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13 ශ්‍රේණිය (A/L) 2025
Grade -13(A/L) 2025

පැය දෙකයි
Two hours

- * 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 **25**, pick one of the alternative 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 answer sheet.

- The monomer of a structural, linear polysaccharide is,
 - (1) fructose
 - (2) pentose and hexoses
 - (3) galacturonic acid
 - (4) glucosamine
 - (5) glucose
- Select the correct statement regarding the plasma membrane.
 - (1) Consists mainly of carbohydrates, phospholipids, and proteins.
 - (2) Transmembrane proteins act as pores that allow ions and some nonpolar molecules to pass through.
 - (3) The composition and function of two sides of the membrane are the same.
 - (4) Since selectively permeable, it regulates the exchange of substances necessary for survival.
 - (5) Cholesterol molecules provide the fluid nature to the membrane.
- Select the combination that correctly matches the subcellular component and function.

(1) Golgi apparatus	- Produce peroxisomes
(2) Lysosomes	- Digest wornout organelles
(3) Smooth endoplasmic reticulum	- Synthesize membrane phospholipids
(4) Rough endoplasmic reticulum	- Involves in detoxification
(5) Cytoskeleton	- Can move fluid over the surface of the tissue
- Which of the following is correct about the central vacuole found in a plant cell ?
 - (1) Stores water and other materials such as sugars, ions and pigments.
 - (2) The composition of the cell sap and the cytosol is similar.
 - (3) The sap pigments give turgidity and support to the cell.
 - (4) Water-insoluble pigments such as anthocyanins are present.
 - (5) Ions such as Ca^{2+} and Cl^- are present.
- The steps of a test performed to identify proteins in an aqueous solution are given below.

A - Obtaining 2cm^3 from the aqueous protein solution.
B - Mixing two drops of 1% CuSO_4 solution.
C - Adding 2cm^3 of 5% KOH solution.

The correct order of the above steps is,
 - (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

6. An incident that occurs in the metaphase of mitosis is,
(1) the nuclear envelope fragments and chromosomes get even more condensed.
(2) attaching of the sister chromatids of each chromosome at their centromere.
(3) the formation of mitotic spindle begins.
(4) centrosomes move towards opposite poles.
(5) spindle microtubules get depolymerized.
7. The most accurate regarding the mechanism of enzyme action is,
(1) An enzyme catalyzes one or few reactions.
(2) The active site of an enzyme is fully complementary to the shape of its specific substrate.
(3) Protein components essential for the catalytic action of some enzymes are called cofactors.
(4) Few amino acids form the active site of the enzyme.
(5) Reversible cofactors are called co-enzymes.
8. Select the correct statement regarding anaerobic respiration.
(1) Some bacteria do ethyl alcohol fermentation.
(2) Limitation of NAD^+ increases recycling of NADH and utilization of NAD^+ .
(3) Lactic acid fermentation is a process that produces ATP in the presence as well as absence of O_2 .
(4) In ethyl alcohol fermentation process, the final electron acceptor is acetaldehyde.
(5) The ratio of the volume of oxygen consumed to the volume of carbon dioxide released for a proteinaceous substrate is 0.7.
9. Natural classification differs from artificial classification is due to,
(1) a system developed before the study of evolution.
(2) easy to expand by adding more groups.
(3) based on many characteristics.
(4) based on a few pre selected unifying characters.
(5) grouping on the basis of common characteristics.
10. This question is based on the following statements.
* Bony skeleton
* Being the first group to possess limbs
* Ectothermic
* Often has lungs for respiration
An animal that possesses all the characteristics related to the above statements is,
(1) skate (2) lizard (3) toad (4) parrot (5) monkey
11. The true statement about the meristematic tissues is,
(1) all new cells formed during cell division undergo elongation and differentiation.
(2) have dormant periods.
(3) only some of their cells have a dense cytoplasm.
(4) the periderm is formed as a result of primary growth.
(5) apical meristems contribute to the rapid regrowth in damaged leaves.
12. This question is based on the following statements.
(A) Mature cells of parenchyma cells bear only primary cell walls.
(B) Collenchyma cells are elongated, having flexible cell walls.
(C) Sclereids can be seen in plant parts where the growth has completely stopped.
Among the above statements, the correct statement/statements is/are,
(1) A only. (2) A and B only.
(3) A and C only. (4) B and C only.
(5) A, B and C only.

The correct statement regarding the primary structure of a plant root is,

- (1) root hairs can be seen in all epidermal cells.
- (2) the pericycle is a structure made up of two or three layers of parenchyma cells located outside the endodermis.
- (3) the pericycle of monocot root contributes to the formation of lateral roots.
- (4) dicot root consists of a central core of parenchyma cells.
- (5) the endodermis does not contain inter-cellular spaces.

14. Which of the following process/processes is/are important for the opening of the stomata during the day ?

- A - Decrease in CO₂ concentration in substomatal cavity.
 B - Loss of K⁺ from guard cells.
 C - High temperature

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

15. The element which is possible to show deficiency symptoms such as healthy appearance but very slow development, thin stems and purpling of veins is,

- (1) C (2) O (3) N (4) P (5) S

16. Select the correct combination of plant growth substance and function.

- (1) Auxin - Stimulates seed development and germination.
 (2) Cytokinin - Retards leaf abscission.
 (3) Gibberellin - Stimulates fruit growth.
 (4) Abscissic acid - Promotes ripening of fruits.
 (5) Ethylene - Promotes seed dormancy.

