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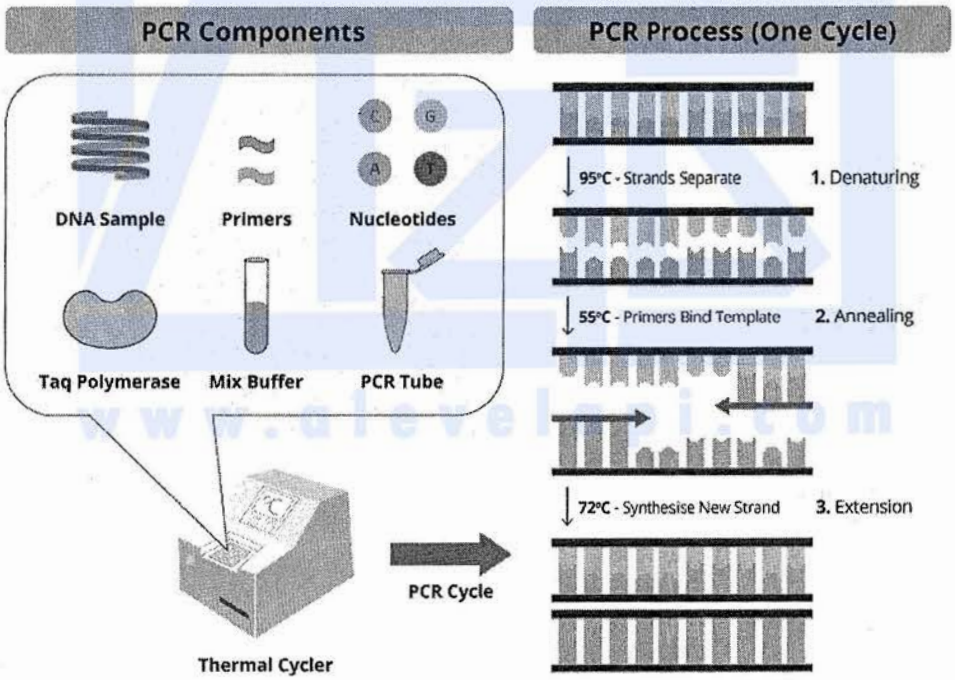
Department of Examinations – Sri Lanka

G.C.E. (A/L) Examination - 2020

09 - Biology

New Syllabus

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 - 2020

09 - Biology (NEW)

Distribution of Marks

- Paper I - 1 x 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 x 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 x 4 = 600

Total Marks = 400 + 600 = 1000

Paper II Final Marks = 100

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Common Techniques of Marking Answer Scripts.

It is compulsory to adhere to the following standard method in marking answer scripts and entering marks into the mark sheets.

1. Use a red color ball point pen for marking. (Only Chief/Additional Chief Examiner may use a mauve color pen.)

2. Note down Examiner's Code Number and initials on the front page of each answer script.

3. Write off any numerals written wrong with a clear single line and authenticate the alterations with Examiner's initials.

4. Write down marks of each subsection in a △ and write the final marks of each question as a rational number in a □ with the question number. Use the column assigned for Examiners to write down marks.

Example: **Question No. 03**

(i) ..... √ $\frac{4}{5}$

(ii) ..... √ $\frac{3}{5}$

(iii) ..... √ $\frac{3}{5}$

03 (i) $\frac{4}{5}$ + (ii) $\frac{3}{5}$ + (iii) $\frac{3}{5}$ = $\frac{10}{15}$

MCQ answer scripts: (Template)

1. Marking templets for G.C.E.(A/L) and GIT examination will be provided by the Department of Examinations itself. Marking examiners bear the responsibility of using correctly prepared and certified templates.

2. Then, check the answer scripts carefully. If there are more than one or no answers Marked to a certain question write off the options with a line. Sometimes candidates may have erased an option marked previously and selected another option. In such occasions, if the erasure is not clear write off those options too.

3. Place the template on the answer script correctly. Mark the right answers with a '√' and the wrong answers with a 'X' against the options column. Write down the number of correct answers inside the cage given under each column. Then, add those numbers and write the number of correct answers in the relevant cage.

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Structured essay type and assay type answer scripts:

1. Cross off any pages left blank by candidates. Underline wrong or unsuitable answers. Show areas where marks can be offered with check marks.

2. Use the right margin of the overland paper to write down the marks.

3. Write down the marks given for each question against the question number in the relevant cage on the front page in two digits. Selection of questions should be in accordance with the instructions given in the question paper. Mark all answers and transfer the marks to the front page, and write off answers with lower marks if extra questions have been answered against instructions.

4. Add the total carefully and write in the relevant cage on the front page. Turn pages of answer script and add all the marks given for all answers again. Check whether that total tallies with the total marks written on the front page.

Preparation of Mark Sheets.

Except for the subjects with a single question paper, final marks of two papers will not be calculated within the evaluation board this time. Therefore, add separate mark sheets for each of the question paper. Write paper 01 marks in the paper 01 column of the mark sheet and write them in words too. Write paper II Marks in the paper II Column and wright the relevant details. For the subject 51 Art, marks for Papers 01, 02 and 03 should be entered numerically in the mark sheets.

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AL/2020/09/E-I(NEW)

සියලු ම හිමිකම් ඇවිරිණි/முழுப் பதிப்புரிமையுடையது/All Rights Reserved

නව නිර්දේශය/புதிய பாடத்திட்டம்/New Syllabus

NEW

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இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2020
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2020
General Certificate of Education (Adv. Level) Examination, 2020

ජීව විද්‍යාව I உயிரியல் I Biology I	09 E I	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 them carefully.*
- *In each of the questions from **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** (×) on the number of the correct option in accordance with the instructions given on the back of the answer sheet.*

1. The first organisms formed on earth are considered to be
(1) heterotrophic, anaerobic eukaryotes.
(2) heterotrophic, aerobic prokaryotes.
(3) autotrophic, anaerobic eukaryotes.
(4) heterotrophic, anaerobic prokaryotes.
(5) autotrophic, aerobic prokaryotes.

2. Proteins
(1) form the secondary structure due to disulphide bonds.
(2) are made up of 26 different amino acids.
(3) are composed of C, H, O, N, S and P.
(4) would not be denatured by detergents.
(5) contribute to transport of materials.

3. Steps involved in observing an onion peel mounted on a glass slide and placed on the stage of a compound light microscope are as follows.
A - Adjusting the mirror
B - Use of fine focussing knob
C - Use of coarse focussing knob
The correct sequence of above steps are
(1) A, B and C. (2) A, C and B.
(3) B, A and C. (4) C, A and B.
(5) C, B and A.

4. Some features of cells are as follows.
A - Presence of plasma membrane
B - Presence of 70S ribosomes
C - Occurrence of mitosis
D - Presence of subcellular components suspended in cytosol
Which of the above features are common to prokaryotic and eukaryotic cells?
(1) A and B only. (2) B and C only.
(3) B and D only. (4) A, B and C only.
(5) A, B and D only.

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5. Which of the following statements regarding eukaryotic cell cycle is correct?
(1) Crossing over takes place in metaphase of meiosis I.
(2) Formation of chromatin occurs in G_1 phase.
(3) DNA replication occurs in G_2 phase.
(4) Nuclear envelope reforms during cytokinesis.
(5) Formation of mitotic spindle begins in prophase.

