TERM 2 - 2023

BIOLOGY – PAPER TWO (231/2)

FORM THREE (3)

MARKING SCHEME

SECTION A (40 Marks)

1. a)i) Osmosis; ***1x1 = 1 mark***

ii) Concentration gradient/Differences in Concentration of solutions; Temperature; ***2x1 = 2 marks***

b) i) Sugar solution is hypertonic; and gained water molecules by osmosis (Visking tubing increased in size/Sugar solution level increased); ***2x1 = 2 marks***

ii) Sugar solution is hypertonic; thus gained water by osmosis (from the water in the visking tubing); ACCEPT Water in the visking tubing is hypotonic; thus lost water molecules by osmosis to the surrounding sugar solution; ***2x1 = 2 marks***

c) Turgor pressure leads to collective rigidity/turgidity of plant cells; ***1x1 = 1 mark***

2. a) Forms bile salts; which emulsifies fats; offers alkaline pH conducive to enzymatic reactions in E; ***2x1 = 2 marks***

b) Churning/Mixing of food with gastric juice; peristalsis/movement of food; act as valve to regulate entry of food into part E; ***Mark 1st 2*** ***2x1 = 2 marks***

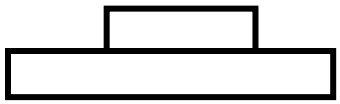
ci) Secretin; Cholecystokinin; ***1x1 = 1 mark***

ii) Cholecystokinin stimulates F/pancreas to secrete pancreatic juice; ***1x1 = 1 mark***

d) Releases insulin hormone; that stimulates the liver cells to increase rate of sugar breakdown/respiration/oxidation/lower gluconeogenesis/formation of new sugar molecules/convert excess sugar into fats/glycogen; ***2x1 = 2 marks***

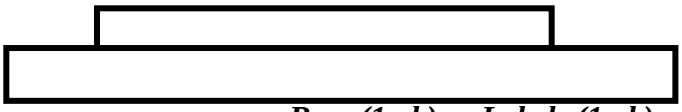
3. a) Tomato plant ◂ Goat ◂ Lion; ***1x1 = 1 mark***
b) Lion; Hawk; ***2x1 = 2 marks***
c) Name: Decomposer; ***1x1 = 1 mark***
Role: Recycling of nutrients; ***1x1 = 1 mark***
d) Generate a lot of energy to support other members of the ecosystem; ***1x1 = 1 mark***

Tomatoes ◂ Rat ◂ Owl ◂ Hawk



Tertiary Consumer (10g/m²)

Secondary Consumer (50g/m²)



Bars (1mk); Labels (1mk) ***2x1 = 2 marks***

4. a(i) A-Bowman's Capsule; **Reject** Bowman/bowman/Bowmans/bowmans ***1x1 = 1 mark***
   (ii) C-Proximal Convoluted Tubule; ***1x1 = 1 mark***

   bi) Due to the reabsorption of water in the Distal convoluted tuble; Because cells along the tubule walls excrete their urea directly into the passing renal fluids; ***1x1 = 1 mark***

   ii) Secretes Vasopressin/Anti-diuretic Hormone/ADH; Which increases permeability of the walls of D/Distal Convoluted Tubule; thus more water molecules are re-absorbed back to the blood stream (less but concentrated urine is passed out as Osmotic pressure of blood is lowered back to normal); ***3x1 = 3 marks***

   c) Presence of numerous microvilli; long; ***2x1 = 2 marks***

5. ai) **N** Class: Dicotyledonae; ***1x1 = 1 mark***
   Reason: Has Network/Reticulate venation; Has petiole/Leaf stalk; ***1x1 = 1 mark***

   ii) **R** Class: Monocotyledonae; ***1x1 = 1 mark***

   Reason: Parallel venation; Has Leaf sheath/Lack Petiole/Leaf stalk; ***1x1 = 1 mark***

   b)