17. Which of the following statements is true regarding human food digestion ?

- (1) The smooth muscles of the esophagus contribute to the processes of swallowing and peristalsis.
 (2) The churning action of the stomach facilitates the chemical digestion by performing mechanical digestion.
 (3) The digestion is fully completed in the duodenum.
 (4) The gall bladder produces bile and stores until released into the duodenum.
 (5) Fatty acids and monoglycerides are reformed into triglycerides, out of the epithelial cells of the microvilli.

18. Select the correct combination of vitamin/mineral and deficiency symptom.

- | Vitamin/Mineral | Deficiency symptom |
|-----------------|---------------------------------|
| (1) Cobalamin | - Loss of balance |
| (2) Sulfur | - Disturbance in nervous system |
| (3) Niacin | - Tingling of hands and feet |
| (4) Vitamin E | - Nausea and paralysis |
| (5) Biotin | - Reduce heart function |

19. Which statement is correct about the conduction system of the heart ?

- (1) A group of specialized neuromuscular cells in the endocardium initiate and conduct impulses.
 (2) SA node lies in the right atrium near the opening of inferior vena cava.
 (3) AV bundle crosses the fibrous ring that separate atria and ventricle at the upper end of the ventricular septum.
 (4) Purkinje fibres transmit impulses from the AV node to the apex of the endocardium.
 (5) Contraction of the left and right ventricles results in pumping of blood into the pulmonary artery and the aorta respectively.

20. Which statement is correct regarding the homeostatic regulation of breathing ?

- (1) The main breathing regulating centre is located in the pons varolii.
 (2) A high CO₂ concentration in the cerebrospinal fluid results increase in pH value.
 (3) Sensors for detecting changes in the pH of cerebrospinal fluid are located only in the madulla oblongata and carotid arteries.
 (4) When blood pH is low, the depth and rate of the breathing are increased to raise it to normal pH value.
 (5) A decrease in blood O₂ concentration has no effect on the breathing control centers.

21. The maximum volume of air a woman can inhale and exhale is 3100ml. If the additional volume of air that this woman can forcibly expel from her lungs after a normal expiration is 700ml, her inspiratory capacity would be approximately,
(1) 2400ml (2) 3800ml (3) 1700ml (4) 1200ml (5) 2500ml
22. Which of the following combination is correct regarding the internal defense in innate immunity ?
(1) Neutrophils - Bind to the pathogenic cell surface and release toxic chemicals
(2) Natural killer cells - Ingest and destroy pathogens
(3) Interferons - Interfere the viral replication
(4) Complement proteins - Accelerate tissue repair
(5) Mast cells - Ingest dead phagocytic cells
23. The correct combination of type of human immunity and example is,

Type of immunity	Example
(1) Naturally acquired active immunity	- In a nursing infant
(2) Artificially acquired active immunity	- Giving antivenin for snake bite
(3) Artificially acquired passive immunity	- Giving BCG vaccine
(4) Naturally acquired passive immunity	- Second infection of the chickenpox virus
(5) Artificially acquired active immunity	- Giving polio vaccine
24. A reason for maintaining resting potential is,
(1) maintaining a positive charge inside the neuron and a negative charge outside.
(2) allowing Na^+ and K^+ ions to diffuse across the plasma membrane against a concentration gradient.
(3) Na^+ channels are open in greater numbers than K^+ channels.
(4) for every two K^+ transported in, three Na^+ are transported out of the cell.
(5) passive transport of ions by the sodium potassium pump.
25. This question is based on the following clauses.
(A) The postsynaptic membrane reaches the action potential.
(B) Diffusion of neurotransmitters across the synaptic cleft.
(C) Binding of synaptic vesicles to the presynaptic membrane.
(D) Depolarization of presynaptic membrane.
(E) Diffusion of K^+ and Na^+ across the postsynaptic membrane.
(F) Depolarization at the presynaptic terminal causes Ca^{2+} to diffuse into the terminal.
(G) Release of neurotransmitters into the synaptic cleft.
(H) Neurotransmitters bind to the postsynaptic membrane and activate it.
Select the option that correctly indicates the sequence of transmission of nerve impulses through chemical synapses.
(1) A F C D G B H E (2) A B D C F E G H (3) C B G F E D H A
(4) D C B G F E H A (5) D F C G B H E A
26. Select the option that correctly represents the part and the function of the human eye.
(1) Sclera - Prevents excessive light penetration by pigments
(2) Cornea - Contributes to maintain the shape of the eye.
(3) Ciliary body - Controls the thickness and size of the lens
(4) Aqueous humour - Maintains intra ocular pressure
(5) Iris - Refracts light rays

Following are some statements about human skin.

- (A) (i) The epidermis has no blood supply.
 (ii) Hypodermis provides nutrition and oxygen.
 (B) (i) The cells on the surface of the epidermis are flat, thin, nucleated and dead.
 (ii) In areas where the skin is subjected to wear and tear, the epidermis is thicker.
 (C) (i) Dermis is composed of areolar connective tissue.
 (ii) The matrix contains collagen fibres interlaced with elastic fibres.

Select the correct response regarding the above statements.

