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 General Certificate of Education (Adv. Level) Final Term Evaluation 2026

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Grade }

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Subject } Biology

09

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Paper }

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Time } Two hours

• Answer all the questions.

(01) Which of the following statements is correct about water?

- 1) When the water is in solid form, its H bonds are very fragile.
- 2) Water functions as a thermal buffer due to its high specific heat.
- 3) Small insects can walk on the surface of water due to adhesion between water molecules.
- 4) Only the cohesion between water molecules allows water to act as a means of transport.
- 5) Ice floats on the surface of water bodies as water has a minimum density at 4°C.

(02) Among the organic compounds of organisms,

- 1) Structural proteins, which prevent desiccation, have the quaternary structure of proteins.
- 2) All monosaccharides are in ring form in aqueous media.
- 3) Number of common pyrimidine bases for both DNA and RNA is two.
- 4) A structural polysaccharide with a linear form is made up of aldose sugar.
- 5) One complete turn of DNA double helical structure consists of ten bases.

(03)

Structure

Function

A - Central vacuole

P - Synthesize phospholipids.

B - Smooth endoplasmic reticulum

Q - Helps in digestion

C - Peroxisome

R - Involves in detoxification.

D - Rough endoplasmic reticulum

Select the choice with the correct combination of above given structure-function.

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

(04) Some incidences of meiosis are given below.

- A - Genetically non-identical, haploid two nuclei form within one cell.
- B - Breakdown of the proteins that bind sister chromatids together.
- C - Pair of sister chromatids of one chromosome move as a single unit towards the corresponding pole.
- D - Kinetochores of sister chromatids are attached to microtubules extending from both poles.

Select the correct order of the above incidences.

- | | | | | |
|------------------|------------------|------------------|------------------|------------------|
| 1) A , B , D , C | 2) C , B , D , A | 3) B , D , C , A | 4) D , B , C , A | 5) C , A , D , B |
|------------------|------------------|------------------|------------------|------------------|

(05) Which of the following statements can be accepted about enzymes?

- 1) The shape of the active site of the enzyme is always completely complementary to the shape of its substrate.
- 2) Toxins bind with enzymes by weak interactions and avoid the formation of the enzyme-substrate complex.
- 3) In most enzymes regulated by allosteric regulation, each subunit consists of a polypeptide chain containing a regulatory site.
- 4) When the supply of ATP exceeds demand, catabolism slows down as ADP binds to the relevant enzyme.
- 5) The molecules that regulate enzyme activity are reversible, non-competitive inhibitors in many cases.

(06) Which of the following is an incidence that occurs during photorespiration?

- 1) Increase of CO_2 : O_2 ratio in the cytosol.
- 2) Oxygenase reaction forms two molecules of 3-PGA and a molecule composed of two carbons
- 3) Leads to a net loss of CO_2 by eliminating the net gain in Carbon.
- 4) Same active site of RuBP used in stimulation of carboxylation reaction is used for the stimulation of oxygenase reaction.
- 5) Enzymes present in chloroplasts, mitochondria and glyoxysomes are involved.

(07) Which of the following statements are correct about cellular respiration?

A - During the oxidation of a pyruvate molecule, two NAD^+ molecules are converted into two molecules of NADH.

B - The total number of ATP molecules produced by oxidative phosphorylation in the Krebs cycle for each glucose molecule is 18.

C - Amino acids obtained from the hydrolysis of proteins can be directly used for cellular respiration.

D - Fatty acids can join the citric acid cycle after converting to Acetyl Co-A

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

(08) Some incidents that occurred during the diversification of eukaryotes are given below.

A - Differentiation of large trees as stems, leaves and roots

B - Colonization of land by fungi, plants and animals.

C - Sponges evolved.

D - Origin of phylum Chordata

Select the correct order of the above incidences,

- 1) C , B , A , D 2) D , C , A , B 3) C , D , B , A 4) C , B , D , A 5) C , D , A , B

(09) Protista in which the storage food is 'Laminarin',

- 1) Are unicellular
- 2) Has chlorophyll d as photosynthetic pigment
- 3) Greenish red in colour.
- 4) Are mixotrophs.
- 5) Cell wall has alginic acid as a component.

(10) Which of the following are the characteristics of the animal group that first invaded the terrestrial environment?

- A - Lay eggs without shells.
- B - Have haemocoels
- C - Adapted for water conservation.
- D - Have restrictions on metabolism
- 1) A and B only 2) B and D only 3) A and D only 4) A, B and C only 5) A, B and D only

(11) Select the correct statement about epidermis?

- 1) Provides protection only for the parts such as stems and roots of the primary plant body.
- 2) Is a loosely packed single cell layer.
- 3) Always covered with a cuticle.
- 4) Some epidermal cells secrete chemicals involved in defense against insects.
- 5) Presence in some places of mature stems and roots, where secondary growth has happened.

(12) Which of the following specimen/s can be used to observe secondary tissues of a plant stem using a light microscope?

- A - *Vernonia* B - *Alocasia* C - *Tradescantia* D - *Stachytarpheta*
- 1) A only 2) A and B only 3) A and D only 4) B and C only 5) C and D only

(13) Which of the following is not suitable to use as initial plant parts of tissue culture experiments?

- 1) Shoot tip 2) Roots 3) Bases of leaves 4) Embryo 5) Cork

(14) Select the correct statement about the life cycles of terrestrial plants.

- 1) *Pogonatum* - Gametophyte depends on the sporophyte.
- 2) *Nephrolepis* - Young sporangia are exposed to the external environment.
- 3) *Selaginella* - Archegonia are fully embedded in the gametophytic tissue.
- 4) *Cycas* - Sporophyte is monocious.
- 5) *Cocos* - Male gametophyte contains three cells.

(15) Some responses of plants to stimuli are given below.

- (A) Phototropism - The directional growth of a tendril towards support.
- (B) Thigmotropism - Have stockier trunks in trees grow in high, windy environments.
- (C) Thigmonasty - Leaflets of some plants collapse due to touch.

Which of the above is/are correct?

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

(16) Select the correct order of elements that cause deficiencies such as death of terminal buds, reduced internode length and thick, leathery and discolored leaves.

- 1) Ca , Zn , B 2) Mo , Zn , B 3) Mo , Fe , Ni
4) Ca , B , Zn 5) Mo , Zn , B

(17) Select the correct statement regarding the chemical digestion that occurs in the small intestine.

- 1) Pancreatic amylases catalyze the conversion of disaccharides into monosaccharides.
- 2) