සියලු ම හිමිකම් ඇවිරිණි/ முழுப் பதிப்புரிமையுடையது/ All Rights Reserved

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மத்திய மாகாண கல்வித் திணைக்களம்

DEPARTMENT OF EDUCATION - CENTRAL PROVINCE

G. C. E. (A/L) Practice Test - 2026

Biology I	09	E	I	Grade 13	2 hours

Instructions:

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

1. Which of the following is correct about protein structure?
   (1) Disulphide bonds between side chains of amino acids is a type of bond help to maintain the tertiary structure of proteins.
   (2) Complete loss of primary structure of protein is due to breakdown of peptide bonds during denaturation of proteins.
   (3) The secondary structure of protein is formed due to intra molecular hydrogen bonds between two polypeptide chains.
   (4) Inter and Intra – molecular hydrogen bonds in myoglobin protein are broken-down due to change of pH value.
   (5) α- helix structure arise due to hydrogen bonds between R groups of amino acids.

2. Which of the following statements is correct about prokaryotic and eukaryotic cellular organization?
   (1) Cell wall of all prokaryotes is composed of peptidoglycan.
   (2) Sub cellular components found only in eukaryotic cells.
   (3) Both prokaryotes and Eukaryotes show photosynthesis.
   (4) Some eukaryotic cells have the nitrogen fixation ability.
   (5) Circular DNA present freely in the nucleus of prokaryotic cells.

3. Select the correct combination of organelle and function.

Organelle	Function
A. Rough endoplasmic reticulum	P. Synthesis of lipid and steroids.
B. Smooth endoplasmic reticulum	Q. Manufacturing non- cellulose cell wall components.
C. Golgi apparatus	R. Produce vesicles to transport proteins.
D. Lysosome	S. Digest worn-out organelle

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

See Page two

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4. Select the correct statement regarding cell junctions in animal cells.
   A. Tight Junctions - Connect the plasma membranes of adjacent cells tightly and prevent the leakage of extracellular fluid.
   B. Desmosomes - Mechanically attach the cytoskeletons of adjoining cells by intermediate filaments.
   C. Gap Junctions - Form continuous seals around the cells by specific proteins.
   D. Communication Junctions – Allow ions, sugars and amino acids to pass through adjacent cells.

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

5. Select the correct statement regarding cancer cells and plant galls.
   (1) External growth factors are always essential for division of cancer cells.
   (2) Galls in plants occur due to controlled mitotic division.
   (3) Cancer cells make required growth factors by themselves.
   (4) Galls in plants occur due to balance of auxin and cytokinins.
   (5) Benign tumour cells enter the lymph and invade other tissues.

6. Which of the following is correct about ATP ?
   (1) All three phosphate groups of an ATP molecule is connected each other by high energy bonds.
   (2) All three phosphate groups in an ATP molecules are negatively charged and release high energy due to the removal of terminal phosphate.
   (3) Hydrolysis of ATP in a cell is an energy absorbing reaction.
   (4) All three types of phosphorylation can be seen in all cells.
   (5) Maintaining body temperature can be considered as an event of transformation of energy stored in ATP into mechanical energy.

7. Select the correct statement regarding the regulation mechanism of enzymatic activity in cells.
   (1) Most of the allosteric enzymes are made from few sub units and shape of the whole enzyme complex is changed due to binding of a regulatory molecule to the active site of one subunit.
   (2) Binding of one substrate molecule to an active site can stimulate or inhibit the activity of other active sites in cooperativity.
   (3) If ATP concentration in a cell increases, catabolism slows down as ATP bind to the same enzyme and function as an allosteric inhibitor.
   (4) In feedback inhibition, a metabolic pathway is stopped by the binding of end product to the active site of the enzyme involved in first step of the same path way.
   (5) Allosteric enzymes are made up of a single polypeptide chain and have few allosteric regulatory sites.

8. Select the correct statement regarding cellular respiration.
   (1) Two ATP molecules are spent to transport one NADH molecule from cytosol to mitochondrial matrix.
   (2) One ATP is produced from one glucose molecule during substrate phosphorylation in Krebs' cycle.
   (3) NADH and $FADH_2$ are reduced by transferring electrons through electron transport chain.
   (4) Energy produced in oxidative phosphorylation is equal to total energy produced by a glucose molecule during anaerobic respiration.
   (5) Two NADH and two CO_2 molecules are produced from two pyruvate molecules during Pyruvate oxidation.

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9. Which of the following is/are correct regarding plant evolution?
   A. All vascular plants have the ability of producing seeds.
   B. The first plant group to originate on earth was Bryophytes.
   C. Sporophyte is dominant in the life cycles of seedless vascular plants.

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

10. A few structures found in the animal kingdom are given below.
   A. Radula
   B. Only longitudinal muscles in the body wall.
   C. Clitellum, parapodia and setae present.
   D. Mantle
   E. Visceral mass

   Which of the above characteristic features belong to phylum Mollusca?
   (1) A , B and C
   (2) B , C and D
   (3) C , D and E
   (4) A , C and D
   (5) A , D and E

11. Select the correct response.
   (1) Hollow tubular nerve cord located ventral to the notochord is present in Chordates
   (2) Young ones of all chordates are nourished by milk produced in mammary glands.
   (3) All terrestrial chordate adults possess a muscular tail posterior to the anus.
   (4) Amphibians possess glands on skin but no glands on skin of Reptilians.
   (5) Caudal fin of chondrycthyes are homocercal.

12. Select the correct combination of meristematic tissue and function

A. Lateral meristem	P. Help in elongation of plant parts.
B. Apical meristem	Q. Rapid regrowth in damaged leaves
C. Intercalary meristem	R. Increase the circumference of roots of plant due to new cells formed.
	S. Help in short distance transport

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

13. Select the correct statement
   (1) In woody plants, primary growth and secondary growth occur simultaneously.
   (2) The cork cambium produces lignified tough thick outer covering.
   (3) Secondary xylem is produced towards primary phloem by the vascular cambium.
   (4) In a typical woody stem vascular cambium consists of a differentiated single cell layer,
   (5) Cork cambium and tissues it produces is collectively called pericycle

14. Which of the following combination shows homospory in their life cycles
   (1) *Pogonatum, Selaginella, Lycopodium*
   (2) *Selaginella, Nephrolepis, Pinus*
   (3) *Pogonatum, Nephrolepis, Lycopodium*
   (4) *Hibiscus, Cycas, Pogonatum*
   (5) *Cycas, Gnetum, Nephrolepis*

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15. Consider the following statement about mechanism of stomatal opening.
    A. Lowering the water potential of guard cells than neighboring epidermal cells.
    B. During day time, the guard cells actively accumulate K^+ from neighboring epidermal cells.
    C. Tugor pressure of guard cells increase and stomata open.
    D. Inflow of water by osmosis from the surrounding epidermal cells.

    Which of the following is the correct order of above mechanism?
    (1) C, A, B, D
    (2) D, B, A, C
    (3) C, A, D, B
    (4) B, A, D, C
    (5) D, C, A, B

16. Select the correct statement.
    (1) Water exits as water vapour from the plant during transpiration and guttation.
    (2) Guttation occurs through hydathodes and lenticels.
    (3) The external factor, which has the greatest effect on transpiration is light.
    (4) Guttation occurs in plants several meters tall.
    (5) Guttation occurs when relative humidity is high in the night.

17. Which of the following statement / statements is/are correct.
    A. Wave length of 660nm inhibits seed germination
    B. Phytochromes provide the plant with information about the quality of light.
    C. Photoperiod controls flowering in all types of plants.
    D. *Mimosa pudica* collapses its leaflets when touched is called thigmonasty.
    (1) A and B
    (2) B and D
    (3) C and D
    (4) B and C
    (5) A and D

18. Which of the following combinations is correct about cells in parts of the human digestive system and functions?

A. Parietal cells in stomach	P. Complete the water reabsorption.
B. Chief cells in stomach	Q. Produce bile.
C. Hepatocytes in liver	R. Secrete H^+ and Cl^-
D. Large intestinal cells	S. Secrete pepsinogen

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

19. Height of a person is 1.5m and mass is 75kg. Select the correct statement.
    (1) Body mass is within the normal recommended range.
    (2) BMI value exceeds 30.0 and it is obesity.
    (3) According to the BMI value suffer from malnutrition.
    (4) There is no issue with the BMI value if the person is a male.
    (5) Person is not in the danger leading to diabetes mellitus, and cardiovascular diseases.

