නව නිර්දේශය/ புதிய பாடத்திட்டம்/New Syllabus

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය (ආදර්ශ), 2021
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை (மாதிரி), 2021
General Certificate of Education (Adv. Level) Examination (Model), 2021

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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. Select the response which includes only the macromolecules out of the following responses.

(1) Glucose, Starch, Maltose
(2) DNA, Estrogen, Hemoglobin
(3) Albumin, Cellulose, Cutin
(4) Starch, Maltase, Chitin
(5) Hemicellulose, Glucosamine, Inulin

2. Out of the following statements, the correct statements regarding water are,

A. Solubility depends on the ionic nature.
B. Water acts as a transport medium.
C. Water has the maximum density at 4K.
D. The ability of water to absorb a relatively high amount of heat energy by a large change in its own temperature is known as the specific heat capacity.

(1) Only A
(2) Only B
(3) Only A & D
(4) Only B & C
(5) Only B, C & D

3. The correct statements regarding the electron microscope out of the following are,

(A) The image cannot be detected through naked eye.
(B) Actual colours of the specimen can be observed.
(C) Resolution power is 0.2 μm.
(D) Only non-living specimens can be observed.

(1) Only A & C
(2) Only B & C
(3) Only A & D
(4) Only A, C & D
(5) All A, B, C, D are correct

[See page two]

4. Select the correct statement out of the following, regarding cellular organelles and subcellular structures.
   (1) Glyoxysomes converts fats into sugars.
   (2) Some vesicles produced by Golgi complex contain hydrolytic enzymes which catalyze the breakdown of main groups of organic compounds.
   (3) The basal body of cilia and flagella and the microtubules of centrioles consist of 9+2 arrangement.
   (4) Nuclear envelope has the nuclear lamina made up of microfilaments which line the interior side of it and these proteins exist as fibrous proteins or as supercoiled into thicker cables.
   (5) Cytoskeleton is a static structure which helps to maintain the shape of the cell.

5. Which of the following statements is acceptable regarding galls and gall causers in plants?
   (1) All gall causers are microorganisms.
   (2) Can develop on different parts of plants after being invaded by some very unique organisms.
   (3) This occurs due to controlled mitotic division of plant cells.
   (4) Can exist as a differentiated mass of cells.
   (5) Usually the gall causers in some way attack the plants growing tissues and causes the host to organize its cells and to develop an abnormal growth.

6. Which of the following responses is true?
   (1) The energy released by the breakdown of all high energy phosphate bonds in ATP is $30.5 kJmol^{-1}$.
   (2) ADP is a universal energy carrier molecule.
   (3) ATP can be produced within living cells using ADP, inorganic phosphates and energy.
   (4) Substrate level phosphorylation occurs in photosynthesis.
   (5) The free energy released by the oxidation of compounds during cellular respiration is not used for ATP synthesis.

7. Which of the following is correct regarding enzyme cofactors?
   (1) These are proteinous components which are essential for the catalytic action of certain enzymes.
   (2) Cofactors that are loosely bound to the enzymes are reversible under certain circumstances.
   (3) Inorganic cofactors are called coenzymes.
   (4) FAD and biotin are inorganic cofactors.
   (5) Some cofactors tightly bind to enzymes and Mg is not a cofactor.

8. What is the true statement regarding citric acid cycle?
   (1) Does not occur in prokaryotes as they lack mitochondria.
   (2) Citric acid consists of 3 carboxylic groups.
   (3) Produces 3 molecules of NADH from 1 molecule of glucose.
   (4) Release 4 molecules of CO_2 from 1 molecule of glucose by carboxylation reaction.
   (5) Major product is citric acid and it consists of 3 carbon atoms.

[See page three]

9. Which of the following responses gives a matching pair when time periods are considered?
   (1) Direct evidence for life on early earth – 3.5 million years ago
   (2) The oldest fossils of multicellular eukaryotes – 1.8 billion years ago
   (3) The divergence of human lineage from other primates - 195,000 years ago
   (4) The origin of earth and the other planets in the solar system – 4600 million years ago
   (5) Origin of ancestors of arthropods, chordates and other animal phyla - 700 million years ago

10. Select the response which includes the organisms that belong to the phyla showing each of the below characteristics, in order.
   (A) Segmented body
   (B) Bears tube feet
   (C) Radial symmetry
   (D) Eversible pharynx
   (E) Tough cuticle

   (1) Ragworms, Feather star, *Hydra*, Hook worm, Mite
   (2) Centipede, *Obelia*, brittle star, Pin worm, Tusk shell
   (3) Millipede, Sea urchins, Coral polyp, *Taenia*, Round worm
   (4) Earthworm, Sea cucumber, Round worm, Oyster, Tick
   (5) Spider, Sand dollar, Sea anemone, *Fasciola*, Chiton

11. Out of the following, what is the phylum that include organisms nourished by milk produced with mammary glands and having a body covered with hair?
   (1) Mammalia
   (2) Aves
   (3) Reptilia
   (4) Arthropoda
   (5) Chordata

12. Which of the following is the true statement regarding photosynthesis?
   (1) Occurs in eukaryotes but not in prokaryotes
   (2) Chlorophyll pigments as well as carotenoid pigments supply electrons at higher energy state to the primary electron acceptor.
   (3) In cyclic electron flow, ATP, NADPH and O_2 are produced as the final products while in linear flow only ATP is produced.
   (4) Sugars are produced by reducing carbon dioxide through enzyme catalyzed reactions.
   (5) The rate of photosynthesis gradually increases with the light intensity.

13. The true statement regarding the cells in the xylem tissue,
   (1) Both vessel elements and tracheids are long cells and tracheids are cylindrical.
   (2) Water moves from one cell to the other through pits found in the walls of tracheids.
   (3) Vessel elements are seen in all vascular plants.
   (4) Xylem vessel elements and tracheids exist as living cells at functional maturity.
   (5) Even though tracheids are thickened with lignin, they collapse under tension of water transport.

[See page four]

14. The true statement regarding the secondary growth of plant shoot and root,
    (1) Occurs in stems and roots of woody perennial plants including, all angiosperms species and many gymnosperm species.
    (2) During early stages of secondary growth, the epidermis is pushed outwards, causing it to split, dry and falls off the stem or root.
    (3) In a typical woody root, the vascular cambium forms laterally exterior to the primary xylem and primary phloem.
    (4) Vascular rays are formed by the initials that are oriented with their long axis parallel to the axis of stem or root.
    (5) In woody plants, secondary growth occurs after primary growth.

15. A plant cell having a solute potential of -2.2 MPa and a pressure potential of 0.5 MPa was placed in a sucrose solution of solute potential of -1.8 MPa, for 45 minutes. Which of the following statements is correct?
    (1) When the cell is in equilibrium, the water potential is equal to the pressure potential.
    (2) The new pressure potential is lower than the initial pressure potential.
    (3) The cell goes into incipient plasmolysis.
    (4) There will be no exchange of solutes in between the cell and the solution.
    (5) The solution of solute potential -1.8 MPa is an isotonic solution.

16. Which of the following responses is correct regarding the methods of water and solute transport?
    (1) Absorption of mineral ions by root hair cells occur passively by diffusion.
    (2) Osmosis is a special type of diffusion of water molecules through a permeable membrane.
    (3) Diffusion occurs in the absence of other forces and through any membrane.
    (4) Bulk flow occurs in response to a pressure gradient and at much greater speed than diffusion, independent of concentration gradient.
    (5) Physical absorption of water molecules by the cellulose cell walls is an example for imbibition.

17. Identify the element matching to the below features and select the answer which consists of the correct form of intake of that element.
    - Is a macronutrient required for plants.
    - A component of nuclear acids.
    - Deficiency symptoms of this element includes thin stems and purpling of veins.

    (1) HPO_4^{2-} (2) NH_4^+ (3) PO_4^{3-}
    (4) CO_2 (5) N^{3-}

18. Which of the following statements is correct regarding the Phylum Lycophyta?
    (1) All plants belonging to phylum Lycophyta bear ground hugging stems.
    (2) Sporophylls are clustered into club shaped male cones.
    (3) All spike mosses are homosporous.
    (4) In some species the tiny gametophyte lives above the ground and in others, it lives below the ground.
    (5) All lycophytes bear photosynthetic male and female gametophytes.

[See page five]

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19. True regarding plant hormones out of the following statements is,
(1) Auxin and cytokinin stimulate seed germination.
(2) Cytokinin regulate sex determination and transition from juvenile to adult phase.
(3) Auxin and ethylene show opposite behavior to each other in leaf abscission.
(4) Gibberellins and abscisic acid helps in inhibition of fruit growth.
(5) Abscisic acid helps in delaying leaf senescence.

20. The true statement is,
(1) Gametophyte of *Pogonatum* is monoecious.
(2) Male gametophyte of *Selaginella* is multicellular and photosynthetic.
(3) Gametophyte of *Nephrolepis* is bisexual, photosynthetic and macroscopic.
(4) Male gametophyte of *Cycas* is developed within the archegonial chamber of the ovule.
(5) The female gametophyte of flowering plants is a microscopic structure with 8 cells and 7 nuclei.

21. The major minerals which are essential for water balance, formation of bones & teeth, nerve & muscle function of humans are respectively,
(1) Na, P and Mg
(2) K, Ca and Fe
(3) Na, P and Ca
(4) K, Fe and Ca
(5) Cl, Ca and Na

22. Correct regarding the human lymphatic system is,
(1) The functions of the human lymphatic system include maintenance of the blood volume in the blood circulatory system, absorption of fat and fat soluble vitamins from the large intestine.
(2) Lymph is a coloured fluid in the lymphatic system which originates from tissue fluid.
(3) The composition of lymph is similar to that of blood plasma.
(4) Similar to veins, lymph vessels also have valves and it prevents the backflow of the lymph.
(5) Lymph nodes are composed of connective tissues and leukocytes.

23. (A) Tidal Volume
(B) Residual volume
(C) Male vital capacity
(D) Total lung capacity

The response that includes the values of A, B, C, D related to human respectively in ml is,
(1) 500, 1200, 3100, 6000
(2) 150, 500, 4800, 6000
(3) 500, 1200, 4800, 6000
(4) 500, 1200, 3100, 4800
(5) 1200, 3100, 4800, 6000

[See page six]

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24. Select the most accurate statement regarding the disorders of the respiratory system,
    (1) Long term exposure to chemicals in cigarette smoke, disrupts the proliferation of cells in the bronchial epithelium.
    (2) Tuberculosis is caused due to an infection by the virus *Mycobacterium tuberculosis*.
    (3) Carbon monoxide binds to hemoglobin better than oxygen and combines reversibly with hemoglobin.
    (4) Silicosis eventually leads to pulmonary hypertension and heart failure.
    (5) The cause of Asthma is the sudden contractions of the skeletal muscles in the walls of the bronchioles which causes bronchioles to narrow or even close.

25. Out of the following, the true statement regarding the liver is,
    (1) The functional unit of liver is hexagonal shaped lobes and a large number of them are found in the liver.
    (2) Metabolism of carbohydrates, fats and proteins can be considered as a function of liver related to digestion.
    (3) Liver regulates the distribution of nutrients absorbed during digestion to the rest of the body.
    (4) Ferrous, vitamin B_{12}, amino acids and vitamin D are stored in the liver.
    (5) In the sinusoids found between two pairs of column of liver cells, mixing of portal blood and bile takes place.

26. Medulla oblongata,
    (1) Contains only a reflex centre and a respiratory centre.
    (2) Extends from the pons varolii and is continuous with the spinal cord.
    (3) Transfers information between peripheral nervous system, hind brain and the fore brain.
    (4) Controls voluntary reflexes such as swallowing, coughing through reflex centres.
    (5) Forms the middle part of the brain stem.

27. Select the correct statement out of the following regarding human eye,
    (1) Human eye consists of three layers as inner fibrous layer, middle vascular layer and outer nervous layer.
    (2) Blood vessels are found abundantly in cornea.
    (3) Ciliary muscles are made up of skeletal muscle fibers.
    (4) Light rays are mostly refracted by the cornea.
    (5) Retina is the innermost lining of the eye and it consists of 3 layers.

[See page seven]

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28. The matching response when comparing the sympathetic and parasympathetic nervous systems is,

	Sympathetic nervous system	Parasympathetic nervous system
(1)	Preganglionic fibers start from the thoracic and lumbar regions of the spinal cord.	Preganglionic fibers start from the sacral region of the spinal cord and the hind brain.
(2)	Secretes acetylcholine as neurotransmitter.	Secretes norepinephrine as neurotransmitter
(3)	Pre ganglionic fibers are long.	Preganglionic fibers are short.
(4)	Ganglia are found inside effector organs.	Ganglia are found closely on either side of the spinal cord.
(5)	Promotes emptying of bladder.	Inhibits emptying of bladder

29. Select the response which contain only the hormones that are secreted by the anterior pituitary which are having a trophic effect and are not inhibited by hypothalamic hormones.
(1) ACTH, FSH, LH
(2) TSH, ACTH, FSH, LH
(3) GH, TSH, ACTH, FSH, LH, Prolactin
(4) GH, TSH, ACTH, FSH, LH
(5) TSH, ACTH, FSH, LH, Prolactin

30. Select the correct statement regarding the events occurring after fertilization.
(1) Out of the fetal membranes, allantois acts as an early site for blood formation.
(2) Amnion and chorion secrete the hormone hCG.
(3) Pregnancy period of a woman is 40 weeks from fertilization.
(4) The chorion is derived from the inner cell mass of the blastocyst.
(5) About 12 hours after fertilization, cleavage of the zygote begins and then forms a solid ball of cells called morula.