- (1) (A)(i) is correct while the reason for this is explained by (ii).
 (2) (A)(i) and (ii) are correct.
 (3) (B)(i) is correct and reason for it is explained by (B)(ii).
 (4) (B)(i) is correct and (B)(ii) is incorrect.
 (5) (C)(i) is correct and the reason for it is explained by (C)(ii).

28. The correct of the following hormone - function combination is,

- (1) Luteinizing hormone - Stimulates growth and development of ovarian follicles.
 (2) Thymosin - Destroy bones and promotes release of calcium into the blood.
 (3) Melatonin - Important in regulation of biological rhythms.
 (4) Cortisol - Maintains the water and electrolyte balance.
 (5) Noradrenaline - Decrease the heart rate and blood pressure.

29. The correct regarding the human male reproductive system is,

- (1) the internal structures include the testes, scrotum and penis.
 (2) the vas deferens extends around and anterior to the urinary bladder, where it joins a duct from a seminal vesicle, forming a short ejaculatory duct.
 (3) the penis, is a part that contains erectile tissue formed by the modification of blood capillaries and arteries.
 (4) it takes about two weeks to produce mature sperm cells from a sperm mother cell.
 (5) the main contributors to the formation of semen are the fluids secreted by the seminal vesicles and the prostate gland.

30. During the ovarian cycle of the female reproductive system,

- (1) the secretion of gonadotrophin from the anterior pituitary is inhibited by the high levels of estradiol
 (2) high levels of estradiol stimulate the hypothalamus and increase GnRH secretion.
 (3) High FSH and LH levels cause the follicle and adjacent wall of the ovary rupture and release the secondary oocyte.
 (4) The corpus luteum secretes estradiol and progesterone and exerts a positive feedback mechanism on the hypothalamus and pituitary.
 (5) High levels of gonadotropins promotes degeneration of the corpus luteum when pregnancy does not occur.

31. Following are some of the human vertebrae and their characteristics.

Vertebrae	Characteristic
A - Lumbar	P - The body and transverse processes have facets for articulation for the ribs
B - Thoracic	Q - Have relatively large spinal processes
C - Cervicle	R - Transverse processes have foramens

Select the correct response for the combination of vertebrae and characteristic.

- (1) A - P, B - Q, C - R
 (2) A - P, C - R, B - Q
 (3) A - Q, B - P, C - R
 (4) A - R, B - Q, C - P
 (5) A - Q, B - R, C - P

32. In a *Pisum sativum* plant variety, tall plants are dominant (T) while short plants are recessive(t). In the same plant variety, yellow seeds are dominant (Y), while green seeds are recessive(y). From a cross between two plants, 298 tall plants with yellow seeds and 102 tall plants with green seeds were obtained. Which of the following can be considered as the genotypes of parent plants?

- (1) TtYy × TTYy
 (2) TtYY × Ttyy
 (3) TTYy × TTYy
 (4) TTYy × TTYy
 (5) TtYy × TtYy

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The correct answer is (1) (2) (3) (4)

33. The expected phenotypes of individuals of the F_1 generation from a mating between a normal sighted man and a carrier woman for colour blindness are,
- (1) 50% colour blinded and 50% normal-sighted ones.
 - (2) 25% colour blinded and 75% normal sighted ones.
 - (3) 75% colour blinded and 25% normal sighted ones.
 - (4) all are normal sighted ones.
 - (5) all are colour blinded ones.
34. Transcription differs from DNA replication because,
- (1) by using helicase to unwind DNA.
 - (2) by using DNA polymerase for polymerization.
 - (3) by initiating at a specific site called promoter.
 - (4) by having both DNA strands acting as templates.
 - (5) by the transcript is made up of two identical DNA strands.
35. The correct regarding DNA libraries is,
- (1) any different DNA sequence from an organism's genome can be present in a transformed bacterial cell.
 - (2) when a single colony is isolated and cultured, it is called a genomic DNA library.
 - (3) a DNA library is a collection of microbial culture each propagating similar fragments of a total genomic DNA.
 - (4) cloned in a population of different vectors.
 - (5) inserts of one colony can be sequenced in order to have a complete sequence of the genome.
36. Select the true statement about microorganisms.
- (1) During the lysogenic cycle of a virus, the host cell incorporates viral DNA into the host DNA without lysis.
 - (2) Mollicutes do not exhibit any form of cellular organization.
 - (3) Fungi exhibit saprophytic, parasitic and commensal nutritional modes.
 - (4) Cyanobacteria reproduce both asexually and sexually.
 - (5) Viroids consist of a short piece of RNA surrounded by a protein coat.
37. The correct combination of endotoxins and exotoxins is,
- | Endotoxins | Exotoxins |
|---|---|
| (1) are proteins. | are lipopolysachcharides. |
| (2) are thermo-labile. | are thermo-stable. |
| (3) produced only by Gram-negative bacteria. | Produced by Gram positive and Gram negative bacteria. |
| (4) they are parts of the growth and metabolism of bacterial cells. | they are parts of microbial cells. |
| (5) are produced by <i>Vibrio cholerae</i> . | are produced by <i>Clostridium tetani</i> . |
38. Following are some statements about the use of microorganisms in agriculture.
- A - Microbial inoculants that improve bioavailability of N and P are called bio-fertilizers.
 - B - Bacteria and fungi secrete organic acids that chelate cationic partners of the phosphate ions, thereby release phosphorus into the soil solution.
 - C - Bacteria in the plant rhizosphere produce plant growth promoting substances like auxins, cytokinins.
 - D - Composting is the decomposition of organic matter by a mix population of microbes under warm, moist and anaerobic conditions.
- The true statements are,
- (1) A, B, C only.
 - (2) A, B, D only.
 - (3) A, C, D only.
 - (4) B, C, D only.
 - (5) A, B, C, D all.