6. ATP
(1) is a nucleoside containing pentose sugar, adenine and phosphate groups.
(2) can be produced by oxidative phosphorylation using solar energy.
(3) hydrolyses to ADP releasing 30.5 kJ/mol of energy.
(4) is formed in pyruvate oxidation through substrate level phosphorylation.
(5) contains deoxyribose.

7. Which of the following is a characteristic of enzymes?
(1) They do not alter the nature of end products.
(2) They increase the activation energy of a reaction.
(3) They are not substrate specific.
(4) A small amount of enzyme is used up during the reaction.
(5) Any part of the enzyme molecule can catalyze a reaction.

8. Some statements regarding biochemical evolution are given below.
P - Small organic molecules such as amino acids and nitrogenous bases were first formed in early oceans.
Q - Small organic molecules polymerized to form organic macromolecules.
R - Protocells contained nucleic acids enclosed in a membrane.
Which of the above statements is/are correct?
(1) P only. (2) Q only. (3) P and Q only.
(4) Q and R only. (5) P, Q and R.

9. Some features of organisms are given below.

Cellular Organization	Peptidoglycan	RNA Polymerase	Response to Streptomycin
A – Prokaryotic	P – Present	R – One kind	X – Growth inhibited.
B – Eukaryotic	Q – Absent	S – Several kinds	Y – Growth not inhibited.

Select the response that indicates the correct combination of above features for each of the organisms given below.
(1) *Nostoc* – A, P, S, X (2) *Thermococcus* – A, P, R, Y
(3) *Euglena* – B, P, S, X (4) *Mucor* – B, Q, S, Y
(5) *Planaria* – B, Q, R, Y

10. Some structures seen among animals are as follows.
Protonephridia, mantle and nematocysts
Organisms showing each of the above structures in correct sequence are
(1) *Obelia*, hook worm and *Fasciola*. (2) *Planaria*, slug and jellyfish.
(3) *Taenia*, pin worm and *Obelia*. (4) *Fasciola*, earthworm and *Hydra*.
(5) Sea cucumber, snail and *Obelia*.

11. Spike mosses can be considered to be more similar to seed plants than club mosses do due to the presence of
(1) stems. (2) leaves. (3) heterospory.
(4) strobili. (5) dominant sporophyte.

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12. Several features seen among some chordates are as follows.

A - Keratinized structures
B - Internal fertilization
C - Parthenogenesis
D - Marine life

Which of the above features can be seen in the organisms of classes Reptilia, Aves and Mammalia?

(1) A and B only. (2) A and C only.
(3) B and D only. (4) A, B and C only.
(5) A, B and D only.

13. Collenchyma cells differ from parenchyma cells because collenchyma cells

(1) are non-living when mature.
(2) have a large central vacuole.
(3) have unevenly thickened cell walls.
(4) are thickened with lignin.
(5) are present in the vascular tissues of plants.

14. Shoot apical meristem

(1) increases height and diameter of stem.
(2) produces cells inwards and outwards.
(3) is composed of parenchyma cells.
(4) is composed of undiffentiated cells.
(5) contributes to primary and secondary growth of stem.

15. Dissolving of solutes in water

(1) increases water potential and solute potential.
(2) decreases water potential and solute potential.
(3) decreases water potential and increases solute potential.
(4) increases water potential and decreases solute potential.
(5) affects water potential and solute potential independent of each other.

16. Osmosis

(1) occurs due to diffusion of water molecules through a permeable membrane.
(2) occurs from a low water potential to a high water potential.
(3) is an active process.
(4) is the mechanism by which water enters root hairs from soil.
(5) reduces pressure in the sieve tube at the source.

17. Chlorosis in older leaves may be caused due to deficiency of which of the following elements?

(1) Mg and S (2) N and P (3) Cl and Fe (4) Mn and Zn (5) Mo and Ni

18. Seed of a fruit is developed from

(1) egg cell. (2) central cell. (3) embryo sac. (4) ovule. (5) ovary.

19. Some plant hormones are given below.

A - Abscisic acid
B - Cytokinins
C - Ethylene
D - Gibberellins

Of the above hormones, leaf senescence is promoted by

(1) A and B only. (2) A and C only. (3) B and C only.
(4) C and D only. (5) A, B and C only.

20. Examples for plants showing homospory are

(1) *Pogonatum* and *Nephrolepis*. (2) *Lycopodium* and *Selaginella*.
(3) *Selaginella* and *Cycas*. (4) *Lycopodium* and *Gnetum*.
(5) *Nephrolepis* and *Pinus*.

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21. Mineral elements mainly required for maintaining acid base balance, nerve functioning and formation of bones in man in correct sequence are
(1) Mg, Fe and P. (2) P, K and Cl. (3) K, Na and I.
(4) Na, K and Cl. (5) Cl, Ca and P.

22. This question is based on the following.
A - Movement of lymph; contraction of cardiac muscle
B - Exchange of gases in capillaries; active transport
C - Clotting of blood; formation of thrombin
D - Transport of CO_2 in blood; participation of red blood cells.
In which of the above pairs, does the second contribute to the first?
(1) A and B (2) A and C (3) B and C (4) B and D (5) C and D

23. Four respiratory volumes of a resting person are as follows.
Inspiratory reserve volume = 2500 ml Tidal volume = 450 ml
Expiratory reserve volume = 1450 ml Residual volume = 1100 ml
Inspiratory capacity, functional residual capacity and vital capacity of this person in correct sequence are
(1) 2950 ml, 2550 ml and 4400 ml.
(2) 1900 ml, 1550 ml and 5050 ml.
(3) 2950 ml, 1900 ml and 4400 ml.
(4) 2550 ml, 3950 ml and 5050 ml.
(5) 2950 ml, 2550 ml and 5500 ml.

24. Which of the following excretory structures of animals opens into digestive tract?
(1) Green glands (2) Salt glands (3) Flame cells
(4) Malpighian tubles (5) Nephridia

25. Select the response that correctly indicates the part of the human brain and its function.
(1) Thalamus – regulation of appetite
(2) Hypothalamus – maintenance of posture
(3) Mid brain – coordination of visual reflexes
(4) Pons Varolii – regulation of sleep and awake cycles
(5) Cerebellum – initiation of fight or flight response

26. In the retina of the human eye, the cell layers are arranged from the choroid to vitreous humour respectively as
(1) epithelial layer, bipolar cells, ganglion cells and photoreceptors.
(2) photoreceptors, epithelial layer, ganglion cells and bipolar cells.
(3) epithelial layer, bipolar cells, photoreceptors and ganglion cells.
(4) ganglion cells, bipolar cells, photoreceptors and epithelial layer.
(5) epithelial layer, photoreceptors, bipolar cells and ganglion cells.

27. Stimulation of the sympathetic division of the autonomic nervous system in man
(1) decreases the rate of heart beat. (2) promotes digestion.
(3) constricts pupil of the eye. (4) stimulates urination.
(5) promotes ejaculation of semen.

