

TANZANIA HEADS OF ISLAMIC SCHOOL COUNCIL (TAHISCO)

INTER ISLAMIC MOCK EXAMINATION

BIOLOGY 01

MARKING SCHEME 2026

1. (a) Effects of damage to the nuclear envelope:

- Loss/failure of separation between the nucleus and cytoplasm content. This will affect the regulation of the gene expression.
- Uncontrolled exchange of Enzymes, RNA and protein between nucleus and cytoplasm.
- Leakage of immature mRNA from nucleus to cytoplasm which may lead to production of abnormal proteins.
- Increase vulnerability of DNA to damage from cytoplasmic enzyme or radiation effect
- Disruption of nucleolus functioning due to lowering ribosome synthesis
- Improper chromosome condensation prior to mitosis
- Abnormal mitosis or complete inhibition of cell division
- Failure of cellular cycle stages such as checkpoint hence leading to uncontrolled cell division
- Affect/Defective spindle fibres attachment to chromosome hence will affect cellular division.

Any 5 points @ 01 mark = 05 marks

(b)

S/No	SPECIFIC NAME	FUNCTION(S)
(i)	PITS – Lateral pits allow lateral movement of water in xylem tracheid	
(ii)	NISSL'S BODIES – Are ribosome on cell body of nerve cell help to synthesize functional protein e.g. Enzyme	
(iii)	ACROSOME – A special lysosome releases acrosin Enzyme that digest corona radiata and zona pellucida for fertilization	
(iv)	CORTICAL GRANULE – Are lysosome on membrane of Zona pellucida help to form barrier prevent polyspermy fertilization	
(v)	CHROMOPLAST – Are plastid contain coloured pigment which give flower petal colour to attract insect for pollination	

Any 05 points @ 01 mark = 05 marks

2. (a)

Identified food	Reason
REDUCING SUGAR	When Benedict test occur the food sample turn brick red, since Cu^{2+} of Benedict turns into Cu^+
PROTEIN	When Biuret test takes place, the mixture turns purple indicating there is formation $\text{Cu} \rightarrow \text{N}$ (complex compound)

Any 2 identified food @ 00 ½ mark = 01 mark

Any 2 reason(s) @ 00 ½ mark = 01 mark

(b) (i)

Identified food	Roles of food
REDUCING SUGAR	- Help to make cell membrane e.g. glucose - Source of energy since is respiration cell as substrate e.g. glucose - Source of disaccharide example fructose
PROTEIN	- Help to make enzyme E.g. Ptyalin - Help to make hormone e.g. Insulin - Help to make antibodies - Help to make haemoglobin in RBC

Any 04 role @ 01 mark = 04 marks

(ii)

Identified food	Enzyme for digestion	Location
REDUCING SUGAR	- Maltase Enzyme - Lactase Enzyme	- Ileum - Ileum
PROTEIN	-Pepsin enzyme -Trypsin -Peptidase	-Stomach -Duodenum -Ileum

Any 02 enzyme @ 01 mark = 02 marks

Any 02 location @ 01 mark = 02 marks

3. (a) Taxonomic hierarchy of African bush elephant:

Kingdom	ANIMAL IA
Phylum	CHORDATA
Class	MAMMALIA
Order	PROBOSCIDAE
Family	ELEPHANTAE
Genus	Loxodonta
Species	africana

Any 07 correct ranking @ 00 ½ mark = 03 ½ marks

Any 07 correct answer @ 00 ½ mark = 03 ½ marks

(b) (i) Modern Advantage technology biological criteria of classification

Consider:

- Anatomical feature
- Embryological feature
- Serology
- Physiological/feature
- Molecular traits /feature

Any 05 points @ 00 ½ mark = 02 ½ marks

- (ii) Habitat is UNRELIABLE because unrelated organism may live in the same environment but differ genetically and structurally (Anatomical) **(00 ½ mark)**

4. (a) Limiting factor(s)

Light Intensity	Temperature
(i) In shaded community such as wood, dawn, twilight	Warm climate
(ii) Bright light day	Cold day (winter day)

Any 04 points @ 01 mark = 04 marks

(b) Adaptation of glandular tissue

- Closely packed secretory cells. Increases efficiency of secretion by allowing many cells to produce and releases substances in small area
- Cell are specialized for secretion enable production and release of substances such as mucus, enzyme
- Presence of goblet cell (unicellular glands) allow direct secretion of mucus for protection and lubrication of epithelial surface
- Development of duct in exocrine gland enables transport of secretion to the specific target such as the lumen of the digestive track
- Different structural forms (tubular, branched tubular, sacular, compound gland) allow, specialization for different type and volume secretions
- Glandular epithelial cell are located in digestive organ (stomach and intestines) adapts the tissue to function effectively in environment requiring, continuous secretions
- Secretion directly into cavity or lumens ensure substance like mucus reach the exact site where protection, lubrication or digestion is needed.

