

MD

BIOLOGY - I
MARKING SCHEME - 2025

wazaelimu.com

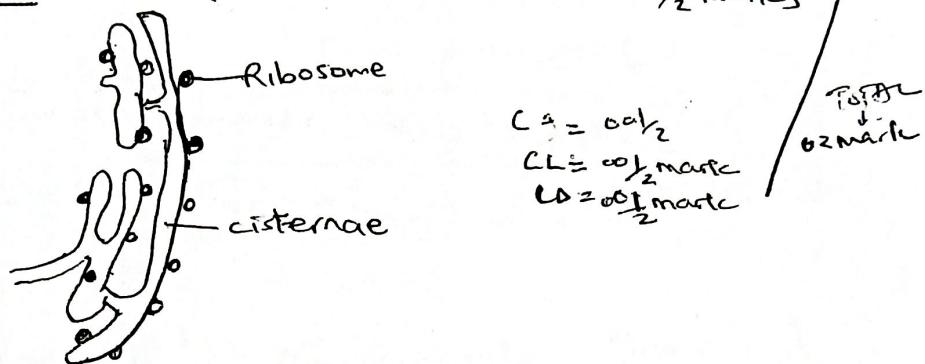
SECTION A (70 MARKS)

1(a) These structures are:

- ROUGH ENDOPLASMIC RETICULUM mark
- SMOOTH ENDOPLASMIC RETICULUM mark

(i) ROUGH ENDOPLASMIC (RER) RETICULUM

Diagram: - It has "ribosome" which give its rough appearance.

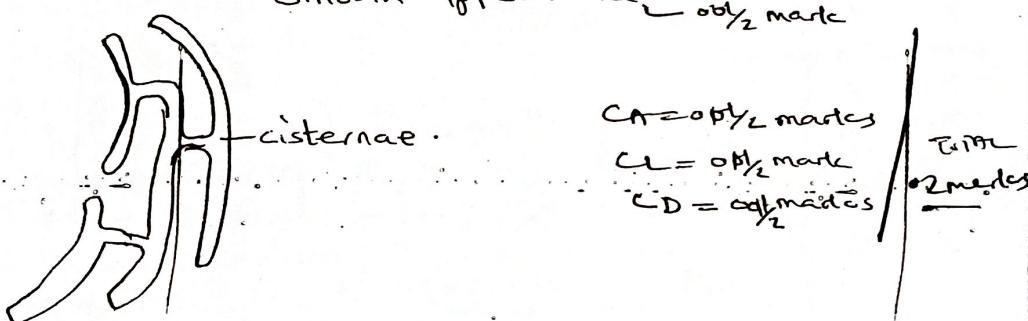


$$\begin{aligned} C_A &= 0 \frac{1}{2} \text{ marks} \\ C_L &= 0 \frac{1}{2} \text{ mark} \\ C_D &= 0 \frac{1}{2} \text{ mark} \end{aligned}$$

TOTAL
02 marks

SMOOTH ENDOPLASMIC RETICULUM (SER)

Diagram: - Not associated with ribosome, hence Smooth appearance. 0 1/2 mark



$$\begin{aligned} C_A &= 0 \frac{1}{2} \text{ marks} \\ C_L &= 0 \frac{1}{2} \text{ mark} \\ C_D &= 0 \frac{1}{2} \text{ marks} \end{aligned}$$

TOTAL
02 marks

1 (a) (ii) Function of RER

- Are site of protein synthesis due to presence of Ribosome
- They provide a pathway for transportation of material through cells, such as synthesized protein in ribosome
- They provide large surface area for chemical reaction to occur.

any 2 points @ 0.1 mark = 0.2 marks

Function of SER

- Site for synthesis, secretion and storage of lipid, carbohydrate and non-protein products
- Contain Enzyme which break down chemical substance in liver cell for synthesis of steroid which later form hormones
- Involved in formation of Golgi bodies

(1-) any 2 points @ 0.1 mark = 0.2 marks

一四

- Molecular size (small size tend to pass faster than larger one)
 - Temperature - (High temperature increase Increase speed since, temperature give kinetic Energy for molecule to pass faster)
 - Thickness of Membrane . (This membrane material move faster, it has short distance)
 - Concentration gradient , The greater the Concentration gradient the faster the material can pass/move)

over fish

2(a)

- i) When concentration of substrate A is reduced,

 - * The rate of production of D would also decrease
 - * This is because few substrate are available to bind enzyme active site (enzyme 1)
 - * This cause low rate / fewer reaction thus conversion of A to D also would slow down.