28. The hormone that has a tropic effect and a non-tropic effect is
(1) TSH. (2) ACTH. (3) prolactin. (4) GH. (5) FSH.

29. Which of the following statements regarding asexual reproduction of animals is correct?
(1) It relies entirely on meiotic division.
(2) It may produce offspring with varied genotypes.
(3) It enhances the evolution of species in changing environments.
(4) It allows rapid multiplication of individuals from a single parent.
(5) New organisms can be developed from a sperm without fertilization.

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30. In the human skull,
(1) vomer contributes to form the cranium.
(2) ethmoid and sphenoid bones are facial bones.
(3) zygomatic and parietal bones contribute to form the zygomatic arch.
(4) mastoid process of mandible articulates with temporal bone.
(5) maxillary and frontal bones contain sinuses.

31. Hybrid vigour is
(1) increased by breeding among genetically similar individuals.
(2) higher in parents than in their F_1 generation.
(3) achieved by increasing heterozygocity.
(4) maintained by breeding among hybrids.
(5) a result of interspecific hybridization.

32. A function of topoisomerase is
(1) sealing the gaps of DNA strands.
(2) unwinding the double helix of DNA.
(3) stabilizing separated DNA strands.
(4) relaxing the strain of overtwisted DNA strands.
(5) breaking the hydrogen bonds between DNA strands.

33. Translation of eukaryotes differs from that of prokaryotes because it
(1) does not start before transcription is terminated.
(2) occurs in the nucleus.
(3) uses UAG, UAA or UGA as stop signals.
(4) does not form polysomes.
(5) does not start at AUG codon.

34. Which of the following responses indicates the biomes in increasing order of average annual rainfall/precipitation?
(1) Arctic tundra, temperate grasslands, temperate broad leaf forests
(2) Temperate grasslands, savannas, tropical rain forests
(3) Deserts, Alpine tundra, northern coniferous forests
(4) Arctic tundra, chaparrals, savannas
(5) Tropical dry forests, chaparrals, Alpine tundra

35. Select the response with three threatened organisms.
(1) Bengal tiger, dodo, Sri Lankan elephant
(2) Black ruby barb, giant tortoise, woolly mammoth
(3) Tilapia, water hyacinth, blue magpie
(4) Giant African land snail, giant panda, Indian fly catcher
(5) Maha madu, Wesak orchid, dusky-striped jungle squirrel

36. Which of the following international agreements may contribute to reduce global warming?
A - Kyoto protocol
B - Basel convention
C - Montreal protocol
D - Cartagena protocol

(1) A only. (2) A and B only. (3) A and C only.
(4) A, B and C only. (5) A, B and D only.

[See page six

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37. Which of the following statements regarding microorganisms is correct?
(1) Almost all mycoplasmas are parasites of animals and plants.
(2) Fungi are chemoheterotrophs which show saprophytic or parasitic modes of nutrition.
(3) Purple non-sulphur bacteria utilize light as the source of energy and CO_2 as the source of carbon.
(4) Streptococcus bacteria divide in multiple planes.
(5) In cyanobacteria, nitrogen fixation is catalyzed by nitrogenase enzyme present in akinetes.

38. Some bacterial pathogens
(1) produce phospholipase which contributes to invasiveness.
(2) produce endotoxins which are thermolabile lipopolysaccharides.
(3) use the capsule and pili to enter host tissue.
(4) obtain nutrients from host cells without altering the metabolism of the host.
(5) produce lecithinase that breaks down the cementing substance between cells.

39. Which of the following statements regarding the roles of microorganisms is correct?
(1) When organic matter is mineralized by bacteria and fungi, oxygen, water and CO_2 are released.
(2) Methanotrophic microorganisms produce methane from ocean sediments.
(3) *Pseudomonas* sp. causes denitrification when oxygen is limited in soil.
(4) Rhizobia are free living nitrogen fixing bacteria in soil.
(5) All rhizosphere fungi are beneficial to plants.

40. Select the response which correctly indicates the disease and its causative microorganism.
(1) Botulism – *Staphylococcus* sp.
(2) Tetanus – *Clostridium* sp.
(3) Cholera – *Shigella* sp.
(4) Dysentry – *Salmonella* sp.
(5) Typhoid – *Vibrio* sp.

- **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. Select the features that can be seen in the tissues of the respiratory system of man.
(A) Single layer of plate like cells
(B) Single layer of cells of different heights
(C) Single layer of dice shaped cells
(D) Matrix with chondroitin sulphate
(E) Single layer of brick shaped cells

42. Three substances that the ingested food get encountered within the buccal cavity, stomach and small intestine of man in correct sequence are
(A) lysozymes, pepsin and aminopeptidase.
(B) immunoglobulins, HCl and chymotrypsin.
(C) salivary amylase, dipeptidase and lipase.
(D) mucus, pepsin and bile.
(E) lysozymes, carboxypeptidase and amylase.

[See page seven

Alevel ලාපිස උසස් පෙළ විද්‍යා/ගණිත/කලා/වාණිජ හා තාක්ෂණ විෂය ධාරාවන්ට අදාල සියලුම ප්‍රශ්න පත්‍ර/සටහන් හා තවත් බොහෝ දෑ ලබා ගැනීමට පිවිසෙන්න www.alevelapi.com වෙත.

43. Some features of circulatory systems and examples for animals showing each of those features are given below. Select the correct "feature-example" combination/combinations.
(A) No distinction between circulatory fluid and interstitial fluid – Centipede
(B) Presence of pulmonary veins – Spider
(C) Back flow of circulatory fluid into the heart via pores in the heart – Cockroach
(D) Two chambered heart – Ray
(E) Absence of blood capillaries – Carp

44. Antibodies
(A) are proteins secreted by plasma cells.
(B) are soluble forms of B lymphocyte antigen receptors.
(C) contain epitopes that initiate immune responses.
(D) inactivate pathogens in body fluids.
(E) kill body cells infected with pathogens.

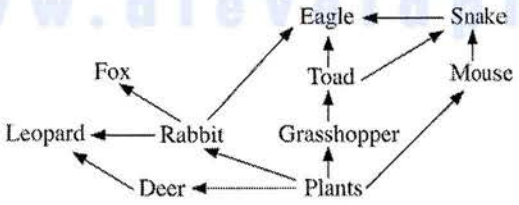
45. Which of the following cells in the testes of man are diploid?
(A) Primary spermatocytes (B) Secondary spermatocytes (C) Spermatogonia
(D) Leydig cells (E) Spermatids

46. In the human vertebral column,
(A) 24 bones are linearly arranged.
(B) cervical curvature develops at about 7–8 months after birth.
(C) thoracic region is formed by 12 vertebrae.
(D) cervical vertebrae contain foramen for vertebral arteries.
(E) lumbar vertebrae contain bifid spinous processes.

47. Which of the following statements regarding the results of Mendel's experiments is/are correct?
(A) F_2 generation of a monohybrid cross shows 3:1 phenotypic ratio.
(B) Heritable factors of a dihybrid cross are located close to each other on the same chromosome.
(C) Each heritable character is determined by two heritable factors.
(D) Heritable factors of a dihybrid cross are located on two non-homologous chromosomes.
(E) F_2 generation of a dihybrid cross shows 9:3:3:1 genotypic ratio.