1a) Simple leaf	…….	Go to 2;
b) Compound leaf	…….	Go to 4;
2a) Parallel leaf venation	…….	**R**;
b) Network leaf venation	…….	Go to 3;
3a) Serrated/saw-like leaf margin	……	**N**;
b) Smooth/entire leaf margin	……	**Q**;
4a) Bipinnate/Leaflet has pinnules	……	**P**;
b) Pinnate Compound leaf/leaflet lack pinnules	..……..	**M**;

Each correct step 1 mark ***4x1 = 4 marks***

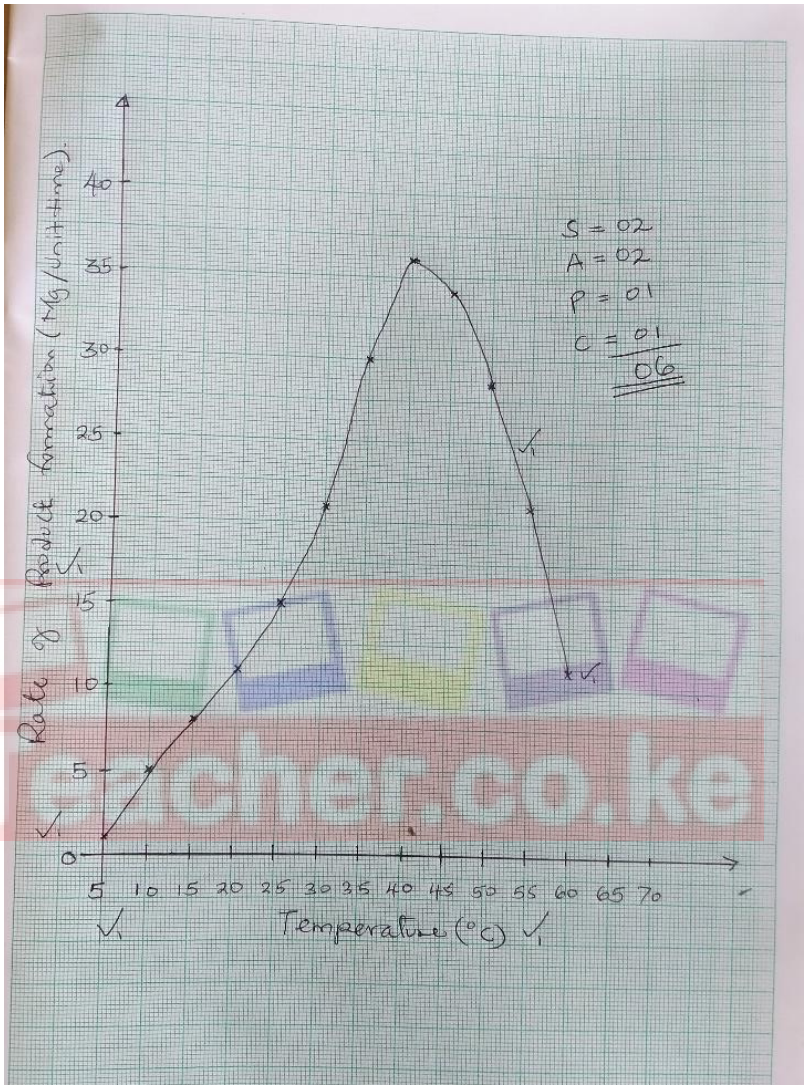
SECTION B (40 Marks)

6. a) i) Thrombin; ***1x1 = 1 mark***
   ii) Lactase; ***1x1 = 1 mark***

b i) 13±0.5 mg/unit time; **reject** if Units not included ***1x1 = 1 mark***

ii) 31.5±0.5mg/unit time; **reject** if Units not included ***1x1 = 1 mark***

c)



6x1 = 6 marks

di) 0 ºC - 15 ºC: Low rate of product formation/reaction; since low temperature inactivate enzymes;

2x1 = 2 marks

ii) 50 ºC - 65 ºC: Low rate of product formation/Declines then stops; Temperature beyond optimum/40 ºC denature enzymes; ***2x1 = 2 marks***

e) Optimum pH; Co-factors/Co-enzymes; Increased Enzyme concentration; ***Mark 1st 2*** ***2x1 = 2 marks***

f) Are substrate-specific thus specialized to increase efficiency; Are not affected by reactions they participate in thus can be re-used; The reactions they catalyse are reversible; Enzymes are efficient in small quantities; ***4x1 = 4 marks***