20. Which of the following statements is correct about circulatory systems of animals?
(1) Chemical exchange occurs directly between haemolymph and body cells of Arthropods.
(2) There is a distinction between circulatory fluid and inertial fluid in Mollusca .
(3) In all chordates in a complete circulation through the entire body, blood passes through the heart twice.
(4) All vessels which transport circulatory fluid are microscopic with thin and porous walls.
(5) In open circulation, the heart pumps blood into the space which surrounds body tissues.

21. Which of the following is correct about homeostatic control of breathing and ventilation of lungs?
(1) Main breathing regulating centres found in medulla oblongata and cerebellum
(2) The pH changes in tissue fluid and blood is detected by sensors in medulla oblongata and major blood vessels.
(3) Ventilation of lungs is essential to maintain high O_2 concentration and low CO_2 concentration in cells.
(4) Both inhalation and exhalation are active processes.
(5) Vital capacity of every person is 3100ml.

22. Which of the following order of action of human immunity is correct?

(1) Nourish the infant with breast milk containing colostrum → Transfer of antibodies to the fetus from mother → Build up the naturally acquired active immunity

(2) Tetanus infectious agent enters the body → Provide readymade human anti-tetanus immunoglobulin → Build up the artificially acquired active immunity

(3) Recognition of antigens in fluids by T lymphocytes → Production of helper cells from cytotoxic T cells. → Destroy infected cells

(4) Infect the body cells by virus → Secrete interferons by infected body cells → Interferon diffuse in to uninfected neighboring cells → Stimulate to produce anti-viral proteins

(5) Recognize antigen presenting cells by B lymphocytes → Produce plasma cells → Produce and secrete antibodies → Destroy infected body cells

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23. Which of the following shows the correct combination using the parts of the human brain and functions?

Part	Function
A. Thalamus	P. Co-ordinates large scale body movements
B. Hypothalamus	Q. Co-ordinates auditory and visual reflexes
C. Pons Varolii	R. Control autonomic nervous system
D. Mid brain	S. Direct the sensory information received from different part of the brain to specific locations of the cerebral cortex

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

24. Which of the following is correct about conduction of nerve impulses?
(1) Polarization, Depolarization and repolarization is repeated through the axon during nerve conduction.
(2) The permeability of cytoplasm to K^+ and Na^+ ions helps to maintain the resting potential.
(3) During hyperpolarization, sodium channels closes and potassium channels open and as a result inside the membrane become more negative.
(4) Refractory period makes reverse conduction of an impulse.
(5) Ca^{2+} ion enters to the terminal through osmosis in synapse transmission.

25. Which of the following order is correct when focusing on objects in near vision?

	Cilliary Muscle	Convexity of the lens	Pull of suspensory ligaments
(1)	Contract	Increase	Reduction
(2)	Contract	Reduce	Reduction
(3)	Relax	Increase	Reduction
(4)	Relax	Reduce	Reduction
(5)	Contract	Increase	Increase

26. Which of the following is correct about human endocrine disorders?

1) Hyperthyroidism	- Occur due to exposure of body tissues to excessive levels of T_3, T_4 & decrease the basal metabolic rate
(2) Hypothyroidism	- Increase the secretion of T_3 and T_4 due to lack of TSH production.
(3) Type diabetes 1	- Destruction of beta cells of the islets of Langerhans by the immune system of the body.
(4) Type diabetes 2	- Due to the reduction of blood glucose level, the body cells can not take up glucose
(5) Anaemia	- Reduce the concentration of erythropoietin secretion from adrenal glands

27. Which of the following hormone/ s contribute to increase the human blood glucose level?

A - Glucagon
B - Cortisol
C - Adrenaline
D – Aldosterone

(1) A and B only (2) A and C only (3) A, B and

(4) A ,C and D (5) All above

28. Which is the following is correct about the spermatogenesis?

(1) The time duration to produce mature sperm cells is 48-72 days.
(2) Spermatid differentiate into head, mid piece and tail of sperm.
(3) Sperms become mature and motile within the seminiferous tubule.
(4) Spermatagonium undergoes meiosis and produce haploid secondary spermatocytes.
(5) Ascorbic acid which secrete from the prostate gland supply nutrient to the sperm.

29. Which of the following combinations are correct regarding human development?

Event		Period
A.	Begins the cleavage of zygote.	P. About five days after fertilization
B.	Developing of the blastocyst.	Q. About seven days after fertilization
C.	Embryo is nourished directly from the endometrium	R. During first 2-4 weeks after fertilization
D.	Implantation	S. About 24 hours after fertilization

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

30. Which of the following is correct about the facial region of human skull?

(1) Both maxilla and mandible bones are movable.
(2) Cartilaginous soft palate separate the buccal cavity from nasal cavity.
(3) There are two vomer bones.
(4) Sinuses present in all facial bones helps to reduce the weight of the skull.
(5) Part of both cranium and facial region contribute to from zygomatic arch.

31. Which of the following is correct about human thoracic cage?

(1) There are 12 ribs present.
(2) 1-7 pairs of ribs are true ribs and 8,9,10 rib pairs, articulate with sternum indirectly.
(3) The first two ribs are firmly fixed to the sternum and thoracic vertebrae.
(4) Ribs, Thoracic vertebrae and sternum provide protection to the organs such as lungs and heart in the thoracic cavity.
(5) The head of the rib articulates with the transverse process of the thoracic vertebrae.

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32. Black colour seeds (B) are dominant to brown colour (b) seeds of a plant. Round seeds (R) are dominant to wrinkled (r) seeds of the same plant. If the cross between two plants are heterozygous to both characters, What is the probability of having plants with brown and wrinkled seeds in filial generation?

(1) $^1/_4$ (2) $^1/_2$ (3) $^1/_8$
(4) $^1/_{16}$ (5) $^3/_{16}$

33. Which of the following is correct about non-Mendelian inheritance?

(1) In the complete dominance at heterozygous state, F_1 phenotype shows the intermediate feature of two parents.
(2) Contribution of three alleles I^A,I^B and i to determine the human blood groups ABO is an example to pleiotropy.
(3) When a dominant allele at a specific locus alters the expression of a separate gene at different locus during dominant epistasis.
(4) Based on the number of genes involved in determining polygenic character, phenotypic combinations of the progeny is varies, but genotypic combination does not vary.
(5) Epigenetics is the transmission of characters from generation to generation due to a permanent change of DNA sequence.

34. Select the correct statement regarding health issues of using genetically modified food.

(1) It ensures the gene mutation occur in human body due to the consumption of GM food.
(2) Horizontal gene transfer among bacteria is more probable when antibiotic resistant genes are used as marker genes.
(3) Inhaling pollen of GM crops does not affect the human immune system.
(4) Antibiotics used in r DNA technology are used in chemotherapy.
(5) It is scientifically confirmed that consumption of GM food does not cause allergies.

35. Consider the following statements.

A. Seed germination occurring only after a hot fire.
B. Scattered trees in a tall grass cover.
C. Emergent layer, canopy and sub canopy and followed by an understory layer with shrubs and large herbaceous plants.
D. Deep roots in shrubs
E. Dominant trees are mostly deciduous.

Select the correct order of biomes found above features respectively

(1) Chaparral, Savana, Tropical forests, Deserts, Temperate broadleaf forest
(2) Savana, Tropical forests, Deserts, Temperate broadleaf forests, Chaparral,
(3) Temperate broadleaf forests, Deserts, Tropical forests, Savana, Chaparral
(4) Deserts, Tropical forests, Savana, Chaparral, Temperate broadleaf forests
(5) Chaparral, Savana, Temperate broadleaf forests, Tropical forests, Desert

36. Select the correct statement

(1) *Dipterocarpus zeylanicus* is a indigenous species
(2) Lula is an alien species.
(3) Punchi Lena is a vulnerable species.
(4) Dumbara gal para diya madiya is extinct in the wild.
(5) Lanka Kahibella is a relict species.