31. The correct statement regarding the bones in the thoracic cavity out of the below statements is,
(1) Only the first rib articulates with the manubrium of the sternum.
(2) 7^{th}, 8^{th}, 9^{th} and 10^{th} ribs articulate with sternum indirectly.
(3) The xiphoid process is the tip of the bone which gives attachment to the diaphragm and muscles of the anterior abdominal wall.
(4) The lowest three pairs of ribs are called floating ribs.
(5) The first two pairs of ribs do not move during inspiration.

32. True statement regarding epigenetics is,
(1) Epigenetic inheritance may not get reversed by various external stimuli from the environment.
(2) Epigenetics results only due to inherited signals from parents.
(3) Demethylation is addition of methyl groups to a wild type DNA sequence.
(4) Occurrence of certain phenotypes of certain characters controlled by the inherited genetic code takes place in epigenetics.
(5) Some epigenetic influences result in inappropriate gene expressions leading to cancers.

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33. True statement regarding PCR is,
(1) Denaturation is done at the optimum temperature of the DNA polymerase used.
(2) Primer used is a specific sequence of RNA which is complementary to a sequence at 3' end of the target DNA to be copied.
(3) PCR is used to identify relationships among species in the field of evolutionary biology.
(4) The annealing temperature will depend only on the length of the primer.
(5) At the end of the first thermal cycle, an exact copy of the target DNA is synthesized.

34. Select the correct response.
(1) 64 codons provide codes for amino acids.
(2) The initiator amino acid is not always methionine in every functional eukaryotic protein.
(3) Forming polyribosomes decreases the rate of translation.
(4) The first amino acid, methionine is removed enzymatically in all proteins.
(5) AGU codon provides the code for methionine.

35. The true statement regarding biomes is,

	Biome	Annual rainfall	Main features
(1)	Tropical rain forests	1500 – 2000 mm	The vegetation is arranged in several vertical layers
(2)	Savanna	300 – 500 mm	Tough evergreen leaves in woody plants
(3)	Deserts	Less than 200 mm	Most plants have C_4 pathway of photosynthesis.
(4)	Chaparral	300 - 500 mm	Average temperature is between 10 to 12 °C
(5)	Northern coniferous forest	700 – 2000 mm	Grazers and burrowing mammals are seen.

36. Which of the following statements is true regarding mycoplasma and phytoplasma?
(1) Phytoplasma only infect plants.
(2) Mycoplasma require high amount of organic growth factors while phytoplasma can grow even in artificial media.
(3) A small number of mycoplasmas are parasites of humans and animals.
(4) Mycoplasma reproduce by budding and fragmentation.
(5) All phytoplasma are transmitted by leafhoppers.

37. The correct response regarding toxins is,
(1) Endotoxins are produced only by gram (-) negative bacteria.
(2) Most of the exotoxins are produced by gram (-) negative bacteria.
(3) *Salmonella typhi* produce exotoxins.
(4) *Corynebacterium diphtheriae* produce neurotoxin, the type of exotoxin that interfere with normal transmission of nerve impulses.
(5) Endotoxins are thermo-labile lipopolysaccharides.

[See page nine]

38. Which of the following statements regarding the commercial products made by microorganisms and their processes is correct?
    (1) The acetic acid fermentation process is highly aerobic.
    (2) Fructose is the most widely used fermentation substrate in production of ethanol.
    (3) The process of converting lactose into lactic acid is carried out by *Streptococcus sp.*
    (4) *Aspergillus oryzae* is used in commercial processes such as citric acid fermentation.
    (5) Vitamin B_2 is produced by bacterial fermentation.

39. The correct statement regarding food spoilage by microorganisms is,
    (1) Molds including yeasts can grow in food only over a narrow range of pH.
    (2) Nutrient content in food is an external factor that influences on food spoilage.
    (3) Only bacterial species always contribute in food intoxication.
    (4) Fruits such as limes, orange and banana are mostly spoiled by bacteria.
    (5) Viruses also can cause some food borne illnesses.

40. Select the true statement regarding dengue.
    (1) *Culex quinquefasciatus* is a dengue vector.
    (2) The posterior margin of the wings of the adult mosquito is fringed with bristle and scales.
    (3) The dengue virus is transmitted to human via an infected male mosquito.
    (4) Bti bacteria can be used to control the dengue vector.
    (5) Female mosquitoes mostly prefer laying eggs in polluted water.

- For each of the question 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. The true statement/s out of the following regarding the determination of rate of photosynthesis using the Audus micro burette is/are,
    (A) A sodium bicarbonate solution is added to the test tube to prevent CO_2 from being a limiting factor.
    (B) The setup is kept in a water heater to keep the temperature constant.
    (C) The *Hydrilla* plant is kept upright to make sure air bubbles are released constantly.
    (D) Water is aerated before the experiment to oxidize organic matter in water by microorganisms.
    (E) A table lamp is used to determine the variation of rate of photosynthesis with light intensity.

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42. The true statement/s regarding the digestion processes in small intestine and the associated enzymes is/are,
(A) Polysaccharides are converted to disaccharides by intestinal disaccharidase.
(B) Proteins are converted to small polypeptides by pepsin.
(C) Small polypeptides are converted to smaller polypeptides by pancreatic trypsin and chymotrypsin.
(D) DNA and RNA are broken down into nucleotides by pancreatic nuclease.
(E) Nucleotides are broken down into nitrogenous bases, sugars and phosphates by pancreatic nucleosidase.

43. The true statement/s regarding the transport of respiratory gases in human blood,
(A) The enzyme carbonic anhydrase catalyzes the combination of CO_2 with water to form HCO_3^- and H^+ ions within erythrocytes.
(B) CO_2 can also be transported as free gas dissolved in plasma.
(C) A single hemoglobin molecule binds irreversibly with 4 O_2 molecules to form oxyhemoglobin.
(D) CO_2 does not compete with oxygen binding sites in hemoglobin as CO_2 combines with protein group of hemoglobin to form carboxyhemoglobin.
(E) Around 70% CO_2 are transported as HCO_3^- in erythrocytes.

44. The matching response/s according to the relation given regarding hormones,

	The trophic hormone secreted by the hypothalamus →	Trophic hormone secreted by the anterior pituitary →	Hormone secreted by the target place.
(A)	Thyrotropin releasing hormone	Thyroid stimulating hormone	Triiodothyronine
(B)	Gonadotropin releasing hormone	Follicle stimulating hormone	Progesterone
(C)	Gonadotropin releasing hormone	Luteinizing hormone	Testosterone
(D)	Corticotropin releasing hormone	Adrenocorticotropic hormone	Cortisol
(E)	Gonadotropin releasing hormone	Luteinizing hormone	Inhibin

45. Select the true statement/s out of the following regarding active and passive immunity.
(A) Both active and passive immunity are types of long term immunity.
(B) Artificially acquired active immunity can be carried out with preparations of antigens/vaccines only from killed pathogens.
(C) Using serum prepared from horses that have been immunized against snake venom is an example for artificially acquired passive immunity.
(D) Body resists subsequent infections of the same antigen due to the activation of passive immunity.
(E) Short term immunity induced artificially in the body against various infectious diseases through vaccination of attenuated pathogens is artificially acquired active immunity.

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46. The correct statement/s is/are,
(A) Organ systems of the fetus are completely developed within the first trimester.
(B) Although only one sperm is needed per one oocyte in in vitro fertilization, in intra cytoplasmic sperm injection, one sperm is not enough.
(C) Chorion produces hCG which is an important hormone in pregnancy.
(D) During the first 2-4 weeks of embryonic development, the embryo obtains nourishment directly from the endometrium.
(E) The secondary oocyte arrested in prophase of meiosis II is released at ovulation, when its follicle breaks open.

47. Character of baldness is determined by the gene B. A male shows baldness when the recessive homozygous genotype bb or the heterozygous Bb genotype is present while a woman shows baldness only when the recessive homozygous bb genotype is present. In a certain family, although the son shows no baldness, the daughter shows baldness. The true statement/s about the mother and the father is/are,
(A) Father's genotype is bb.
(B) Mother also shows baldness.
(C) Father definitely shows baldness.
(D) The genotypes of both the mother and the father are the same.
(E) Cannot determine the genotype of the father.

48. The correct statement/s regarding DNA delivery systems,
(A) A large number of copies of DNA of interest is mixed with host cells in transformation.
(B) *Agrobacterium* used for gene transfer is a bacterium which can infect plants.
(C) Transformation is more efficient than transduction.
(D) Transduction is based on the ability of bacteriophages to infect host cells.
(E) Gene Gun is used to shot particles that are coated with copies of the DNA of interest, at high velocity into the cells to be transformed.

49. The true statement/s out of the following, regarding biomes is/are,
(A) Both evergreens and deciduous plant species can be seen in tropical forests.
(B) Plants growing in chaparral and temperate grasslands have adaptations to cope with fire.
(C) Tundra is the largest biome on earth.
(D) The dominant trees in temperate broadleaf forests are mostly deciduous.
(E) Chaparral occurs in mid latitude coastal regions.

50. The correct statement/s out of the following regarding wastewater treatment,
(A) Biological activities are used in primary treatment.
(B) Sludge remaining from both primary and secondary treatments is subjected to aerobic decomposition.
(C) Waste water is aerated to facilitate the rapid microbial oxidation.
(D) The only end product of decomposition of organic matter in sludge is methane.
(E) In trickling filters, vigorous aeration is done mechanically.

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නව නිර්දේශය/ புதிய பாடத்திட்டம்/New Syllabus

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය (ආදර්ශ), 2021
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை (மாதிரி), 2021
General Certificate of Education (Adv. Level) Examination (Model), 2021

ජීව විද්‍යාව II
உயிரியல் II
Biology II

09 E II

පැය තුනයි
மூன்று மணித்தியாலம்
Three Hours

අමතර කියවීම් කාලය - මිනිත්තු 10 යි
மேலதிக வாசிப்பு நேரம் - 10 நிமிடங்கள்
Additional Reading Time - 10 minutes

Use additional reading time to go through the question paper, select the questions you will answer and decide which of them you will prioritise.

Index No. : ....

Instructions:

- *This question paper contains 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 (Page 13)

- *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		

Total

In Numbers	
In Letters	

Code Numbers

Marking Examiner 1	
Marking Examiner 2	
Marks checked by	
Supervised by	

[see page two]

Part A – Structured Essay

Answer all questions on this paper itself.

(*Each question carries* **100** *marks.*)

Do not write in this column

1. (A) (i) Sustainable food production is necessary for the survival of human beings. What is meant by sustainable food production?

.....

.....

(ii) State the reasons as to why water is important for the continuation of life on earth?

.....

.....

(iii) What is meant by denaturation of proteins?

.....

.....

(iv) State three agents affecting the denaturation of proteins.

.....

.....

.....

(v) (a) State the protein identifying test.

.....

(b) Elaborate how the protein identifying test is done in the school laboratory.

.....

.....

(B) (i) What is aerobic respiration?

.....

.....

(ii) Write the balanced chemical equation to represent the aerobic respiration of one glucose molecule.

.....

(iii) What is meant by respiratory quotient?

.....

.....

(iv) (a) What are the building units of triacylglycerol?

.....

(b) State how the building units you stated above are used during cellular respiration.

.....

.....

(v) State two functions of the extra cellular matrix in animal cells.

.....

.....

[see page three]

Do not write in this column

(C) (i) Complete the dichotomous key given to identify and separate the below organisms.

Agaricus, *Obelia*, *Sargassum*, Tuna, *Ulva*, Feather star, Skate, *Aspergillus*

(1) Possess a holdfast .....

Do not possess a holdfast .....

(2) Possess a stem like stipe .....

Do not possess a stem like stipe .....

(3) Show cephalization. .....

Do not show cephalization .....

(4) Gills are covered by operculum. .....

Gills are not covered by operculum. .....

(5) Presence of exospores .....

Absence of exospores .....

(6) Possess conidiophores .....

Do not possess conidiophores .....

(7) Possess tube feet .....

Do not possess tube feet .....

(ii) State three molecular biological information on which the present system of classification is mainly based.

.....

.....

.....

(iii) State the multicellular structures produced for sexual reproduction by the phyla to which the below organisms belong.

Penicillium : .....

Rhizopus : .....

(iv) State two similarities in between the Domain Archea and Domain Eukarya.

.....

.....

(v) State two main features by which terrestrial plants differ from green algae.

.....

.....

100

2. (A) (i) State the location and function of the intercalary meristem.

Location : .....

Function : .....

[see page four]

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Do not write in this column

(ii) Name one phylum of the kingdom plantae where each soft wood and hard wood can be found.

Soft wood : .....

Hard wood : .....

(iii) Mention two structural features of a guard cell found in angiosperms that contains a typical stomata.

.....

.....

(iv) Explain what is meant by plasmolysis of a cell.

.....

.....

.....

(v) State the functions of the endodermis in radial transport of water.

.....

.....

(vi) Name the main active process occurring in phloem translocation in many plants and state the reason for it to be active.

(a) Active process : .....

(b) Reason : .....

.....

(B) (i) Cell A with pressure potential of 0.6 MPa and solute potential of -1.3 MPa, was kept in contact with cell B with solute potential of -1.4 MPa and was allowed to achieve equilibrium. The final water potential of the cells was -0.8 MPa. Find the initial pressure potential of cell B.

.....

.....

.....

.....

.....

(ii) (a) What is the instrument used in school laboratories to determine the rate of transpiration?

.....

(b) Draw a labelled diagram of that instrument.

[see page five]

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(iii) (a) What is the major assumption done during this experiment?

.....

.....

(b) Give one activity that can be done to demonstrate the influence of each of the following factors by taking the above setup as the main experiment.

(1) Humidity : .....

(2) Wind : .....

(iv) Define the term "carnivorous plants".

.....

.....

.....

(v) Give two similarities that can be seen in the life cycles of *Pogonatum* and *Selaginella*.

.....

.....

(vi) (a) Name plant growth substances that affect the movement of statoliths.

.....

(b) Give two functions of the above-mentioned plant growth substance.

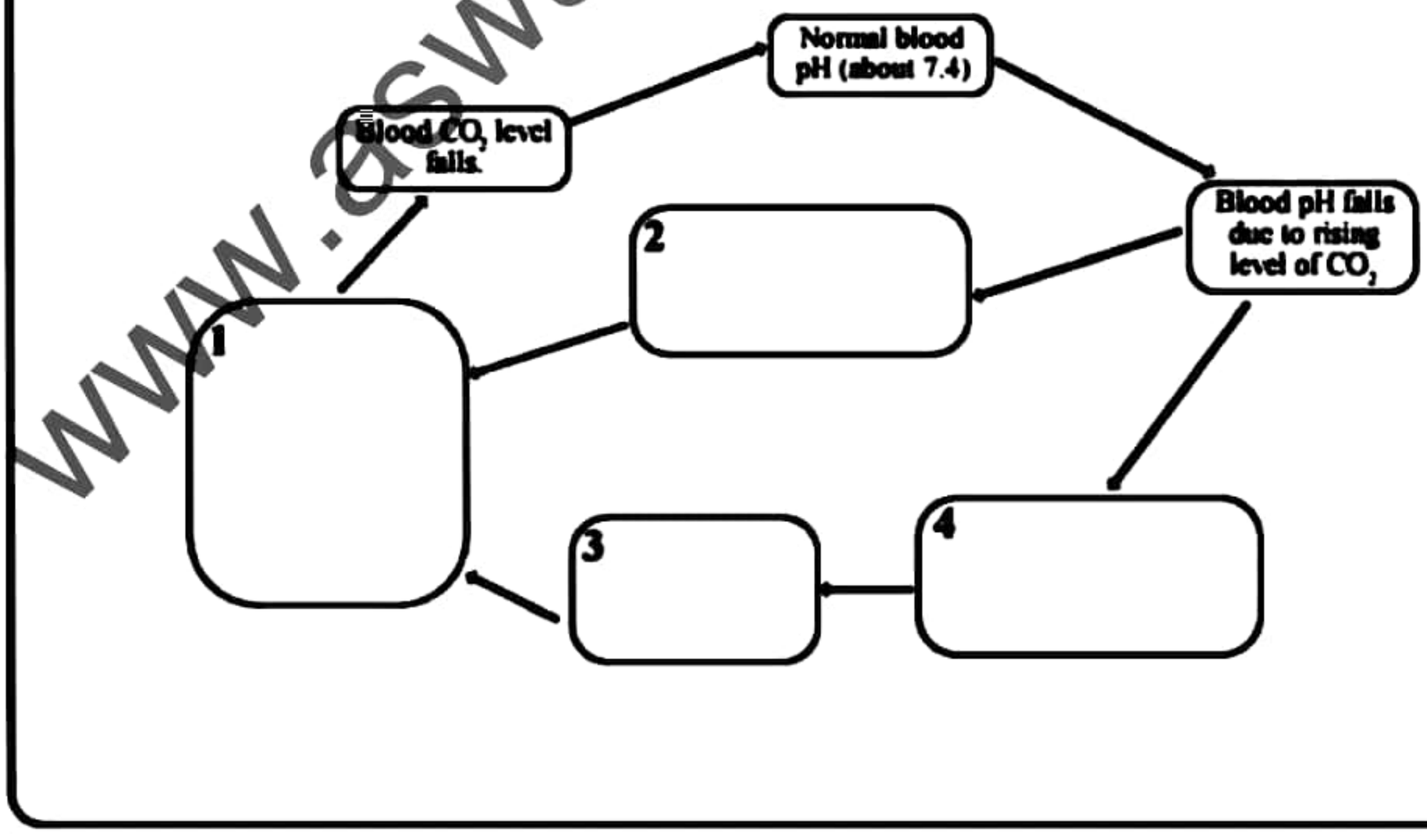
.....

.....

(vii) State two differences between the female gametophyte of *Cycas* and the female gametophyte of Anthophyta.

Female gametophyte of Anthophyta	Female gametophyte of *Cycas*

(C) (i) Complete the blanks in the below chart related to the homeostatic control of breathing.



[see page six]

Do not write in this column

(ii) How is sound produced by the vocal cords?

.....

.....

(iii) What is external respiration of human?

.....

.....

(iv) What are the functions of heparin which is widely used clinically as an anticoagulant?

.....

.....

(v) What is the reason for the donor's cells to be agglutinated when the blood groups of the recipient and the donor are incompatible during blood transfusion?

.....

.....

.....

100

3. (A) (i) Name the main excretory product of the animals given below.

(a) Tadpoles : .....

(b) Birds : .....

(ii) Arrange the excretory products ammonia, urea and uric acid produced by animals in ascending order of the amount of energy needed for their production.

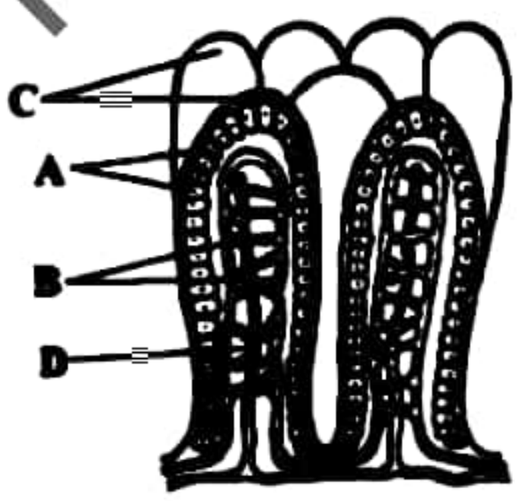
.....

(iii) State two common reasons for both kidney failure and chronic kidney disease.

.....

.....

(iv)



Name the parts A-D in the structure shown in the above diagram.

A - ..... C - .....

B - ..... D - .....

(v) (a) Explain what is meant by sinusoids in liver.

.....

.....

[see page seven]

Do not write in this column

(b) What are the structures found in the corner of the hexagonal structures in liver?

.....

.....

(c) Name the vitamins / minerals matching to below statements.

(1) Enlarged thyroid gland is a deficiency symptom. - .....

(2) Pellagra is a deficiency symptom. - .....

(3) Act as an antioxidant and nervous system degeneration could occur when deficient. -

.....

(4) Helps in acid-base balance and heart failure could occur when deficient - .....

(B) (i) What is the type of cells that secrete histamine in inflammatory responses?

.....

(ii) What are "allergens" ?

.....

.....

(iii) Define what "effector cells" are.

.....

.....

(iv) Complete the table below with relevant information regarding the location and hormones secreted by each of the below endocrine glands.

Gland	Location	Hormone
Thymus gland		
		Parathyroid hormone

[see page eight]

Do not write in this column

(v) (a) Identify the diagram given below and name the labelled parts A-F.

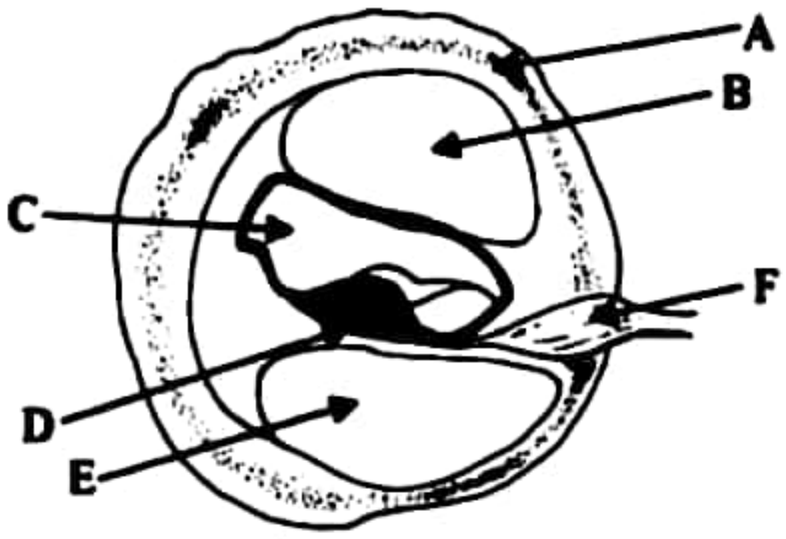


Diagram : .....

A : ..... D : .....

B : ..... E : .....

C : ..... F : .....

(b) What are the main parts that belong to the structure D?

.....

.....

(C) (i) State the method of asexual reproduction shown by the below organisms / groups of organisms.

(a) *Hydra* : .....

(b) Aphids : .....

(c) Cnidarians : .....

(ii) (a) Mention two permanent birth control methods.

.....

.....

(b) How does birth control occur in each of the birth control methods you mentioned above in (ii) (a).

.....

.....

(iii) State one infection that is sexually transmitted by each of the bacteria given below.

Treponema pallidum : .....

Neisseria gonorrhoeae : .....

(iv) (a) Explain what fontanelles are.

.....

(b) What are the functions of fontanelles?

.....

[see page nine]

Do not write in this column

(v) Which structures separate the buccal cavity from nasal cavity?

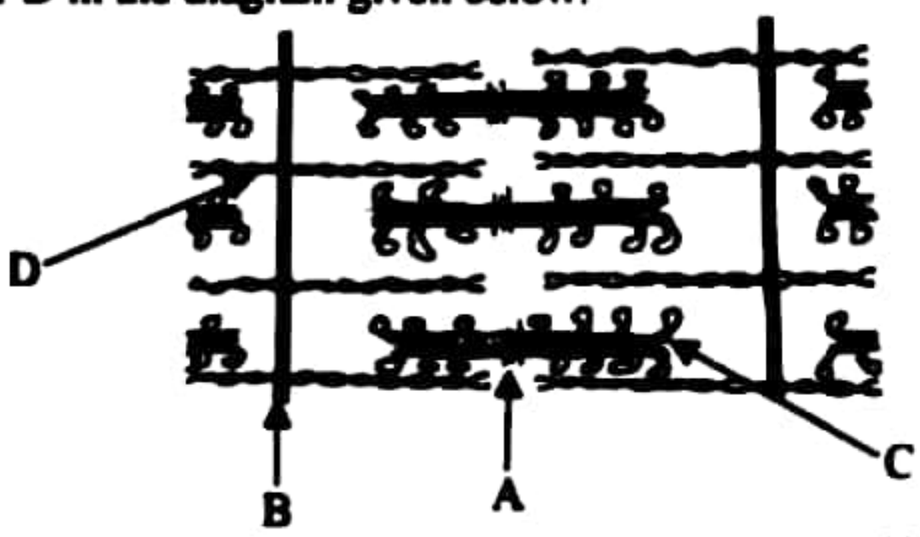
.....

(vi) (a) Briefly explain the meanings of the terms given below.

(1) Contractility : .....

(2) Elasticity : .....

(b) Name the parts A-D in the diagram given below.



A : ..... C : .....

B : ..... D : .....

100

4. (A) (i) In a human population of 600 individuals, 54 individuals do not show a widow's peak. What is the no. of individuals who are heterozygous to this character? (Assume that this population obeys Hardy Weinberg Equilibrium).

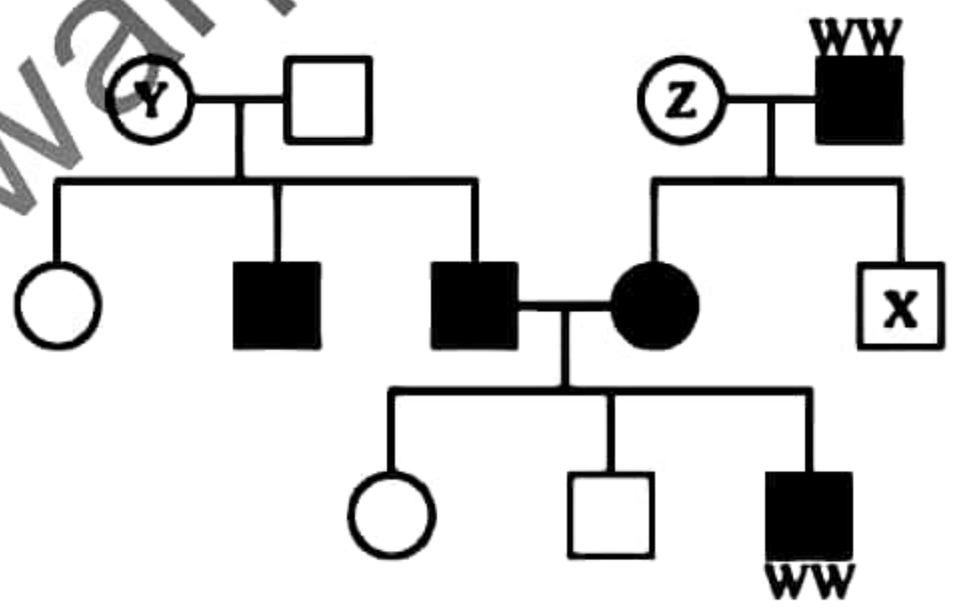
.....