Any exp. $\Theta_{\text{vol}} = 0$

- | For the
- | For reasons

- (ii) - If the Conc. of Enzyme 1 increase the rate of conversion of A to B will be faster/increase provided that Concentration of Enzyme 2 and 3 remain constant. These Enzyme would reach a point called SATURATION POINT

-1

- Also enzyme 2 and 3 will act as limiting factor hence the rate of formation of D would initially increase and when saturation point attained the rate remain fairly constant

any 4 points @ $\alpha l_1/2 = \alpha 2$ meters

- (iii) Molecule D acts as End-product inhibitor through the mechanism called Negative feedback inhibition

-1

- Where the End product D if its concentration rises up (above optimum) some of it during metabolic pathway will bind to allosteric site of Enzyme 1.

Product B.

- Binding of End product D to Enzyme allosteric site cause the Enzyme 1 active site to change and be incapable to bind substrate A.

- This cause failure of enzyme 1 to convert Substrate A to B and finally no further D

- so the overall reaction of conversion of A to D is affected by action of product D.

Q, (b)

Classes of Enzyme based on reaction they catalyses

Dehydrogenases

- OXIDOREDUCTASE Eg. Dehydrogenases
- TRANSFERASE Eg. amino transferase
- HYDROLASES Eg. Lactase
- LYASES Eg. Decarboxylase
- ISOMERASES Eg. Phospho-hexo-isomerase
- ICLASSES Eg. amino acyl - tRNA synthetase

any 4 point @ $1/2$ = 02 marks

any 4 example @ $1/2$ = 02 marks

3. a) Transmission of Impulse across neurone junction:

- * → Arrival of nerve impulse at the End of pre-synaptic neurone, depolarizes it, causing the voltage gated Calcium channel to open and calcium ion to flow into pre-synaptic knob by diffusion
- * → The influx of calcium ion causes the synaptic vesicle to fuse with the pre-synaptic membrane and rupture releasing neurotransmitter to the synaptic cleft by exocytosis.
- * → The vesicle then returns to the cytoplasm where they are refilled with neurotransmitter again.
- * → The neurotransmitter diffuses across the synaptic cleft
- * → The neurotransmitter bind to the Special protein receptor (neuroreceptor) in the post-synaptic membrane forming bond.
- * → The formed bond cause the Na^+ gated channel or chloride gated channel to open and allow Na^+ ion or Cl^- ion to rush into the pre-synaptic knob and K^+ to leave the membrane
- * → The Influx of Na^+ ion or Cl^- ion causes the depolarization of post-synaptic cell membrane, which may initiate action potential if threshold reached / attained

Continue/continue:

3(a)

- i) The neurotransmitter is broken down by specific Enzyme in the synaptic cleft Eg Acetylcholine esterase situated on the post-synaptic membrane that breaks down the acetylcholine into acetic acid & chlorine.
- The breakdown products are absorbed by presynaptic membrane by Endocytosis and used to resynthesize more neurotransmitter and are stored in synaptic vesicle for future use, using Energy from mitochondria
- any 8 - correct explanation @ 01 mark = 08 marks

- Abscisic acid

3(b)

- i) A plant cannot able to promote dormancy
A plant can not able to promote closure of stomata during water stress condition
- A plant can not undergo Abscission (leaf falling)
any 2 points @ 01₂ mark = 01 mark

ii) Ethene

- A plant can not able to break bud dormancy
- A plant stem and root elongation cannot be suppressed during drought
- A plant can fail to ripe properly.
any 2 point @ 00₁ mark = 01 mark

4.