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37. Select the correct statement regarding mycoplasma.
(1) They are very small bacteria with a cell wall.
(2) They are pleomorphic and vary in shape from spherical to filamentous.
(3) They are entirely anaerobic.
(4) Genetic materials are surrounded by a protein coat.
(5) They reproduce in both leaf hoppers as well as plant body.

38. Which of the following statement/s is/are correct regarding applications of micro-organisms in agriculture?
A. Bacteria like *Pseudomonas* produce plant growth promoting substances.
B. Bacteria like *Anabaena* and *Azotobacter* form symbiotic associations and fix atmospheric nitrgen.
C. Some soil bacteria and fungi secrete organic acids and improve the solubility of phosphorus.
D. Protein crystals produced by *Bacillus thuringiensis*, lyse tissues of the guts of insect larvae.
(1) A and B only. (2) B and C only.
(3) C and D only. (4) A, C and D only.
(5) B, C and D only .

39. Which of the following is correct regarding nutrition and tolerance to oxygen in bacteria?
(1) Facultative anaerobic organisms can grow only in the presence f oxygen.
(2) Purple non-sulphur bacteria use carbon dioxide as the source of carbon.
(3) *Nitrosomonas* uses inorganic chemicals as the source of energy and, they are chemoautotrophs.
(4) *Clostridium* generates energy by aerobic respiration.
(5) *Thiobacillus thiooxidans* is chemoautotroph and uses inorganic chemicals as the source of carbon.

40. Select the correct statement.
(1) Source of embryonic stem cells is the inner cell mass.
(2) Embryonic stem cells can be differentiated into a single type of cells.
(3) Embryonic stem cells can show limited multiplication in a culture media.
(4) Embryonic stem cells can not self-renew.
(5) Induced pluripotent stem cells are the stem cells obtained by reprogramming embryonic stem cells.

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

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

Directions summarised				
1)	2)	3)	4)	5)
(A),(B),(D) correct	(A),(C),(D) correct	(A),(B) correct	(C),(D) correct	any other response or combination of responses correct

41. Which of the following is/are correct about C_4 pathway of photosynthesis?
(A) Chloroplast in bundle sheath cells are rich with grana and PS II is active in them.
(B) Oxaloacetate produced in mesophyll cells enters into bundle sheath cells directly and enter into the Calvin cycle.
(C) In C_4 plants Rubisco is absent in mesophyll cells and CO_2 fixation occurs first in them.
(D) Photorespiration is minimized due to high CO_2 concentration in bundle sheath cells of the C_4 pathway.
(E) Malate enters back into the mesophyll cells by releasing CO_2 and regenerate PEP.

42. Select the correct statement/s.
(A) The parts of the body that are used extensively become larger and stronger. If not used they deteriorate. This is expressed by Darwin and Wallace.
(B) In artificial classification, evolutionary relationships are used and it is easy to expand by adding more groups.
(C) Aristotle used mode of locomotion, reproduction and presence or absence of red blood cells as criteria in his classification.
(D) From domain to species , the number of shared characteristics among the members in the taxa increases.
(E) Keratin is the cell wall component of members of kingdom fungi.

43. Select the correct statement/s regarding water potential.
(A) When water enters to the cell with a vacuole the maximum value of Ψ_P equals to Ψ_s.
(B) When a non-woody tissue is placed in a solution with higher water potential, water moves out of the cell.
(C) If the cell is in fully turgid state, the water potential of it is 0 MPa.
(D) In a fully flaccid cell, $\Psi - \Psi_S$ as a result of water losing.
(E) Solute potential of pure water is 0 MPa.

44. Which of the following enzyme/s is/are found only in intestinal juice and contributes to protein digestion?
(A) Dipeptidases
(B) Aminopeptidases
(C) Trypsin
(D) Carboxypeptidases
(E) Chymotripsin.

45. Which of the following component/s is/are collected to the glomerular filtrate during the urine formation? of a healthy person ?
(A) Glucose
(B) Amino acid
(C) Albumin
(D) Vitamin
(E) Neutrophil

46. Which of the following group/s has/have an external skeleton?
(A) Arthropods
(B) Molluscs
(C) Echinodermates
(D) Some reptiles
(E) Birds

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47. Which of the following is /are application/s of DNA sequencing in medicine?
    (A) To identify whether a healthy person is a carrier or not for genetic disorders.
    (B) To find the location of genes coding for a polypeptide.
    (C) Diagnosis of cancer.
    (D) For the early diagnosis of genetic disorders using DNA isolated from a fetal placenta.
    (E) Easy to work out the amino acid sequence via DNA sequences.

48. Which of the following is/are environmental service values of biodiversity?
    (A) Knowledge about how animals react before a natural disaster.
    (B) Twenty eight species of trees are scared for Buddhist.
    (C) Maintaining of essential nutrition cycles.
    (D) Water purification.
    (E) Watching natural landscapes at undisturbed places.

49. Select the correct statement/s regarding microorganism/s involved in nitrogen cycle.
    (A) Proteins are decomposed by extracellular proteolytic enzymes secreted by microorganisms during Ammonification.
    (B) Nitrification frequently occurs in waterlogged soils, where limited oxygen is present.
    (C) *Nitrobacter* oxidizes nitrites in to nitrates.
    (D) In moist soil, ammonia is solubilized in water to form ammonium ions.
    (E) *Anabaena* fixes nitrogen and make it bio available to be used in root nodules of leguminous plants.

50. Which of the following is/are considered as basic principle of food preservation?
    (A) Killing micro-organism in food
    (B) Prevention of entry of microorganisms into food.
    (C) Application of radiation.
    (D) Prevention of growth and activity of microorganisms.
    (E) Salting and drying.

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மத்திய மாகாண கல்வித் திணைக்களம்
DEPARTMENT OF EDUCATION - CENTRAL PROVINCE

G.C.E. (A/L) Practice Test - 2026

Biology II	09	E	II	Grade 13

Three Hours	Additional Reading Time – 10

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

Index No. :.....

Instructions: * *This question paper comprises Part* A *and Part* B. *The time allotted for* both parts *is*

three hours.

PART A - STRUCTURED ESSAY

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

PART B - Essay

- *Answer* **four** *questions only. At the end of the time allotted for this paper, before handing over 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	

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

01. (A)

i. Name a structural polysaccharide with each of the following architecture.

a. Linear form -.....

b. Branched form -.....

ii. State the basic unit of each of the following organic compound.

a. Chitin .....

b. Inulin - .....

c. Triacylglycerol - .....

d. Pepsin - .....

e. m RNA - .....

iii. Name specific characters of organisms which are controlled by genes.

.....

.....

.....

iv. What is the importance of having order and organization from molecular level to biosphere,in organisms

.....

.....

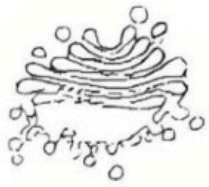
v. What are the main interactions found in quaternary structure of proteins?

.....

.....

(B)

i.



What is the above organelle?

.....

ii. a) State which organelle is located near the above organelle in the cytoplasm?

.....

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b) What is the relationship between the organelle you mentioned above ii (a) and the organelle in the diagram?

.....

.....

iii. Name three specific biochemicals, which act as receptor molecules in the plasma membrane

.....

.....

.....

iv. Name type of cell junction present in each of the following places of animal body.

a. Heart muscles - .....
b. Skin epithelium - .....
c. Animal embryo - .....
d. Muscle tissue - .....

v. Name two nucleotides, which contributes to anacrobic cellular respiration .

.....

.....

(C)

i. Write a similarity and a difference between Anaphase I and Anaphase II in Meiosis.

Similarity -.....

Difference -.....

.....

ii. What is the type of enzyme inhibitors present in drugs used against microbes?

.....

iii. a) What is the main pigment, which participates directly in the light reaction of photosynthesis?

.....

b) What is the process which occurs in photosystem I during cyclic electron flow in photosynthesis?

.....

.....

c) What is the reason for the production of 30 molecules of ATP from one glucose molecule in other cells except the active cells of the body during aerobic cellular respiration?

.....

.....

.....

See page four

CamScanner

iv. a) Write four main stages of producing first cells by the force of natural selection.