.....

.....

.....

(ii) Shown below is a pedigree chart drawn to a family in the above population.



Identify the genotype/s of the individuals shown by letters.

X : .....

Y : .....

Z : .....

[see page ten]

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(iii) 5'═TAGTCTATAATGTCGATCAAAATAACGTAGTTGGTG═3'
3'—ATCAGATATTACAGCTAGTTTTATTGCATCAACCAC—5'

Shown above is a DNA fragment present in an imaginary gene of a bacteria.

(a) Which of the above chains contains the template DNA strand? (top / bottom) .....

(b) How many amino acids will be there in the polypeptide chain that can be synthesized from this? .....

(iv) Regarding DNA replication in prokaryotes and eukaryotes,

(a) Mention two similarities.

.....

.....

(b) Mention two dissimilarities.

.....

.....

(v) What is meant by a recombinant DNA molecule?

.....

.....

(B) (i) What is meant by desertification?

.....

.....

(ii) (a) Give four threats to biodiversity.

.....

.....

.....

.....

(b) State respectively, a species responsible for causing threats to biodiversity in Sri Lanka and a species that has been subjected to such threats.

(i) Species responsible .....

(ii) Species threatened .....

[see page eleven]

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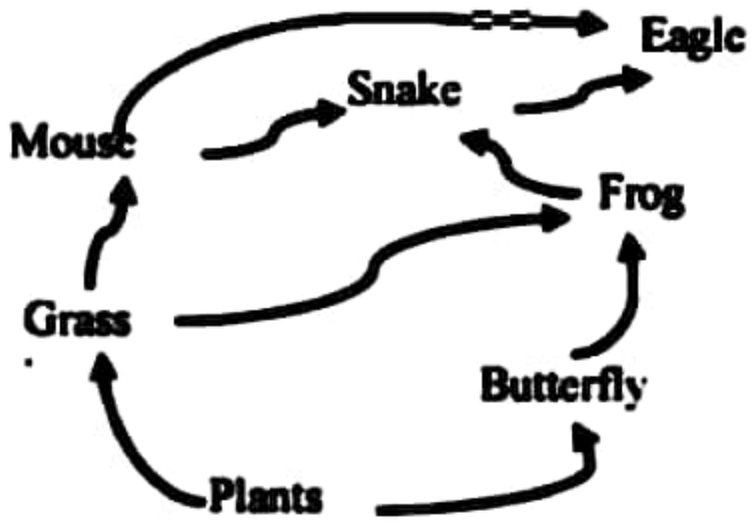
(iii)



Primary producers fix only 1% of the solar energy. If 90% of the potential energy is lost at each trophic level, what is the percentage of solar energy transferred to the mouse?

.....

.....

(iv) (a) Due to a sudden fire occurred in a certain chemical factory, the gas named Helene was released in large volumes into the environment. What could be the main effect on the atmosphere due to this?

.....

(b) Name two harmful effects that could occur in the sea ecosystem due to the above effect.

.....

.....

(v) What is the protocol created with international solutions regarding the effect mentioned in (iv) (a) above?

.....

(C) (i) (a) What is the most significant morphological feature in a bacterial cell?

.....

(b) What is the no. of planes in which cell division takes place in the sarcinae form of cell arrangement of Coccus bacteria?

.....

(ii) (a) What are virulent factors?

.....

.....

(b) On what does the outcome of the relationship between a host and a pathogen depend on?

.....

.....

(iii) (a) Explain the reason for the microorganisms to have a higher growth rate.

.....

.....

(b) What is a culture medium?

.....

.....

[see page twelve]

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(iv) (a) What is bioremediation?

.....

.....

(b) What is the reason for the increase of temperature during the initial stage of compost production?

.....

.....

(v) (a) Mention one harmful effect of extensive use of chemical pesticides.

.....

(b) Give two examples along with a suitable microbial species for bio control agents (BCA) / bio-pesticides which are environmentally friendly and less toxic alternative strategies to replace synthetic chemicals as pesticides.

.....

.....

100

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නව නිර්දේශය/ புதிய பாடத்திட்டம்/New Syllabus

NEW

Pre Medicine Association, Colombo District 2020

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය (ආදර්ශ), 2021
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை (மாதிரி), 2021
General Certificate of Education (Adv. Level) Examination (Model), 2021

ජීව විද්‍යාව II
உயிரியல் II
Biology II

09 E II

Part B - Essay

Instructions:

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

5. (*a*) Describe the events of the eukaryotic cell cycle.
   (*b*) Briefly state the significance of mitosis.

6. (*a*) Describe the structure of skin.
   (*b*) Briefly explain the contribution of skin to maintain homeostasis.

7. (*a*) Explain the location of the human kidney.
   (*b*) Briefly describe the process of urine formation in human kidney.

8. (*a*) Briefly describe the primary structure of a typical dicot root.
   (*b*) Explain the responses of plants to biotic stresses providing suitable examples.

9. (*a*) Fur colour of mice occur due to recessive epistasis. Black fur colour of mice is governed by gene A and gene b is epistatic to that. Explain how recessive epistasis is resulted during the cross between homozygous double dominant black mice and homozygous double recessive white mice, using this example.
   (*b*) Describe how DNA is packed inside a chromosome of a eukaryotic nucleus.

10. Write short notes on the following.
   (*a*) How cell mediated immunity responses occur against an antigen
   (*b*) Grasslands found in intermediate zone of Sri Lanka
   (*c*) Food preservation using radiation.

•••

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AL/2021/09/E-I(NEW)

නව නිර්දේශය/ புதிய பாடத்திட்டம்/New Syllabus

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය (ආදර්ශ), 2021
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை (மாதிரி), 2021
General Certificate of Education (Adv. Level) Examination (Model), 2021

ජීව විද්‍යාව	I
உயிரியல்	I
Biology	I

09 E I

පැය දෙකයි
இரண்டு மணித்தியாலம்
Two Hours

ලකුණු යෝජනා ක්‍රමය
Marking Scheme

Question Number	Answer	Question Number	Answer	Question Number	Answer	Question Number	Answer	Question Number	Answer
1	4	11	5	21	3	31	3	41	5
2	2	12	4	22	4/5	32	5	42	4
3	3	13	2	23	3	33	3	43	3
4	2	14	2	24	4	34	2	44	2
5	2	15	2	25	3	35	4	45	5
6	3	16	4	26	2	36	1	46	4
7	2	17	1	27	5	37	1	47	4
8	2	18	4	28	1	38	1	48	5
9	4	19	3	29	1	39	5	49	5
10	3	20	3	30	1	40	4	50	5

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AL/2021/09/E-II(NEW)

නව නිර්දේශය/ புதிய பாடத்திட்டம்/New Syllabus

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය (ආදර්ශ), 2021
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை (மாதிரி), 2021
General Certificate of Education (Adv. Level) Examination (Model), 2021

ජීව විද්‍යාව	II
உயிரியல்	II
Biology	II

09 E II

ලකුණු දීමේ පටිපාටිය
Marking Scheme

පැය තුනයි
மூன்று மணித்தியாலம்
Three Hours

අමතර කියවීම් කාලය
மேலதிக வாசிப்பு நேரம்
Additional Reading Time - මිනිත්තු 10 යි / 10 நிமிடங்கள் / 10 minutes

Use additional reading time to go through the question paper, select the questions you will answer and decide which of them you will prioritise.

Index No. : .....

Instructions:

- *This question paper contains 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 (Page 13)

- *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		

Total

In Numbers	
In Letters	

Code Numbers

Marking Examiner 1	
Marking Examiner 2	
Marks checked by	
Supervised by	

[see page two]

Part A – Structured Essay

Answer all questions on this paper itself.

(*Each question carries* 100 *marks.*)

Do not write in this column

1. (A) (i) Sustainable food production is necessary for the survival of human beings. What is meant by sustainable food production?

Sustainable food production is the production of sufficient amounts of food for the human population using environmentally safe methods. ①

(ii) State the reasons as to why water is important for the continuation of life on earth?

Vital chemical constituent of living cell ①

Provides a biological medium for all organisms ①

(iii) What is meant by denaturation of proteins?

Denaturation of protein is the loss of specific chemical three dimensional shape, due to the alteration of weak chemical bonds and interactions. ① ①

(iv) State three agents affecting the denaturation of proteins.

High temperature and high energy radiation

Strong acids, alkaline and high concentrations of salts ③

Heavy metals Organic solvents and detergents

(v) (a) State the protein identifying test.

Biuret test ①

(b) Elaborate how the protein identifying test is done in the school laboratory. ①

① To 2cm³ of a protein solution, add ① equal volume of 5% KOH solution and mix. Then add 2 drops of 1% $CuSO_4$ solution and mix. ① The solution will acquire a blue / purple colour indicating the presence of proteins.

(B) (i) What is aerobic respiration?

The process of synthesis of ATP from the respiratory substrates such as glucose in the presence of molecular oxygen (or) is known as aerobic respiration. ①

(ii) Write the balanced chemical equation to represent the aerobic respiration of one glucose molecule.

$C_6H_{12}O_6 + 6O_{2(g)} \rightarrow 6CO_{2(g)} + 6H_2O + Energy\ (ATP + heat)$ (If only ATP is mentioned, no marks are given.) ①

(iii) What is meant by respiratory quotient?

The ratio of CO_2 evolved and the volume of O_2 consumed ① in a given time for ① respiratory substrate (No marks are given for (V_{CO_2}/V_{O_2}) ①

(iv) (a) What are the building units of triacylglycerol?

Fatty acids, Glycerol ②

(b) State how the building units you stated above are used during cellular respiration.

Glycerol participates in glycolysis as G3P. ①

Fatty acids participate in pyruvate oxidation as acetyl Co-A (Co-enzyme A). ①

(v) State two functions of the extra cellular matrix in animal cells.

Forms a protective layer over the cell surface

Linking extra cellular matrix and cytoskeleton. ②

Influences the cell behavior by involving in the mechanical and chemical signaling.

(Any 2 of the above)

[see page three]

Do not write in this column

(C) (i) Complete the dichotomous key given to identify and separate the below organisms.

Agaricus, *Obelia*, *Sargassum*, Tuna, *Ulva*, Feather star, Skate, *Aspergillus*

(1) Possess a holdfast ..... (2) ..... ①
Do not possess a holdfast ..... (3) .....

(2) Possess a stem like stipe ..... *Sargassum* ..... ①
Do not possess a stem like stipe ..... *Ulva* .....

(3) Show cephalization. ..... (4) ..... ①
Do not show cephalization ..... (5) .....

(4) Gills are covered by operculum. ..... Tuna ..... ①
Gills are not covered by operculum. ..... Skate .....

(5) Presence of exospores ..... (6) ..... ①
Absence of exospores ..... (7) .....

(6) Possess conidiophores ..... *Aspergillus* ..... ①
Do not possess conidiophores ..... *Agaricus* .....

(7) Possess tube feet ..... Feather Star ..... ①
Do not possess tube feet ..... *Obelia* .....

(ii) State three molecular biological information on which the present system of classification is mainly based.

the sequence of bases of DNA of important genes / molecular structure of cellular components / the sequences of bases of DNA of mitochondria and chloroplasts / the base sequence of ribosomal RNA / the sequence of amino acids in common proteins ③

(iii) State the multicellular structures produced for sexual reproduction by the phyla to which the below organisms belong.

Penicillium : Ascus / Ascocarps ①
Rhizopus : Zygosporangium ①

(iv) State two similarities in between the Domain Archea and Domain Eukarya.

The initiator amino acid for protein synthesis is Methionine
Growth is not inhibited in response to antibiotics ②
Several kinds of RNA polymerases are present

(v) State two main features by which terrestrial plants differ from green algae.

walled spores produced in sporangia — dependent embryo
multicellular gametangia — apical meristem ②

100

2. (A) (i) State the location and function of the intercalary meristem.

Location : At the bases of stems and leaves (nodes) of some monocots such as grasses. ①
Function : Allow rapid regrowth in damaged leaves. ①

[see page four]

Do not write in this column

(ii) Name one phylum of the kingdom plantae where each soft wood and hard wood can be found.

Soft wood : Phylum Cycadophyta, Phylum Coniferophyta ①

Hard wood : Phylum Anthophyta ①

(iii) Mention two structural features of a guard cell found in angiosperms that contains a typical stomata.

Contains chloroplasts, Typically bean shaped ②

Cell walls are unevenly thickened with cellulose.

(iv) Explain what is meant by plasmolysis of a cell.

Plasmolysis is the process where the protoplast of the cell shrinks and pulls away from the cell wall due to the diffusion of water out of the cell. ①

(v) State the functions of the endodermis in radial transport of water.

Prevents unneeded and toxic materials from entering into the vascular tissue. ①

Prevents solutes that have accumulated in the xylem from leaking back into the soil solution. ①

(vi) Name the main active process occurring in phloem translocation in many plants and state the reason for it to be active.