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The correct combination of the biome and the feature is,

- | | |
|--------------------------------|--|
| (1) Temperate broadleaf forest | - During the winter time temperature falls below -10°C |
| (2) Chaparral | - Distribution is at mid latitudes in the northern hemisphere |
| (3) Desert | - Average annual rainfall is 300 - 500mm |
| (4) Savanna | - Naturally grown grasses are adapted to withstand drought |
| (5) Tropical forests | - The largest biome on the earth |

40. This question is based on the following flora and fauna species.

- | | | |
|-----------------------|-----------------------|-----------------------------|
| A - <i>Lingula</i> | B - Snake Head (Lula) | C - Elephant (Etha) |
| D - Marbled rock Frog | E - Wesak orchids | F - <i>Crudia zeylanica</i> |

- (1) C and F are two critically endangered species.
- (2) A and F are two extincted species.
- (3) B and E are two endangered species.
- (4) A and D are two relict species.
- (5) D and E are two indigenous species.

- For each of the questions 41to 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. The combination that indicates the scientist - mode of classification correctly is,

- | | |
|----------------------|--|
| (A) Aristotle | - First to classify organisms scientifically. |
| (B) Theophrastus | - Classified plants according to habit as trees ,shrubs and herbs. |
| (C) Carolus Linnaeus | - Introduced binomial nomenclature. |
| (D) Ernest Haeckel | - Introduced the kingdom Protista. |
| (E) Robert Whittaker | - Introduced the five kingdom classification. |

42. The true statement/statements of the following, regarding seedless vascular plants is/are,

- (A) The plant grows taller by strengthening the cell walls of the tracheids and fibers with lignin, ease the spore dispersal.
- (B) Microphylls with unbranched vascular tissue are designed for efficient photosynthesis.
- (C) Most seedless vascular plant species produce one type of spores and bear one type of sporangia.
- (D) Most sporophytic plants of Pterophyta bear an underground stem.
- (E) All club mosses are heterosporous, while all spike mosses are homosporous.

43. The correct statement/statements regarding the life cycle of *Salagenella* is/are,

- (A) Gametophytes are reduced and partially dependent on sporophyte.
- (B) Both microspores and megaspores are covered by a thick wall.
- (C) In the microsporangium, a large number of small microspores are formed by mitosis.
- (D) The male gametophyte is photosynthetic but depend on stored food.
- (E) The megaspore develops into a sporophyte and is never released into the external environment.

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44. The option/options that correctly matches the animal tissue and its location is/are,
 (A) Simple columnar epithelium - In nasal passage
 (B) Loose connective tissue - In tendons.
 (C) Smooth muscles - In arteries
 (D) Cartilages - In trachea
 (E) Stratified squamous epithelium - In outer layer of the Bowman's capsule
45. Select the true statement/statements regarding immune diseases.
 (A) Autoimmune diseases affect females and males equally.
 (B) Cytotoxic T cells are activated by certain mechanisms and kill body cells.
 (C) In multiple sclerosis, T cells attack the myelin sheaths around neurons.
 (D) In rheumatoid arthritis, the immune system mistakenly sends antibodies to the lining of the joints.
 (E) In type I diabetes mellitus, T cells attack the pancreatic alpha cells.
46. The option/options that correctly indicates/indicate the organism and the excretory structure is/are,
 (A) Body surface - *Planaria*
 (B) Malpighian tubules - Cockroach
 (C) Nephridia - Leech
 (D) Green glands - Crab
 (E) Salt glands - Scorpion
47. The correct regarding DNA probes is/are,
 (A) before hybridizing with the probe, the double stranded DNA needs to be denatured.
 (B) a DNA probe is a single-stranded labeled DNA fragment used to detect the presence of complementary nucleotide sequence by hybridization.
 (C) in probes, labelling is the shortening of a DNA strand in such a way that it gives a signal which enables the detecting of that DNA strand.
 (D) in Southern blotting process, the denatured bands need to be transferred to a nitrocellulose membrane.
 (E) the probes strongly bind to any DNA fragment which are fixed to the nitrocellulose membrane.
48. The correct regarding the loss of biodiversity and threats to biodiversity is/are,
 (A) according to the Red Data Book, within groups of conifers, cycads, amphibians, birds and mammals, up to 50% of species are threatened with extinction.
 (B) mass scale destruction of mangrove in lagoons such as Negombo and Puttalam is due to establishment of prawn culture.
 (C) bio diversity has increased due to the rate of evolution has been generally higher than that of extinction.
 (D) ebony has been threatened due to over exploitation during the colonial period
 (E) it is estimated that about 50% of the species may face extinction on the Earth within the next 30 years.
49. The correct about water waste management is/are,
 (A) primary treatment removes 25 - 35% organic matter.
 (B) in trickling filter method, microorganisms grow on the filter bed and oxidize organic matter.
 (C) 99% of bacteria are removed when water is filtered through a fine bed of sand.
 (D) sludge remaining from both primary and secondary treatment is sent to an anaerobic sludge digester.
 (E) the value of BOD in reservoirs increases during decomposition.
50. The correct about propagation methods used in floriculture industry is /are,
 (A) The spider plant propagates by runners and *Stachys* by stolons.
 (B) Rose and Hibiscus propagates by layering.
 (C) In grafting, initially formed callus originates by the rootstock.
 (D) When propagating by cuttings, it is necessary for the stem and leaf bud cuttings to develop new shoot as well as a root system.
 (E) In division, stem cuttings or plants with roots and stems are propagated by dividing them into several parts.

