



# Biology

## Marking Scheme.

Grade 12 (2020).

### Part I

1) 2	6) 2	11) 3	16) 4	21) 4	26) 4
2) 4	7) 4	12) 3	17) 3	22) 2	27) 2
3) 2	8) 1	13) 3	18) 2	23) 3	28) 2
4) 4	9) 3	14) 2	19) 3	24) 5	29) 3
5) 5	10) 2	15) 5	20) 2	25) 1	30) 5

(30 x 1 = 30 Marks)

### Part II

#### A. Structured Essay.

- 1 A D) a. Adhesive force, cohesive force 2x  
 b. high surface tension 1x  
 c. high (latent) heat of vaporization 1x
- ii). Sucrose, Lactose 2x  
 iii). Starch, Inulin 2x  
 iv). Cellulose, Pectin, Chitin/Hemicellulose 3x  
 v) Casein storage in milk  
 Ovalbumin " " egg (2+2)x
- B D) a Nucleolus b. SER c. Lysosome d. Centriole 4x  
 ii). Tight prevent leakage of extracellular fluids thro. intercellular spaces.  
 Desmosome/ Anchor attach the cytoskeletons of adjoining cells by intermediate filaments.
- Gap/communication. signal, material exchange between adjacent cells (3+3)6x
- iii). a. pro meta phase b. Anaphase c. Telophase 3x
- C i) a Phosphorylation 1x  
 b. Substrate phosphorylation. • cytosol / cytoplasm  
 • matrix of mitochondria  
 oxidative " Cristae / inner membrane of mitochondria  
 photo " " grana / thylakoid membrane  
 (3+4)7x

ii) a. ✓ b. x c. ✓ d ✓ 4x  
 $40 \times 2.5 = 100$

2A i). source - water Destination -  $\text{NADP}^+$  2x

ii) a. Carboxylation / C-fixation.

Reduction

Regeneration of  $\text{CO}_2$  acceptor 3x

b. RuBP carboxylase-oxygenase / Rubisco 1x

c. substrate to both  $\text{CO}_2$  and  $\text{O}_2$  1x

iii). Light,  $\text{CO}_2$  concentration 2x

iv). Chloroplast, Peroxisome, mitochondria 3x

v). Since Rubisco can operate under high  $\text{CO}_2$  concentrations in bundle sheath cells.

•  $\text{C}_4$  plants need less of this enzyme than  $\text{C}_3$  2x

B i) RNA 1x ii) Cyanobacteria 1x

iii) Paleozoic, Mesozoic, Cenozoic 3x

iv). a. meso b. Paleo c. Ceno 3x

v). cellular organization  
 • Nutrition type 2x

vi). Species as the smallest group of individuals that share a common ancestor. 1x

vii). the sequence of bases of DNA of important genes  
 • " " " " " " mitochondria + chloroplast  
 • the base " of ribosomal RNA  
 • the sequence of amino acids in common proteins  
 • the molecular structure of cellular components

any 4x

C. i). 1. 5  
 2

2. 3

A

3 D

F

4 A

B

5 E

C 10x

(ii). Mammalia 1x

(iii). Reptilia 1x

Any  $40 \times 2.5 = 100$

3 A D. Collenchyma 1x      ii). Root cap 1x

iii). Secondary cell walls are produced after cell elongation  
• " " " thickened by large amount of lignin  
• Dead cells at maturity 3x

iv). Tracheids 1x      v). Nucleus, ribosomes 2x

w). Diffusion, Osmosis, Imbibition, Facilitated diffusion 4x.

B i) Removal of water from leaves and other aerial parts  
of plant body as water vapour 1x

b). Stomata, cuticle, Lenticels 3x

ii). At night, relative humidity high / approaching 100%.  
root cells continuously pump water & minerals in to  
xylem.

• Endodermis prevents ions from leaking back to  
cortex, soil.

• ∴ mineral ions accumulate in the vascular  
cylinder reduce  $\psi$ . ∴ water moves from cortex.

• It generates a root pressure, push upward of xylem sap.