48. Substitution of a single nucleotide in a DNA sequence may result in
(A) silent mutation. (B) shift in the reading frame.
(C) formation of a shorter peptide. (D) cancer.
(E) shortening of gene.

49. This question is based on the food web given below.



In the above food web, the organisms that can be considered as in the same trophic level are
(A) eagle and snake. (B) leopard and fox. (C) toad and mouse.
(D) toad and eagle. (E) grasshopper and leopard.

50. Which of the following statements regarding drinking water treatment process is/are correct?
(A) Alum is added to remove suspended matter and microorganisms.
(B) Ozone is used to kill microorganisms.
(C) During filtration stage, microorganisms are removed by absorption into sand particles.
(D) Trickling filter method is used to filter microorganisms.
(E) During the primary treatment, about 90% of organic matter is removed.

* * *

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இலங்கைப் பரீட்சைத் திணைக்களம்

අ.පො.ස. (උ.පෙළ) විභාගය/ க.பொ.த. (உயர் தர)ப் பரீட்சை - 2020

නව නිර්දේශය/ புதிய பாடத்திட்டம்

විෂය අංකය
பாட இலக்கம் **09**

විෂය
பாடம் **Biology** **NEW**

ලකුණු දීමේ පටිපාටිය/புள்ளி வழங்கும் திட்டம்
I පත්‍රය/பத்திரம் I

ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.	ප්‍රශ්න අංකය வினா இல.	පිළිතුරු අංකය விடை இல.
01.	4	11.	3	21.	5	31.	3	41.	1/5
02.	5	12.	5	22.	5	32.	4	42.	1
03.	2	13.	3	23.	1	33.	1	43.	2
04.	5	14.	4	24.	4	34.	1	44.	1
05.	5	15.	3	25.	3	35.	5	45.	2
06.	3	16.	4	26.	5	36.	3	46.	4
07.	1	17.	5	27.	5	37.	2	47.	2
08.	2	18.	4	28.	4	38.	1	48.	2
09.	4	19.	2	29.	4	39.	3	49.	1
10.	2	20.	1	30.	5	40	2	50	3

✪ විශේෂ උපදෙස්/ விசேட அறிவுறுத்தல் :

එක් පිළිතුරකට/ ஒரு சரியான விடைக்கு ලකුණු 01 බැගින්/புள்ளி
මුළු ලකුණු/மொத்தப் புள்ளிகள் 1 × 50 = 50

Alevel Apis උසස් පෙළ විද්‍යා/ගණිත/කලා/වාණිජ හා තාක්ෂණ විෂය ධාරාවන්ට අදාළ සියලුම ප්‍රශ්න පත්‍ර/සටහන් හා තවත් බොහෝ දෑ ලබා ගැනීමට පිවිසෙන්න www.alevelapi.com වෙත.

Part A – Structured Essay – New
Answer all questions on this paper itself
(Each question carries 100 Marks)

1. (A) **(i) One of the characteristic features of living organisms is irritability. What is known as irritability?**

- Ability to respond to internal and external stimuli/ Ability to respond stimuli from both internal and external environments

1pt

(ii) What is the monomer of each of the following?

Pectin: Galacturonic acid

Hemicellulose: Pentose

2pts

(iii) State two common functions of NAD^+, $NADP^+$ and FAD.

- Act as a co-enzyme
- Act as an electron carrier

2pts

(iv) Name the structure that helps in cytoplasmic streaming and movement of chromosomes, and state its structural components.

Structure: Cytoskeleton **1pt**

Structural components: Microfilaments/ Actin filaments
Microtubules **2pts**

(v) State the location of the secondary cell wall of a plant cell and name a substance present in it other than cellulose.

Location: Between plasma membrane & primary cell wall **1pt**

Substance: Lignin/ Suberin **1pt**

(B) **(i) What are the three events that contribute to genetic variations during meiosis?**

- Crossing over
- Recombination
- Independent assortment.

3pts

(ii) Name the type of photosynthetic pigment that prevents the formation of reactive oxidative molecules harmful to plant cells.

- Carotenoids

1pt

(iii) What is known as the action spectrum of photosynthesis?

- A graph showing the effectiveness of different wave lengths of light in (stimulating) photosynthesis/ A graph showing the variation of the rate of photosynthesis at different wave lengths of light.

5 / 0 marks

Alevel ඇප්ස් පෙළ විද්‍යා/ගණිත/කලා/වාණිජ හා තාක්ෂණ විෂය ධාරාවන්ට අදාළ සියලුම ප්‍රශ්න පත්‍ර/සටහන් හා තවත් බොහෝ දේ ලබා ගැනීමට පිවිසෙන්න www.alevelapi.com වෙත.

(iv) Name the two types of cells in which $C0_2$ fixation occurs in C4 plants and state the CO_2 acceptor and CO_2 fixing enzyme present in each of them.

Type of cell	CO_2 acceptor	CO_2 fixing enzyme
(a) Mesophyll cell	PEP/ Phosphoenol pyruvate	PEP Carboxylase
(b) Bundle sheath cell	RuBP/ Ribulose bisphosphate	RuBISCO/ Ribulose bisphosphate carboxylase oxygenase

6pts

(v) How do the two types of cells stated in B(iv) above interconnect tightly with each other?

- Having large number/high number of plasmodesmata **1pt**

(C) (i) In which geological eon did the first eukaryotes appear on earth?

- Proterozoic **1pt**

(ii) Three events that occurred during evolution of organisms are as follows.

P - Origin of mammals
Q - Origin of seed plants
R - Dominance of angiosperms
Write the above events in chronological order using the relevant letters.

Q P R **1pt**

(iii) State three features of free living forms of phylum Platyhelminthes that cannot be seen in parasitic forms.

- Eye spots / Sensory organs.
- Cilia.
- No larval stage / Direct development
- Eversible pharynx

Any 3pts

(iv) State where the male and female gametophytes are present in seed plants.

Male gametophyte: Inside the pollen grain

Female gametophyte: Inside the Ovule **2pt**

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(v) Complete the following dichotomous key to distinguish the protists given below.
***Euglena, Paramecium, Amoeba, Ulva, Sargassum,* Diatoms**

(1) Cell wall present	- 2
Cell wall absent	- 4
(2) Multicellular	- 3
Unicellular	- Diatoms
(3) Gas filled floats present	- *Sargassum*
Gas filled floats absent	- *Ulva*
(4) Pellicle present	- 5
Pellicle absent	- *Amoeba*
(5) Cilia present	- *Paramecium*
Cilia absent	- *Euglena*

10pts

38 x 2.5= 95 marks

Marks for B (iii) = +5 marks

Total = 100 marks

2. (A) (i) State the three processes that contribute to growth of plants.

- Cell division
- Cell elongation
- Cell differentiation

3pts

(ii) State one function of each of the following plant tissues.

Vascular cambium: Produces secondary vascular tissue / xylem and phloem.

Cork cambium: Produces periderm / cork

2pts

(iii) Through which structure, each of the following activities takes place in plants?

Gaseous exchange in woody stems: Lenticels

Guttation: Hydathodes **2pts**

(iv) State in correct sequence what happens in guard cells from the stage of accumulation of K^+ ions until the opening of stomata.