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Third Term Test, 2025

09

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II

ජීව විද්‍යාව II
Biology II

13 ශ්‍රේණිය (A/L) 2025
Grade -13 (A/L) 2025

පැය තුනයි මිනිත්තු 10 යි.
Three hours & 10 minutes

අමතර කියවීමේ කාලය - මිනිත්තු 10 කි.
Additional Reading Time - 10 minutes

Name Class :.....

Instructions :

- * This question paper consists of 10 questions in 13 pages.
- * This question paper comprises Part A and Part B. The time allotted for both parts is three hours.

• PART A – Structured Essay (Pages 2 -12)

- * Answer all four questions on this paper itself.
- * Write your answers in the space provided for each question. Note that the space provided is sufficient for your answers and extensive answers are not expected.

• PART B – Essay

- * Answer four questions only. Use the papers supplied for this purpose. At the end of the time allotted for this paper, before handing over to the supervisor tie the two parts together so that Part A is on the top of Part B.
- * You are permitted to remove only part B of the question paper from the examination hall.

For Examiners' Use Only.

Part	Question No.	Marks
A	1	
	2	
	3	
	4	
B	5	
	6	
	7	
	8	
	9	
	10	
Total		
Percentage		
Part II – Final marks		

Part I	Part II	Total
50	50	100

Part A-Structured Essay
 Answer all questions on this paper itself.
 (Each question carries 100 marks)

1.(A) (i) State a method to maintain sustainable food production which are based on knowledge in biology.

.....

(ii) Name a lipid compound that acts as signaling molecules that travel through the body.

.....

(iii) State an example for a protein that transport fatty acids.

.....

(iv) What is meant by magnification in a compound light microscope?

.....

.....

(v) Compare the following characteristics in prokaryotic and eukaryotic cellular organizations.

Characteristic	Prokaryotic	Eukaryotic
Respiration		
Type of ribosome		

(vi)(a) State three characteristics of cell wall.

.....

.....

.....

(b) State the type of cell junction that can be seen in the following locations.

Skin epithelium -

Muscle tissue -

(B) (i) State the type of division that contributes to maintain the genetic stability.

.....

(ii) State the physiological process that causes the formation of galls in plants.

.....

(iii) Define the term energy that organisms use for biological processes.

.....

.....

(iv) Briefly state the effect of substrate concentration on the rate of an enzymatic reaction.

.....

.....

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(v) What is meant by the absorption spectrum of photosynthesis?

.....
.....

(vi) (a) State two ways in which photorespiration affects the productivity of photosynthesis.

.....
.....

(b) State an advantage that C_4 plants have gained due to their CO_2 concentration mechanism.

.....

(c) State the major factor that limits the photosynthesis process in terrestrial plants.

.....

(vii) State the step that apply only to aerobic respiration, where decarboxylation does not occur.

.....

(C) (i) According to the theory of Lamarck, state the principle used to explain the following examples.

(a) Long muscular neck of the giraffe had evolved over many generations as giraffes stretch their necks even higher.

.....

(b) Giraffe stretching its neck to reach leaves on higher branches.

.....

(ii) State the phylum of plants that is most evolutionary related to Lycopphyta.

.....

(iii) State the evolutionary periods that provide fossil evidences that plant evolution occurred

.....

(iv) State a phylum of fungi, that produces flagellated sperms during reproduction.

.....

(v) Some of the characteristics shown by the following organisms A-H are indicated by P-T. Write the corresponding English letter for the organism that exhibits each of these characteristics in the space provided.

A - Frog

B - *Taenia*

C - *Hydra*

D - Pin worm

E - *Sargassum*

F - *Gelidium*

G - Earthworm

H - *Chiton*

(P) Contain laminarin as the stored food.

.....

(Q) Contain an acellular layer of mesoglea.

.....

(R) Tape like body without true segmentation.

.....

(S) A clear cephalization or segmentation cannot be seen.

.....

(T) Adults respire through buccal cavity living.

.....

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(vi) State the main tissue systems in vascular plants.

.....

.....

.....

(vii) State two adaptations in the sieve tube elements for the free flow of nutrients through.

.....

.....

2.(4) (i) State three structural differences between the dicotyledonous and monocotyledonous primary stems.

.....

.....

.....

(ii) Introduce the term softwood.

.....

(iii) State two differences between the transverse sections of dicotyledonous and monocotyledonous plant leaves.

.....

