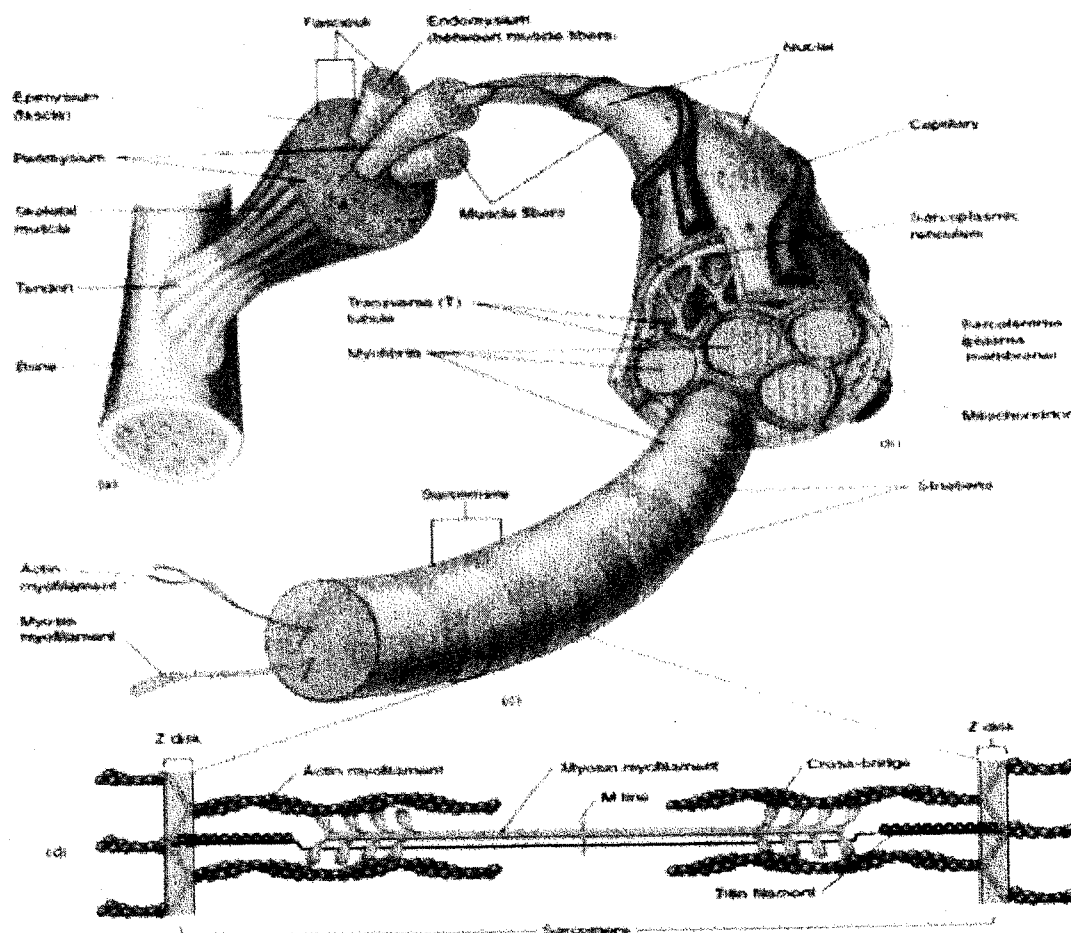


Department of Examinations - Sri Lanka
G.C.E. (A/L) Examination - 2018

09 - Biology

Marking Scheme



This document has been prepared for the use of Marking Examiners. Some changes would be made according to the views presented at the Chief Examiners' meeting.

Amendments to be included

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G.C.E. [A/L] Examination - 2018

09 - Biology

Distribution of Marks

- Paper I - $1 \times 50 = 50$

Paper II**Part A - Structured Essay (Answer all four questions)**

Question No. 01	-	100
Question No. 02	-	100
Question No. 03	-	100
Question No. 04	-	100

$$100 \times 4 = 400$$

Part B - Essay (Answer four questions only)

Question No. 05	-	150
Question No. 06	-	150
Question No. 07	-	150
Question No. 08	-	150
Question No. 09	-	150
Question No. 10	-	150

$$150 \times 4 = 600$$

$$\text{Total Marks} = 400 + 600 = 1000$$

$$\text{Paper II Final Marks} = 100$$

උත්තරපත්‍ර ලකුණු කිරීමේ පොදු ශිල්පීය ක්‍රම

උත්තරපත්‍ර ලකුණු කිරීමේ හා ලකුණු ලැයිස්තුවල ලකුණු සටහන් කිරීමේ සම්මත ක්‍රමය අනුගමනය කිරීම අනිවාර්යයෙන් ම කළ යුතුවේ. ඒ සඳහා පහත පරිදි කටයුතු කරන්න.

1. උත්තරපත්‍ර ලකුණු කිරීමට රතුපාට බෝල් පොයින්ට් පෑනක් පාවිච්චි කරන්න.
2. සෑම උත්තරපත්‍රයකම මුල් පිටුවේ සහකාර පරීක්ෂක සංකේත අංකය සටහන් කරන්න.
ඉලක්කම් ලිවීමේදී පැහැදිලි ඉලක්කමෙන් ලියන්න.
3. ඉලක්කම් ලිවීමේදී වැරදුණු අවස්ථාවක් වේ නම් එය පැහැදිලිව තනි ඉරකින් කපා හැර නැවත ලියා කෙටි අත්සන යොදන්න.
4. එක් එක් ප්‍රශ්නයේ අනු කොටස්වල පිළිතුරු සඳහා හිමි ලකුණු ඒ ඒ කොටස අවසානයේ Δ ක් තුළ ලියා දක්වන්න. අවසාන ලකුණු ප්‍රශ්න අංකයත් සමඟ $\square$ ක් තුළ, භාග සංඛ්‍යාවක් ලෙස ඇතුළත් කරන්න. ලකුණු සටහන් කිරීම සඳහා පරීක්ෂකවරයාගේ ප්‍රයෝජනය සඳහා ඇති තීරුව භාවිත කරන්න.

උදාහරණ : ප්‍රශ්න අංක 03

- | | | | |
|-------|-------------------------|---|---|
| (i) |
.....
..... | ✓ |  |
| (ii) |
.....
..... | ✓ |  |
| (iii) |
.....
..... | ✓ |  |

03

(i) $\frac{4}{5}$

+

(ii) $\frac{3}{5}$

+

(iii) $\frac{3}{5}$

=

$\frac{10}{15}$

බහුවරණ උත්තරපත්‍ර : (කවුළු පත්‍රය)

1. අ.පො.ස. (උ.පෙළ) හා තොරතුරු තාක්ෂණ විභාගය සඳහා කවුළු පත්‍ර දෙපාර්තමේන්තුව මගින් සකසනු ලැබේ. නිවැරදි වරණ කපා ඉවත් කළ සහතික කරන ලද කවුළුපතක් ඔබ වෙත සපයනු ලැබේ. සහතික කළ කවුළු පත්‍රයක් භාවිත කිරීම පරීක්ෂකගේ වගකීම වේ.
2. අනතුරුව උත්තරපත්‍ර හොඳින් පරීක්ෂා කර බලන්න. කිසියම් ප්‍රශ්නයකට එක් පිළිතුරකට වඩා ලකුණු කර ඇත්නම් හෝ එකම පිළිතුරක්වත් ලකුණු කර නැත්නම් හෝ වරණ කැපී යන පරිදි ඉරක් අඳින්න. ඇතැම් විට අයදුම්කරුවන් විසින් මුලින් ලකුණු කර ඇති පිළිතුරක් මකා වෙනත් පිළිතුරක් ලකුණු කර තිබෙන්නට පුළුවන. එසේ මකන ලද අවස්ථාවකදී පැහැදිලිව මකා නොමැති නම් මකන ලද වරණය මත ද ඉරක් අඳින්න.
3. කවුළු පත්‍රය උත්තරපත්‍රය මත නිවැරදිව තබන්න. නිවැරදි පිළිතුර ✓ ලකුණකින් ද, වැරදි පිළිතුර 0 ලකුණකින් ද වරණ මත ලකුණු කරන්න. නිවැරදි පිළිතුරු සංඛ්‍යාව ඒ ඒ වරණ කීරයට පහළින් ලියා දක්වන්න. අනතුරුව එම සංඛ්‍යා එකතු කර මුළු නිවැරදි පිළිතුරු සංඛ්‍යාව අදාළ කොටුව තුළ ලියන්න.