(a) Active process : Phloem loading / Loading of sugar ①

(b) Reason : Sucrose is more concentrated in sieve tube elements and companion cells than in mesophyll cells. ①

(B) (i) Cell A with pressure potential of 0.6 MPa and solute potential of -1.3 MPa, was kept in contact with cell B with solute potential of -1.4 MPa and was allowed to achieve equilibrium. The final water potential of the cells was -0.8 MPa. Find the initial pressure potential of cell B.

Water potential of cell A (by $\psi = \psi_s + \psi_p$) = 0.6 MPa + (-1.3) MPa

= (-0.7) MPa ①

$\frac{\psi_p + (-0.7)}{2} = -0.8$ $\psi_p = -0.9$ MPa ①

Water potential of cell B = ψ_p + (-1.4) MPa

-0.9 MPa = ψ_p + (-1.4) MPa

ψ_p = + 0.5 MPa ①

(ii) (a) What is the instrument used in school laboratories to determine the rate of transpiration?

Potometer ①

(b) Draw a labelled diagram of that instrument.

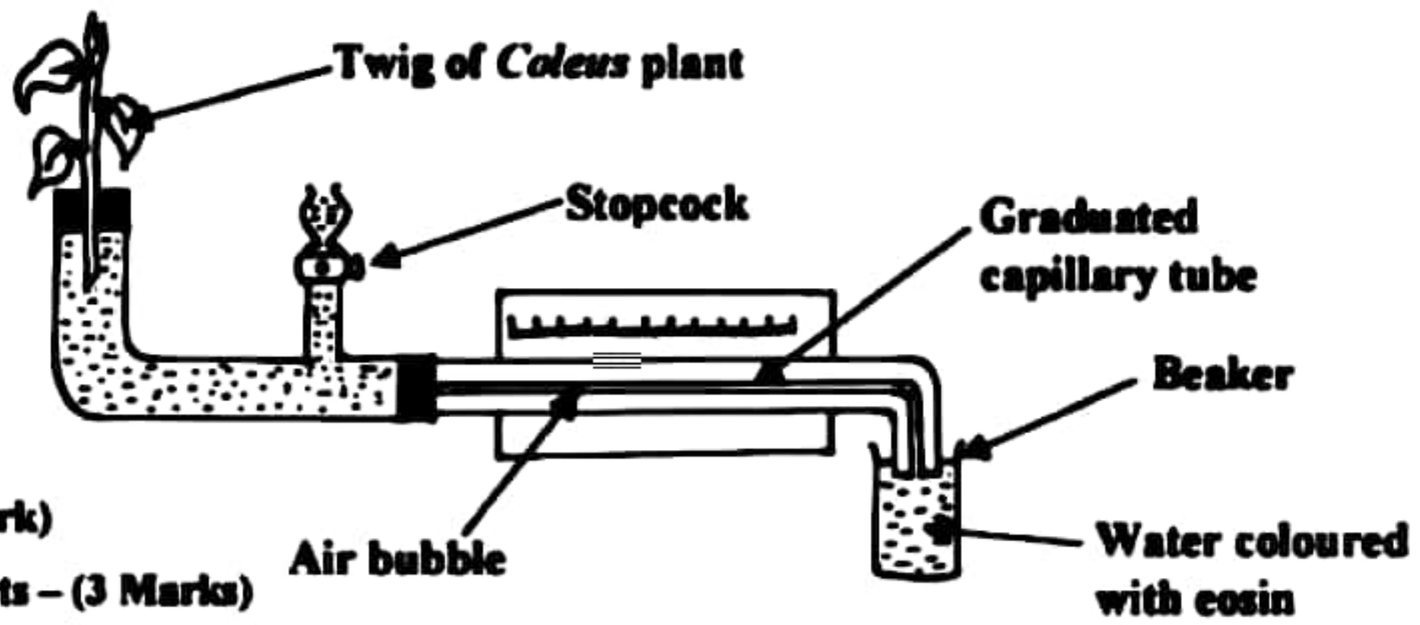

Diagram – (1 Mark)

Labelling the parts – (3 Marks)

[see page five]

Do not write in this column

(iii) (a) What is the major assumption done during this experiment?

That the volume of water removed by the plant through transpiration is equal to the volume of water absorbed by the plant from the experimental setup. —①

(b) Give one activity that can be done to demonstrate the influence of each of the following factors by taking the above setup as the main experiment.

(1) Humidity : Covering the shoot of the plant by a transparent polythene cover. —①

(2) Wind : Operating a fan near the experimental setup. —①

(iv) Define the term "carnivorous plants".

The photosynthetic plants which obtain nitrogen and minerals by killing and digesting insects and other small animals. —①

(v) Give two similarities that can be seen in the life cycles of *Pogonatum* and *Selaginella*.

Heteromorphic alternation of generations External water being essential for fertilization

Dioecious gametophyte Flagellated sperms —②

(vi) (a) Name plant growth substances that affect the movement of statoliths.

Auxin —①

(b) Give two functions of the above-mentioned plant growth substance.

stimulates stem elongation in low concentration, promotes the formation of lateral and adventitious roots, regulates development of fruit, enhances apical dominance, functions in phototropism, functions in gravitropism, promotes vascular differentiation, retards leaf abscision —②

(vii) State two differences between the female gametophyte of *Cycas* and the female gametophyte of Anthophyta.

Female gametophyte of Anthophyta	Female gametophyte of *Cycas*
Do not contain archegonia.	Contains archegonia
Contain antipodal cells and synergids.	Do not contain antipodal cells and synergids.
Contain two polar nuclei	Do not contain two polar nuclei.
Do not contain archegonial chambers or pollen chambers.	Contain archegonial chambers and pollen chambers.

$\frac{1}{2} \times 4 =$ ②

[see page six]

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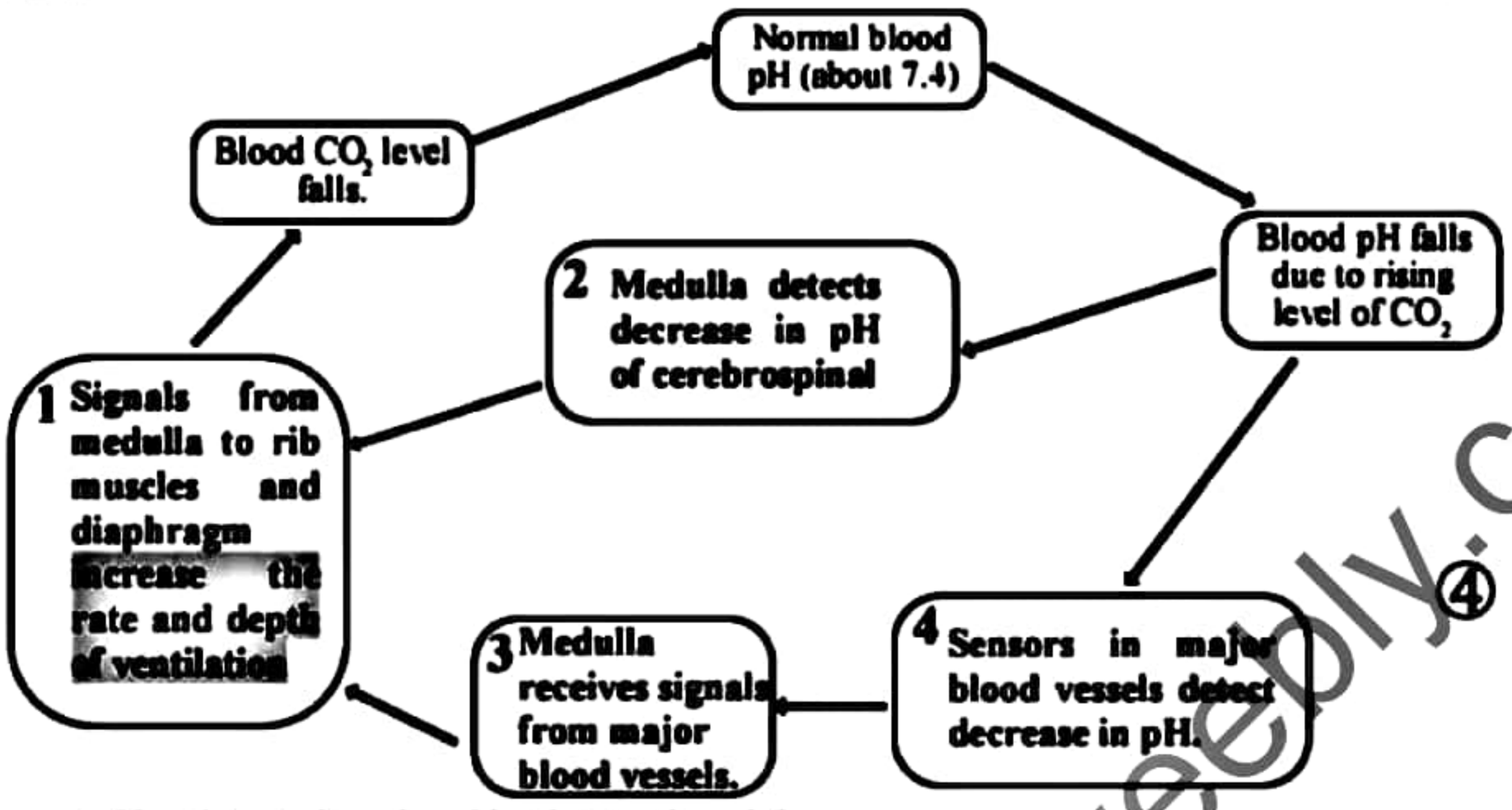
(C) (i) Complete the blanks in the below chart related to the homeostatic control of breathing.



④

100

(ii) How is sound produced by the vocal cords?

By the vibration of them, when expired air rushes across the stretched or tensed vocal cords. ① ①

(iii) What is external respiration of human?

The transport of O_2 from the lungs to the blood and transport of CO_2 from the blood to the lungs is referred to as external respiration. ①

(iv) What are the functions of heparin which is widely used clinically as an anticoagulant?

Acts as an anticoagulant by, preventing the conversion of prothrombin into thrombin.
preventing the conversion of fibrinogen to fibrin. ②

(v) What is the reason for the donor's cells to be agglutinated when the blood groups of the recipient and the donor are incompatible during blood transfusion? ①

The donor's red cell membranes possessing glycoprotein which act as antigens (agglutinogen) and react with antibodies (agglutinin) in the recipient's plasma. As a result, the donor's cells are agglutinated.

3. (A) (i) Name the main excretory product of the animals given below.

(a) Tadpoles : Ammonia ①

(b) Birds : Uric acid ①

(ii) Arrange the excretory products ammonia, urea and uric acid produced by animals in ascending order of the amount of energy needed for their production.

Ammonia < urea < uric acid ①

[see page seven]

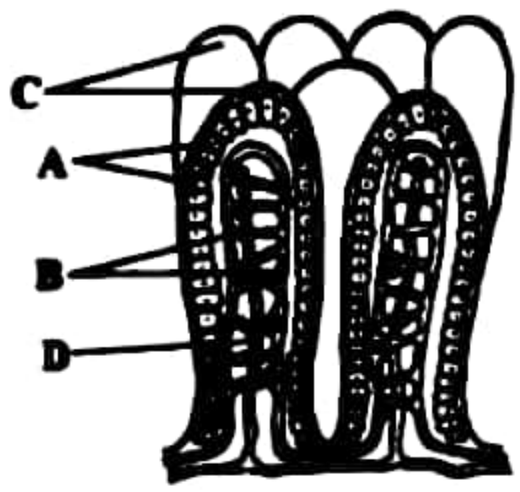
Do not write in this column

(iii) State two common reasons for both kidney failure and chronic kidney disease.

Diabetes High blood pressure

Having family history Getting older —②

(iv)



Name the parts A-D in the structure shown in the above diagram.

A - Epithelial cells C - Blood capillaries

B - Blood capillaries D - Lateral $\frac{1}{2} \times 4$ —②

(v) (a) Explain what is meant by sinusoids in liver.

Sinusoids are blood vessels with [redacted] found between [redacted] from a central vein in the liver. —①

(b) What are the structures found in the corner of the hexagonal structures in liver?

A [redacted] of hepatic artery A [redacted] of the hepatic [redacted] vein

Intra lobular bile duct (the highlighted parts should be there to give marks) —③

(c) Name the vitamins / minerals matching to below statements.

(1) Enlarged thyroid gland is a deficiency symptom. - Iodine(I)

(2) Pellagra is a deficiency symptom. - Niacin (Vitamin B_3)

(3) Act as an antioxidant and nervous system degeneration could occur when deficient. - Vitamin E

(4) Helps in acid-base balance and heart failure could occur when deficient - Potassium $\frac{1}{2} \times 4$ —②

(B) (i) What is the type of cells that secrete histamine in inflammatory responses?

Mast cells in the connective tissues —①

(ii) What are "allergens" ?

Antigens that induce hypersensitive reactions in some persons are called allergens. —①

(iii) Define what "effector cells" are.

[redacted] cells that [redacted] against antigen to provide [redacted] responses. —①

[see page eight]

Do not write in this column

(iv) Complete the table below with relevant information regarding the location and hormones secreted by each of the below endocrine glands.