.....

.....

.....

.....

.....

.....

.....

b) Write two observations interpreted by Charles Darwin. in relation to the natural selection process.

.....

.....

.....

v. Put (√) relevant cage to show the presence of the respective photosynthetic pigment in the protists given below.

	Chlorophyll a	Chlorophyll c	Chlorophyll d
Gelidium			
Sargassum			
Diatoms			

100

02. (A)

i. What is the basis of dividing vascular plants into two groups?

.....

ii. Write three significant features of seed plants.

.....

.....

.....

iii. Complete the following dichotomous key using the organism given below.

Agaricus , *Saccharomyces*, *Mucor*, *Penicillium*, *Chytridium*

1. Produce flagellated motile spores produce .....
   Do not produce flagellated motile spores not produce .....

2. Unicellular .....
   Multicellular .....

3. Produce exogenous spores produce during asexual reproduction .....
   Do not produce exogenous spores not produce during asexual reproduction .....

4. Dikaryotic mycelium is dominant .....
   Dikaryotic mycelium is not dominant .....

See page five

CamScanner

iv. Name respiratory structures of Echinodermata other than the body wall and tube feet.

.....

.....

B)i.

a) Name two non-living cell types of ground tissues in vascular plants.

.....

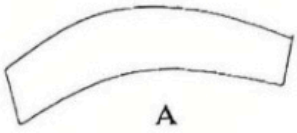
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b) Write a structural difference between two cell types you mentioned in above (a).

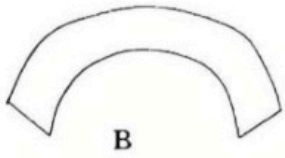
.....

.....

ii. The following diagram (B) shows a piece of *Alocasia* petioles which was dipped in sucrose solution, after achieving osmotic equilibrium.



Initial state



After the equilibrium

a) What is the reason for changing the curvature in (B)?

.....

.....

b) What is the name that can be used to explain the external solution at this stage?

.....

c) How long this piece of *Alocasia* petiole is dipped to achieve osmotic equilibrium?

.....

iii. Write an example to a close relationship between two species, in which is benefited one and harmful to the other one in plants.

.....

iv.

a) What is the macro element, which causes chlorosis in younger leaves?

.....

b) What is the plant growth regulator, which stimulates pollen development?

.....

CamScanner

ii.

a) Name the most important colors of light in regulating plant photomorphogenesis.

.....

b) Briefly state the process that occurs after two sperms are discharged into the embryo sac from a pollen tube entering through the micropyle in angiosperms.

.....

.....

.....

.....

C)

i. Name the main steps of animal holozoic nutrition.

.....

.....

ii. Name vitamins and elements stored in the human liver.

- Vitamins - .....
- Elements -.....

iii. a) What are the components of a lymph node?

.....

b) How does lymph move through lymph vessels ?

.....

.....

iv. a) Name two types of proteins, which contribute to the process of blood clotting during a tissue damage.

.....

v. a) Name the cell type which is responsible to produce heparin and helps to prevent blood clotting.

.....

b) Write another component produced by the above cells, other than heparin and mention two functions of it.

Component - .....

Functions - .....

.....

100

CamScanner

03. (A)

i. Name an invertebrate organism that possesses each of the following respiratory structures.

a. Internal gills - .....

b. Tracheal system - .....

ii. Complete the following table about excretory structures.

Features of the structure	Name of the structure	The phylum with the structure
a. Extensive, blind end tubules immersed in hemolymph		
b. Multicellular one end of the tubule is open to the coelom and other end opens to the outside.		

iii. Name two organs of digestive system, which is stimulated by the parasympathetic division of human nervous system.

.....

.....

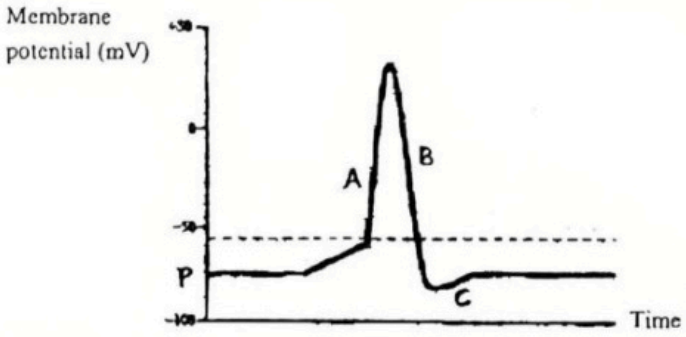
iv. What is sensory adaptation in sensory receptors?

.....

.....

.....

v. The following graph is related to the conduction of nerve impulse.



a) A, B, C are phases of action potential. Name them.

A -.....

B -.....

C -.....

See page eight

CamScanner

b) State the reason of having phase "C"

.....

.....

c) What is the potential represented by letter "P" and Mention the typical value of it.

P - .....

Typical value -.....

(B)

i. To which stimuli are the following sensory receptors in human skin sensitive?

a. Meissner's corpuscles -.....
b. Merkel discs -.....

ii. a) Write in order the three ear ossicles in human ear from tympanic membrane in correct order.

.....

b) What is the function of ear ossicles in hearing?

.....

.....

iii. a) What is the normal blood glucose level in humans?

.....

b) State the location and mode of reabsorption of glucose in kidney tubules of humans.

Location - .....
Mode - .....

iv. a) Briefly mention what is meant by inactivation of hormones in liver?

.....

.....

b) Name a blood plasma protein synthesized in liver and mention the its function.

Protein -.....
Function -.....

v. a) Name a class of terrestrial animals, which shows external fertilization.

.....

b) What is the function of shells and internal membranes of internally fertilized eggs in animals that show internal fertilization?

.....

CamScanner

(C)

i. a) What is menopause in females?

.....

b) At what age does menopause usually occur?

.....

c) What is the reason for menopause?

.....

ii. What is the blood vessel of umbilical cord containing oxygen poor blood, which travels from embryo to placenta

.....

iii. a) What is the motor protein that helps skeletal muscle contraction?

.....

b) Name the type of joints, which one bone fits into a hoop-shaped ligament that holds it close to another bone and allows it to rotate in the ring formed by the ligament.

.....

iv. Write two circumstances where Mendel's second law of inheritance can apply according to the current knowledge.

.....

.....

v. a) What is the reason for resulting low frequency of recombinant offspring in gene linkage?

.....

b) Consider the tri hybrid cross for flower color, seed color and seed shape.

Yellow colored flower - Y	Black seeds - B
White colored flower - y	Brown seeds - b

Round seeds - R
Wrinkled seeds - r

What is the probability of having white colored flowers, heterozygous for both traits, black seeds and round shape for a cross of YyBbRr × yyBbrr

.....

.....

100

04. (A)

i) a) What is contained in a c DNA library?

.....

.....

b) How DNA is transformed into a cell using a gene gun?

.....

.....

See page ten

CamScanner

ii. a) Mention the aim of Cartagena protocol on biosafety.

.....

.....

.....

.....

b) What is the first approved enzyme produced by GMO?

.....

iii. a) Number of trophic levels in any food chain is limited to four or five. What is the reason for it?

.....

.....

.....

b) What happens to the body size of the organisms, when moving up the ecological pyramid?

.....

iv. a) Name a common mammal found in the largest biome on earth.

.....

b) Write a Sri Lankan climatic zone in which Thalawa is found?

.....

v. a) Write a plant found in each of the following ecosystems in Sri Lanka

a. Tropical thorn shrubs .....

b. Tropical mountain forest - .....

c. Tropical dry mixed evergreen forest - .....

d. Tropical Wet low land rainforest - .....

(B) i. Name the three values of biodiversity.

.....

.....

.....

ii. Give one example of Sri Lankan species for each of the following categories.

- Indigenous species - .....
- Relict species - .....
- Flagship species - .....

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iii. a) Name two basic morphological symmetries of viruses on the basis of capsid architecture.

.....

.....

b) How do viroids multiply?

.....

iv. Name the equipment used for the following conditions in sterilization .

a. 170 ^{0}C temperature and maintain for 2 hours - .....

b. 121 ^{0}C temperature and pressure at 1 atm for 15 minutes - .....