• Due to this, water lost as liquid in thru. hydathodes  
in some plants. 5x

iii). 1. c    2. d    3. a, c    4. b, d    5. e    7x

iv). a. Cytokinins    b. Auxin    c. ABA    3x

C i) a. simple cuboidal    b. simple squamous  
c. Pseudostratified (columnar) ciliated epithelium 3x

ii). Similarity - cells in lacunae  
Diff. - bone contain blood vessels  
Cartilage lacks " " 2x

iii). • Binding and support  
structural  
• Protection  
• Transport of materials  
• Insulation (of heat) 4x

w). long cylindrical cells  
• multinucleated / Coenocytic 2x

40 x 2.5 = 1000

4 A 1) Trypsin, chymotrypsin, pancreatic amylase, pancreatic lipase, Nuclease, Carboxypeptidase 6x

- ii) a. (hexagonal) lobules 1x  
b. hepatocytes 1x

iii) vitamins are organic compounds, required in small amounts for the maintenance of normal health and metabolism 1x

- iv) a. vit. B<sub>5</sub> / Pantothenic acid 1x  
b. vit. B<sub>1</sub> / Thiamine 1x  
c. vit. B<sub>6</sub>, vit. B<sub>12</sub>, folic acid 3x

B 1) SA node, AV node (include Purkinje fibre) 3x

- ii) • Transport of O<sub>2</sub> to organs and removal of CO<sub>2</sub> from organs/tissues  
• Transport of soluble excretory materials to organs of excretion.  
• Transport of nutrients  
• " " hormones to targets.  
• Defence against foreign invasions  
• Aids in osmoregulation. any 5x

iii) a. organic compounds, combine O<sub>2</sub> at high partial pressure of O<sub>2</sub> and release O<sub>2</sub> at low O<sub>2</sub> concentrations 1x

- b. • O<sub>2</sub> is less soluble in blood.  
• complex animals need O<sub>2</sub> transport - from respiratory surface to the organs 2x

iv) • undamaged blood vessels  
• Heparin prevents conversion of prothrombin → thrombin and fibrinogen → fibrin. 3x

C 1) a. book lung b. body covering/surface c. Trachea 3x

ii) external intercostal muscle, Diaphragm. 2x

iii) CO<sub>2</sub> concentration / Hypercapnia 1x

- iv) a. increase heart beat temporarily  
b. decrease the transportation of O<sub>2</sub>  
c. stops cilia from working properly 3x

v) skin, mucus membrane, secretions 3x

any 40 x 2.5 = 100.

## B- Essay.

- 5 a
1. Macromolecules
  2. act as biological catalyst-
  3. producing in living cells.
- b.
4. Most of enzymes are globular proteins
  5. biological catalysts
  6. by reducing activation energy of the reaction
  7. most enzymes are heat liable/sensitive
  8. their presence do not alter the nature of end products
  9. highly specific to the substrate
  10. Most enzyme catalyzed reactions are reversible
  11. Rate of enzyme activities are affected by temp. pH, substrate concentration and inhibitors.
  12. Enzymes are not being used up during the reaction
  13. Enzymes possess active sites where the reaction takes place.
  14. Some enzymes need non-proteinous components to catalyze reaction
  15. which are known co-factors.
- c.
16. Temperature
  17. pH
  18. Substrate concentration
  19. Enzyme concentration
  20. Inhibitors
  21. Increase in temperature increase molecular motion
  22. both enzyme + substrate move at speed.
  23. More collisions occur between enzyme-substrate
  24. generate greater chance for the reaction occur.
  25. Enzyme reaction increases up to a optimum temp.
  26. beyond optimum temperature bonds break down in the active site.
  27. Denatures / changes the shape of active site
  28. further increase in temp. increases the collision
  29. but rate of enzyme reaction completely stops.
  30. certain pH ranges has the  $\uparrow$  efficient rate of reaction
  31. at optimum pH highest rate of reaction.
  32. Dif. enzymes have dif. pH (optimum)
  33. increase in substrate concentration increase the probability of collision bet<sup>n</sup> enzyme-subst. at correct orientation.

34. (however) enzymes saturated after a particular concentration & then constant.

35. <sup>Increase in</sup> Enzymes concentration increases rate of reaction

36. inhibitors selectively, molecules/cells

37. permanently / temporarily joins and prevents the formation substrate - enzyme complex.