ව්‍යුහගත රචනා හා රචනා උත්තරපත්‍ර :

1. අයදුම්කරුවන් විසින් උත්තරපත්‍රයේ නිස්ව තබා ඇති පිටු හරහා රේඛාවක් ඇඳ කපා හරින්න. වැරදි හෝ නුසුදුසු පිළිතුරු යටින් ඉරි අඳින්න. ලකුණු දිය හැකි ස්ථානවල හරි ලකුණු යෙදීමෙන් එය පෙන්වන්න.
2. ලකුණු සටහන් කිරීමේදී ඕවර්ලන්ඩ් කඩදාසියේ දකුණු පස තීරය යොදා ගත යුතු වේ.
3. සෑම ප්‍රශ්නයකටම දෙන මුළු ලකුණු උත්තරපත්‍රයේ මුල් පිටුවේ ඇති අදාළ කොටුව තුළ ප්‍රශ්න අංකය ඉදිරියෙන් අංක දෙකකින් ලියා දක්වන්න. ප්‍රශ්න පත්‍රයේ දී ඇති උපදෙස් අනුව ප්‍රශ්න තෝරා ගැනීම කළ යුතුවේ. සියලු ම උත්තර ලකුණු කර ලකුණු මුල් පිටුවේ සටහන් කරන්න. ප්‍රශ්න පත්‍රයේ දී ඇති උපදෙස්වලට පටහැනිව වැඩි ප්‍රශ්න ගණනකට පිළිතුරු ලියා ඇත්නම් අඩු ලකුණු සහිත පිළිතුරු කපා ඉවත් කරන්න.
4. පරීක්ෂාකාරීව මුළු ලකුණු ගණන එකතු කොට මුල් පිටුවේ නියමිත ස්ථානයේ ලියන්න. උත්තරපත්‍රයේ සෑම උත්තරයකටම දී ඇති ලකුණු ගණන උත්තරපත්‍රයේ පිටු පෙරළමින් නැවත එකතු කරන්න. එම ලකුණු ඔබ විසින් මුල් පිටුවේ එකතුව ලෙස සටහන් කර ඇති මුළු ලකුණට සමාන දැයි නැවත පරීක්ෂා කර බලන්න.

ලකුණු ලැයිස්තු සකස් කිරීම :

මෙවර සියලු ම විෂයන්හි අවසාන ලකුණු ඇගයීම් මණ්ඩලය තුළදී ගණනය කරනු නොලැබේ. එබැවින් එක් එක් පත්‍රයට අදාළ අවසාන ලකුණු වෙන වෙනම ලකුණු ලැයිස්තුවලට ඇතුළත් කළ යුතු ය. I පත්‍රයට අදාළ ලකුණු ලකුණු ලැයිස්තුවේ "I වන පත්‍රය" තීරුවේ ඇතුළත් කර අකුරෙන් ද ලියන්න. අදාළ විස්තර ලකුණු ඇතුළත් කර "II වන පත්‍රය" තීරුවේ II පත්‍රයේ අවසාන ලකුණු ඇතුළත් කරන්න. 51 විත්‍ර විෂයයේ I, II හා III පත්‍රවලට අදාළ ලකුණු වෙන වෙනම ලකුණු ලැයිස්තුවල ඇතුළත් කර අකුරෙන් ද ලිවිය යුතු වේ.

සියලු ම හිමිකම් ඇවිරිණි / முழுப் பதிப்புரிமையுடையது / All Rights Reserved

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka
ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
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Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2018 අගෝස්තු
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2018 ஓகஸ்ட்
General Certificate of Education (Adv. Level) Examination, August 2018

ජීව විද්‍යාව I
உயிரியல் I
Biology I

09 E I

06.08.2018 / 1300 - 1500

පැය දෙකයි
இரண்டு மணித்தியாலம்
Two hours

Instructions:

- * Answer **all** questions.
- * Write your **Index Number** in the space provided in the answer sheet.
- * Instructions are given on the back of the answer sheet. Follow those carefully.
- * In each of the questions 1 to 50, pick one of the alternatives from (1), (2), (3), (4), (5) which is **correct** or **most appropriate** and mark your response on the answer sheet with a cross (x) on the number of the correct option in accordance with the instructions given on the back of the answer sheet.

1. Which of the following takes place in the metaphase of mitosis?
 - (1) Formation of spindle
 - (2) Condensation of chromosomes
 - (3) Disappearance of nucleolus
 - (4) Aligning chromosomes in the middle of the cell
 - (5) Breaking down of nuclear membrane
2. Which of the following **cannot** be seen in a typical plant cell when observed under a light microscope?
 - (1) Chloroplasts
 - (2) Starch granules
 - (3) Nucleus
 - (4) Mitochondria
 - (5) Vacuoles
3. Which of the following biochemical processes requires ATP?
 - (1) Photolysis of water during photosynthesis
 - (2) Absorption of K^+ into root hair cells from soil solution
 - (3) Diffusion of oxygen into living cells through cell membrane
 - (4) Attaching a carbon dioxide molecule to RuBP in the Calvin cycle
 - (5) Conversion of pyruvate to PEP in C4 pathway
4. Which of the following statements regarding the elements found in living matter is correct?
 - (1) There are 92 naturally occurring elements in living matter.
 - (2) Composition of elements in organisms is not constant.
 - (3) Elements found in organisms in less than 0.1% in dry weight are considered as trace elements.
 - (4) Iron is an example for a macroelement found in all organisms.
 - (5) Carbon, hydrogen, oxygen, nitrogen, phosphorus and magnesium are the six most abundant elements of living matter.
5. Having strong adhesive and cohesive forces is an important physical property of water molecules. Which of the following functions of plants is **not** associated with this property?
 - (1) Mechanical support in herbaceous plants
 - (2) Absorption of water from soil
 - (3) Turgor movements
 - (4) Transport of water within plant
 - (5) Dissolving of materials in protoplasm

6. All features given in which one of the following responses are present in a plant with trimerous flower parts?
- (1) Parallel veins in leaves, embryos with one cotyledon, fibrous roots, branched lipids in cell membrane
 - (2) Seeds in fruits, dominant sporophyte, several kinds of RNA polymerases, scattered vascular bundles in stem
 - (3) Embryos with one cotyledon, photosynthetic gametophyte, vascular bundles in the stem without cambium, unbranched lipids in cell membrane
 - (4) Parallel veins in leaves, heterospory, fibrous roots, protein synthesis that begins with formyl methionine
 - (5) Scattered vascular bundles in stem, perianth, naked seeds, unbranched lipids in cell membrane
7. A unicellular protist without flagella
- (1) could be sensitive to penicillin.
 - (2) may contain fucoxanthin.
 - (3) could be heterotrophic.
 - (4) may belong to phylum Rhodophyta.
 - (5) may contain phycocyanin.
8. Which of the following statements regarding classification of organisms is correct?
- (1) Viruses do not belong to any kingdom as they do not have a well organized nucleus.
 - (2) Protista is a natural kingdom where organisms with different evolutionary origins are included.
 - (3) The number of common characteristics found within a genus is higher than that of a species.
 - (4) The kingdom of plants was first identified by Carolus Linnaeus.
 - (5) Robert Whittaker introduced the three domain classification.
9. Which of the following may be present in a bilaterally symmetrical coelomic animal with tentacles and without a ventral heart?
- (1) Spines
 - (2) Nerve ring
 - (3) Antennae
 - (4) Gills
 - (5) Pinnules
10. Which of the following statements regarding the digestive system of man is correct?
- (1) Longitudinal muscles in the stomach are located between the circular muscles and sub-mucosa.
 - (2) Secretion of gastric juice is stimulated by parasympathetic nervous system.
 - (3) Spaces between two microvilli in small intestine are called crypts of Lieberkuhn.
 - (4) Secretin stimulates the contraction of gall bladder to release bile into duodenum.
 - (5) Microvilli in small intestine are visible under low power of the optical microscope.
11. Which of the following statements regarding regulation of breathing in man is correct?
- (1) It is regulated by the respiratory centres located in medulla oblongata and hypothalamus.
 - (2) Due to stimulation of inspiratory centre of medulla oblongata, nerve impulses are sent to external intercostal muscles.
 - (3) Increase in the pH of arterial blood stimulates chemoreceptors in aorta.
 - (4) Stimulation of stretch receptors in lungs inhibits expiratory centre.
 - (5) Stimulation of expiratory centre results in the contraction of diaphragm.
12. Transport of water and minerals in plants
- (1) occurs in both directions.
 - (2) is not aided by transpiration.
 - (3) is an active process.
 - (4) is explained by pressure flow hypothesis.
 - (5) occurs under a negative pressure gradient.

13. Characteristics of two plant cells named P and Q are given below.

Cell P: Thick secondary cell wall, isodiametric, pits in cell wall, large lumen

Cell Q: Thick secondary cell wall, not isodiametric, no pits in cell wall, narrow lumen

The cells P and Q are respectively

- (1) a companion cell and a vessel element.
- (2) a sieve tube element and a trachied.
- (3) a vessel element and a sclerenchyma cell.
- (4) a vessel element and a trachied.
- (5) a trachied and a vessel element.

14. Which of the following statements regarding circulatory systems of animals is correct?

- (1) Open circulatory system with ventral heart is present in mollusks.
- (2) Closed circulatory system is found in nematodes.
- (3) Haemoerythrin is the blood pigment of crustaceans.
- (4) AV node is the pacemaker of human heart.
- (5) In human heart, mitral valve is found between the left auricle and left ventricle.

15. Pons Varolii of humans is involved in

- (1) regulation of blood pressure.
- (2) recognition of sensory information.
- (3) regulation of ventilation of lungs.
- (4) regulation of the rate of heart beat.
- (5) regulation of reflex movements of eye muscles.

16. Select the correct statement regarding human ear.

- (1) Its normal hearing range is 40 - 20000 Hz.
- (2) Incus is connected to the oval window.
- (3) Pinna is composed of hyaline cartilage.
- (4) Membranous labyrinth is filled with perilymph.
- (5) Organ of Corti is associated with auditory function.

17. In humans, parasympathetic stimulations

- (1) dilate the pupil of eye.
- (2) decrease the rate of heart beat.
- (3) increase secretion of sweat.
- (4) dilate bronchi.
- (5) increase conversion of glycogen to glucose in the liver.

18. Select the correct statement regarding action potential of a human neurone.

- (1) K^+ influx into the neurone occurs during repolarization phase of action potential.
- (2) Duration of an action potential is about 5 milliseconds.
- (3) Na^+ efflux from the neurone occurs during depolarization phase of action potential.
- (4) It is a transient reversal of polarity of the nerve cell membrane.
- (5) Immediately after one action potential, another action potential can be produced.

19. Select the correct statement regarding human hormones.

- (1) Insulin is secreted by α -cells of islets of Langerhans.
- (2) Aldosterone is the main glucocorticoid secreted from the adrenal cortex.
- (3) Parathyroid hormone reduces blood calcium level.
- (4) Thyroxine increases heat production of the body.
- (5) Inhibin stimulates the secretion of FSH.

20. Select the plant growth substance which stimulates elongation of internodes and activates the enzymes in seed germination.

- | | | |
|-----------------|--------------------|---------------|
| (1) Ethylene | (2) Absciscic acid | (3) Cytokinin |
| (4) Gibberellin | (5) Auxin | |

21. Which of the following statements regarding excretion is correct?
- (1) Simple excretory system with longitudinal canals are found in nematodes.
 - (2) Nephridia are excretory structures found only in annelids.
 - (3) In humans, kidney is the main site of urea synthesis.
 - (4) Water conservation is highest when urea is produced as the nitrogenous excretory product.
 - (5) Ammonia is the main nitrogenous excretory product of marine bony fishes.
22. Which of the following is **not** likely to be found in human milk?
- (1) Vitamin B₁₂ and vitamin D
 - (2) Casein
 - (3) Galactose
 - (4) Fatty acids
 - (5) Calcium
23. Select the correct statement regarding human ribs.
- (1) They are short and curved bones.
 - (2) Superior surface of ribs is deeply grooved.
 - (3) There are 14 pairs of ribs.
 - (4) The first eight pairs of ribs articulate directly with the sternum.
 - (5) All ribs articulate posteriorly with the vertebral column.
24. Which of the following statements regarding human upper limb is correct?
- (1) Humerus is the longest and heaviest bone in the body.
 - (2) Radius is longer than ulna.
 - (3) Head of radius articulates with ulna.
 - (4) Wrist is made up of seven carpal bones.
 - (5) Distal end of humerus articulates only with ulna.
25. In humans, inhibin is secreted by
- (1) prostate glands.
 - (2) epididymis.
 - (3) seminal vesicles.
 - (4) testes.
 - (5) Cowper's glands.
26. Select the correct statement regarding thigmotropism.
- (1) It can be seen in male gametes of some plants.
 - (2) Auxins are not involved in it.
 - (3) Unequal elongation in different regions of plant can occur during it.
 - (4) Pollen tube growing towards ovule is an example for it.
 - (5) Cytokinins are involved in it.
27. The male gametophyte of a flowering plant is the
- (1) pollen sac.
 - (2) microspore.
 - (3) sperm cell.
 - (4) microspore mother cell.
 - (5) pollen grain.
28. When a red flowered plant of a certain species is crossed with a white flowered plant of the same species, all progeny were pink flowered. This type of inheritance results in due to
- (1) Mendelian inheritance.
 - (2) polygenic inheritance.
 - (3) codominance.
 - (4) incomplete dominance.
 - (5) polyallelism.
29. This question is based on the statement with three blanks given below.
- "Variants of genes, which are called, arise due to that occur as a result of mistakes in"
- Which of the following indicates in correct order, the terms that are best suited to fill the blanks of the above statement?
- (1) genotypes, variations, DNA replication
 - (2) alleles, mutations, transcription
 - (3) alleles, mutations, DNA replication
 - (4) mutants, variations, protein synthesis
 - (5) heterozygotes, mutations, meiosis

30. Turner syndrome is best illustrated in which of the following persons?
- (1) A girl born with a gene mutation on X chromosome
 - (2) A boy born with a gene mutation on Y chromosome
 - (3) A boy or a girl born with only one X chromosome
 - (4) A girl born with only one X chromosome
 - (5) A boy born with an additional Y chromosome
31. A genetically modified organism is different from other members of the same species because
- (1) it carries an extra chromosome.
 - (2) it carries a gene or genes from another organism.
 - (3) it is generated by cloning of another organism.
 - (4) it cannot produce fertile offspring by interbreeding with other members of the same species.
 - (5) its gene expression is well regulated.
32. Select the **incorrect** statement regarding an expert in genetic counselling.
- (1) He is knowledgeable on genetic disorders of humans.
 - (2) He advises persons with genetic disorders about the nature of the problem.
 - (3) He advises to abort a foetus if one of the parents is a carrier of a genetic disorder.
 - (4) He helps family members of the person with genetic disorder to manage the situation.
 - (5) He explains the persons with genetic disorder and family members how the disorder is inherited.
33. In an ecosystem, gross primary productivity and the amount of energy available at the third trophic level were determined to be $2000 \text{ kJ m}^{-2} \text{ year}^{-1}$ and $11 \text{ kJ m}^{-2} \text{ year}^{-1}$ respectively. If 90% of energy is lost when flows from one trophic level to the next, the amount of energy used for respiration by the primary producers in this ecosystem is
- (1) $900 \text{ kJ m}^{-2} \text{ year}^{-1}$.
 - (2) $990 \text{ kJ m}^{-2} \text{ year}^{-1}$.
 - (3) $1010 \text{ kJ m}^{-2} \text{ year}^{-1}$.
 - (4) $1100 \text{ kJ m}^{-2} \text{ year}^{-1}$.
 - (5) $1800 \text{ kJ m}^{-2} \text{ year}^{-1}$.
34. Clearing of forests contributes to
- (1) increase the concentration of heavy metals in plants.
 - (2) skin cancer.
 - (3) eroding of limestone monuments.
 - (4) sea level rise.
 - (5) reduce the range of spread of tropical diseases.
35. Experiments of Stanley Miller
- (1) provided evidence for the theory of spontaneous generation of life.
 - (2) showed that primordial soup contained a large amount of organic molecules.
 - (3) showed that organic molecules can be formed from inorganic gases.
 - (4) provided evidence for the theory presented by Schleiden, Schwann and Virchow.
 - (5) showed that life originated about 3500 million years ago.
36. *Nitrosomonas* is
- (1) a chemoautotroph which reduces N_2 to NH_4^+ .
 - (2) a chemoheterotroph which oxidises NH_4^+ to NO_2^- .
 - (3) a chemoautotroph which oxidises NH_4^+ to NO_2^- .
 - (4) a chemoautotroph which reduces NO_3^- to NO_2^- .
 - (5) a chemoheterotroph which reduces N_2 to NH_4^+ .

37. If a component in a culture medium is liable to be destroyed when exposed to high temperature, the best way to prepare that culture medium is to
- (1) heat the medium at 80°C for two hours.
 - (2) autoclave the medium and filter through a membrane filter with 0.45 μm pores.
 - (3) autoclave the medium without the heat labile component and the solution of heat labile component separately, and mix them after cooling.
 - (4) autoclave the medium without the heat labile component, filter the solution of heat labile component through a membrane filter with 0.45 μm pores and mix after cooling.
 - (5) mix all components of the medium in a glass flask and sterilize using ultraviolet radiation.

38. A characteristic feature of fungi is
- (1) having cell walls made up of glycopeptides.
 - (2) having heterotrophic absorptive nutrition.
 - (3) ingestion of food and digestion.
 - (4) storing food as starch.
 - (5) reproduction by endospores.

39. Which of the following statements regarding the use of sanitary landfills is correct?
- (1) It is not a good choice due to high operational costs.
 - (2) It involves dumping of municipal solid waste to wetland areas for land filling.
 - (3) It is a method of reducing the volume of solid waste.
 - (4) It is limited due to low ground water level in many regions.
 - (5) It does not involve decomposition of waste.

40. Food preservation is based on the following principles.
- a - Prevention of entry of microorganisms into food
 - b - Prevention of growth and activity of microorganisms in food
 - c - Removal or killing of microorganisms in food

Canning of food is based on which of the above principles?

- (1) a, b and c
- (2) a and b only.
- (3) a and c only.
- (4) b and c only.
- (5) c only.

- For each of the questions 41 to 50 one or more of the responses is/are correct. Decide which response/responses is/are correct and then select the correct number.

- If only A, B and D are correct 1
 If only A, C and D are correct 2
 If only A and B are correct 3
 If only C and D are correct 4
 If any other response or combination of responses is correct 5

Directions summarised				
1	2	3	4	5
A, B, D correct.	A, C, D correct.	A, B correct.	C, D correct.	Any other response or combination of responses correct.

41. Which of the following indicates/indicate the examples for some hierarchical levels of biological organization in correct order?
- (A) DNA, nucleus, muscle fibre, circular muscles, stomach
 - (B) Crow, flock of crows, flock of birds, home garden, biosphere
 - (C) Neurilemma, axon, neurone, brain, nervous system
 - (D) Amino acids, endoplasmic reticulum, neutrophils, blood vessels, blood
 - (E) Toad, Amphibia, Chordata, Animalia, Eukariya

42. Glycolipids are synthesized by which of the following organelle/organelles?
(A) Lysosome (B) Microbody (C) Golgi complex
(D) Endoplasmic reticulum (E) Mitochondrion
43. Which of the following is/are found only in plant tissues?
(A) Glyoxisomes (B) Plasmodesmata (C) Lysosomes
(D) Peroxisomes (E) Tight junctions
44. A poikilothermic animal with urea as the major nitrogenous waste may have which of the following structure/structures?
(A) Gills (B) Four-chambered heart (C) Neck
(D) Lungs (E) Beak
45. Which of the following statements regarding the absorption of end products of digestion in man is/are correct?
(A) Glucose is absorbed actively in the small intestine.
(B) Triglycerides are synthesized in the epithelial cells of villi of small intestine.
(C) Amino acids are absorbed into blood capillaries of villi of small intestine by diffusion.
(D) Fatty acids and glycerol are absorbed into lymphatic vessels of villi of small intestine.
(E) Maltose is absorbed actively into the epithelial cells of villi of small intestine.
46. Which of the following statements regarding human erythrocytes is/are correct?
(A) They are produced in red bone marrow.
(B) They transport both oxygen and carbon dioxide.
(C) Their diameter is about 10 μm .
(D) They are destroyed in the spleen.
(E) The normal range of erythrocyte count in a healthy adult man is 3.8 – 5.8 million/ mm^3 .
47. In the proximal convoluted tubule of human nephron, which of the following is/are actively reabsorbed?
(A) Na^+ (B) K^+ (C) Amino acids
(D) Glucose (E) Urea
48. Which of the following statements regarding skeletal muscle is/are correct?
(A) They have gap junctions.
(B) They fatigue easily.
(C) Each of their fibres contains several sarcomeres.
(D) They are extensible.
(E) Their fibres are short, cylindrical and unbranched.
49. Regarding human uterus, which of the following statements is/are correct?
(A) Both oestrogen and progesterone stimulate contractions of myometrium.
(B) Uterine secretions nourish the foetus.
(C) Oestrogen stimulates the formation of oxytocin receptors in the myometrium.
(D) Implantation of embryo in the uterus commences by about seventh day following fertilization.
(E) Endometrium is made up of stratified squamous epithelial cells.
50. Which of the following indicates/indicate a characteristic feature of each of the savannas, dry mixed evergreen forests, tropical rain forests and montane forests in correct order?
(A) Fire resistant trees, no clear stratification, continuous canopy, evergreen trees
(B) Evergreen trees, deciduous plants, clear stratification, trees with twisted trunks
(C) Grass, evergreen trees, no clear stratification, xerophytic plants
(D) Grass, fire resistant trees, evergreen trees, no clear stratification
(E) Evergreen trees, no clear stratification, stunted trees, trees with twisted trunks

Part A - Structured Essay

1. (A) (i) Following are some of the characteristics seen in living organisms. Explain what is meant by each of these characteristics.

(a) Growth

An irreversible increase in dry mass of organisms 1pt

(b) Development

Irreversible changes that occur during the life span of an organism 1pt

(c) Reproduction

Ability to produce new offspring for continuous existence of species /
Production of new generation of individuals of the same species 1pt

- (ii) There are four main types of organic compounds found in organisms. State the mostly found main type of organic compound in each of the following.

(a) Egg White:	Protein	1pt
(b) Coconut milk:	Lipid	1pt
(c) Primary cell walls:	Carbohydrate	1pt
(d) Arthropod exoskeleton:	Carbohydrate	1pt

- (iii) Name a laboratory test used to identify the following.

(a) Main type of organic compound found in egg white	
Biuret test	1pt
(b) Main type of organic compound found in coconut milk	
Sudan III test	1pt
(c) Main storage substance of Chlorophyta	
Iodine test	1pt
(d) Reducing sugars	
Benedict test	1pt

- (B) (i) Name four monosaccharides according to the number of carbon atoms and give an example for each of them.

Monosaccharide	Example	
(a) Triose	Glyceraldehyde	1+1pt
(b) Tetrose	Erythrose	1+1pt
(c) Pentose	Ribose / Ribulose / Deoxyribose	1+1pt
(d) Hexose	Glucose / Fructose / Galactose	1+1pt

- (ii) What is a disaccharide?

A (Sugar) molecule formed when two molecules of monosaccharides are joined by a glycosidic bond
1pt

(iii) (a) State the common characteristic of all monosaccharides and some disaccharides.

Reducing nature

1pt

(b) Describe a simple laboratory test used to identify sugars with the characteristic stated as the answer for (iii) (a) above.

- Take aqueous solution of sugar and
- Add an equal volume of Benedict's solution, mix well
- and boil (in a water bath)
- Brick red precipitate is formed

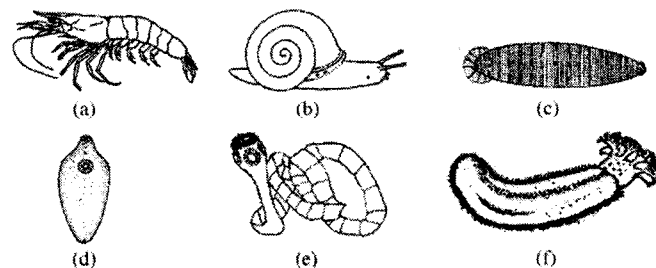
4pts

(C) (i) State the generic names of two homosporous, seedless plants with vascular tissues.

- *Nephrolepis*
- *Lycopodium*

2pts

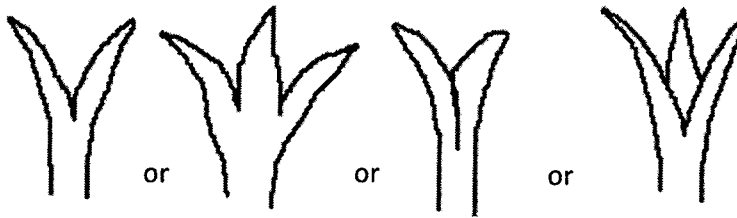
(ii)



Complete the following dichotomous key using appropriate numbers and letters to distinguish the animals shown in the diagrams (a)-(f) above.

(1) Tentacles present	5	1pt
Tentacles absent	2	1pt
(2) Suckers present	3	1pt
Suckers absent	a	1pt
(3) Hooks present	e	1pt
Hooks absent	4	1pt
(4) Segmented body	c	1pt
Unsegmented body	d	1pt
(5) Large foot present	b	1pt
Large foot absent	f	1pt

(iii) Structures known as pedicellaria are present in some echinoderms such as starfishes.
Draw the external appearance of a pedicellaria.



1pt

(iv) Name two classes of phylum Echinodermata that do not have pedicellaria.

- Ophiuroidea
- Holothuroidea
- Crinoidea

any 2 2pts

Total 40 x 2½ marks = 100 marks

2. (A) (i) Name a class which has animals with an incomplete alimentary canal other than coelenterates and flatworms.

Ophiuroidea

1pt

(ii) (a) What is radula?

(Chitinous) structure/ band with minute teeth found in the mouth / mouth cavity of some mollusks

1pt

(b) What is the use of radula?

Scraping food

1pt

(iii) (a) Why are some plants insectivorous?

To obtain nitrogen (required by them)

1pt

(b) State the generic name of an insectivorous aquatic plant.

Utricularia

1pt

(iv) (a) Write in correct order, the passage of air from outside to alveoli in man.

nostrils, nasal cavity, pharynx, larynx, trachea, bronchus, bronchiole, alveolar duct

1pt

(b) What is the role of goblet cells present in human respiratory tract?

Secretion of mucous

1pt

(v) (a) What is respiratory cycle?

One inspiration, one expiration and period after expiration until the start of the next inspiration

1pt

(b) What is the volume of air that enters the respiratory system during one normal respiratory cycle of a healthy adult man at rest?

450 ml / 500 ml

1pt

(B) (i) (a) What is meant by ultrafiltration that takes place during urine formation?

Filtration of blood under high pressure from glomerulus to the Bowman's capsule

1pt

(b) Name an ion that is secreted into the lumen of human nephron.

$H^+ / K^+ / NH_4^+$

any 1 1pt

(ii) State three functions of human kidney other than urine formation.

- Osmoregulation/ maintaining the constant osmotic pressure in the blood
- Secretion of hormone /Erythropoietin
- Regulation of blood pH
- Maintenance of blood volume
- Maintenance of blood pressure

any 3 3pts

(iii) Name the skin receptors involved in thermoregulation in man.

- Ruffini corpuscles/ bodies
- Krause end bulbs
- Free nerve endings

3pts

(iv) (a) What is the functional unit of human liver?

(Liver) lobules

1pt

(b) State four homeostatic functions of human liver.

- Regulation of blood glucose level
- Regulation of lipid content
- Synthesis of non-essential amino acids
- Detoxification
- Heat production
- Breakdown/ elimination of (sex) hormones
- Breakdown/ elimination of haemoglobin
- Storing blood
- Storing vitamins (A, E, K and D)
- Synthesis of blood proteins
- Synthesis of cholesterol
- Urea production

any 4 4pts

(v) (a) What are the three factors that contribute to the resting membrane potential of neurons?

- Differences in the concentrations of specific ions inside and outside the cell (membrane)
- Selective permeability of plasma membrane for K^+ ions and Na^+ ions
- $Na^+ K^+$ pump

3pts

(b) Which lobe of the human cerebrum controls muscle movement needed for speech?

Frontal (lobe)

1pt

(C) (i) (a) What is a hormone?

- A chemical (messenger) secreted/released by endocrine glands into blood
- which acts (usually) on a distant organ to modify its physiology/ function.

2pts

(b) Where does ADH act on the kidney tubules of man?

- Distal convoluted tubule
- Collecting duct

2pts

(ii) State two main differences between nervous coordination and endocrine coordination.

- Pathway is specific in nervous coordination; Pathway is not specific in endocrine coordination
- Nervous coordination is chemical and electrical; Endocrine coordination is chemical
- Nervous coordination is rapid / rapid response; Endocrine coordination is slow / slow response
- Response is often localized in nervous coordination; Response may be diffused / widespread in endocrine coordination.

(Both conditions have to be written)

any 2 2pts

(iii) (a) Briefly describe what are known as sinuses located in some bones of the human skeleton.

Air filled cavities/ sacs/ spaces lined with ciliated mucous membrane

1pt

(b) Name a bone that contains sinuses but does not take part in the formation of human cranium.

Maxillary (bone)

1pt

(iv) State two functions of sinuses.

- Give resonance to the voice
- Lighten the bones of face / skull / cranium
- Make it easier for the head / skull to balance on top of the vertebral column

any 2 2pts

(v) Name the two processes found in human mandible and state the function of each of them.

Process	Function	
Condylloid process	Articulates with the temporal bone	2pts
Coronoid process	Gives attachment to muscles and ligaments	2pts

Total 40 x 2½ marks = 100 marks

3. (A) (i) State the location of the pacemaker in the human heart.

On the wall / myocardium of right auricle close to the opening of the superior vena cava

1pt

(ii) Name the arteries that arise first from the aorta and state the structure to which they supply blood.

Arteries	Structure	
Coronary arteries	Heart	1+1 2pts

(iii) State how blood circulatory system contributes to maintain constant body temperature in man.