Any 06 points @ 01 mark = 06 marks

5. (a)(i) Calcium ion enter Neurone through pre synaptic membrane

- Depolarization at synaptic knob after arrival of nerve impulse create action potential which opens voltage –gated calcium channel located near the synapse
- In the presynaptic membrane, thus increasing the permeability of membrane to calcium ion
- The electrochemical gradients for Ca^{2+} ion results in the flow of calcium ion through the open channels

(ii) The events which follow the entry of calcium ion until depolarization of post synaptic membrane:

- In response to the increase of calcium concentration inside the axon, synaptic vesicles fuse with the presynaptic membrane and release neurotransmitters into the gap between the cells which is called the synaptic cleft. The delivery of neurotransmitters into the cleft is an example of exocytosis.

- The vesicles then return to the cytoplasm and are refilled with transmitter substance. The neurotransmitter diffuses across the synaptic cleft, a process which takes 0.5ms per synapse. Upon reaching the postsynaptic membrane, it binds with receptor molecules which recognise the molecular structure of the acetylcholine molecule.
- The arrival of neurotransmitter at the post synaptic membrane change the shape of receptor site. This create a new potential known as the excitatory postsynaptic potential (EPSP), it is hydrolyzed to form acetyl and choline by an enzyme called 'acetylcholinesterase' which found in the post synaptic membrane. This prevents the successive impulse merging at the synapse.

Any 03 points @ 01mark = 03 marks

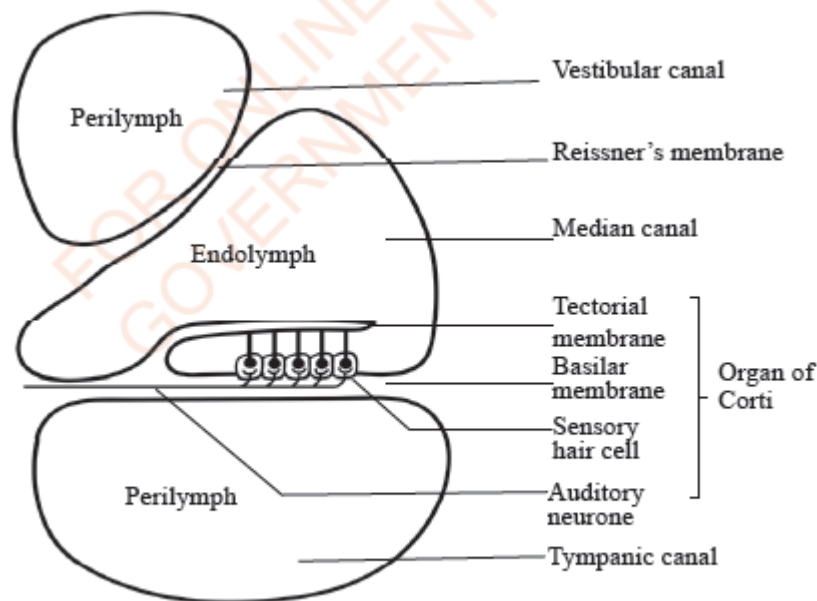


Figure 4.33 Transverse section of cochlea showing the organ of corti

Diagram

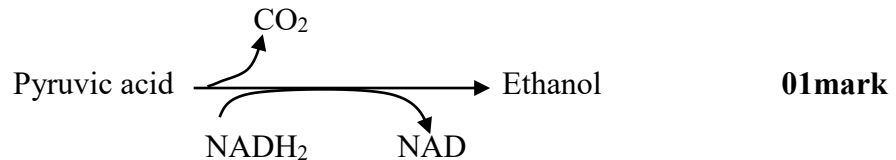
Caption 01 Mark

Diagram 01 Mark

Labelling @001/2 Mark = 04 Marks

6. (a) (i) Fate of pyruvic acid
MUSCLE CELL DURING intense exercise
- In absence of oxygen pyruvic Acid will enter Lactic Acid fermentation in a cytoplasm, where, **(01mark)**
 - The pyruvic acid from glycolysis is reduced by NADH_2 under enzyme called lactate dehydrogenase to form oxidized $\text{NAD}(\text{NAD}^+)$ and lactic acid. **(01mark)**
 - Pyruvate $\xrightarrow[\text{NADH}_2]{\text{Lactate dehydrogenase}} \text{Lactic acid}$ **(01mark)**
 $\text{NADH}_2 \rightarrow \text{NAD}$
- (ii) YEAST CELL in a sealed container and PLANT TISSUE in water logged soil