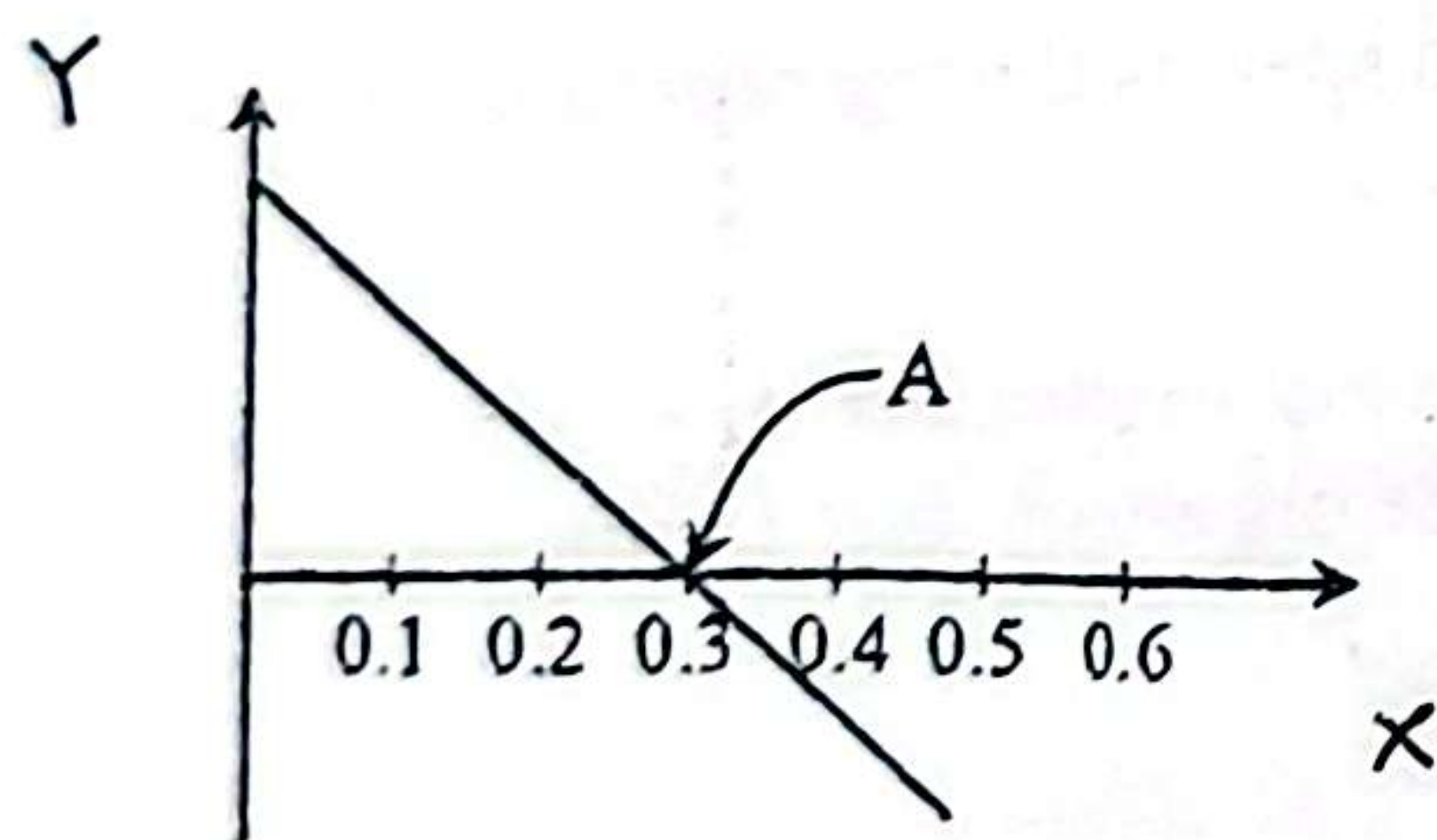
.....

(iv) State how plants obtain the energy needed to accumulate K^+ in guard cells during day time.

.....

.....

(v) The data from a practical test conducted to determine the water potential of the potato strips are given below. Answer the questions regarding the data given.



Molarity of the sucrose solution	Solute potential (Ψ_s) (kPa)
0.1	-260
0.2	-540
0.3	-820
0.4	-1120
0.5	-1450
0.6	-1800

(a) Name the axes X and Y of the graph given in (v) above.

X -

Y -

(b) If the initial lengths of the potato strips are L_1 and final lengths are L_2 , write an expression to obtain the values of Ψ using L_1 and L_2 .

.....

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(c) State the reason for getting two values as positive and negative for χ axis in the graph given in (v) above.

.....

.....

(d) Introduce the point A in the graph given in (v) above.

.....

(e) Determine the water potential of the potato strips using the given data.

.....

.....

.....

(B) (i) State the cause for occurrence of guttation.

.....

(ii) State the element that causes the deficiency symptom given below.

(a) Crinkling of young leaves and death of terminal buds

(b) Death of meristems, thick leathery and discoloured leaves

(iii) State two terrestrial adaptations of the sporophyte of *Nephrolepis*.

.....

.....

(iv) State two specific characteristics of the mature male gametophyte of *Selaginella*.

.....

.....

(v) Write one structural and functional difference between the male gametophytes of *Cycas* and Anthophyta.

	Male gametophyte of <i>Cycas</i>	Male gametophyte of Anthophyta
Structural		
Functional		

(vi) Which is the name given to the development of seeds by the formation of a diploid egg by mitosis?

.....

(vii) State what photomorphogenesis is ?

.....

.....

(viii) State the plant growth substance that contributes to the following processes.