.....

v. Name three types of exotoxins.

.....

.....

.....

(C)

i. Name a group of disease causing agents of the following disease of ornamental fish.

- Columnaris -.....
- Trichodinosis -.....

ii. Name three fish that could be introduced to water storage tanks to control mosquitos.

.....

.....

.....

iii. Write three aims of human genome project.

.....

.....

.....

iv. State two main types of stem cells.

.....

.....

iv. State three broad categories of post-harvest losses.

.....

.....

.....

100

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මධ්‍යම පළාත් අධ්‍යාපන දෙපාර්තමේන්තුව
மத்தியமாகாணகல்வித் திணைக்களம்
DEPARTMENT OF EDUCATION - CENTRAL PROVINCE

G. C. E. (A/L) Practice Test - 2026

Biology II	09	E	II	Grade 13

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

Part B - Essay

05. a) Describe the mechanism of enzyme action.
b) Explain the process of breaking down of glucose within a cell in the absence of molecular oxygen.

06. a) Explain the main method, by which water that has entered the leaf through xylem, is released into the atmosphere.
b) Briefly explain the different modes of nutrition in plants.

07. a) Explain how the cardiac cycle is regulated by the conducting system of the human heart.
b) Briefly describe transport of respiratory gasses in human blood.

08. a) Describe the process of osmoregulation in humans.
b) Discuss the functions of human ear in equilibrium.

09. a) Describe the mutations occur due to alteration of chromosomal structure.
b) Describe the toxigenecity in pathogens.

10. Write short notes.
(a) Class Mammalia
(b) Co-dominance
(c) Biodiversity conservation.

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පිළිතුරු පත්‍රය

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

Part A – Structured Essay

Answer all questions in this paper itself.

(Each question carries 100 marks.)

01. (A)

i. Name a structural polysaccharide for each of the following types

a. Linear form - Cellulose.

b. Branched form - Hemicellulose

(× 2)

ii. State the basic unit of each of the following organic compound.

a. Chitin - Glucosamine.

b. Inulin - Fructose.

c. Triacylglycerol - Glycerol + Three fatty acids

d. Pepsin - Amino acid

e. m RNA - Ribonucleotide.

(× 5)

iii. Name specific characters of organisms which are controlled by genes.

- Physiological
- Morphological
- Behavioural.

(× 3)

iv. What is the importance of organisms having order and organization from molecular level to biosphere

- To perform their biological activities efficiently.

(× 1)

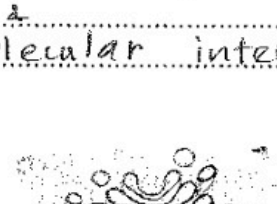
v. What are the main interactions found in Quaternary structure of protein?

- Inter &
- Intra molecular interactions

(× 2)

(B)

i.



What is the above organellae?

- Golgi apparatus.

(× 1)

ii. a) State what organelle located near to the above organelle in the cytoplasm?

- E.R

(× 1)

b) What is the relationship between the organelle you mentioned above (a) & the organelle in the diagram?

- Receive (transport) vesicles to cis face from ER.

(× 1)

iii. Name three specific biochemicals which act as receptor molecules in plasma membrane

- hormones
- Neurotransmitter.
- immune proteins.

(× 3)

iv. Name type of cell junction present in the following places of animal body.

a. Heart muscles - Gap / communicating junction.
b. Skin epithelium - Tight junction.
c. Animal embryo - Gap / communicating junction.
d. Muscle tissue - Desmosomes / Anchor junction.

(× 4)

v. Name 2 nucleotide which contribute to anaerobic cellular respiration .

- ATP
- NADH

(× 2)

(C)

i. Write a similarity and a difference between Anaphase I and Anaphase II in Meiosis.

- Nuclear envelope reform/nucleoli reappear/spindle depolymerized /form chromatin / form genetically non Identical nuclei.
- AnaphaseI - form 2 haploid daugher nuclei & Anaphase II form 4 haploid daughter nucleii.

(× 2)

ii. What is the type of enzyme inhibitors present in drugs used against microbes?

(competitive) Reversible inhibitors.

(× 1)

iii. a) What is the main pigment participate directly to the light reaction of photosynthesis?

chlorophyll - a

(× 1)

b) What is the process occurs in photosystem I during cyclic electron flow in photosynthesis?

Some photoexcited electrons uses alternative cyclic pathways & produce ATP.

(× 1)

c) What is the reason for production of 30ATP from one glucose molecule in active cells of body during aerobic cellular respiration?

Two ATP produced in glycolysis used to transport 2 NADH from cytosol to mitochondrial matrix.

(× 1)

iv. a) Write 4 main stages of producing first cells as a force of natural selection.

- Abiotic synthesis of small organic molecules from inorganic molecules.
- polymerization of small organic molecules & form organic macromolecules
- Organic macromolecules coere packed into membrane to produce protocell.
- Nucleic acid gained self replicating capability.

(× 4)

b) Write two observations interpreted by Charles Darwin which are related to the natural selection process.

- Over production / Each species produce more offsprings than their environment could accomanadate.
- Variations / The population of species varg in characteristics among their inheritance traits.

(× 2)

v. Put (√) relevant cage to show the presence .

	Chlorophyll a	Chlorophyll c	Chlorophyll d	
Gelidium	✓	—	✓	(× 1)
Sargassum	✓	✓	—	(× 1)
Diatoms	✓	✓	—	(× 1)

40 × 2.5.

100

02. (A)

i. What is the basis of dividing vascular plants into two groups?

Presence or absence of seeds.

(× 1)

ii. Write three significant features of seed plants.

- Production of Seeds / Reduced gametophyte.
- Heterospory / Production of ovules & eggs /
- Production of pollen grains and sperms.

(× 3)

iii. Complete the following dichotomous key using the organism given below.

Agaricus , Saccharomyces, Mucor, Penicillium, Chytridium

1. Flagellated motile spores produce ..... Chytridium .....
   Flagellated motile spores not produce ..... (2) .....
2. Unicellular ..... Saccharomyces .....
   Multicellular ..... (3) .....
3. Exogenous spores produce during asexual reproduction ..... Penicillium .....
   Exogenous spores not produce during asexual reproduction ..... (4) .....
4. Dikaryotic mycelium is dominant ..... Agaricus .....
   Dikaryotic mycelium is not dominant ..... Mucor. .....

(4)

(× 8)

iv. Name respiratory structures of Echinodermata other than the body wall and tube feet.

- Respiratory tree
- Papillae

(x 2)

B)i.

a) Name two non-living cell types of ground tissues in vascular plants.

- fibres
- sclereids

(x2)

b) Write a structural difference between two cell types above (a) you mentioned.

fibres	sclereids
• Long	• shorter
• Slender	• wider
• tapered	• Irregular

(x1)

ii. The following diagram (B) shows a piece of *Alocasia* obtained after the equilibrium which was dipped in sucrose solution.



Initial state — After the equilibrium

a) What is the reason for changing the curvature?

Endoosmosis / water enters to Alocasia petiole cells from external water through Osmosis.

(x1)

b) What is the name that can be used to explain the external solution at this stage?

Hypertonic

(x1)

c) How long this piece of *Alocasia* dipped to being an equilibrium?

About one hour

(x1)

iii. Write an example to a close relationship between 2 species in which one is benefited and the other one is harm in plants.

Cuscuta and host plant / Loranthus & host plant.

(x1)

iv.

a) What is the macro element which causes chlorosis in younger leaves?

S

(x1)

b) What is the plant growth regulator which is responsible to stimulate pollen development?

Gibberallin.

(x1)

V.

a) Name most important colors in regulating plant morphogenesis.

• blue and red (x1)

b) Briefly state the process after discharge two sperms into the embryo sac which enters to the pollen tube from micropyle in Angiosperm.

• One sperm fuses with the egg cell & form diploid zygote.
• Other sperm nucleus fuses with 2 polar nucleii
• This is double fertilization (x3)

C)

i. Name main steps of animal holozoic nutrition.

• Ingestion, Digestion, Absorption, Assimillation, Elimination (x1)

ii. Name vitamins and elements stored in human liver.