a) i) Glycolysis

— 01 mark

ii) Krebs cycle

— 01 mark

(b) Summary of ATP from NADH and Carbon dioxide

- (C) High hydrogen proportion long chain fatty acids.
- ATP is formed from Reduced NAD₊ (NADH₂) in the mitochondria through Oxidative phosphorylation
- Here the electrons are transferred by (from) NADH₂ along the electron transport chain, creating a proton gradient across the mitochondrial membrane
- This drives the synthesis of ATP by ATP synthase
- CO₂ is not directly involved in this process but it released as a product during the Krebs cycle where NADH₂ reacts

2 marks

5(a) Function of two generative nuclei present in pollen tube nuclei

- * First haploid male nuclei - fuses with female gamete/egg (haploid) to form diploid zygote ($2n$) - 0.8 marks
- * The second haploid male nuclei fuses with diploid nuclei (polar nuclei) to form triploid primary Endosperm ($3n$) - 0.8 marks

- (b)
- i) Nucellus - disintegrates to provide nutrient to provide nutrient for supporting initial growth
 - ii) Integuments of the ovule form a tough protective layer called SEED COAT / TESTA
 - iii) Sepal, Petal and stamen - wither and fall off
 - iv) Style - also withers/fly out and fall off leaving its scar on the fruit
 - v) Mature ovary become Fruit with three differentiated layers, Exocarp, mesocarp and Endocarp, which collectively called PERICARP.
 - vi) Microyle These remain as a small pore in the testa through which oxygen and water entering seed germination.
 - vii) Synergid - disintegrate
 - viii) Antipodal - disintegrate

any 8 points @ 0.8 marks = 0.8 marks

Bracketed Key

6. a) organism with wing s - - - - 2
 (b) organism without wing s - - - - 3
2. (a) Body with Scale - - - - - 4
 (b) Body without scale - - - - - 5
3. (a) organism with legs - - - - - E
 (b) organism without leg - - - - - 6.
4. (a) organism with clubbed antennae - - F
 (b) organism without clubbed antennae - - G
5. (a) organism with thin abdomen - - B
 (b) organism without thin abdomen - - S
6. (a) organism with elongated body shape - - C
 (b) organism without elongated body shape A
- Any 6 points @ 01 mark = 06 marks

(b) i) Phylogenetic system of classification

Organism were classified from simple to complex reflecting evolution history

ii) Phenetic - the classification based solely on observable characteristics and all characters used are considered of equal importance

ii) Phylogenetic - the type of classification where organism were divided based on evolutionary relationship

(iv) Numerical taxonomy - 1. the system of classification the uses Computer in taxonomy.

(-6-) Any 4 defn. @ 01 mark
= 4 marks

item	C ₃ plant	C ₄ plant
(i)	Tobacco, cereals, Beans	Maize, sugar cane
(ii)	No change in rate / low rate of photosynthesis	50% greater rate at 35%
(iii)	occurs once	occurs twice (1st in mesophyll and in bundle sheath)
(iv)	only one type of chloroplast	Kranz anatomy (two types of cells)
(v)	relatively less efficient in photosynthesis than C ₄ pathway (yield much lower)	- yield much higher - more efficiently photosynthesis
(vi)	C ₃ - Acid or PGPA Phosphoglyceric acid	C ₄ acid (OAA) oxaloacetic acid
(vii)	RuBP, a 5C - Compound	PEP a 3C - Compound

any 7 points @ 0.1 marks
(difference) = 0.7 marks

- (b)
- It is faster means of transport
 - Ensure material moves in one direction only
 - It ensure material move against concentration gradient
 - It may lead to total absorption of nutrient
 - It is relatively more efficient
- any 3 points @ 0.1 marks = 0.3 marks

SECTION B (30 MARKS)