(a) Stimulate seed development and germination

(b) Promote tripe response in seedlings

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(C) (i) (a) State the function performed by the intercalated discs of cardiac muscle tissue

.....

(b) Name the feeding mechanism by which food particles are drawn into the mouth through a film of mucus by sweeping of the cilia in the gills, and name an animal that demonstrates this mechanism.

Feeding mechanism

Animal

(c) Which is the digestive function performed by proteases ?

.....

(d) Name the blood vessels that supply blood to sinusoids in liver.

.....

(ii) (a) What is meant by malnutrition ?

.....

(b) Write the equation for the energy budget.

.....

(iii) Which is the main difference in the exchange of chemicals in open and closed blood circulatory systems ?

.....

(iv) State the reason why double circulation is more efficient than the single circulation.

.....

(v) This question is based on the following diagram.

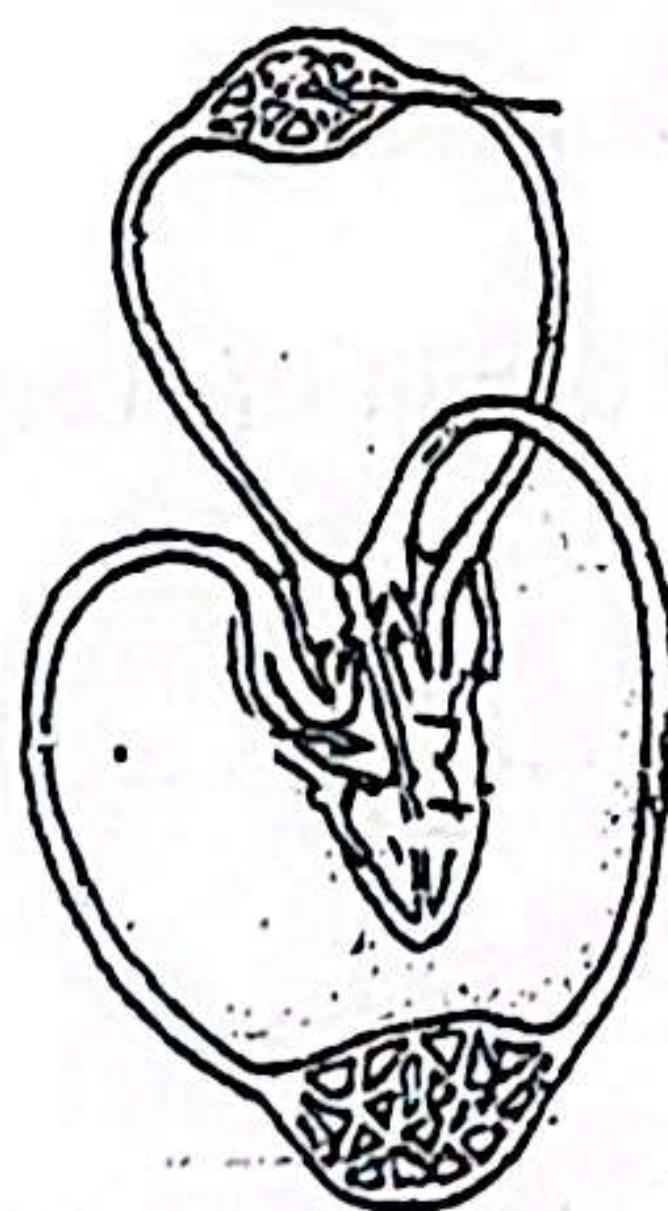


Diagram (1)

(a) Name a group of organisms that belongs to the above circulatory pathway.

.....

(b) Indicate the pulmonary circulation and systemic circulation with the letters A and B respectively in the diagram 1 above.

(A) (i) Which is indicated by an ECG ?

.....

(ii) (a) State the cause of a heart attack.

.....

(b) State a structural feature of red blood cells that allows for efficient O₂ transportation.

.....

(c) State a reason why blood clotting does not occur in undamaged blood vessels.

.....

(iii) Name an invertebrate animal that has internal gills.

.....

(iv) How cigarette smoke causes bronchitis.

.....

.....

(v) Name a location where antigens can be identified by B lymphocytes.

.....

(vi) Name the types of constituents not contained in the glomerular filtrate in ultrafiltration.

.....

(vii) Write a function performed by the Angiotensin II in regulating blood volume and blood pressure.

.....

(B) (i) Write one adaptation in the brain and spinal cord to protect against physical damage.

.....

.....

(ii) (a) Name the lobes found in the human cerebral cortex.

.....

.....

(b) State a main function of the cerebellum.

.....

- (c) State the location of the pons varolii and an important centre in there.

Location

.....

Important centre

- (d) Name the main functional area located in the cerebral cortex that is important for complex mental functions such as memory and intelligence.

.....

- (iii) (a) Name the components that make up the peripheral nervous system.

.....

- (b) Name the two efferent components of the peripheral nervous system.

.....

.....

- (c) What is sensory adaptation ?

.....

.....

- (iv) (a) Name the type of receptor that is important in detecting stimuli that reflect harmful conditions.

.....

- (b) State a function of aqueous fluid of human eye.

.....

- (c) State the three main types of cells found in human dermis.

.....

- (v) (a) State a non trophic hormone secreted by the anterior pituitary.

.....