- Vitamins - A, D, E, K and B12 (x1)
- Elements - Fe, Cu (x1)

iii. a) How is the lymph node made up of?

• Connective tissue • White blood cells (x2)

b) How is the lymph move through lymph vessels?

• Rhythmic contraction of lymph vessel wall
• Skeletal muscle contraction x2.

iv. a) Name two types of proteins which contribute to process of blood clotting in tissue damage

Collagen / (Pro) thrombin / fibrinogen x2.

v. a) Name of the cell type of responsible to produce heparin which is help to prevent blood clotting.

mast cells. x1

b) Write another component produce other than heparin and mention two function of it. x2

Component - Histamine

Function - Increase permeability of blood vessels / dialation of blood vessels.

40 x 2,5.

100

(6)

03. (A)

i. Name an invertebrate two organism who possess the following respiratory structure.

a. Internal gills - Prawns / shrimps.

b. Tracheal system - (any) Insect. x 2

ii. Complete the following table about excretory structures.

Features of the structure	Name of the structure	The phylum which observed
a. Extensive blind end tubules immersed in hemolymph	Malphigian tubule.	(Terrestrial) Arthropoda.
b. Multicellular one end of the tubule is open to the coelom & other end opens to the outside.	(Meta) Nephridia	Annelida.

(x 4)

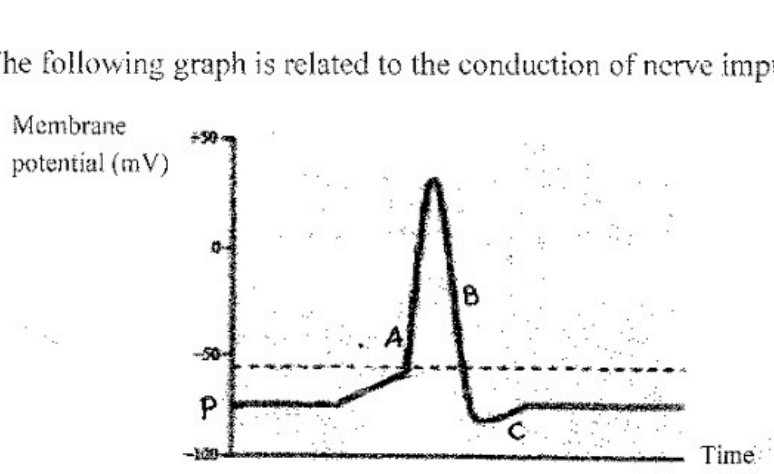
iii. Name two organs of digestive system which stimulate from the parasympathetic division.

• Stomach / small intestine /
• Gall bladder / Pancreas. (x 2)

iv. What is sensory adaptation in sensory receptors?

If the stimulation is continuous many receptors show decrease in responsiveness (x 1)

v. The following graph is related to the conduction of nerve impulse.



a) A,B, C are phases of action potential. Name them.

A - Deplorization

B - Repolarization

C - Hyperpolarization ×3.

b) State the reason of having phase "C"

Na channels are closed K channells opned. inside the membrane is more negative. ×1

c) What is the potential represented by letter "P" & mention the typical value of it.

P - Resting potential ×1

Typical value - −60 − 80 mV. ×1

(B)

i. Mention to which stimuli the following sensory receptors on human skin respond

a. Meissner's corpuscles - Light pressure ×1

b. Merkel discs - light touch ×1

ii. a) Write in order the three ear ossicles in human ear from tympanic membrane.

malleus, Incus, stapes. (Order compulsory) ×1

b) What is the function of ear ossicles in hearing?

Tymphanic membrane vibrations are amlified & transmit through middle ear. ×2.

iii. a) What is the normal blood glucose level in human?

70 − 110 mg / 100ml ×1

b) State the location and mode of reabsorption of glucose in kidney tubules of human.

Location - Proximal convoluted tubule.

Mode - Actively ×2.

iv. a) Briefly mention what inactivation of hormones in liver.

Some hormones are inactivated by the liver after their biological action ×1.

b) Name a blood plasma protein synthesis in liver and mention the function of it.

Protein - Albumin

Function - Transport fatty acids / Act as a buffer ×2.

(8)

v. a) Name a terrestrial animal class which shows external fertilization.

Amphibia ×1

b) What is the function of shells and internal membrane of internally fertilized eggs in animals who shows internal fertilization?

• against water loss & • physical damage. ×2.

(C)

i. a) What is menopause in female?

Cessation of ovulation & mensuration in Woman ×1

b) What is the age that menopause takes places?

Age 45–55 years. ×1

c) What is the reason for menopause?

less responsiveness to hormone FSH & LH produced by an anterior pituitary. ×1

ii. What is the blood vessel of umbilical cord contain oxygen poor blood which travels from embryo to placenta

Arteries of umbilical cord ×1

iii. a) What is the motor protein that helps to contraction of skeletal muscle?

Myosin ×1

b) Name the type of joint that, one bone fits into a hoop shaped ligament that hold it close to another bone and allows it to rotate in the ring formed by the ligament.

Pivot joint ×1

iv. Write two circumstances where Mendel's second law of inheritance can currently apply.

• Genes located on different Chromosomes
• Genes located far apart on the same Chromosome ×2.

v. a) What is reason of resulting low frequency of recombinant offspring in gene linkage?

crossing over. ×1

b) Consider the tri hybrid cross for flower color, seed color and seed shape.

Yellow color flower - Y	Black seeds - B
White color flower - y	Brown seeds - b

Round seeds - R
Wrinkled seeds - r

What is the probability of having white color flowers, heterozygous for both traits black seeds & round shape for the cross of YyBbRr × yyBbrr

×2.

• $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$ = • $\frac{1}{8}$

40×2.5.

100

04. (A)

i) a) What does c DNA libraries contain?

• Complementary DNA obtained by reverse transcription of the m-RNA isolated from cells / tissues. x 1

b) Briefly state how DNA transformed into cells using a gene gun.

• Gold like heavy metal coated with large no: of DNA interest.
• & shot at high velocity x 2

ii. a) Mention the aim of Cartagena protocol on biosafety.

• Protect the biological divesity from the potential risks caused by genetically modified organisms or living modified organisms (LMO) created as a result of biotechnology x 1.

b) What is the first approved enzyme produced by GMO?

• Chymosin / rennin / rennet x 1

iii. a) Number of trophic levels in any food chain is limited to four or five. What is the reason for it?

At each trophic level in the food chain a considerable fraction (about 90%) of potential energy is lost as heat and respiration. x 1

b) What is happened to the body size of the individuals in higher the steps of ecological pyramid?

larger in their size / increase x 1

iv. a) Name a common mammal found in the largest biome on earth.

brown bears / moose / siberan tiger x 1.

b) Write a Sri Lankan climatic zone which is found in Thalawa

• Dry zone / wet zone. x 1.

v. a) Write a plant found in the following ecosystems in Sri Lanka

a. Tropical thorn and shrubs - Gini Andara / Ranawara / Heerassa.
b. Tropical mountain forest - Keena / Walkaduru / Galveralu.
c. Tropical dry mixed evergreen forest - Weera / Palu / Kaluwara
d. Tropical Wet low land rainforest - Hora / Na / Hal x 4

(B) i. Name the 3 values of biodiversity.

• Environmental service value / Recreational value /
• Ethical value / Educational scientific value /
• Social, Cultural, Religious Value x 3.

(10)

See page eleven

ii. Give one example of Sri Lankan species for the followings.

- Indigenous species - • Lula / Kithul
- Relict species - • Lingula
- Flagship species - • Kahibella / Blue magpie x 3.

iii. a) Name two basic morphological symmetries on the basis of capsid architecture.

• Helical
• Icosahedral x 2.

b) How is viroid multiply?

• within a living host cell using host cell resources x 1.

iv. Name the equipment used for the following conditions in sterilization.

a. 170 ^{0}C temperature & maintain for 2 hours - Dry air oven. x 1
b. 121 ^{0}C temperature & pressure at 1 atm for 15 minutes - Autoclaving x 1.

v. Name three exotoxins.

• Neurotoxin
• Enterotoxin
• Cytotoxin x 3

(C)

i. Name a group of disease causing agent for the following disease for ornamental species.