- Lowering of water potential / Increase in solute potential,
- Inflow of water (due to osmosis),
- Increase in turgor,
- Expansion of cells,
- Bending of inner wall / Draw away of inner walls from each other.

5pts

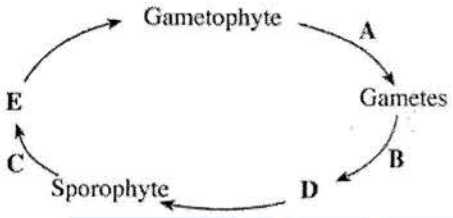
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(v) How do temperatures below a critical level affect the cell membrane of plant cells?

- Lipids become crystalized.
- Membrane loses its fluidity,
- resulting in blocking transport (across membrane).
- Reduce the rate of membrane enzyme reaction/ Stops the enzyme activity.

Any 3pts

(B) (i) A sketch of the life cycle of a land plant is given below.
Name the processes denoted by A, B and C and the structures denoted by D and E.



A: Mitosis

B: Fertilization

C: Meiosis

D: (Diploid) Zygote

E: (Haploid) Spore

5pts

(ii) Slate the following types of symbiosis.

Beneficial to both organisms: Mutualism

Beneficial to one organism and no effect on the other: Commensalism

2pts

(iii) (a) Calculate the body mass index of a person who is 153 cm tall and weighs 50 kg.

$\frac{Weight\ (kg)}{Height(m)^2} = \frac{50}{1.53^2} = 21.36 \approx 21.4$

Equation or numerical substitution 1pt
Answer 1pt

(b) According to the World Health Organization criteria, what is the minimum weight this person should have in order to consider him as non-malnourished? (Give your answer in kg to the first decimal)

- 43.3 kg

1pt

(iv) Name a fat soluble vitamin that acts as an antioxidant.

- Vitamin E

1pt

(v) Name two hormones that are secreted by the digestive tract of man and have functions antagonistic to each other.

- Cholecystokinin / Secretin
- Gastrin

2pts

(C) (i) (a) State a common function of epithelial tissues and connective tissues.

- Protection

1pt

(b) State three structural features of dense connective tissue that can be used to distinguish it from other connective tissues when observed under the light microscope.

- Densely packed collagen fibres
- Reduced matrix
- Contain fewer cells

3pts

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(ii) State the functions of the SA node and AV node of the human heart.

SA node: Initiates heart beat/ Originates the stimulus for contraction of heart.
Sets the rhythm of heart beat. **2pts**

AV node: Transmits electrical signals / impulse from atria to ventricles. **1pt**

(iii) Draw the normal ECG tracing of a healthy person and label its waves.

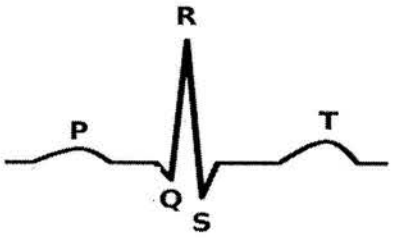


Diagram **1pt**
Correct Labelling **1pt**

(iv) State what are represented by the first and last waves of the ECG tracing.

First wave: Atrial depolarization / Spreading of impulse (from SA Node) over the atria **1 pt**

Last wave: Ventricular repolarization (and relaxation of ventricles / Relaxation of ventricular muscle)

1pt

(v) Considering a haemoglobin molecule as 'Hb' write the equation for the chemical reaction that occurs only in the red blood cells of lung capillaries.

- $Hb + 4O_2 \leftrightharpoons HbO_8$

1pt

40 X 2.5marks = 100 marks

3. (A) (i) Briefly state what interferons are?

- Proteins secreted by virus infected body cells,
- that can protect uninfected body cells (from viral infection)
- by stimulating production of anti-viral proteins /by producing proteins that inhibit viral replication.

3pts

(ii) Name two capillary networks that are associated with the human nephron other than the glomerulus.

- Peritubular Capillaries
- Vasa recta

2pts

(iii) What is dialysis carried out for kidney patients?

Process of removing

- excretory products
- excess solutes and
- toxins

from blood by artificial method.

3pts

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(iv) State a similarity between nervous coordination and hormonal coordination.

- Chemical transmission

1pt

(v) Name two phyla that include animals with brain, ventral nerve cord and segmented ganglia.

- Annelida.
- Arthropoda.

2pts

(B) (i) (a) What are known as ventricles in the human brain?

- Irregular shaped cavities in the central canal.

1pt

(b) What are the three parts of the human brain that form the brain stem?

- Mid brain.
- Pons Varolii
- Medulla oblongata.

3pts

(ii) State two functions of the human spinal cord.

- Links the central nervous system to sensory and motor neurons.
- (Facilitates) nerve impulse propagation towards the brain/ away from the brain.
- Coordinates / produces reflexes.

Any 2pts

(iii) What is the importance of refractory period of a neuron?

- Prevention of reverse conduction of a nerve impulse. **1pt**

(iv) Name the progressive motor disorder of the nervous system that leads to lack of coordination and control of muscle movements in elderly people.

- Parkinson disease

1pt

(v) Briefly state what a hormone is?

- Specific types of signaling molecules secreted by an endocrine gland / endocrine cell
- which travels in blood and
- acts on/ change the functioning of specific target cells elsewhere in the body.

3pts

(C) (i) (a) State three functions of Sertoli cells.

- Secretion of inhibin,
- Providing nourishment and
- Providing attachment for cells that are in different stages of spermatogenesis.

3pts

(b) State the function of acrosome in human sperm.

- Help the sperm to enter the ovum
- by penetrating its outer layer
- due to hydrolytic enzymes / trypsin and hyaluronidase.

3pts

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(c) In which structure of the male reproductive system do the sperm mature?

Epididymis

1pt

(ii) (a) State two methods that can be used to analyze genetic disorders of the foetus during pregnancy.

1. Amniocentesis / Chorionic villi sampling
2. Analysis of genome of foetus

2pts

(b) Write in correct sequence, the pathway that oxygen poor blood of human foetus gets oxygenated and returns to the foetus.

(Foetus) ⟶ (two) arteries of umbilical cord ⟶ chorionic villi ⟶ (foetus) ⟵ umbilical veins ⟵

1pt

(iii) Name a phylum which includes animals with an endoskeleton made up of calcium carbonate plates.

- Echinodermata **1pt**

(iv) (a) Why doesn't the first pair of ribs move during inspiration of man?

- As it is firmly fixed to the sternum and first thoracic vertebra.

1pt

(b) State three structural features of the human vertebral column that help to maintain upright posture.

- Development of two secondary curvatures / Presence of two primary and two secondary curvatures.
- Vertebrae become larger towards the end of the vertebral column.
- Secral vertebra fused to form sacrum.

3pts

(v) (a) State the function of the arches of the foot of the lower limb of man.

- Distribute the weight of the body when standing / moving

1pt

(b) State two locations where ball and socket joints are found in the human body.

- Head of the humerus with glenoid cavity (of scapula)/ Shoulder joint
- Head of femur with acetabulum (of hip bone/ pelvis) Hip joint

2pts

40 X 2.5 = 100 marks

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4. (A) (i) State four desirable features of garden peas for genetic experiments.

