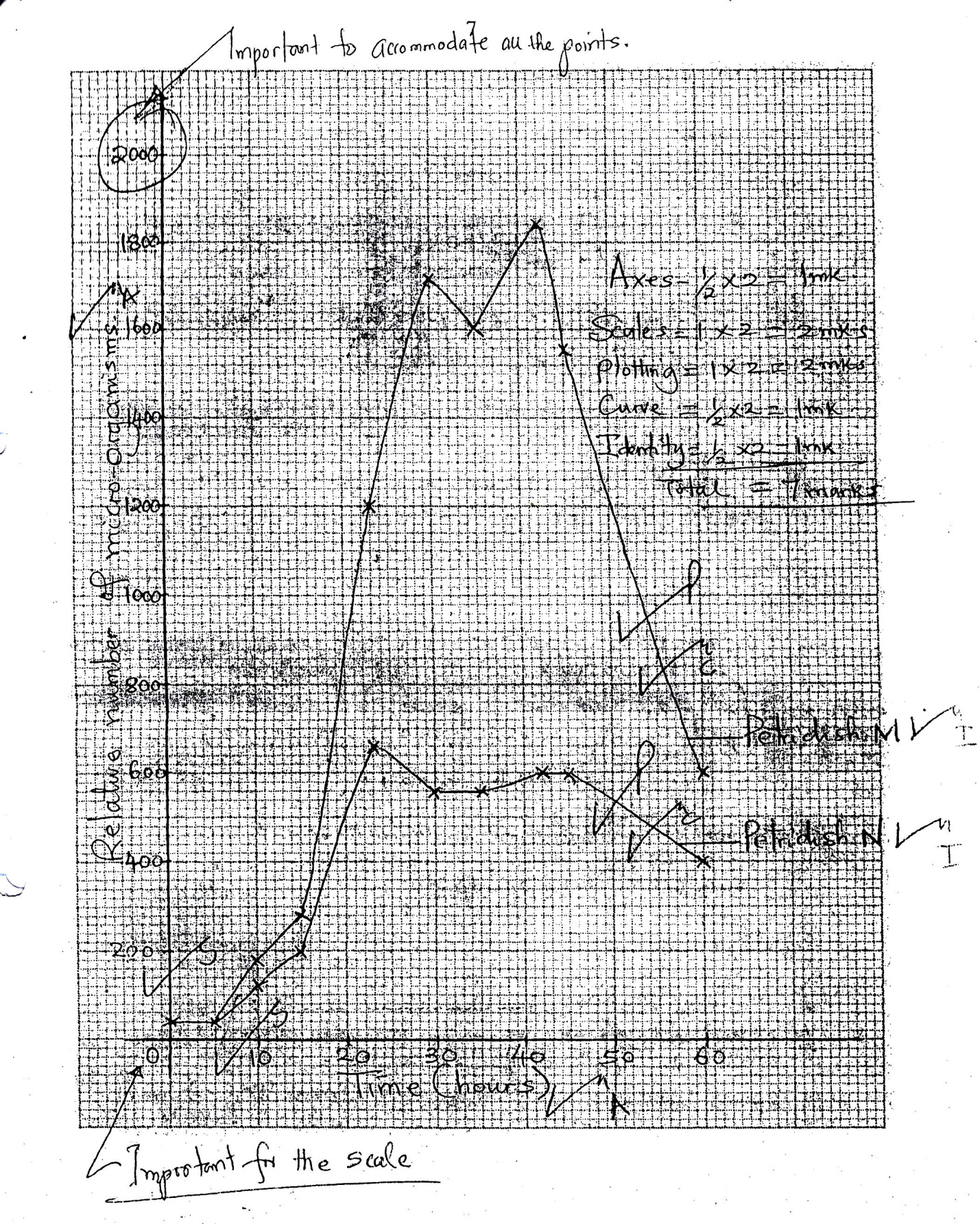
(b) When osmotic pressure of the blood increases (beyond the normal osmoreceptors in) the hypothalamus detects this and stimulates the pituitary gland; to secrete /release more antidiuretic hormone/ vasopressin; which makes distal convoluted tubule /kidney tubules more permeable to water; and more water is reabsorbed into the blood; reducing the osmotic pressure to normal level; (Accept the converse, Reject use of Abbreviations. (5 marks)

Or

When osmotic pressure is high;

When there is too much sodium ions in the blood; the adrenal cortex responds by secreting less aldosterone; which causes less sodium ions to be absorbed from the gut into the blood and less sodium ions to be reabsorbed from the kidney tubules into the blood; and more sodium to be reabsorbed from the kidney tubules into the blood; raising the sodium levels;

6 (a) (i) Graph



1. (a) Budding in yeast

* Part of cellwall softens and extends a projection called a bud;
* Nucleus divides into two;
* One nucleus move into the bud;
* Bud increases in size; cellwall forms between growing bud and parent cell;

Bud is cut off to grow into new organism /yeast organism; (6 marks)

Max 5

*NB: accept a drawn well labeled diagram accompanied by explanation;*

(b) Economic Importance of bacteria

* Some bacteria are used in making milk products e.g. yoghurt/cheese/fermented milk;
* Some bacteria are used in curing tobacco and fermentation of tea;
* Production of enzymes /vitamin B12/ vitamin K;
* Biogas production /methane;
* Saprophytic bacteria important in decomposition of dead organic matter e.g. compost manure;
* Symbiotic bacteria important in decomposition of dead organic matter in compost manure;
* Cause diseases in man /domestic animals/ plants;
* Some bacteria spoil food /cause food poisoning;
* Some symbiotic bacteria /free living bacteria fix atmospheric nitrogen into nitrates;
* Denitrifying bacteria reduce the nitrate content of the soil lowering its fertility.