- (b) Name a hormone that are not synthesized by the posterior pituitary, but are secreted into the blood stream by it.

.....

- (c) What is a positive feedback mechanism ?

.....

.....

- (d) State an example for a positive feedback mechanism.

.....

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(C) (i) Name the location of the receptors that are important for detecting when blood pressure increases.

.....

(ii) Write the cells in a seminiferous tubule in order from the innermost to the centre.

.....

.....

(iii) (a) Draw a labelled diagram of a cross section of a mature human ovary in the space below.

(b) How many days does it takes for a primordial follicle to convert into a mature ovarian follicle ?

.....

(c) Name a hormone secreted by the mature human ovary.

.....

.....

(d) Name the embryonic portion and the maternal portion in order, that are important in forming the human placenta.

.....

.....

(iv) (a) State the processes found in the human temporal bone.

.....

.....

.....

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(b) Out of the processes stated in above (iv) (b), name the process that is important for muscular attachment for moving the mandible.

.....

(c) Name two features that are found only in cervicle vertebrae.

.....

.....

4. (A)(i) At least one dominant allele of the C gene is required for the black fur colour in a certain species of mice. When the c allele is homozygous recessive the hair turns white because it does not produce colour. A gene controls the distribution of pigment in hair. When the A allele is dominant the colour of the fur is white, while homozygous recessive a allele cannot prevent the production of pigment.

(a) State the phenotype of the CCAA × ccaa parents.

CCAA

ccaa

(b) State the genotype and phenotype of F₁ generation of the cross stated in above (i)(a).

Genotype

Phenotype

F₁

(ii) State the Hardy-Weinberg Equilibrium Principle.

.....

.....

(iii) State a factor that causes the deviation of Hardy - Weinburg Equilibrium of a population.

.....

.....

(iv) (a) What is polyploidy ?

.....

.....

(b) Name a substance that artificially induces polyploidy.

.....

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- (v) The initial nucleotide sequence of a gene located in a DNA molecule and two possible mutations are shown below.

Initial nucleotide sequence	TAC	AGC	GCA	CTA	CAC
Amino acid sequence	Met	Ser	Arg	Asp	Val
Mutation 1 nucleotide sequence	TAC	AGC	GCC	CTA	CAC
	Met	Ser	Arg	Asp	Val
Mutation 2 nucleotide sequence	TAC	AGC	GAA	CCA	ATCAC
	Met	Ser	Leu	Gly	stop

- (a) State the two types of mutations 1 and 2 separately, that have in the gene in above (v).

Mutation 1

Mutation 2

- (b) State the base sequence of mRNA molecule that can be synthesized based on the initial DNA sequence shown above.

.....

- (B) (i) (a) State the organizational levels of the environment in order.

.....

- (b) State an example for biotic and abiotic interactions in plants.

.....

- (c) Introduce the term primary production and state its unit.

Primary production

.....

Unit

- (ii) State the common name/scientific name of a plant that grows in tropical dry mixed evergreen forests.

.....

- (iii) Introduce the term invasive alien species.

.....

- (iv) According to the Red Data Book, give one Sri Lankan example for each of the following groups of organisms.

Indigenous species

Flagship species

- (v) (a) Draw a diagram to show Streptobacilli in the space below.

- (b) Name the ingredients contained in the nutrient agar culture medium.

.....

(c) State the steps in the method of staining bacteria in toddy using a simple dye.

.....
.....
.....

(vi) (a) State a method of sterilizing heat sensitive culture media.

.....

(b) State the type, to which the following vaccines belong.

Rubella vaccine

Hepatitis-B vaccine

(C) (i) (a) State a characteristic feature of pathogenic microorganisms.

.....
.....

(b) State a species of microorganisms that produce the following substances.

Cellulose enzyme

Streptomycin

(ii) State the steps of nitrification in the nitrogen cycle and state the generic name of microorganisms involved.

.....
.....

(iii) State an impact of food spoilage on human health.

.....

(iv) Name a fish species that have been conserved through ornamental fish farming.

.....
.....

(v) Name a disease transmitted commonly to ornamental fish species by unicellular external opportunistic parasites.

.....

(vi) (a) What are liposomes ?

.....

(b) Name the virus that Viva gel give protection against.

.....

(vii) What is meant by Pluripotent ?

.....

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Third Term Test, 2025

ජීව විද්‍යාව II
Biology II

13 ශ්‍රේණිය (A/L) 2025
Grade -13 (A/L) 2025

09

E

II

Part B - Essay

Answer four questions only.
Give clear labelled diagrams where necessary.
Each question carries 150 marks.

5. (a) Briefly describe the basic chemical nature of carbohydrates.
(b) Briefly describe the delivery systems used for introducing foreign DNA into a cell.
6. (a) Briefly explain the methods of plant nutrition.
(b) Describe the life cycle of *Nephrolepis* in brief.
7. (a) Describe the gross structure of the human respiratory system.
(b) Briefly describe allergies.
8. (a) Briefly describe the homeostatic regulation of blood pressure in human.
(b) Briefly describe how hearing occurs in the human ear.
9. (a) Describe the ecological pyramids in brief.
(b) Briefly describe the steps in an urban water purification treatment plant.
10. Write short notes on the following.
 - (a) Characteristic features of bacteria
 - (b) Pleiotropy
 - (c) Environmental impacts of ornamental fish farming

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