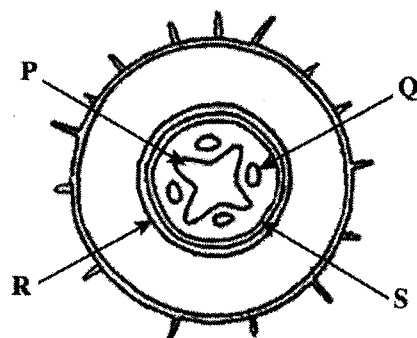
- Transfer heat from active tissues
- constriction and dilation of skin blood vessels

2pts

(iv) Considering the ABO blood groups and Rh factor, state the blood groups of the following persons

Universal donor	O ⁻	1pt
Universal recipient	AB ⁺	1pt

(B)



(i) Identify the structure shown in the above diagram.

T.S./ C.S. of a primary dicot root

1pt

(ii) (a) Name the tissues labeled as P, Q, R and S in the above diagram.

P - (Primary) xylem

Q - (Primary) phloem

R - Endodermis

S - Pericycle

1 pt each

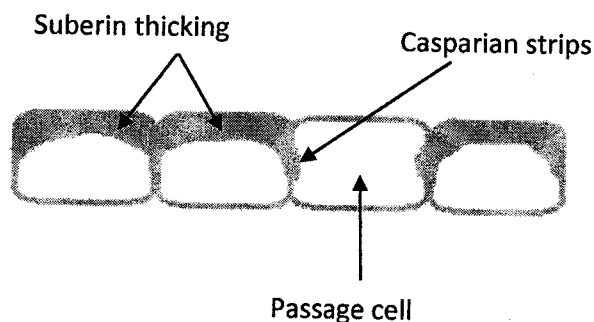
4pts

(b) What is the tissue of the above diagram that appears in red when stained with Safranin?

Xylem

1pt

(iii) Draw and label a few cells of tissue R when it is at matured stage.



Correct diagram 1pt + 1 pt each for labeling

(Incorrect diagram or no labeling – No marks)

4pts

(iv) What are the features of gymnosperms that enable them to be more successful on terrestrial habitats than bryophytes?

- Presence of well differentiated roots, stem and leaves
- Presence of vascular tissues/ xylem and phloem
- Presence of seeds
- (Diploid) sporophyte is dominant
- Presence of cuticles (on leaves/ aerial parts of the plant)
- Not dependent on external water for reproduction/ fertilization

any 5 5pts

(v) State three uses of plant tissue culture other than the propagation of plants with desired characters.

- Cryopreservation of germplasm
- Producing genetically modified plants
- Obtaining haploid plants
- Obtaining disease free plants

any 3 3pts

(C) (i) What is the main purpose of examining a bacteria smear stained with methylene blue under high power of a light microscope.

Observing (basic) shape

1pt

(ii) (a) Name the forms of arrangement of cells of cocci shown in the diagrams A—D write given below.



A



B



C



D

A - Cocci

B - Tetrad

C - Streptococci

D - Staphylococci

(1 point each) 4pts

(b) What are the two types of arrangement of cells of bacilli?

- Diplobacilli
- Streptobacilli

2pts

(iii) (a) What are prions?

- Proteinaceous infectious particles

1pt

(b) How could prions be transmitted from human to human?

- During transplanting of tissues / organs
- Transfusion of contaminated blood

2pts

(iv) Some microorganisms in the normal microbiota of humans may become pathogenic when general resistance of the body is lowered. How are these microorganisms called?

Opportunistic pathogens

1pt

(v) Give four reasons for lowering the general resistance of the human body against microbial infections.

- Exhaustion
- Prolonged use of antibiotics
- Use of immune suppressive drugs
- Stress
- Malnutrition
- Use of narcotics

any 4 4pts

Total 40 x 2½ marks = 100 marks

4. (A) (i) (a) What is placenta?

A structure formed between the mother and the foetus (mainly) for exchange of materials (between mother and foetus).

1pt

(b) What is the type of placenta found in humans?

Deciduous alanto-chorion placenta

1pt

(ii) (a) Name a material that passes from mother to foetus and from foetus to mother through placenta.

Water / H₂O

1pt

(b) Name a virus that can pass from mother to foetus through placenta.

Hepatitis B/ Rubella

1pt

(iii) (a) Name a hormone secreted only by the human placenta.

Human placental lactogen/ hCG (Human chorionic gonadotrophin)

1pt

(b) State two functions of placenta other than hormone secretion and exchange of material between mother and foetus.

- Attachment of foetus to mother
- Prevention from coagulation of blood due to Rh factor of different blood groups
- Protection from relatively high blood pressure of maternal circulation
- Acting as a barrier for certain materials

any 2 2pts

(iv) (a) What is lactation?

Synthesis and release of milk

1pt

(b) Name two hormones that are directly involved in lactation.

- Prolactin
- Oxytocin

2pts

(v) What is the reason for menopause?

- Ovaries become less sensitive to FSH and LH

1pt

(B) (i) Where does oxidative phosphorylation take place in an eukaryotic cell?

- Inner membrane / cristae of mitochondria

1pt

(ii) State the events that take place during oxidative phosphorylation in a eukaryotic cell.

- Oxidation of reduced co-enzymes
- ATP formation / Conversion of ADP to ATP
- Hydrogen accepted by molecular oxygen
- forming water
- Electrons transported through electron carriers

5pts

(iii) Name three enzymes involved in DNA replication and state one function of each of them.

Enzyme	Function	
(DNA) Helicase	uncoiling/unwinding/unzipping of DNA	2pts
DNA polymerase	Synthesis/ Polimerization of new (complementary) DNA strand	2pts
(DNA) Ligase	Joining DNA fragments	2pts

(iv) State three traits introduced to agricultural crops by genetic modification for crop protection.

- Pest resistance
 - Climate tolerance
 - Disease resistance
- 3pts

(C) (i) Why is it important to study environmental science?

- Today mankind is faced with many environmental issues
 - They are increasing / growing and
 - become more and more complex day by day
 - To make effective suggestions for these and
 - to take remedial actions
- 5pts

(ii) What is in-situ conservation?

- Species are protected in its natural habitat
 - and their reproduction is facilitated
- 2pts

(iii) State three methods of in-situ conservation other than establishing national reserves.

- Traditional home gardens
 - Establishing sanctuaries
 - Reintroduction of species into natural habitat/ environment
- 3pts

(iv) What is Ramsar convention?

(Convention dealing with) conservation of wetlands of international importance especially as waterfowl habitats

1pt

(v) Name two Ramsar sites located in the north-West of Sri Lanka.

- Anawilundawa (tank) sanctuary
 - Vankalai sanctuary
 - Willpattu national park
- any 2 2pts