(c) Transpiration

* Excretion of excess water in form of water vapour.

Diffusion

* Elimination of carbon (iv) oxide from cellular respiration and excess oxygen from photosynthesis.

Deposition and leaf / flower /fruit fall

* These occur when these structures fall off the plant with deposited excretory substances;

Exudation /guttation

* Excretion of excess water, gases and salts through special pores /hydathodes;

Storage in heartwood

* Some nitrogenous wastes e.g. Tannins /germs/ oil/ resins are stored in the heartwood /dead non-conducive xylem;

1. (a)Process of photosynthesis in green plants

Raw materials of photosynthesis are water; and carbon (iv) oxide;

For the process of photosynthesis to take place, it requires light; and chlorophyll; (pigment)

It occurs in the chloroplast; in the leaf

It takes place in two stages:

Light stage /light dependent stage; and dark stage /light independent stage;

(7 marks)

**Light stage/light dependent stage** occurs in the grana of chloroplasts; chlorophyll molecule traps sunlight energy; for splitting water molecules into oxygen and hydrogen/ photolysis;  **Light energy**

**acc/2H20 4H + 02**

**chlorophyll**

**chlorophyll**

**Water Hydrogen + Oxygen;**

**Light energy**

Hydrogen atoms produced in photolysis enter dark stage; while oxygen is released into the atmosphere and some used by plant for respiration;

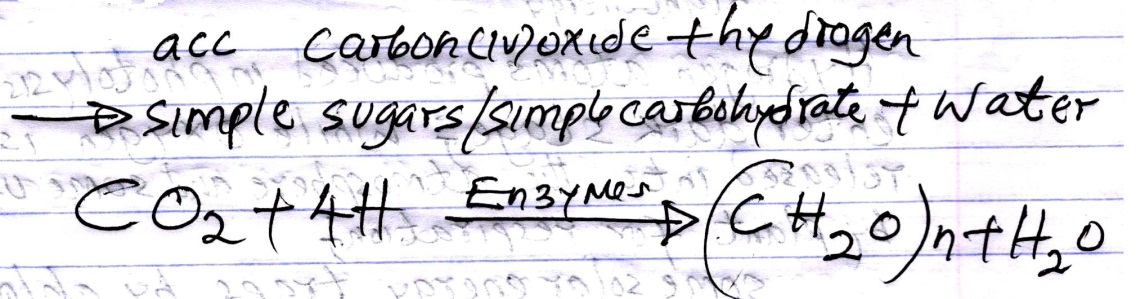
Some solar energy traps by chlorophyll is used in formation of Adenosine triphosphate/ATP; This reaction involves conversion of light energy into chemical energy;

**Dark stage/Light Independent Stage**

It proceeds whether light is present or not; it take place in the stroma; Reject stoma. It involves combination of carbon(iv)oxide with hydrogen atoms; a process known as carbon(iv)oxide fixation; to form simple sugar e.g glucose; it involves a series of enzyme controlled reactions;

The energy required for this process is provided by ATP (Adenosine Triphosphate) from light stage reaction; intermediates products undergoes further chemical reactions to form simple sugars e.g. glucose; some is utilized directly by plant cells while the rest are converted into starch for storage in plant tissues;

Fatty acids and glycerols, amino acids are formed in the dark stage.



21 max 10

(b) Conditions necessary for germination

1. Water;

* Medium for enzymatic activity;
* Hydrolyze /hydrolysis of stored substances into simple substances;
* Medium of transport /Transport hydrolyzed food to region of growth at tip of shoot and root;
* Softens seed testa/coat for emergence of radicle and plumule.
* Act as a solvent / dissolve food substances;
* Activates enzymes hence speed up rate of reaction in the seed; (7 marks)

1. Oxygen;

* Oxygen is used for respiration/oxidation of food to release /generate energy; (2 marks)

1. Suitable /optimal temperature;

* Temperature above optimum enzymes are denatured; rate of enzyme action during respiration is slowed down; Temperature below optimum enzymes are inactivated slowing down rate of germination;
* Enzymes action/activity is highest when temperature is optimum/ at optimal temperatures; rate oof germination increases;
* Rate of germination increases with increase in temperature upto optimum; (6 marks)

Accept examples of enzymes and food substances they act on and products.

1. Enzymes;

* Oxidation of food and breakdown /hydrolysis of food;
* Assist in conservation of hydrolyzed food products into new plant tissues;

(3 marks)

1. Viability of seeds; acc viability.

* Seeds whose embryo are alive and healthy can germinate;
* Seeds stored for a long time lose their viability due to depletion of food reserves and destruction of their embryo by pests and diseases and insects; (3 marks)

NB: Accept named examples of enzymes, substrate they hydrolyze and their end products to score for hydrolysis of food.

Examples: Diastase enzyme – hydrolyze carbohydrates into glucose; lipase hydrolyze lipids into fatty acids and glycerol; protease act on proteins to amino acids;

1. Hormones; / Gibberellins/ cytokinins;

* Counteract effect of germination inhibitors;