- Available in many varieties with contrasting traits
- Short generation time
- Produce a large number of offspring (from each cross)
- Crossing between plants could be (strictly) controlled

4pts

(ii) (a) What is known as pleiotropy in genetics?

- Expression of a single gene affecting the expression of multiple traits which are not related to each other.

1pt

(b) Give two examples for pleiotropy seen in man.

- Cystic fibrosis
- Sickle cell disease /Sickle cell anemia

2pts

(iii) What are known as intergenic DNA and introns?

Intergenic DNA : Regions/ DNA segments/nucleotide sequences without an identified functions present in between genes / Non – coding regions/DNA segments / neucleotide sequences in between genes.
Introns : Non – coding regions / DNA segments/ nucleotide sequences within the genes.

2pts

(iv) State whether trisomy, monosomy or gene mutation is the reason for each of the following disorders.

Disorder	Reason
Colour blindness	Gene mutation
Down syndrome	Trisomy
Turner syndrome	Monosomy

3pts

(v) (a) State why each of the following is used during DNA isolation.

Chelating agent: To inhibit DNase activity / to remove metal ions required for nuclease activity.

Proteolytic enzymes: To free DNA from its binding proteins / disrupt DNA-protein molecules /dissociation of nucleoprotein complex

Cold ethanol: To precipitate DNA

3pts

(b) State two essential features of a cloning vector.

- Ori
- Multiple cloning sites
- Markers

Any 2 pts

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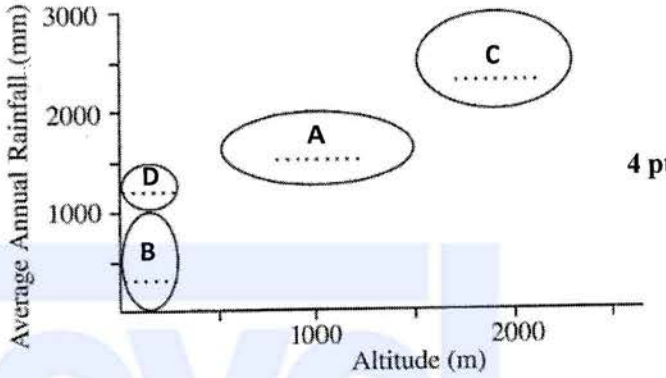
(B) (i) What is meant by primary production?

- The amount of organic matter produced by autotrophs in a given area during a given period of time.

1pt

(ii) (a) Using the correct letter, indicate the ellipse in the diagram that represents each of the following ecosystems of Sri Lanka.

A - Savanna
B - Tropical thorn scrubs
C - Wet patana
D - Tropical dry mixed evergreen forests



4 pts

(b) Which one of the ecosystems given in (ii)(a) above can be found in the dry zone as well as in the intermediate zone of Sri Lanka?

- Savanna / A

1pt

(iii) Write the common name of an endemic plant found in tropical wet lowland rain forests of Sri Lanka.

- Hora

1pt

(iv) Write the common name of a plant in Sri Lanka which is facing a very high risk of extinction in the wild.

- Wesak orchid

1pt

(v) (a) State the group of organisms that contributes most to reduce the CO_2 content in the atmosphere.

- Phytoplankton

1pt

(b) What is the major global environmental issue that affects the organisms stated in (v)(a) above?

- Ozone depletion

1pt

(C) (i) (a) Name an obligate anaerobic bacterial species.

- *Clostridium tetani/ Clostridium botulinum/ Clostridium* sp.

1pt

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(b) State the importance of akinetes to cyanobacteria.

- Can survive / tolerate / resistant to unfavorable environmental conditions / high temperature/ drought

1pt

(ii) **(a) COVID-19 coronavirus is roughly spherical. To which type of morphological form do such spherical viruses belong?**

- Enveloped

1pt

(b) How does a viroid structurally differ from a virus?

- Due to absence of protein coat / capsid / protective layer.

1pt

(iii) Name two diseases for which immunity can be induced using subunit vaccines.

- Tetanus
- Diphtheria
- Hepatitis B

Any 2pts

(iv) Name a species of microorganisms used for the production of each of the following substances.

Citric acid from sucrose : *Aspergillus niger*

Invertase : *Saccharomyces cerevisiae*

Streptomycin : *Streptomyces griseus/ Streptomyces* sp.

3pts

(v) **(a) Name two substances that are produced when putrefaction of food occurs due to action of microorganisms.**

- Amino acid
- Amines
- Ammonia
- Hydrogen Sulphide

Any 2pts

(b) In routine testing of water samples for consumption, why is the presence of indicator organisms such as coliform bacteria tested instead of the presence of pathogenic microorganisms?

- Pathogens may present only in small numbers/ pathogens may not be detected.
- Takes a lot of time (to test the presence of pathogens).

2pts

40 X 2.5 = 100 marks

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General Certificate (A/L) Examination – 2020 New Syllabus
09 – Biology Marking Scheme
PAPER II - PART B - Essay

5. **Describe the process of aerobic respiration that occurs in liver cells of man using glucose as the substrate.**

Three main steps

1. Glycolysis
2. Pyruvate oxidation and citric acid cycle /Krebs cycle / TCA cycle
3. Oxidative phosphorylation /Electron transport chain

4. Glycolysis takes place in the cytosol (of a cell),
5. Does not depend on oxygen/oxygen is not involved.
6. (one) Glucose (6C) molecule is oxidized (broken down) into two (3C) pyruvate molecules.
7. Two ATP (molecules) are utilized (to initiate the process) and
8. four H^+ and electrons are produced.
9. Electrons/ H^+ are accepted by two NAD^+ (molecules) and
10. two NADH (molecules) are produced.
11. (In later steps of glycolysis) four ATP (molecules) are produced
12. by substrate level phosphorylation.
13. The net gain of ATP (molecules) in glycolysis is 2 ATP (as two ATP molecules are used up).
14. Two pyruvate (molecules) enter mitochondria
15. by active transport.
16. Pyruvate is converted to acetyl group by releasing $2CO_2$ (molecules),
17. in the matrix of mitochondria.
18. Acetyl group combines with co-enzyme A to produce Acetyl Co-enzyme A.
19. (In this reaction) two NAD^+ (molecules) are converted to two NADH (molecules).
20. Cytric acid cycle/ Krebs cycle/ TCA cycle takes place in the matrix of mitochondria (using specific enzymes).
21. Acetyl Co-enzyme A is combined with (4C) oxaloacetic acid/oxaloacetate and produce (6C) citric acid/citrate.
22. Citric acid/citrate undergoes a series of reactions to regenerate oxaloacetic acid/oxaloacetate
23. by releasing two (molecules of) CO_2 (decarboxylation)
24. and one ATP molecule
25. by substrate level phosphorylation.
26. One $FADH_2$ (molecule) and
27. three (molecules of) NADH are produced (for one cycle/for one molecule of acetyl co-A)
28. These numbers should be doubled when the yield of one glucose molecule is considered.
29. Electron transport chain takes place in the inner membrane (cristae) of mitochondria and
30. synthesize ATP
31. by oxidation of reduced co-enzymes / NADH and $FADH_2$.
32. This process is oxidative phosphorylation.
33. Electrons (of reduced co-enzymes) pass through a series of proteins and non-protein molecules
34. and are finally accepted by molecular oxygen/O_2 /O_2 is the final electron acceptor.
35. One (molecule of) NADH produces 2.5 molecules of ATP.
36. One (molecule of) $FADH_2$ produces 1.5 molecules of ATP.
37. Total number of ATP molecules produced in the electron transport chain is 28.
38. Thus the total number of ATP molecules produced for one molecule of glucose is 32 (during aerobic respiration in the liver cell).