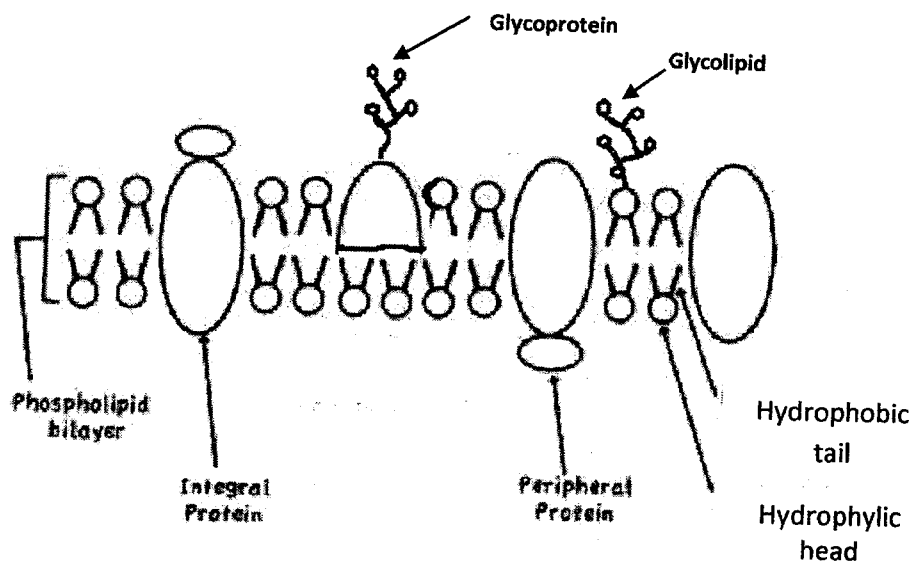
Total 40 x 2½ marks = 100 marks

PART B - Essay

5. (a) Describe the structure of plasma membrane

1. Fluid mosaic model of plasma membrane
2. consists of phospholipids and proteins.
3. Phospholipids form a fluid bilayer / two layers
4. with outer hydrophilic heads
5. and inner hydrophobic tails.
6. Some proteins are fully embedded
7. while some are partially embedded
8. in the fluid matrix and
9. they are called intergral proteins.
10. (Some) proteins are (loosely) bound to the membrane and
11. they are called peripheral proteins.
12. (Some) (short) sugar molecules/ (short) chains/ oligosaccharides/ polysaccharides
13. are attached to the surface of proteins
14. to form glycoproteins
15. and to phospholipids
16. to form glycolipids.

16 x 4 marks = 64 marks



Diagram

Fully labeled correct diagram 7

Partially labeled correct diagram 3

Unlabeled diagram no marks

Diagram = 07 marks

Sub total for (a) = 71 marks

(b) Explain how a nerve impulse is generated in the plasma membrane of an axon and how it is conducted along a non-myelinated axon

1. At resting condition axolemma / plasma membrane of axon is polarized.
2. Outside of axolemma is positively (+vely) charged.
3. Inside of axolemma is negatively (-vely) charged.
4. Application of a threshold stimulus,
5. produces influx/flow of Na^+ from extra cellular fluid to intracellular fluid /outside to inside of the axon.
6. This is followed by exflux/flow of K^+ from intracellular fluid to extra cellular fluid/ inside to outside of the axon.
7. This causes an action potential at the site of stimulus / (plasma) membrane of axon depolarizes,
8. causing reversal of polarity.
9. Outside of membrane becomes -vely charged,
10. and inside of the membrane becomes +vely charged.
11. Region of the membrane immediately ahead of this region is still at resting condition / outside is +vely charged and inside is -vely charged.
12. Difference in the (electric) potential now exists between the region of action potential and this.
13. Due to this difference in potential, eddy currents / local circuits will flow
14. from the region to the region of action potential immediately ahead of action potential
15. through extracellular fluid and
16. through the intracellular fluid.
17. These eddy currents / local circuits (eventually) pass through plasma membrane.
18. and the action potential will move forward (as an impulse).
19. Action potential will not be formed in the reverse direction (although eddy currents/ local circuits / flow),
20. because immediately after one action potential 2nd action potential cannot be formed / there is a refractory period.

Sub total for (b): $20 \times 4 = 80$

Total 71 +80 = 151

Maximum = 150

(06) (a) Describe advantages and disadvantages of sexual and asexual reproduction in plants**Advantages of sexual reproduction in plants:**

1. Meiosis takes place when gametes are formed,
2. where random segregation / independent assortment of chromosomes
3. and exchange of genetic material between homologous chromosomes / crossing over takes place.
4. Therefore, reshuffling of genetic material occurs,
5. resulting in new combination of genes,
6. which leads to genetic variation / new traits.
7. Therefore, evolution is possible.
8. Offspring have unique combinations of genes (inherited from the two parents).
9. Produces seeds.
10. which facilitates the dispersal of offspring.
11. Seed dormancy allows germination to be suspended/delayed until environment is suitable.

Disadvantages of sexual reproduction in plants:

12. Two parents/ mates/ two types of gametes are needed.
13. Time consuming/ takes more time (to make offspring).
14. Expensive (in-terms of resources)
15. (May) need pollinators / pollinating mechanisms / external agents.

Advantages of asexual reproduction in plants:

16. Only one parent is required.
17. It gives more chance for reproduction / rapid multiplication in number.
18. Special mechanisms for pollination are not required.
19. Genetically identical offspring are produced.
20. Favorable characters are preserved.

Disadvantages of asexual reproduction in Plants:

21. Many propagules fail to grow/ spores fail to produce offspring
22. resulting in waste of resources/ Expensive.
23. No (genetic) variations and
24. Does not aid in evolution.

(b) Explain alternation of generation with respect to plants

1. Alternation of a haploid gametophyte generation and a diploid sporophyte generation (in the life cycle of a plant).
2. Diploid sporophyte produces spores
3. by meiotic division,
4. which are haploid.
5. Spores germinate and
6. divide by mitosis,
7. producing gametophyte,
8. which produces gametes
9. which are haploid.
10. Two gametes fuse / fertilize
11. to form a zygote
12. which is diploid.
13. Zygote undergoes mitosis
14. to form the embryo,

15. which develops in to sporophyte.

16. During evolution, sporophyte generation becomes dominant / gametophyte generation becomes recessive

24 + 16 = 40;

Any 38 X 4 marks = 152 marks

Maximum 150 marks

7. (a) Discuss the importance of microorganisms in human health

1. Some microorganisms are harmful / pathogenic.
2. Some are opportunistic pathogens and
3. cause infection if there is injury/tissue damage
4. or if the general resistance of the body is lowered.
5. Some are potential pathogens and
6. cause infectious diseases/ infections.
7. Some of them are virulent.
8. eg. Chicken pox virus.
9. Some produce toxins.
10. eg: *Vibrio cholerae* / *Corynebacterium diphtheriae* / *Clostridium tetani* / *Salmonella typhi*.
11. Pathogens are generally specialized/ adapted for a particular portal of entry (to cause disease).
12. They invade through gastrointestinal tract
13. eg. *Salmonella typhi* / *Vibrio cholerae* / *Shigella* sp. / Polio virus / *Escherichia coli*
14. or respiratory tract
15. eg. *Mycobacterium tuberculosis* / *Corynebacterium diphtheriae* / *Bordetella pertussis* / Myxovirus
16. or genitourinary tract
17. eg. *Treponema pallidum* / *Neisseria gonorrhoeae* / HIV/ *E. coli*
18. or wounds of skin
19. eg; *Clostridium tetani* / *Leptospira* / Rhabdovirus / HIV.
20. Some are beneficial (to human health)
21. eg: Lactic acid bacteria / Lactic acid produced by vaginal bacteria creates an unfavorable environment for many pathogens.
22. Some microorganisms are used in vaccine production
23. eg: B.C.G. vaccine / Polio vaccine.
24. Some are used in antibiotic production
25. eg. *Penicillium* / *Streptomyces* / Penicillin / Streptomycin / Tetracyclin.
26. Some of the intestinal microorganisms produce vitamins.

b) Describe the economic importance of Fungi

1. Some (heterotrophic / saprotrophic) fungi cause food spoilage,
2. eg. *Mucor*
3. some (pathogenic) fungi cause diseases of plants
4. and reduce the economic benefits / cause economic losses.
5. Some fungi cause decay in furniture / wooden structures.
6. Some fungi are used as food.
7. eg. Mushrooms/ *Pleurotus*/ *Agaricus* /*Lentinus*.
8. Some are used for production of alcoholic beverages/ alcohol/ bakery industry/ bread
9. eg. *Saccharomyces cerevisiae*.
10. Some are used to produce antibiotics.
11. eg. *Penicillium notatum*/ *Penicillium chrysogenum*.
12. Some are used to produce enzymes.
13. eg. *Aspergillus niger*/ *Saccharomyces cerevisiae*/ *Rhizopus* sp ./ *Aspergillus oryzae*
14. Some are used to produce compost./ Recycling of wastes.

26 + 14 = 40;

Any 38 x 4 =152

Maximum 150 marks

8. (a) Briefly describe the diversity of nutrition seen among protists.