- Columnaris - Bacteria x 1
- Trichodinosis - Unicellular, external, Opportunistic parasite x 1.

ii. Name three fish species who could introduce to water storage tanks in controlling mosquitos.

• Guppy
• Dandi
• Juvenile stages of Tilapia x3.

iii. Write three aims of human genome project.

• Identify all genes / store information in data base /
• Improve tools for data analysis / transfer related technologies to private sector (etc). x3.

iv. State two main types of stem cells.

• Embryonic stem cells.
• Adult stem cells x 2

(11)

iv. State three broad categories of post-harvest losses .

- Weight loss due to spoilage / Quality loss
- Nutritional loss / seed viability loss /
- commercial loss.

100

X3 .

40 x 2.5 .

(12)

05.(a) Describe the mechanism of enzyme action.

1. The reactant on which an enzyme acts is called the substrate.
2. The enzyme binds with the substrate to form the enzyme-substrate complex.
3. The catalytic process of the enzyme converts the substrate into products.
4. Each enzyme catalyzes a highly specific reaction.
5. The shape of the enzyme is responsible for its specificity.
6. The substrate binds to a specific site on the enzyme, which is called the active site.
7. The active site is formed by only a few amino acids.
8. The remaining amino acids are necessary to maintain the shape of the enzyme.
9. The shape of the enzyme's active site is complementary to the shape of its specific substrate.
10. The active site of the enzyme is not always completely complementary to the substrate.
11. Since the enzyme is not a rigid structure, the interaction between the enzyme and the substrate
12. can slightly alter the shape of the enzyme's active site.
13. As a result, the substrate and the active site become complementary to each other.
14. This is known as the induced-fit mechanism.
15. In addition to bringing the substrate and the active site closer together due to the tight fit,
16. it ensures the correct orientation of the molecules.
17. This contributes to the proceed of the reaction and catalyzes the conversion of the substrate into products.
18. Afterwards, the products dissociate (release) from the active site of the enzyme.
19. The enzyme is now free to accept another substrate into its active site.

(b) Explain the process of breaking down glucose within a cell in the absence of molecular oxygen

1. Breaking down glucose in the absence of molecular oxygen is anaerobic respiration.
2. This is catalyzed by enzymes in the cytosol.
3. In the absence of molecular oxygen, pyruvate molecules cannot be broken down further.
4. The produced ATP is used to fulfill energy requirements.
5. However, the NADH produced in glycolysis cannot be utilized.
6. The limitation of NAD+ leads to an increase in the ability to recycle NADH and utilize NAD+.
7. According to the end products produced by pyruvate, the most common types of fermentation are ethyl alcohol fermentation
8. Lactic acid fermentation
9. In both types of fermentation, the first step is glycolysis.
10. In ethyl alcohol fermentation, the two pyruvate molecules obtained from one glucose molecule contribute to 02 steps.
11. In the first step, pyruvate becomes acetaldehyde
12. While releasing a CO2 molecule.
13. In the second step, acetaldehyde becomes ethanol
14. reduced using NADH.
15. In ethyl alcohol fermentation, the final hydrogen acceptor is acetaldehyde.
16. Example: Many bacteria / Yeast.
17. In lactic acid fermentation, pyruvate formed from one glucose molecule directly becomes lactic acid as the end product
18. Reduced by NADH.
19. The final H acceptor is pyruvate.
20. Example: Some fungi and bacteria / lactic acid bacteria.

Any 3 8 × 4

06.(a)

1. This is stomatal transpiration.
2. Water is distributed throughout the leaf by a fine branching network of veins.
3. These branches terminate in one or a few xylem vessels or tracheids with little lignification.
4. Because of this, water is easily released into the leaf mesophyll cells through their cellulosic cell walls.
5. According to a water potential gradient, that water moves through the leaf mesophyll cells via:
6. Apoplast
7. Symplast
8. Transmembrane pathways
9. Water evaporates from the moist cell walls of the leaf mesophyll cells and enters into:
10. Intercellular air spaces
11. Specially into sub-stomatal air spaces
12. From there, water vapor diffuses into the atmosphere through the stomata.
13. Immediately adjacent to the leaf blade, there is a thin layer of still (non-flowing) air.
14. The escaping water vapor diffuses through this thin layer
15. and is Swept away due to the moving wind.
16. A diffusion gradient exists between the thin air layer and the leaf mesophyll cells.
17. In still air, the diffusion shells formed at adjacent stomata overlap each other to form one complete diffusion shell.

06.(b) Briefly explain the different modes of nutrition found in plants with examples.

1. Autotrophic nutrition (Autotrophism)
2. Photosynthetic autotrophic plants (Photoautotrophs)
3. Synthesize organic food using light energy and carbon dioxide / inorganic substances.
4. Plants exhibit symbiosis.
5. Symbiosis is an ecological relationship in which two species live in close contact with each other
6. Mutualism
7. A symbiotic relationship where both organisms of the two different species benefit.
8. Examples: * Association between *Rhizobium* bacteria and root nodules of leguminous plants./Association between roots of higher plants and fungi / Mycorrhizae./Association between coralloid roots of *Cycas* and *Anabaena*.
9. Commensalism
10. An interaction between two species where only one species benefits while the other species is neither benifit nor harmed (unaffected).
11. Epiphytic Orchids
12. Parasitism
13. A close relationship between two species where only one species benefits while the other (host) species is harmed.
14. Semi-parasitic (Partial parasitic)
15. *Loranthus* and the host plant
16. (Total) parasitic
17. *Cuscuta* and the host plant
18. Carnivorous plants is also a special mode of nutrition shown by plants.
19. These plants grow in nitrogen and mineral-deficient soils.
20. They kill insects and other small animals,
21. Digest them, and absorb those digested products.
22. *Nepenthes / Drosera / Utricularia*

Any 38 × 4

07.(a) Explain how the cardiac cycle is regulated by the human cardiac conduction system.

1. It is the sequence of events that occurs in a complete heartbeat.
2. In one complete cycle, pumping of blood by the heart and filling of the heart with blood take place.
3. A complete cardiac cycle takes 0.8 seconds.
4. (There are three stages.) Atrial systole, ventricular systole, complete cardiac diastole.
5. Complete cardiac diastole - occurs within 0.4 seconds.
6. When atria and ventricles are relaxed, through the superior and inferior vena cava,
7. Oxygen-poor blood is transported/flows into the right atrium.
8. Oxygen-rich blood is transported/flows into the left atrium via the four pulmonary veins.
9. The pressure in the ventricles becomes higher than in the atria.
10. Atrioventricular valves / bicuspid and tricuspid valves open.
11. A portion of blood flows passively into the ventricles.
12. Simultaneously with the arrival of blood into the atria, the SA node is stimulated.
13. Waves of contraction are initiated by electrical impulses generated within the SA node.
14. As the impulse spreads through the myocardium of both atria, the remaining blood in the atria flows into the ventricles, emptying the atria.
15. Ventricular systole - 0.3 seconds.
16. Electrical impulses travel through the atrial muscle to the AV node.
17. At the AV node, transmission of those impulses from the atria to the ventricles is delayed for a short period of time, so
18. It allows the blood in the atria to be completely released into the ventricles before ventricular contraction begins.
19. The electrical impulse originating from the AV node is sent to the ventricular muscle via the AV bundle, its branches, and Purkinje fibers.
20. Ventricular walls generate contraction waves upward from the apex of the heart.
21. Both ventricles contract at the same time.
22. When the pressure within the right ventricle becomes higher than that of the pulmonary artery, the pulmonary valve opens.
23. Since the pressure within the left ventricle is higher than that of the aorta, the aortic valve opens.
24. Blood is pumped into the pulmonary artery and aorta by the contraction of both ventricles.

25. Due to the high pressure generated when the ventricles contract, the atrioventricular valves / bicuspid and tricuspid valves close.
26. Blood does not flow backward.
27. When the ventricles relax, the pressure decreases, and the pressure in the pulmonary artery and the aorta becomes higher than that in the ventricles.
28. Then the pulmonary valve and aortic valve close.
29. Since the opening and closing of valves in the large vessels of the heart and valves within the heart occur in accordance with the pressure inside the heart chambers,
30. Blood flows unidirectionally.