- In absence of oxygen their pyruvic acid will enter ALCOHOLIC FERMENTATION where, **(01mark)**
- Pyruvic acid will first converted to acetylaldehyde by enzyme called decarboxylase, after remove carbondioxide **(01mark)**
- Then the acatyaldehyde will be converted to ethanol after being reduced by NADH₂. **(01mark)**



(b)

Part	Role
(i)	It keep trachea firm and intact
(ii)	This cilia beat and moves the trapped dust and bacteria back to the cavity where they get swallowed
(iii)	- Are essential for mucus production that trap dust and bacteria together - Also moistens the air that pass down to alveoli
(iv)	It allow alveoli to expand and recoil during breathing

Any 04 points @ 01 mark = 04 marks

7. Four phases of Oogenesis in human includes

- Multiplication phase (mitosis phase)
- Growth phase
- Meiosis phase
- Maturation phase

Multiplication phase

- It is initial stage of Oogenesis which start during foetal development.
- It involves diploid primordial germ cell undergo repeated mitotic division to provide Oogonia (many) **(01 ½ marks)**

Growth phase

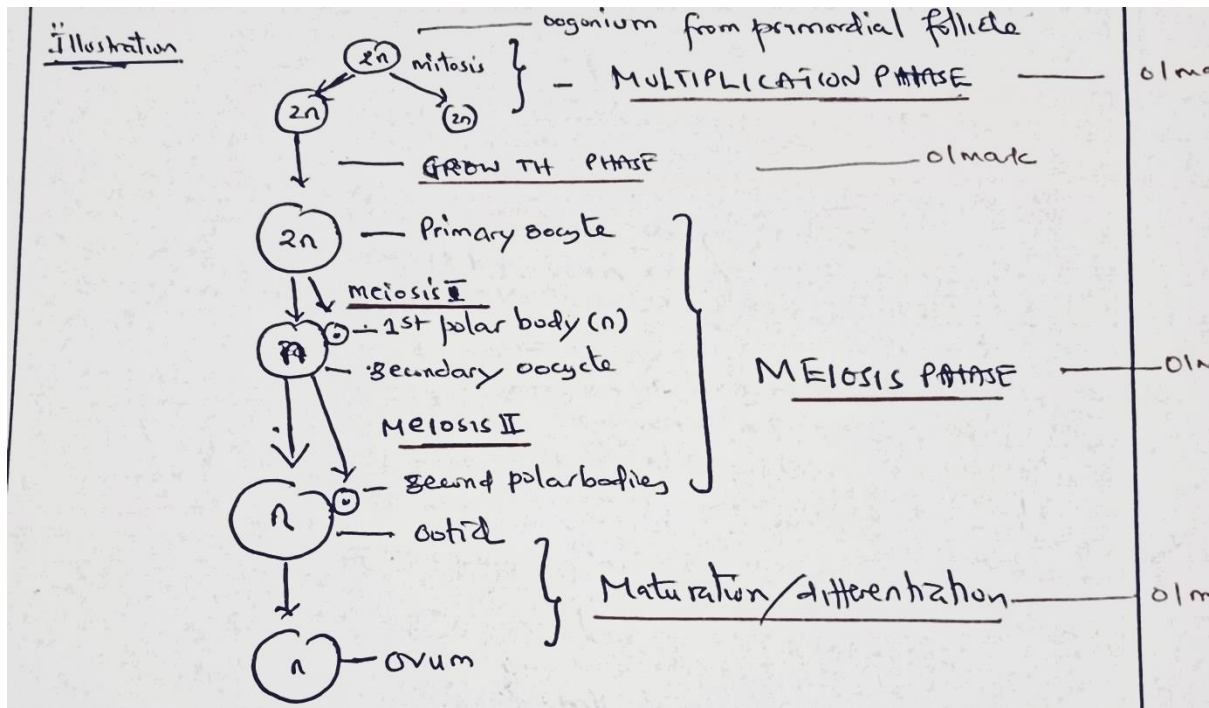
- It is 2nd stage, occur when each oogonia grow and develop into primary oocytes due to accumulation of nutrient, the primary oocyte remain at prophase I of meiosis through out child hood **01 ½ mark)**

Meiosis phase

- It occur when the primary oocyte undergo meiosis I to form secondary oocyrt and first polar bodies, at childhood then,
- Secondary oocyte undergo meiosis II during puberty to form ootid **(01 ½ marks)**