Gland	Location	Hormone
Thymus gland	in the upper part of the chest, directly behind the sternum and between the lungs (1)	Thymosin (1)
Parathyroid glands (1)	in the posterior surface of the thyroid gland located in the neck (1)	Parathyroid hormone

(v) (a) Identify the diagram given below and name the labelled parts A-F.

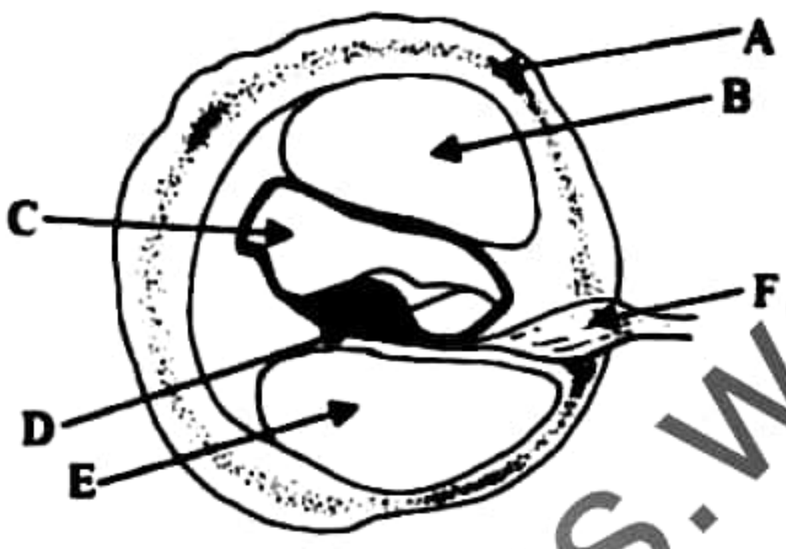


Diagram : the structure of cross section of a human cochlea (1)

A : Temporal bone / Bone

B : Vestibular canal

C : Cochlear duct

D : Organ of Corti

E : Tympanic canal

F : Auditory Nerve

$\frac{1}{2} \times 6 =$ (3)

(b) What are the main parts that belong to the structure D?

Basilar membrane, Tectorial membrane,
Axons of sensory neurons, Hair cells

$\frac{1}{2} \times 4 =$ (2)

(C) (i) State the method of asexual reproduction shown by the below organisms / groups of organisms.

(a) *Hydra* : Budding (1)

(b) Aphids : Parthenogenesis (1)

(c) Cnidarians : Fragmentation and regeneration (1)

(ii) (a) Mention two permanent birth control methods.

Vasectomy for males
Tubal ligation for females (LRT) (2)

(b) How does birth control occur in each of the birth control methods you mentioned above in (ii) (a).

Vasectomy for males - Prevents release of sperms (2)
Tubal ligation for females (LRT) - Prevents ovum from entering uterus

[see page nine]

Do not write in this column

(iii) State one infection that is sexually transmitted by each of the bacteria given below.

Treponema pallidum : Syphilis

Neisseria gonorrhoeae : Gonorrhea

$\frac{1}{2} \times 2 = 1$

(iv) (a) Explain what fontanelles are.

[redacted] regions in the [redacted]. —1

(b) What are the functions of fontanelles?

Allow slight compressions of the bones (of the baby) at birth facilitating parturition. —1

(v) Which structures separate the buccal cavity from nasal cavity?

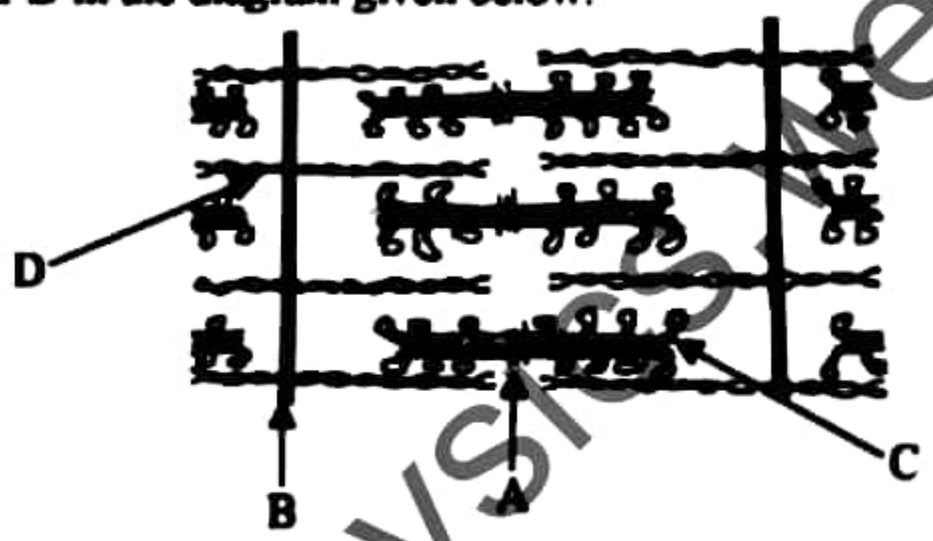
Bony hard palate and cartilaginous soft palate —1

(vi) (a) Briefly explain the meanings of the terms given below.

(1) Contractility : ability of muscles to contract or shorten

(2) Elasticity : ability of muscles to return to its original length after being stretched or contracted —2

(b) Name the parts A-D in the diagram given below.



A : M line

B : Z line

C : Thick filaments / myosin filaments

D : Thin filaments / actin filaments

$\frac{1}{2} \times 4 = 2$

10

4. (A) (i) In a human population of 600 individuals, 54 individuals do not show a widow's peak. What is the no. of individuals who are heterozygous to this character? (Assume that this population obeys Hardy Weinberg Equilibrium).

Frequency of the recessive homozygotes = q^2 = 108 / 1200 = 0.09 ∴ q = 0.3 —1

p + q = 1 ∴ p + 0.3 ∴ p = 0.7 —1

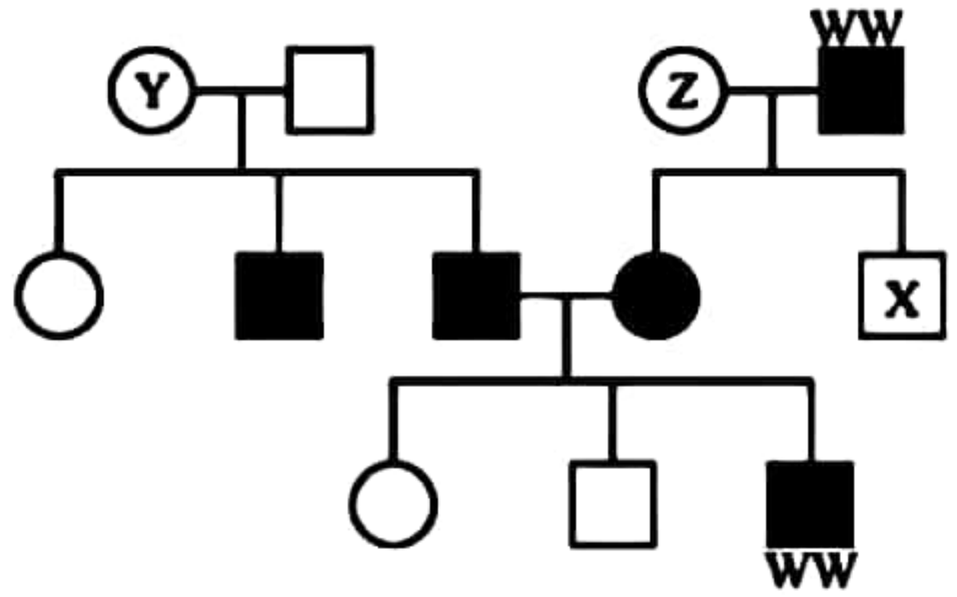
Frequency of the heterozygotes = 2pq = 2 × 0.7 × 0.3 = 0.42 —1

No. of heterozygous individuals = 600 × 42/100 = 252 —1

[see page ten]

Do not write in this column

(ii) Shown below is a pedigree chart drawn to a family in the above population.



Identify the genotype/s of the individuals shown by letters.

X : WW / Ww .....

Y : Ww ..... —③

Z : Ww / ww .....

(iii) 5'—TAGTCTATAATGTCGATCAAAATAACGTAGTTGGTG—3'
3'—ATCAGATATTACAGCTAGTTTTATTGCATCAACCAC—5'

Shown above is a DNA fragment present in an imaginary gene of a bacteria.

(a) Which of the above chains contains the template DNA strand? (top / bottom) Bottom one —①

(b) How many amino acids will be there in the polypeptide chain that can be synthesized from this? 6 —①

(iv) Regarding DNA replication in prokaryotes and eukaryotes,

(a) Mention two similarities.

DNA helicase is used to unwind the double helix of the DNA molecule, DNA polymerase is used to carry out DNA polymerization, DNA replication is originated at specific sequences /origin of replication / Ori, Tropoisomerase is used to twist the DNA molecule to relieve the strain, Leading strand and lagging strand are produced, RNA primers are produced and then later replaced by a DNA fragment, Gaps are sealed by ligase. (Any 2 of the above) —②

(b) Mention two dissimilarities.

Generally, in prokaryotes only one ori is present whereas in eukaryotes several ori are present, Prokaryotic DNA replication occurs continuously while eukaryotic DNA replication occurs only in S phase of the cell cycle, DNA polymerases in eukaryotes and prokaryotes are different from each other in their structure. —②

(v) What is meant by a recombinant DNA molecule?

DNA molecules made by laboratory methods of genetic recombination, which brings together DNA from different sources, creating sequences that are not found naturally. —①

[see page eleven]

Do not write in this column

(B) (i) What is meant by desertification?

Process of land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities. —①

(ii) (a) Give four threats to biodiversity.

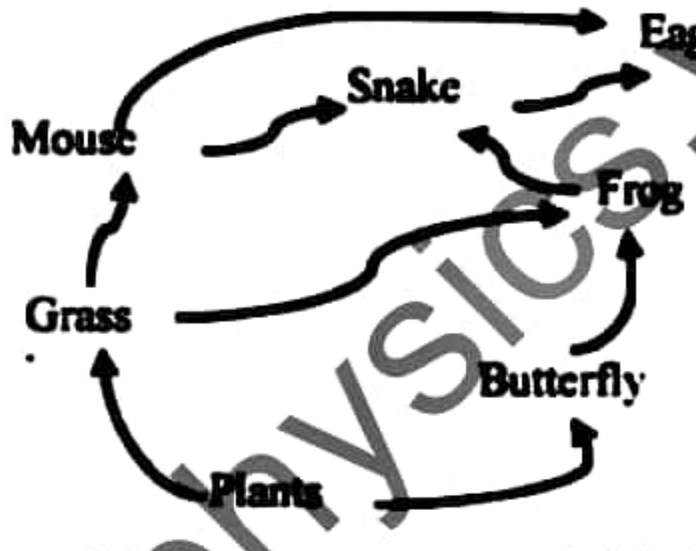
Habitat loss/fragmentation Overexploitation
Pollution
Introduction of invasive alien species
Climate change (For any 4 of the above) —④

(b) State respectively, a species responsible for causing threats to biodiversity in Sri Lanka and a species that has been subjected to such threats.

(i) Species responsible Lantana(E) / *Lantana camara* or Guinea grass(E) / *Panicum maximum* —①

(ii) Species threatened *Salacia reticulata* / Kotalahimbutu (S) or Ebony(E) / *Diospyrus ebanum* —①

(iii)



Primary producers fix only 1% of the solar energy. If 90% of the potential energy is lost at each trophic level, what is the percentage of solar energy transferred to the mouse?

$1 \times \frac{10}{100} \times \frac{10}{100} = 0.01\%$ —①

(iv) (a) Due to a sudden fire occurred in a certain chemical factory, the gas named Helene was released in large volumes into the environment. What could be the main effect on the atmosphere due to this?

Ozone layer depletion —①

(b) Name two harmful effects that could occur in the sea ecosystem due to the above effect.

Directly destroys phytoplankton in the sea / causes to reduce the composition of food web in the sea ecosystem. —①

Causes damage to early development stages of fish, shrimp, crab, amphibians and other animals. —①

(v) What is the protocol created with international solutions regarding the effect mentioned in (iv) (a) above?

Montreal Protocol —①

[see page twelve]

Do not write in this column

(C) (i) (a) What is the most significant morphological feature in a bacterial cell?

Cell shape ①

(b) What is the no. of planes in which cell division takes place in the sarcinae form of cell arrangement of Coccus bacteria?

3 planes ①

(ii) (a) What are virulent factors?

The factors expressed by few genes of pathogenic microorganisms, which provide them the ability to infect their host and cause disease. ①

(b) On what does the outcome of the relationship between a host and a pathogen depend on?

Virulence of the pathogen and ①

The effectiveness of the host defence mechanism ①

(iii) (a) Explain the reason for the microorganisms to have a higher growth rate. ①

Microorganisms possess a high surface area/ volume ratio due to their smaller size. As a result, flowing rate of materials in to the inside of cells and the exit of waste materials to the outside of the cells increase and results in high metabolic rates ①

(b) What is a culture medium?

A nutrient material prepared for providing nutrition and anchorage essential to the growth of microorganisms at laboratory conditions is called a culture medium. ①

(iv) (a) What is bioremediation?

A technology that applies of living organisms to remove, degrade or detoxify pollutants. ①

(b) What is the reason for the increase of temperature during the initial stage of compost production?