7. a) -Increase in temperature to optimum/Optimum temperature; since enzymes are more activated;

-Reduction in age of an animal; since younger animals are more active/have higher metabolic rates;
-Increase in surface area to volume; since it leads to loss of more energy (thus higher rate of respiration to compensate the energy lost);
-increase in hormones/thyroxine/adrenaline; since they prepare the body for flight/fight which require muscle action that require a lot of energy;
-increase in Oxygen concentration; that enhance oxidation of substrate to release energy;
-increase in respiratory substrate concentration; since they are easily broken down by enzymes to release energy; ***Maximum 8 marks***

b) Contain blood vessels; that have blood which supply nutrients to skin cells/bring metabolic wastes to the skin for excretion; Contain sebaceous glands; which secrete sebum which keeps the skin supple and waterproof/has an antiseptic to protect skin from infections; Has subcutaneous layer/adipose tissue; for fat storage/insulates against excess loss of heat; Has nerve cells; that detect changes in temperature/pressure/contact/pain; Has sweat glands; which secrete sweat to expel excess metabolic wastes/help in temperature regulation/salt and water balance; Has erector pili muscles; which alter the angle on which the hairs are held on skin surface to help in temperature regulation; Has Hairs; which lie on the body to increase loss by radiation/stand erect to trap still air and prevent heat loss by radiation/

Maximum 12 marks

8. a) **Importance of Fungi**

-Production of antibiotics/medicine for example Penicillium sp. Used in production of Penicillin for treatment of human/animal diseases/Production of Streptomycin/ Pharmaceuticals/Some inhibit tumor growth in cancer patients;
-Cause diseases in crops (leading to food shortage/losses) e.g Ergot disease/
-Cause animal and human diseases e.g athlete foot/Candidiasis
-Food spoilage e.g moulds/Rhizobium sp. Leading to losses;
-Some antibiotics released by fungi are used to improve meat quality/hasten growth of some animals;
-Some antibiotics are used in food industry to preserve freshly produced meat;
- Some are used in research e.g in detection of presence of Copper and Arsenic Compounds in the soil/Research on Nerospora sp led to One gene-one protein research breakthrough;
-Manufacture of some enzymes e.g cellulases/lipases/Tannases useful in pulp/paper/textile industries;
-Some are used as human food e.g edible mushroom;
-Some cause food poisoning through release of deadly chemicals e.g Aflatoxins;
-Breakdown of organic matter in dead organisms leading to conservation of environment e.g the saprophytic fungi;
- Action of saprophytic fungi on dead decomposing organic matter, leads to release of nutrients to the soil thus improve soil fertility/Manufacture of compost manure;
- Mycorrhizal fungi help forest trees in obtaining of nutrients;
- Biological control of pests e.g control of Ash borers;
- Help in release of Carbon (IV) Oxide through fermentation which is important in plant production as raw material for photosynthesis;
- Manufacture of alcoholic drinks through fermentation by producing ethyl alcohol
-Manufacture of 'Dry ice' from frozen Carbon (IV) Oxide released from fermentation process which is used in the food industries;

-Used in Dairy industry to produce cheese e.g *Penicillium sp*.;
-Manufacture of Single Cell Protein (SCPs) from yeast that is used as a food supplement;
-Baking industry where fermentation of carbohydrates by yeast releases Carbon (IV) Oxide that raises dough leading to manufacture of bread; ***Maximum 14 marks***

b) Are components of structures in the body like cell membrane, hooves, nails and connective tissu;e that offer protection to delicate body parts/support other body structures; Are broken into amino acids that are used to form new proteins; which build and repair other body parts; are broken down/ metabolised during starvation/extreme hunger; to provide energy used in other metabolic processes; form enzymes that catalyze metabolic processes and hormones; that influence body processes like growth and development; reproduction as well balance of ions/water/salts/sugar in the body;
Maximum 6 marks

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