07.b) Briefly describe the role of blood in respiratory gas transport.

1. Oxygen and carbon dioxide must be transported through the blood.
2. Oxygen binds to the heme group of hemoglobin in red blood cells.
3. One hemoglobin molecule binds reversibly with four oxygen molecules
4. And is transported as oxyhemoglobin.
5. Carbon dioxide diffuses into red blood cells and, catalyzed by the carbonic anhydrase enzyme, forms H^+ and bicarbonate ions.
6. Bicarbonate ions move into the blood plasma and are transported through the blood.
7. Carbon dioxide binds with the protein group of hemoglobin and is transported as carbaminohemoglobin.
8. A small amount of carbon dioxide is transported dissolved in blood plasma.

38 x 4

(8) a) Describe the process of osmoregulation in humans.

1. Osmoregulation is required to maintain a constant, optimum osmotic pressure within the body.
2. Through osmoregulation, it ensures that the total blood volume,
3. and the concentration of dissolved substances in the plasma and tissue fluid,
4. are maintained constant within a favorable range.
5. The amount of water inside and outside the cells is equal.
6. The solute concentration inside and outside the cells is equal.
7. (There are two forms of osmotic balance.) Control of the amount of water.
8. Control of the amount of solutes gained and lost by the body.
9. Blood water homeostasis is controlled by the hypothalamus.
10. There are osmoreceptors in the hypothalamus.
11. It detects the osmotic osmolarity / osmotic pressure of the data/blood passing through the brain.
12. When the osmotic pressure increases, the hypothalamus induces thirst, and when water is consumed, the osmotic pressure decreases.
13. When the osmotic pressure increases, the hypothalamus stimulates the posterior pituitary to release ADH into the blood.
14. ADH acts on the renal tubules / distal convoluted tubules, and acts on the collecting ducts to increase water reabsorption.
15. Concentrated urine is produced.
16. When the osmotic pressure / osmotic osmolarity of the blood decreases, ADH is not secreted.
17. Water reabsorption stops and dilute urine is produced.
18. When blood volume decreases and blood sodium ions / Na+
19. the kidneys are stimulated to produce Angiotensin II.
20. By Angiotensin II, to secrete the hormone aldosterone,
21. the adrenal cortex is stimulated.
22. Aldosterone increases the reabsorption of sodium ions / Na+ in the renal tubules.
23. When blood retains water, blood volume and pressure increase.
24. The main osmoregulatory organ is the kidney.

b) Discuss the role of the human ear in balance.

1. The vestibule and the (three) semicircular canals of the inner ear provide information about the position of the head in space and maintain posture and balance.
2. The utricle and saccule are located in the vestibule.

3. The position relative to gravity and linear movements is perceived.
4. Inside the chamber filled with endolymph,
5. there is a gelatinous substance in which calcium carbonate particles / otoliths are embedded.
6. It has hair cells projecting into it.
7. When the head tilts, the hairs press against the otoliths.
8. The bending converts the stimulus into a membrane potential by the hair cell receptors.
9. A nerve impulse is generated and it reaches the cerebellum.
10. Semicircular canals detect angular movements.
11. Inside the canals, there are clusters of hair cells projecting into a gelatinous cap.
12. When the position of the head changes, movements of perilymph and endolymph fluids occur.
13. Impulses received from the stimulation of hair cells travel to the brain / cerebellum.
14. The cerebellum contributes to maintaining posture and balance.

38 × 4

09.(a) Describe mutations caused by changes in chromosome structure.

1. large chunks of chromosomes, which can contain several genes to several hundreds genes, may be lost
2. Moved to another chromosome (cut and paste)
3. Copied and moved to another chromosome (copy and paste),
4. Or a change in orientation occurs.
5. The four types of those chromosomal mutations are:
6. Deletion,
7. Translocation,
8. Duplication, and
9. Inversion.
10. When a part of a chromosome is lost / deletion, several genes are removed.
11. Therefore, these mutations are often lethal.
12. In translocation, a decrease in the total number of DNA does not occur.
13. However, gene expression may change due to the change in the environment at the new location.
14. The breakage of the chromosome can occur within a gene, and if it occurs, the gene cannot perform its function.
15. In duplication, a DNA fragment carrying extra genes is located at another position in the genome.
16. In this case too, gene expression can be changed, and it usually causes a harmful effect on the phenotype.
17. The change in orientation of a chromosomal segment / inversion also changes gene expression.
18. The majority of these are adverse variations.

09.(b) Briefly describe the toxigenicity of pathogens.

1. Toxigenicity is the ability to produce biochemical substances called toxins that disrupt the normal functioning of cells.
2. These are called biological poisons because they cause specific damage to the host.
3. There are two types.
4. Endotoxins are lipopolysaccharides.
5. these are thermo-stable toxins which are part ofmicrobial cell
6. These are released after the lysis (breakdown) of bacterial cell walls.
7. They cause general symptoms such as chills, fever, weakness, and aches.
8. In some cases, shock and even death can occur.
9. Produced by Gram-negative (-) bacteria.
10. Example: Lipopolysaccharides in the cell walls of *Salmonella typhi.*
11. Exotoxins
12. These are proteins produced inside bacterial cells as part of their growth and metabolism, and
13. Secreted into the surrounding environment following cell lysis (or during growth).
14. Most of them are enzymes, and even a very small amount is extremely harmful.
15. These are thermo-labile protein toxins.
16. The majority of these are produced by Gram-positive (+) bacteria, while a small amount is produced by Gram-negative (-) bacteria.
    They are classified into three types:
17. Neurotoxins
18. Example: Toxins produced by *Clostridium tetani.*
19. Enterotoxins
20. Example: Toxins produced by *Vibrio cholerae.*
21. Cytotoxins
22. Example: Toxins produced by *Corynebacterium diphtheriae.*

Any 38×4

10.(a)Class Mammalia

1. The majority live in terrestrial habitats, while some are aquatic.
2. The young depend on milk produced by mammary glands.
3. They have a skeleton made of bones with cartilaginous articular surfaces.
4. The body is covered with hair.
5. The skin contains glands.
6. They are endothermic / Most members exhibit high metabolic rates.
7. Possess differentiated types of teeth / Heterodont.
8. The heart consists of four chambers.
9. Possess an efficient respiratory system with lungs.
10. A muscular diaphragm is important for lung ventilation.
11. Possess a brain that is larger and more developed than other vertebrates; they are intelligent, with learning skills and memory.
12. Exhibit internal fertilization.
13. The majority use limbs for locomotion, while some are adapted for flying and others for aquatic environments.
14. Examples: Whale,/ Bat, /Cow,/ Monkey

(b). Codominance

1. For certain traits, to express the phenotype in the heterozygous state,
2. both alleles contributing equally is known as codominance.
3. As an example: on the surface of blood cells of individuals with AB blood group,
4. both A and B types of carbohydrates exist at the same time.
5. This is encoded by the I^A and I^B alleles of a single gene.
6. In the heterozygous condition (I^A ,I^B) both types of carbohydrates are expressed in an equal manner
7. homozygotes for the I^A allele ($I^A I^A$), carry only A carbohydrate on RBC
8. homozygotes for the I^B allele ($I^B I^B$) carry only B carbohydrate on RBC
9. mating homozygous individuals for each allele,
10. everyone in the F1 generation will have the AB blood group.
11. Due to the mating occurring between heterozygotes of the F1 generation,
12. the resulting ratio between A : AB : B blood groups in the F2 generation is 1:2:1.

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10.(c) Biodiversity Conservation

1. The Principal goal of the conservation process is to ensure the long-term survival of the maximum number of species.
2. Conservation can be carried out in two ways.
3. In-situ Conservation
4. Here, the protection of the species and
5. their reproduction are ensured within their natural habitat.
6. basically, it must be ensured that a large population and
7. adequate as well as suitable habitats are available.
8. Examples: Yala / Minneriya National Park, / Kanneliya, / Pidurutalagala Reserves.
9. Ex-situ Conservation (Off-site conservation)
10. Here, the species is taken away from its natural habitat,
11. and looked after in another location in a manner that ensures its survival and reproduction.
12. Examples: Zoological gardens and Botanical gardens.

38 × 4

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