Muturation phase

- It occurs when oocyte is transformed to form functional ovum (01 ½ marks)



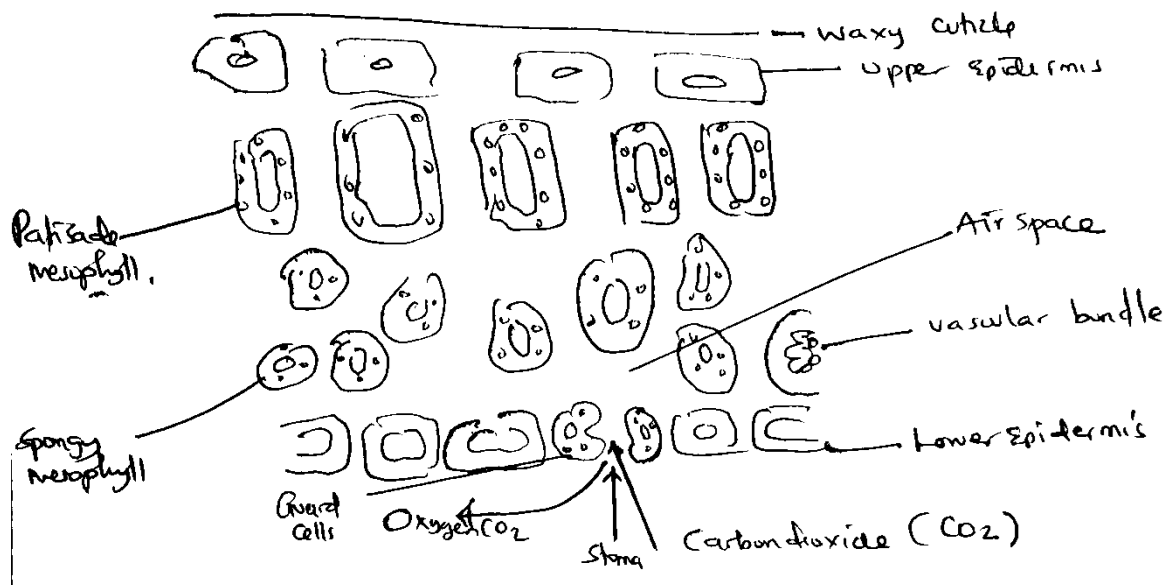
SECTION B

8. (a) Mechanism of Gaseous exchange in plants

- Plant obtain oxygen and carbon dioxide through LEAVES
- Also plants uses LENTICELS (raised pores on the stem of woody plants for exchanging minute amount of gases)
- Plants require oxygen for respiration and carbondioxide for photosynthesis
- The gases entered the leaf into the intercellular spaces of leaf through stomata which found underside of leaf
- The gases from spaces entered/diffused the desired cell (mesophyll) etc
- The lenticels is the porous tissue found in periderm of secondary thickened organs, the back of woody stem and roots of dicotyledonous flowering plants.
- Also like stomata lenticel provide direct root for exchange gases between internal tissue and atmosphere

Any 05 points @ 01 mark = 05 marks

Internal structure of leaf showing the position of stomata for gaseous exchange



Caption – 001/2 Mark

Diagram 001/2 Mark

Labelling any ten parts @001/2 Mark = 10 Marks

(b) Factors affecting rate of respiration

(i) Oxygen concentration

- In presence oxygen the cell undergo aerobic respiration hence high rate of ATP (energy), but when oxygen is low, then low rate of respiration since cell will take anaerobic path way and form less ATP. **(01 ½ marks)**

(ii) Temperature - As the respiration is enzyme controlled process, then

- The rate of respiration is maximum at optimum temperature for human being is 37°C, since it is a temperature will enable enzyme of respiration to work best **(01 ½ marks)**

(iii) Physical activity. As the physical activity increase body will also demand more energy hence the rate or respiration will be higher but on resting the rate will be low **(01 ½ marks)**

(iv) Type of food substrate

- When glucose is respired rate will be faster since it will take a direct of path to form ATP compared to when fat and protein are respired it will be low since will demand a lot of step to covert them into usable forms hence slow rate. **(01 ½ marks)**

(v) Availability of ATP

- During respiration ATP is required for activation process on glycolytic stage of respiration, so when ATP level is higher in a cell also rate of respiration will be loss since the ATP will inhibit by doing feedback control process. **(01 ½ marks)**

9. (a) There a three pathway in which water move sin root such

APOPLASTIC PATHWAY **01mark**

- This is the movement of water across the wall through inter cellular spaces without cross the membrane / cytoplasm (living part).
- Water passes through the system of connected adjacent wall throughout the plant
- It occur when water evaporate out of mesophyll cell and entered spaces of cell wall the tension develop a continuous stream of water by means of cohesion. **01mark**