38. by weak interactions reversibly

39. eg:- Drugs used against microbes.

40. by covalent bonds, irreversibly

41. eg: Toxins / poisons

42. competitive inhibitors - compete with active sites) resembles the shape of substrates.

43. Non-competitive - joins other than active sites

44. and modify shapes of the active sites

Any  $3 \times 4 = 152$   
max - 150 marks.

b. a.

1) Cardiac cycle refers to the sequence of events that takes place in a complete heart beat.

2) events that pumping of heart & filling takes place.

3) It lasts to 0.8 s.

It has following events.

4) Atrial systole

5) Ventricular systole

6) Complete cardiac diastole.

Atrial systole.

7. SA node stimulated & starts the waves along the atria

8. the remaining blood pumped into ventricle emptying atria

9. time taken - 0.1 s

Ventricular systole.

10. Thus, the atrial muscle impulses reaches AV node.

11. then AV bundle & perkinje fiber & to the wall of ventricles.

12. contraction begins in the apex and sweep upwards
13. Due to this both ventricles contract.
14. Pressure.  $R.V. > \text{Pulmonary artery}$ ,  $L.V. > \text{Systemic Artery}$
15. blood enters into the " " + " "
16. great valves close.
17. prevents back flow of blood into atria.
18. lasts for 0.3 s.

Complete cardiac diastole.

19. both ventricles & atria relaxes simultaneously.
  20. To. RA - from superior + inferior vena cava
  21. four pulmonary veins to LA
  22. blood returns (to heart)
  23. deoxygenated & oxygenated blood respectively
  24. Pressure  $R, L.V. < L, R.A.$
  25. there for AV valves open. blood flows into LV + RV
  26. about 70% blood come to ventricles without contraction of atria while standing.
  27. lasts for 0.4 s
- b.
28. Most  $O_2$  combines with Hb and transported to the whole body
  29.  $Hb + 4O_2 \rightleftharpoons HbO_4$  / one Hb binds 4  $O_2$
  30. by oxyhaemoglobin
  31.  $CO_2$  - 70% by  $HCO_3^-$
  32. In erythrocytes -  $CO_2 + H_2O \rightarrow H_2CO_3$
  33.  $H_2CO_3 \rightarrow HCO_3^- + H^+$
  34.  $HCO_3^-$  leave the RBC into the plasma
  35.  $CO_2$  reaches the respiratory surface by reversible reaction
  36. 23% by carbamino haemoglobin / combine with protein in Hb
  37. do not compete with  $O_2$  binding sites
  38. 7% by dissolved  $CO_2$  free gas.

any  $38 \times 4 = 152$   
max 150.

7 a. Prokaryotic cellular organization.

1. mostly unicellular
2. average diameter 1-5  $\mu\text{m}$
3. originated before 3.5 bya
4. binary fission - cell division
5. circular DNA at nucleoid region
6. 70S ribosomes
7. no membrane bound organ/no cytoskeleton
8. Peptidoglycan - bac
9. polysaccharide, protein in Archea.
10. flagellum - simple - no microtubule, non membrane surrounded.
11. Respi - mesosome
12. photo - in membranes
13. some fix N.
14. eg: Bacteria, Cyanobac, Archaeobacteria.

b. Plant wood

15. During secondary growth in perinials
16. by vascular cambium activity
17. newly produced secondary xylem - sap wood
18. Old/already produced " - heart wood
19. Heart wood found in the middle in both ~~stem~~ stem & root
20. dead cells.
21. resin deposited. (dark colour)
22. protect from fungi & insects (resin)
23. sapwood - conduct water & minerals
24. have parenchyma cells  $\uparrow$
25. in gymnosperms - soft wood
26. have no xylem vessels
27. Angiosperm - hard wood

c. Functions of human stomach.

28. Store temporarily food. for this
29. have folds & elastic walls.
30. mechanical digestion - churning action
31. Gastric juice
32. functions - chemical digestion.
33. pepsin converts protein  $\rightarrow$  polypeptides.
34. Absorb -  $\text{H}_2\text{O}$ , Alcohol, (fat soluble) drugs
35. HCl - kills microbes
36. non-specific immunity
37. pyloric sphincter prevents flow of chyme
38. secrete gastrin
39. regulate digestion