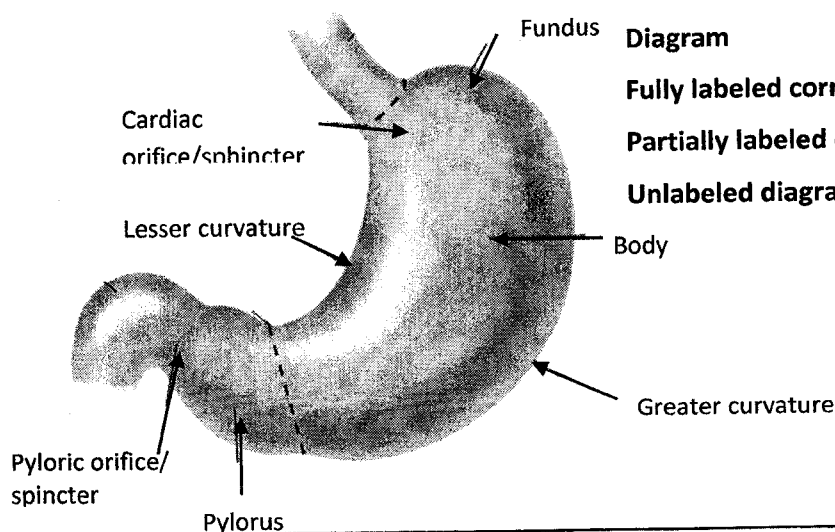
1. Protists can be autotrophic or
2. heterotrophic.
3. In autotrophic nutrition, source of carbon is inorganic/ CO₂.
4. Some protists are photoautotrophic and
5. their energy source is light.
6. eg. Chlorophyta
7. Rhodophyta and
8. Phaeophyta
9. In heterotrophic nutrition, source of carbon is organic.
10. Some heterotrophic protists are holozoic
11. They ingest (food),
12. digest,
13. absorb (nutrients),
14. assimilate and
15. eject (undigestable matter).
16. eg. Ciliophora / *Paramecium*
17. Rhizopoda / *Amoeba*.
18. Some protists are symbiotic and
19. get nutrients by living in association with another species / by two species living together.
20. Some (symbiotic protists) are parasitic
21. eg. *Plasmodium*.
22. Some are mutualistic.
23. eg. algae of lichens

(b) Describe the gross structure of human stomach

1. J shaped
2. muscular sac / dilated sac (in the abdominal cavity).
3. Proximally continuous / Its proximal end connects with oesophagus
4. by cardiac orifice /sphincter and
5. continuous / connects with the duodenum from the distally
6. Pyloric orifice
7. which is controlled by pyloric sphincter.

Stomach is divided into

8. the fundus
9. the body and
10. the pylorus.
11. It has a lesser curvature and a greater curvature.
12. External surface is smooth.
13. Internal surface is folded / contain rugae.

**Diagram**

Fully labeled correct diagram: 7 marks

Partially labeled correct diagram: 3 marks

Unlabeled diagram: No marks

(23+13) 36 x 4 marks = 144 + 7 marks for the diagram = 151 marks

Maximum 150 marks

9. (a) Describe the Hardy-Weinberg equilibrium.

Hardy-Weinberg equilibrium states that

1. Allele / genotype frequencies of a (an ideal) population remain constant from generation to generation (in the absence of other evolutionary influences).

This occurs under several conditions / Several assumptions need to be fulfilled. They are:

2. Population size is very large / infinite;
3. random mating occurs;
4. no mutations take place;
5. no immigration and no emigration / no migration (in to or out of population) / close population;
6. no (natural) selection.
7. Deviations of above assumptions / conditions / if those assumptions are not fulfilled, changes in allele / genotype frequencies / genetic drift occurs
8. leading to evolution.

(b) (i) Describe how blood groups are inherited to the children of a mother having blood group AB and a father having blood group A.

1. Genotype of the mother (having blood group AB) is $I^A I^B$.
 2. Genotypes for father are either $I^A I^A$
 3. or $I^A I^0 / I^A i$
 4. Gametes of the mother are I^A
 5. and I^B
 6. in 50% of each / 1:1 ratio.
 7. If father's genotype is $I^A I^A$, all the gametes are I^A .
 8. The possible genotypes of the children are $I^A I^A$
 9. and $I^A I^B$
 10. in 1:1 ratio / 50% each.
 11. Their phenotypes/ blood groups are A
 12. and AB
 13. in 1:1 ratio / 50% each.
 14. If the father's genotype is $I^A I^0 / I^A i$, gametes produced are I^A
 15. and I^0 / i
 16. in 50% each / 1:1 ratio.
 17. The genotypes of the children are $I^A I^A$,
 18. $I^A I^B$,
 19. $I^A I^0 / I^A i$,
 20. $I^B I^0 / I^B i$
 21. in 1:1:1:1 ratio / 25% each.
 22. Phenotypes / blood groups of children are A, AB and B
 23. in 2:1:1 ratio.
- If points are shown in a diagram, marks should be given. However, correct words should be used.

(ii) Explain how the inheritance of ABO blood groups differs from Medelian inheritance.

1. In Medelian inheritance, a character is controlled/ inherited by two alleles of a gene.
2. ABO blood groups are controlled/ inherited by three alleles.
3. They are denoted as I^A , I^B and I^0/i .
4. In Mendelian inheritance, one allele is dominant over the other (recessive).
5. and in phenotype, dominant character is expressed.
6. In ABO blood groups, I^A and I^B are codominant,
7. and both A and B characters are expressed in the phenotype, (when both I^A and I^B alleles are present).

8+ 23 + 7 =38
38 x 4 marks= 152
Maximum 150 marks

10. Write short notes on the following.**(a) Lymphatic system of man**

1. Lymphatic system consists of lacteals,
2. lymph capillaries,
3. lymph nodes,
4. diffused lymph tissue,
5. lymphatic organs / spleen / thymus
6. and bone marrow.
7. It transports lymph.
8. Lymph capillaries originate blindly / have a blind end
9. and (they join to) form large lymph vessels
10. which join together to form two large ducts,
11. called right lymphatic duct and
12. thoracic duct.
13. Lymph flows due to contraction of nearby muscles and
14. pulsation of large arteries.
15. Lymphatic system involves in / perform specific and non-specific immune responses/ immunity,
16. and helps in absorption of fat / fat soluble material (any example such as Vitamin A, D, E, K is accepted).

(b) Sliding filament theory of muscle contraction

1. This theory explains the mechanism of muscle contraction.
2. (According to this theory) thin actin filaments (of muscle fibers) slide over thick myosin filaments (during muscle contraction).
3. Myosin filaments contain heads and
4. actin filaments contain binding sites/ regions.
5. When a nerve impulse reaches the skeletal muscle fibre (through neuro-muscular junction),
6. sarcoplasmic reticulum releases Ca^{2+} .
7. Ca^{2+} expose binding sites/ regions of actin filaments and
8. myosin heads attach to binding sites/ regions
9. forming (actin-myosin) cross bridges.
10. ATP provides the energy for this/ ATP is needed for this.
11. (When activated) (actin-myosin) cross bridges tilt inwards / towards center of sarcomere
12. in a short powerful stroke.
13. A series of powerful strokes causes the contraction of muscle fibre/ sarcomere
14. (Due to this), the actin filaments slide towards the centre of sarcomere,
15. shortening the I band and
16. H zones while
17. A band remains at the same length.

(c) Ozone layer depletion

1. Depletion of ozone layer occurs due to release of chlorofluorocarbons/ CFCs
2. from refrigerators/ air conditioners/ aerosol cans.
3. This increases the harmful ultra-violet radiation/ rays (coming from the sun)
4. This increases (risk of) cataracts of eyes,
5. skin cancers and
6. lowers crop yield by
7. interfering with photosynthesis.

16+17+07 = 40**Any 38 X 4 marks = 152 marks****Maximum 150 marks**