Thermophilic bacteria on the plant remains dominating in the degradation process. ①

(v) (a) Mention one harmful effect of extensive use of chemical pesticides.

Leads to hazardous side effects to people.

The residual toxicity may affect the non-target organisms.

Pests may develop resistance against pesticides. ①

(b) Give two examples along with a suitable microbial species for bio control agents (BCA) / bio-pesticides which are environmentally friendly and less toxic alternative strategies to replace synthetic chemicals as pesticides.

Entomopathogenic fungi / entomopathogenic bacteria / virus (for any 2 of the above) ②

Eg: *Bacillus thuringiensis* ①

$\frac{}{100}$

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NEW

Pre Medicine Association, Colombo District 2020

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය (ආදර්ශ), 2021
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை (மாதிரி), 2021
General Certificate of Education (Adv. Level) Examination (Model), 2021

ජීව විද්‍යාව II
உயிரியல் II
Biology II

පිළිතුරු පත්‍රය
Marking Scheme

09 E II

Part B - Essay

Instructions:

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

5. (*a*) Describe the events of the eukaryotic cell cycle.

1. The sequence of events that take place in the cell from end of one cell division to the end of next cell division is referred to as cell cycle.
2. At the end of cell division, two genetically identical daughter cells resembling the parent cell are produced in mitosis.
3. Cell cycle is divided into two major phases as interphase and
4. mitotic phase/M-phase.
5. Interphase is divided into 3 phases as G_1 phase,
6. S phase and
7. G_2 phase.

<u>G_1 phase</u>

8. synthesis of proteins
9. production of cellular organelles leading to cell growth

<u>S phase</u>

10. DNA replication
11. synthesis of histone proteins
12. DNA wind around histone beads and form chromatin

<u>G_2 phase</u>

13. synthesis of cellular organelles and
14. protein synthesis continues the cell growth.
15. Mitotic phase includes mitosis and
16. cytokinesis.

[see page fourteen]

17. Mitosis is referred to the nuclear division which gives rise to two genetically identical nuclei from a mother nucleus.
18. Mitosis is divided into 5 stages as; Prophase
19. Prometaphase
20. Metaphase
21. Anaphase and
22. Telophase
23. In prophase chromatin fibres get condensed by shortening and thickening and transformed into chromosomes.
24. Nucleoli get disappeared.
25. Formation of mitotic spindle begins.
26. At prometaphase nuclear envelope fragments.
27. Some of the microtubules that attach to the kinetochore of the chromosomes move the chromosomes back and forth.
28. Microtubules which are not attached to the kinetochore interact with those from the opposite poles.
29. At metaphase centrosomes reach the opposite poles.
30. The chromosomes have arrived to a place called metaphase plate which is located in equal distance from each pole.
31. In anaphase sister chromatids are separated at the centromere.
32. Microtubules attached to kinetochore get shorten and pull sister chromatids towards the opposite poles.
33. Cell elongates as the non-kinetochore microtubules are lengthen.
34. At the end of anaphase equal and complete set of chromosomes found at each pole of the cell.
35. At telophase nuclear envelope reforms around each set of chromosomes at opposite Poles,
36. nucleoli reappear,
37. spindle microtubules get depolymerized,
38. chromosomes unwind and become less condense to form chromatin.
39. During cytokinesis of animal cells, a cleavage furrow is formed
40. and in plant cells cytoplasm is divided by a cell plate.

(*b*) Briefly state the significance of mitosis.

1. Maintains the genetic stability.
2. Growth and development.
3. Cell repair, replacement and regeneration.
4. Asexual reproduction.

For the diagrams 06 × 3 = 18
44 points × 3 = 132
Total marks = 150

[see page fifteen]

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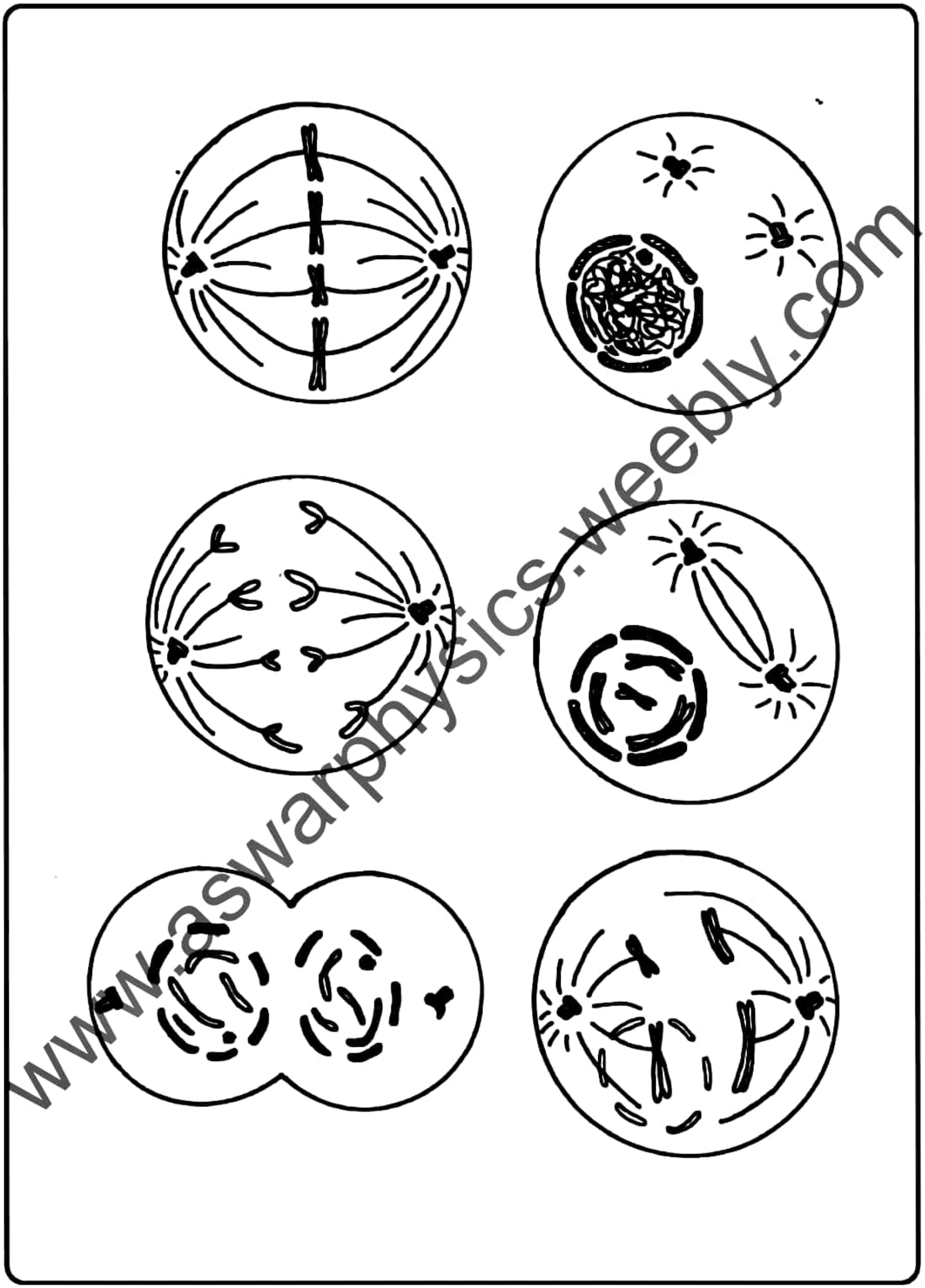

[see page sixteen]

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6. (*a*) Describe the structure of skin.

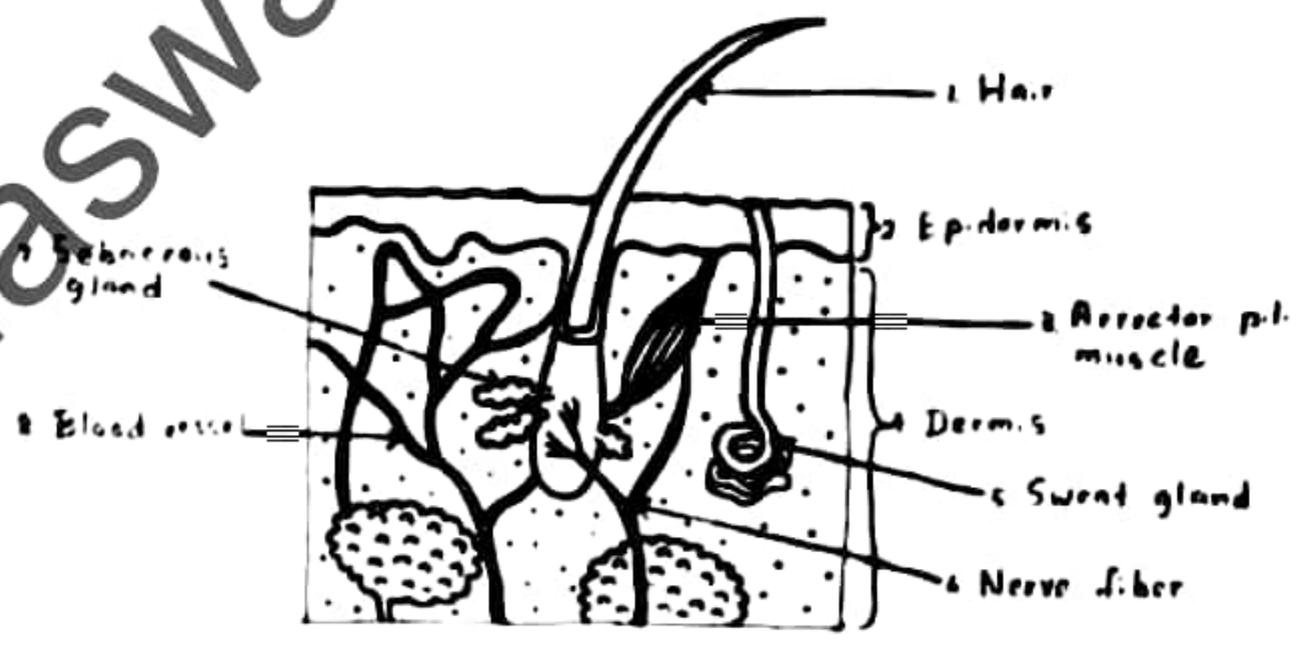
1. It consists of two main layers,
2. epidermis and
3. dermis.

Epidermis

4. Consist of stratified keratinized squamous epithelium.
5. Not supplied with blood vessels.
6. Its deeper layers are provided with nutrients and oxygen by the interstitial fluid of the dermis.
7. There are several layers of cells in the epidermis
8. The deepest layer is the germinative layer.
9. The cells on the surface are flat, thin, non-nucleated and dead,
10. in which cytoplasm has been replaced by keratin which is a fibrous protein.
11. The epidermis is thicker in areas where the skin is subjected to wear and tear. (Palms, Fingers of the hand, sole of the foot)

Dermis

12. Composed of areolar connective tissue.
13. (The matrix) contain collagen fibers interlaced with elastic fibers.
14. The main cells found in the dermis are fibroblasts, macrophages and mast cells.
15. Blood and lymph vessels,
16. Sensory nerve endings
17. Sweat glands/Sebaceous glands
18. Hair and erector pili muscles
19. Sensory receptors
20. Ex: Meissner's corpuscle / Pacinian corpuscles / Merkel discs,
21. Organ of Ruffini, Bulb of Krause



Fully labelled (5 - 8 structures) correct diagram - 06 Marks
Partially labelled (0 - 5 structures) correct diagram - 03 Marks
No marks for unlabeled diagrams.

[see page seventeen]

(*b*) Briefly explain the contribution of skin to maintain homeostasis.

1. (Main homeostatic function carried out is) helping for regulation of body temperature.
2. High peripheral temperature (when the person is in a hot surrounding) is detected by warm receptors in skin.
3. In response to the increase of body temperature above the preset level,
4. dilate the blood vessels in the skin
5. which causes filling of blood capillaries with warm blood,
6. radiating heat from the skin surface.
7. Sweat glands increase sweat secretion.
8. It promotes heat dissipation through evaporative cooling.
9. Low peripheral temperature (when in cold surroundings) is detected by cold receptors in the skin.
10. When body temperature decreases below the preset level,
11. constrict the blood vessels in skin,
12. which divert blood from the skin to deeper tissues thereby reducing heat loss through the skin surface.
13. generate heat to some extent by contracting hair erector muscles.
14. Skin serves as a minor excretory organ thereby contributing to maintain a constant internal environment.
15. Ex: Sodium chloride, Urea and aromatic substances (such as garlic) excreted in sweat.

21 + 15	=	36
Any 36 × 4	=	144
Marks for the diagrams	=	06
Total marks	=	150

7. (*a*) Explain the location of the human kidney.

1. Located on the posterior abdominal wall,
2. on either side of the vertebral column,
3. below the diaphragm.
4. Right kidney is slightly lower than the left.

(*b*) Briefly describe the process of urine formation in human kidney.