Any 37 x 4 = 148 marks

If > 37 points are correct +2 marks

Total = 150 marks

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6. (a) Describe the effects of light on Plants

1. Light triggers many key events in plant growth and development.
2. It is collectively known as photomorphogenesis.
3. Light reception allows plants to measure the passage of days
4. and seasons.
5. Plants detect light signals,
6. and direction of light,
7. intensity of light and
8. wave length (Colour) of light.
9. Red and blue light are the important colours in (regulating) photomorphogenesis.

There are two major classes of light receptors:

10. Phytochrome photoreceptors / Phytochromes
11. which absorb (mostly) red light, and
12. Blue light photoreceptors
13. which initiates phototropism,
14. opening of stomata, and
15. slowing of hypocotyl elongation.
16. Positive phototropism/ growth of shoot towards light strengthen photosynthesis.
17. Phytochromes (photoreceptors) regulate plant responses to light, and
18. seed germination.
19. Some seeds remain dormant until light becomes (nearly) optimal.
20. Phytochromes provide information about the quality of light,
21. which enables the plant to get adapted to changes in (outside) light conditions.
22. eg ; Shade avoidance and
23. plant spacing.
24. When exposed to direct sun light branching is stimulated and
25. vertical growth is inhibited.
26. Photoperiod controls flowering (in many plants).

(b) Explain how plants are designed to capture maximum amount of light

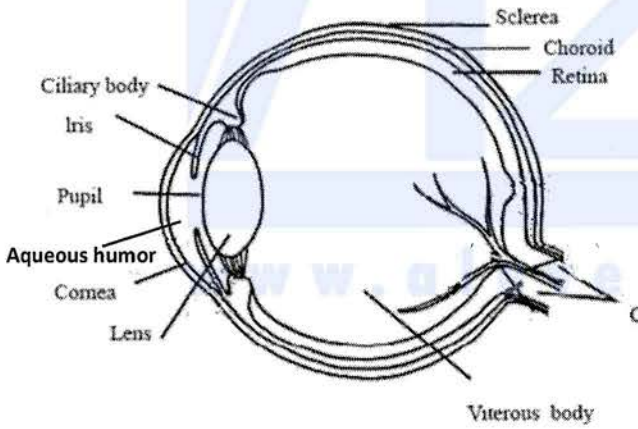
1. Plants grow tall to avoid shading from neighboring plants.
2. Most tall plants have thick stems / strong mechanical support.
3. Woody plants undergo secondary growth to make (tall) stem stronger.
4. The branching pattern enables the plants to absorb maximum light.
5. Size of the leaves vary based on the place where the plant grow.
6. Large leaves are found in plants in rain forests and
7. smalle leaves are found in plants in dry / very cold environments .
8. The arrangement of leaves on the stem / phyllotaxy (helps the plants to capture maximum sun light).
9. One, two or several leaves per node.
10. Leaf orientation,
11. Some are horizontally oriented
12. to capture light efficiently in low light conditions.
13. Some leaves/ leaves of grasses are vertically arranged
14. to avoid the damage caused by exposure to the over intense light.

26 + 14 = 40
Any 37 x 4 = 148 marks
If > 37 are correct + 2 marks
Total = 150 marks

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7. (a) Briefly describe the basic structure of human eye.

1. Outer fibrous layer
2. consists of sclera and cornea.
3. Middle vascular layer
4. consists of choroid, ciliary body and iris.
5. Inner nervous layer
6. is the retina.
7. Inside of the eye ball there is the lens, aqueous fluid/aqueous humour and vitreous body/vitreous humour/ vitreous fluid.
8. Sclera is opaque/white.
9. Cornea is clear/transparent,
10. no blood vessels.
11. Choroid is (thin) pigmented,
12. rich with blood vessels.
13. Ciliary body consists of smooth muscle fibers/ ciliary muscles.
14. Iris is coloured / contains pigmented cells and
15. has two layers of smooth muscle fibers/circular and radial bundles
16. Lens is elastic,
17. biconvex and
18. transparent.
19. Aqueous humour /aqueous fluid is clear/watery.
20. Vitreous humour/ vitreous fluid/vitreous body is colourless / transparent/ jelly like structure (behind the lens).
21. Retina contains photoreceptors/ rods and cones.



If fully labelled **06 marks**

Partially labelled **03 marks**

No marks if unlabelled

(b). Explain the role of human eye and brain in vision.

1. Light rays (coming from the object) are mostly refracted by lens
2. to focus a clear image on the retina of each eye
3. which is upside down.
4. Conjunctiva, cornea, aqueous fluid/ aqueous humour and vitreous fluid/ vitreous humour/ vitreous body also contribute to light refraction (Any 3 should be written to get the full marks).
5. For (clear) near vision, eyes make adjustments to increase the refraction
6. under the control of autonomic nervous system.
7. The muscles attached to the eye ball rotate the eye
8. to focus light rays on corresponding area of two retina/ convergence.

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9. For near vision (to focus near object on retina) curvature/convexity of the lens is increased.
10. by ciliary muscle contraction/ accommodating.
11. For distant vision (to focus on distance objects on retina) curvature/convexity of the lens is reduced
12. by relaxing the ciliary muscles.
13. Photoreceptor cells, (in the retina) convert light energy to voltage changes.
14. Stimulation of rods leads to black and white vision and
15. night vision.
16. Stimulation of cones leads to color vision.
17. Bipolar cells in the retina receive electrical signals from the photoreceptor cells and
18. pass to ganglion cells.
19. Optic nerve (fibre) transmits the sensation/ action potential/impulse
20. to the occipital lobe of cerebrum.
21. Brain perceives the visual objects in the correct way/ right way up.

21 + 21 = 42
Any 36 x 4 = 144 marks
Diagram = 06 marks

Total = 150

8. Describe the menstrual cycle of women and its hormonal regulation.

1. Consists of changes in the uterus
2. that occur once a month/ 28 days
3. during the reproductive years of women.
4. These cyclic changes are controlled by the ovarian cycle.

Menstrual cycle consists of

5. Proliferative phase,
6. Secretory Phase and
7. Menstrual flow phase.

Proliferative phase:

8. Coincides/coordinates with the follicular phase of the ovarian cycle.
9. Occurs before ovulation.
10. Growing follicles in the ovary
11. secrete estradiol / oestrogen which
12. stimulate the uterus to prepare to support an embryo/for implantation
13. by stimulating the endometrium (of the uterus) to thicken.