SYMPLASTIC PATHWAY (01mark)

- Involve movement of water and low molecular weight solute from cell to cell via a plasmodesmata
- It give a network of continuous connection of cytoplasm of all cells
- The water and solute can move via adjacent cell without passing the membrane of cell
- The movement is aided by cytoplasmic streaming **01mark**

VACUOLAR PATHWAY

- In the pathway the water moves from vacuole to vacuole of neighboring cell
- Here water move through membrane and tonoplast by osmosis
- However, the water encounter resistance as a result of little flow usually occur making pathway insignificant **01mark**

Diagram to show PATHWAY OF WATER in plant cell

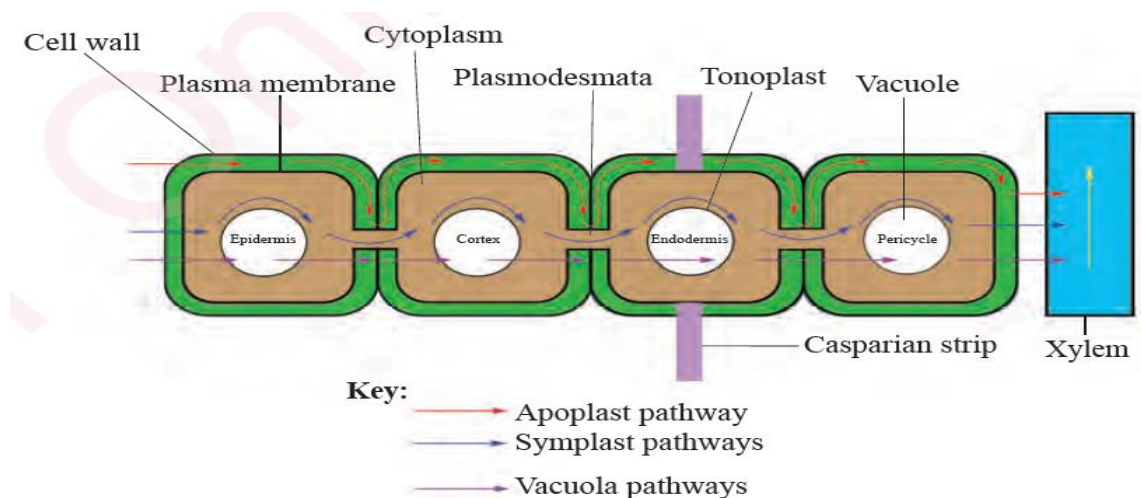


Figure 1.5 Apoplast, Symplast and Vacuolar pathways in plants

(b)

Open circulatory system	Closed circulatory system
- Blood not confined to a vessel - The organs are in contact with blood (organ immersed in blood) - The rate of flow cannot be controlled	- Blood is confined to vessel - Organ are not in contact with blood -Rate of flow can be controlled

-The exchange of material takes place between blood and sinuses -Blood circulate slowly around body due to low pressure	-The exchange of material takes space between tissue and spaces of blood capillaries -Blood circulate rapidly around body due to high pressure
--	---

Any 03 difference (points) @ 01 mark = 03 marks

10. (a) Factors that favour cross pollination:

- (i) Protoandry and Protogyny – It occur when anther and stigma mature at different times.
Protandry – It occur when an their anther mature first than stigma
Protogyny – It occur when stigma mature faster than anther so if these mature at different time this increase the chances of cross pollination in this flowering plant.
- (ii) Dioecious – It will occur when plant have separate male and female plant
In this plant self pollination is impossible
- (iii) Seif incompatibility (sterility) Some plant species have a tendency of even if the self pollination occurred but the pollen gain landed on stigma will never develop or develop slowly hence the chance of self fertilization in this plant is reduced or prevented by itself. This process is genetically determined.

Any 03 points and explanation @ 02 ½ marks = 07 ½ marks

(b) Similarities of fertilization events between Bryophyte and Amphibian

- (i) Nature of gamete
Both Bryophyte and amphibian produce motile gamete (sperm) (flagellated sperm), that can swim in water to meet ovum for fertilization just like amphibian.
- (ii) Types of fertilization
Both bryophyte and amphibian carry external fertilization.
- (iii) Fertilization medium
Both amphibian and Bryophyte depend on water since they release their gamete into water (sperms) then the gamete swim to meat ovum for sufficient fertilization during reproduction.

Any 03 points and explanation @ 02 ½ marks = 07 ½ marks