1. Filtration which occur through capillary walls of glomerulus and inner wall of Bowman's Capsule,
2. under high pressure
3. into the cavity of the Bowman's capsule
4. is called as ultrafiltration.
5. The filtrate in the Bowman's capsule contains water, (amino acids, glucose,)
6. vitamins,
7. nitrogenous wastes, other small molecules and

[see page eighteen]

8. salts.
9. It doesn't contain blood cells, platelets and plasma proteins.
10. Glomerular filtrate then moves from Bowman's capsule into the proximal convoluted tubules.
11. At proximal convoluted tubules selective reabsorption take place.
12. The process through which useful molecules, ions and water
13. from the glomerular filtrate are recovered and returned to interstitial fluid and
14. then into capillary network of the tubules
15. is called **selective reabsorption.**
16. At proximal convoluted tubules,
17. active reabsorption of glucose and amino acids,
18. active reabsorption of Na^+, Passive reabsorption of Cl^-
19. passive reabsorption of K^+
20. passive reabsorption of HCO_3^-
21. passive reabsorption of water by osmosis take place.
22. Major portion of water is reabsorbed at proximal convoluted tubules.
23. Into lumen of proximal convoluted tubules,
24. H^+ is secreted by active transport
25. NH_3 by passive transport,
26. and drugs and toxins are secreted actively.
27. The process by which foreign materials and substances not required to the body including wastes are cleared from peritubular capillaries and interstitial fluid into the filtrate is called **secretion**.
28. Water reabsorption take place by osmosis through descending loop of Henle.
29. As the ascending limb of loop of Henle is impermeable to water, water reabsorption doesn't take place.
30. In ascending limb of loop of Henle majority of Na^+ are actively reabsorbed.
31. In distal convoluted tubules,
32. Active reabsorption of Na^+,
33. passive reabsorption of Cl^-,
34. passive reabsorption of HCO_3^-,
35. active secretion of H^+, K^+ take place.
36. Because of high urea concentration in the filtrate, some urea diffuses into the interstitial fluid.
37. Final processing of the filtrate at the collecting duct forms urine.

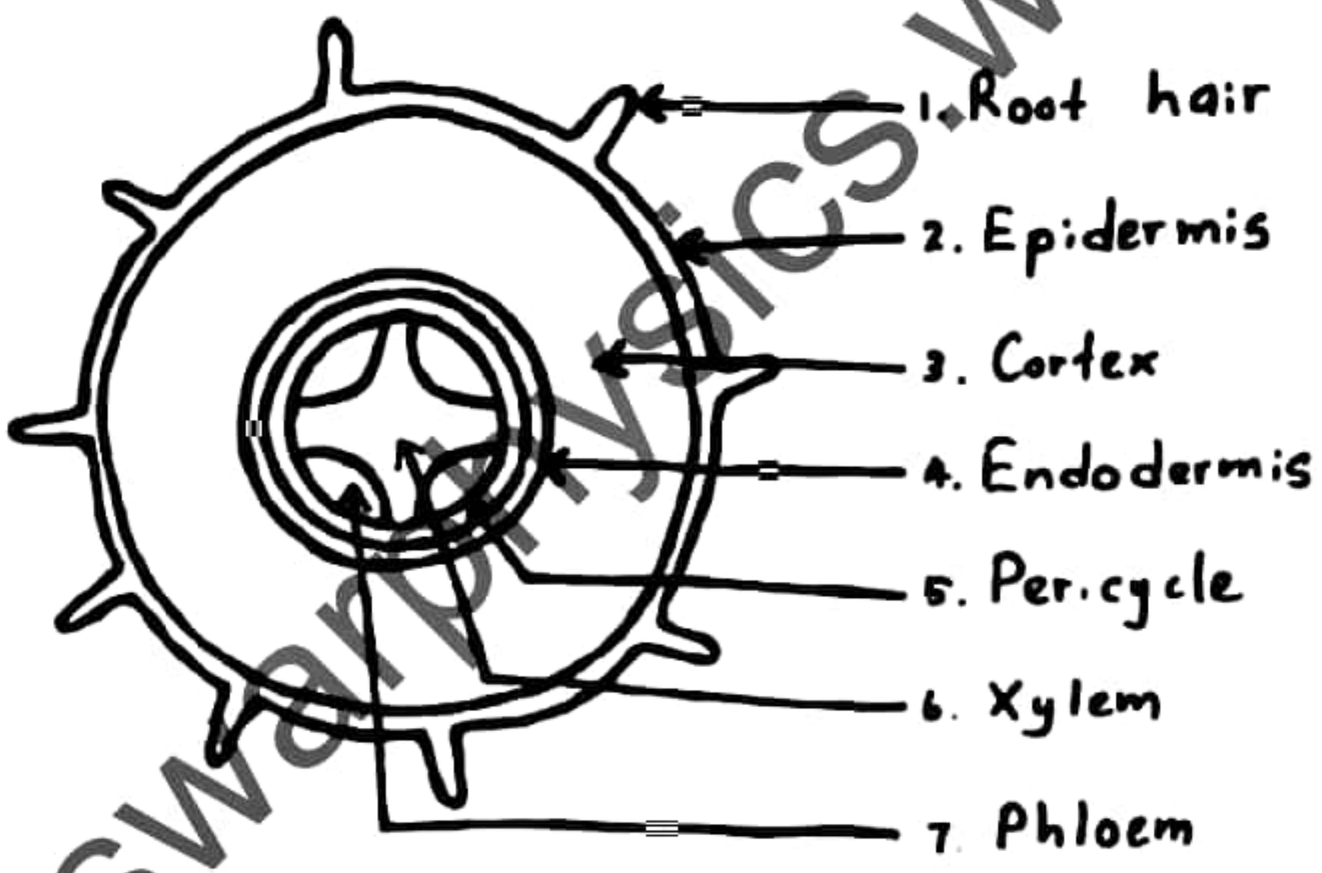
37 + 04	= 41
Any 37 × 4	= 148
If >37 are correct, marks	= +02
Total marks	= 150

8. (*a*) describe the primary structure of a typical dicot root.

1. The outermost cell layer of a primary dicot root is
2. epidermis.

[see page nineteen]

3. Epidermal cells have unicellular outgrowths
4. called as root hairs.
5. The ground tissue between epidermis and vascular cylinder
6. is cortex.
7. Innermost layer of the cortex
8. is endodermis.
9. Endodermis is a single cell layer.
10. Interior to endodermis
11. there is pericycle.
12. Pericycle is made up of two or three parenchyma layers.
13. Inner to pericycle
14. Vascular tissues can be seen as a solid core.
15. At the middle of the vascular cylinder
16. Xylem can be seen in star shape.
17. In the groove between arms of the xylem
18. Phloem is located.
19. There is no pith in primary dicot root.



Fully labelled (5 - 7 points) <u>correct</u> diagram - 06 Marks
Partially labelled (0 – 5 points) <u>correct</u> diagram - 03 Marks
No marks for unlabeled diagrams.

(b) Explain the responses of plants to biotic stresses providing suitable examples.

1. There are two categories of structural and mechanical defense mechanisms through which plants response to biotic stresses. They are,
2. Preexisting structural and chemical defense mechanisms and
3. induced structural and chemical defense mechanisms.

[see page twenty]

Examples for preexisting structural and defense mechanisms.

4. Amount and quality of wax and cuticle that cover the epidermal cells.
5. The structure of the epidermal cell walls and thickness.
6. The size, location and shapes of stomata.
7. Produce toxic compounds.
8. Alkaloids (ex: Nicotine),
9. Phenolics (ex: Flavonoids / Lignin / Tannins),
10. Terpenoids (ex: Azadirachtin) and
11. Lectin can be stated as examples for toxic compounds.
12. Thorns, pricks and trichomes.

Examples for internal structural and chemical defense mechanisms.

13. Morphological changes in cell wall.
14. Formation of cork and abscission layers.
15. Producing phenolic compounds.
16. Producing toxic compounds.
17. Enzymes that can degrade fungal cell walls
18. or damage insect organs.

19 + 18	=	37
Any 36 × 4	=	144
Marks for the diagrams	=	06
Total Marks	=	150

9. (*a*) Fur colour of mice occur due to recessive epistasis. Black fur colour of mice is governed by gene A and gene b is epistatic to that. Explain how recessive epistasis is resulted during the cross between homozygous double dominant black mice and homozygous double recessive white mice, using this example.

1. When a homozygous recessive genotype
2. of a particular chromosomal locus
3. alters/masks the expression of a separate gene at a different locus, it is referred to as recessive epistasis.
4. Fur colour of mice is governed by two dominant genes. / A and B genes.
5. Black colour is expressed only during the presence of both dominant A and B alleles.
6. Double recessive genotype at any locus results white coloured mice. / aa or bb
7. Double recessive genotype at any locus is epistatic to either homozygous dominant.
8. or heterozygous condition.
9. AAbb, Aabb, aaBB, aaBb, aabb genotypes result white fur colour.
10. AaBb, AaBB, AABb, AABB genotypes result black fur colour.
11. When considering the cross between black mice with AABB genotypes and white mice with aabb genotype, all of the F1 generation express black mice with AaBb genotype.

[see page twenty one]

AABB × aabb
(Black mice) (White mice)

F_1 : AaBb (Black mice)

F_1 × F_1

Egg \ Sperm	AB $\frac{1}{4}$	Ab $\frac{1}{4}$	aB $\frac{1}{4}$	ab $\frac{1}{4}$
AB $\frac{1}{4}$	AABB Black	AABb Black	AaBB Black	AaBb Black
Ab $\frac{1}{4}$	AABb Black	AAbb white	AaBb black	Aabb white
aB $\frac{1}{4}$	AaBB black	AaBb black	aaBB white	aaBb white
ab $\frac{1}{4}$	AaBb black	Aabb white	aaBb white	aabb white

Marks – 16
(If at least 1 is incorrect full marks are not given)

12. In F_2 generation, mice having genotypes with both A and B alleles (9/16) express black fur.
13. Mice having genotypes with 'aa' and one 'B' allele (3/16),
14. 'A' allele and 'bb' allele (3/16) and
15. 'aabb' genotype (1/16) produce mice with white fur.
16. Black fur to white fur phenotypic ratio in F_2 generation is 9:7.

(*b*) Describe how DNA is packed inside an eukaryotic chromosome.

1. Association with a large number of proteins called histones help to organize the DNA inside the nucleus.
2. This DNA-protein complex is known as chromatin.
3. Chromatin may be lightly packed as in euchromatin
4. or tightly packed as in heterochromatin.
5. Euchromatin is rich in genes and is probably active in transcription.
6. Heterochromatin consists of nucleotide sequences which are mostly inactive.
7. In the first level, the double helix winds around a complex of eight histone molecules.
8. These are called nucleosomes.
9. The adjoining beads of nucleosomes are linked together by a stretch of DNA,
10. known as linker DNA.

[see page twenty two]

11. In the second level, the nucleosomes twist and pack in a spiral fashion to form a chromatin fiber.
12. This forms 30nm fibers from 10nm fibers.
13. At the third level, the fiber forms looped domains.
14. They attach to a protein scaffold.
15. This structure has a thickness of 300nm.
16. At the fourth level, the looped domains coil, fold
17. and further compact to form the mitotic chromosome.
18. this diameter of the chromatid is about 700nm.
19. In the metaphase chromosome, the chromatids are already replicated.

Any 32 × 4	=	128
Marks for the sketches	=	22
Total marks	=	150

10. Write short notes on the following.

(*a*) How cell mediated immunity responses occur against an antigen

1. Specifically sensitized T lymphocytes,
2. attach to the antigen
3. Undergo proliferation
4. (and eventually) differentiate into "cytotoxic T cells"
5. that can directly kill the cells
6. with invading antigen.
7. A type of acquired immunity.
8. At the subsequent encounter of the same antigen to the body
9. stronger and more rapid responses can be shown.
10. "Memory T cells" are formed.
11. They are particularly effective against infected cells,
12. some cancer cells
13. and foreign transplanted cells.
14. consist of cells attacking cells.

(*b*) Grasslands found in intermediate zone of Sri Lanka.

1. Both savanna and
2. Dry patana belongs to this zone.

Savanna

3. Thick grass cover can be seen/ few scattered trees.
4. Common on hill slopes of the dry or intermediate zone.

[see page twenty three]

5. Fried grass cover easily catch fire in dry period / periodic fires are common / have trees with fire resistant species.
6. (tree species) *Terminalia chebula / Phyllanthus emblica / Terminalia bellirica*
7. (grass species) *Cymbopogon nardus / Imperata cylindrical*
8. can be seen in Bibile/ Monaragala/ Mahiyanganaya/ Wellawaya areas.

Dry patana

9. Found in altitudes between 500m-1600m.
10. Receive a rainfall about 1400-2000mm with a definite dry period.
11. Temperature ranges from 18℃ - 24℃
12. Made up of grasses that grow up to 1 - 2m height.
13. *Cymbopogon nardus* and *Themeda tremula* can be seen.
14. Common on hill tops in Hantana/ Gampola / Welimada/ Haputale.

(No marks if the scientific names are not given in 6, 7 and 13 points)

(*c*) Food preservation using radiation.

1. High energy gamma rays,
2. X rays,
3. accelerated electrons are used.
4. (Processing of food by radiation) involves exposure of food to short wave radiation energy.
5. Insect disinfestation,
6. elimination of food borne pathogens
7. and parasites.
8. These specific purposes can be achieved.
9. Ex: Packets of spices,
10. ground meat.

14 + 14 + 10	= 38
Any 37 × 4	= 148
If >37 are correct, marks	= +02
Total marks	= 150

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