Secretory Phase:

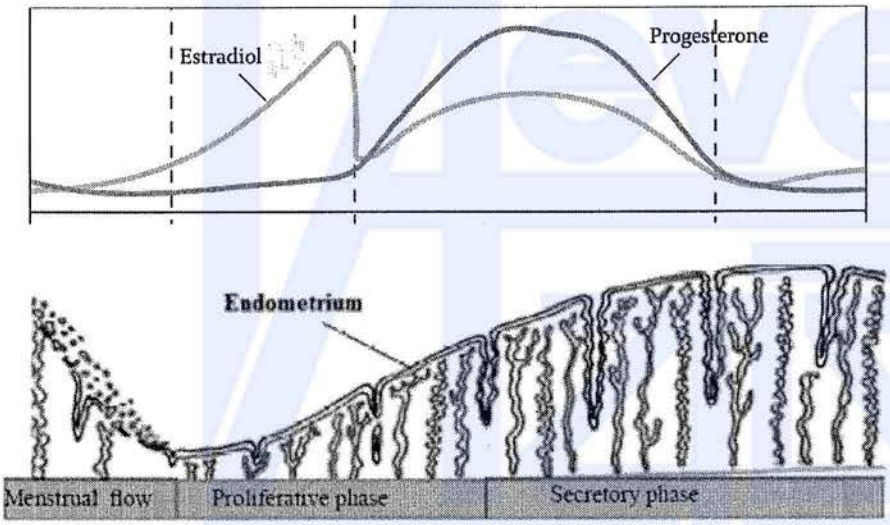
14. Coincides/coordinates with the luteal phase of the ovarian cycle.
15. Starts after ovulation.
16. Corpus luteum, which secrete
17. estradiol/oestrogen and
18. progesterone
19. stimulates / promotes maintenance and
20. further development of the lining of uterus
21. by enlarging arteries and
22. growth of endometrial glands
23. which secrete nutrient fluid
24. that can sustain an (early) embryo if implantation occurs.

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Menstrual flow phase:

25. If implantation (of an embryo) does not occur, levels of ovarian hormones /estradiol/oestrogen and progesterone are decreased
26. due to disintegration of corpus luteum.
27. As a result, arteries in the uterine lining constrict and
28. uterine lining disintegrates.
29. This causes shedding of endometrial tissues
30. and fluid from the uterus.
31. Menstrual flow occurs for a few days,
32. through cervix and
33. vagina,
34. which is called menstruation.
35. Next menstrual cycle starts during the follicular phase of the ovarian cycle
36. with the growth of a new follicle.

36 x 4 = 144 marks



* **Diagrams to show.**

- **Changes in estradiol, progesterone levels in blood.** **3 marks**
- **Gross changes in endometrium.** **3 marks**

Total = 150 marks

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9. a) Briefly describe the applications of microorganisms in agriculture.

1. Used as biofertilizers
2. to improve bioavailability of nitrogen (N) and
3. phosphorous (P).
4. Improves / increases solubility of phosphate in soil solution
5. by secreting organic acids
6. that dissolve minerals containing phosphorus
7. and chelate cationic partners of phosphate ions.
8. Involved in nitrogen fixation,
9. symbiotically
10. eg. *Rhizobium* sp. living in leguminous plants/ *Anabaena* sp. living in water fern/ *Azolla.*
11. Free living nitrogen fixation (in soil/ rhizosphere)
12. eg. *Azotobacter.*
13. (Involved in) promoting plant growth
14. by secreting plant growth substances
15. such as auxins (Indole-3- acetic acid)/ cytokinins/ gibberellins.
16. Serve as biopesticides,
17. eg. Entomopathogenic fungi/ bacteria/ *Bacillus thuringiensis.*
18. Used in composting,
19. eg. thermophilic bacteria/ bacteria that degrade organic matter/ protozoa/ fungi/ actinomycetes

b) Discuss the applications of Polymerase Chain Reaction (PCR)

1. Used in analyzing clinical samples/ specimens
2. to determine the presence of infectious agents
3. such as HIV/ Hepatitis/ Malaria/ COVID-19
4. Used in analyzing mutations that cause genetic diseases/ genetic disorders
5. eg. Cystic fibrosis/ Sickle cell anemia/ Phenylketouria.
6. Used in forensic laboratories
7. because PCR can make large number of copies from a small amount of DNA (template).
8. Used in cloning
9. because a large amount of pure DNA can be produced (from tiny amount of template).
10. Used in sequencing of DNA.
11. Used in evolutionary biology
12. to identify/ explore relationships among species.
13. Used in anthropology
14. to understand the ancient human migration patterns.
15. Used in Archaeology
16. to spot the ancient human race.
17. Used in Paleontology
18. to amplify DNA from extinct species/ cryopreserved fossils
19. to explain evolutionary relationships.

19 +19= 38

Any 37 X 4 = 148 marks

If > 37 points are correct +2 marks

Total = 150 marks

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10. Write short notes on the following.

(a) Salt marshes of Sri Lanka

1. Found in arid
2. coastal regions.
3. Soil dries up during dry season and
4. form crystals of salts.
5. Low rainfall.
6. High wind.
7. High temperature.
8. Loose sand.
9. Sand blows with salt.
10. Few plant species.
11. Plants are short,
12. with fleshy/ succulent bodies.
13. Few animal species are present.
14. Found in Puttalam / Hambantota / Mannar / Vakarai areas.

(b) Epigenetics

1. Occurrence of certain phenotypes (of certain characters) controlled by factors other than their DNA sequence / genetic code. /Control of certain characters by factors other than DNA sequence / genetic code.
2. This is due to switching on and
3. switching off of certain genes,
4. due to modifying nucleotides of a DNA sequence
5. by methylation/ addition of methyl groups
6. or by demethylation / removal of methyl groups.
7. This results in modified expression of a DNA sequence.
8. Epigenetics occurs due to inherited signals/ inheritance/inherited epigenetics.
9. or due to environmental factors.
10. eg: cancer
11. Inherited epigenetics can also be reversed by stimuli from the environment/due to environmental factors
12. eg: Schizophrenia.

(c) Reproduction in Ascomycota

1. Shows asexual and
2. sexual reproduction.
3. Asexual reproduction is by conidia
4. which are produced (on the tip of) in conidiophores
5. which are specialized hypae.
6. Sexual reproduction is by gametangia,
7. which are sexually differentiated.
8. They fuse and
9. produce asci,
10. which contain ascospores. / Ascospores are produced in asci.
11. There are 8 ascospores in each asci.
12. Asci are enclosed in ascocarp.

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Or

Biological control of Dengue vector

1. Using (larvivorous) fish
2. eg: Guppy/ Dandi/ juvenile Tilapia
3. They feed on mosquito larvae/ control mosquito larvae.
4. Using / *Bacillus thuringiensis* / Bti,
5. which produces an endotoxin,
6. which is toxic to (mosquito) larvae.
7. There are few limitations (of biological control).
8. Fish will die
9. due to absence of food,
10. changing water quality and
11. additions of chlorinated water.
12. Bti / *Bacillus thuringiensis* cannot be applied to some places.

14 + 12 + 12 = 38 pts
37 X 4 = 148 marks
If > 37 points are correct +2 marks
Total = 150 marks

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