8. FACtORS AFFECTING OXYGEN BINDING TO HEMOGLOBINS

- (i) Presence of Carbon dioxide
= More carbon dioxide causes less affinity of Hb to oxygen
(Bohr shift)
- (ii) Decrease in pH cause the Hb to have less affinity to oxygen
- (iii) Increase in temperature ^{above optimum} cause the Hb to have less affinity to oxygen.
- (iv) Increase in organic phosphate also cause decrease of Hb affinity to bind oxygen
- (v) Presence of CO (Carbon monoxide)
decrease affinity of Hb to bind oxygen
- any 5 points @ 01 mark = 05 marks
any 5 explns @ 02 marks = 10 marks
-
- TOTAL 15 marks

$$\begin{array}{r}
 31 \\
 17 \\
 24 \\
 23 \\
 \hline
 85 \\
 \end{array}
 \quad
 \begin{array}{r}
 26 \\
 32 \\
 29 \\
 77 \\
 \hline
 77
 \end{array}$$

$\frac{42}{162} \times 90$ $\frac{85}{162} \times 3$

(-8-)

- 9.
- (a) Male infertility (causes)
- * Under developed male reproductive organ (caused by hormone problem), or other problem
 - * Impotence — Inability to maintain erect penis for placement of sperm in female reproductive tract
 - * Sexually Transmitted Diseases / Infection
Eg Syphilis, or gonorrhoea which destroy the seminiferous tubule at severe stage of infection cause failure of male to fertilize female
 - * Infertility — Gamete produced are inactive hence cannot fertilize egg,
 - * Insufficient number of sperm, If ejaculation has small number of sperm count then these impair fertilization
 - * Inadequate vitamin C and Zinc diet which are factors propulsive spermatogenesis
 - * Exposure to Environmental hazard and toxin such as pesticide, lead, paint radiation this can affect sperm production

any 07 point @ 01 marks
07 marks

Q:

(b) Healthy effect of abortion :-

- Increase a risk of subsequent ectopic pregnancy
- Damage of the uterus may occur
- An average of five of woman dies from abortion
- occasionally infection occurs as a result of abortion
- Damage of Cervix may occur and cause inability to carry next pregnancy
- Placenta may be retained resulting to excessive bleeding
- Risk of life or permanent injury (Death)
- Placenta may be retained
- Substantial risk of children being born seriously handicapped (carrying time)

any 8 points @ 1 mark = 08 marks

10. (a) Xylem is complex tissue made up of cell

- Xylem tracheid
- " Vessel (vessel members)
- Parenchyma
- Fibre (blast)

01

Xylem Tracheid - specialized for Conduction in gymnosperm
characteristics

- They have tapering end
- They have secondary thickened wall
- They are well elongated
- They have empty lumen
- Their dead cell at their maturity

02

Xylem Vessel - Specialized for Conduction in angiosperm

Characteristics

- Their dead at maturity
- They have secondary thickened wall
- They are joined end to end to give continuous tube
- They have perforation
- Have bordered pit (un lignified area) allows lateral movement of material

02

Xylem Parenchyme - well lignified specialized for support and storage of food

Characteristics

- Their secondary thickened wall
- They able to store carbohydrate in form of starch
- They are active cell and can retain its functional protoplasm

02

Xylem Fibre (Blast) features

- They don't conduct water
- They provide mechanical support
- They provide pathways for lateral movement of material and as storage area for food
- Their thicker wall than tracheid.

02

(09) Total

any 4 components @ 01 mark = 05 marks

any 08 characters @ 01 mark = 08 marks

10.

Evidence to show that the xylem tissue transport water and mineral salts in plant

- If shoot is cut and placed in water containing dye such as red eosin, it takes up the dye and when the shoot is removed from the dye and cut on various height, only xylem tissue is stained red indicating that transport water
- Removal of a ring of tissue outside a woody stem does not affect flow of water. This because only pass the bark. Including the phloem however if the outer layer of wood (part xylem) are removed, upward transport of water stop and leaves it wilt.
- Metabolic poison such as cyanide don't impede water flow through xylem. This reveals that transportation of water is passive and takes place in dead cell (inactive cell) of vessel or tracheid
- If the lumen of vessel elements and tracheid are artificially blocked by fat and uptake and transportation of water cease and plants wilt.

Try 4 points @ off mark = 0.6 mark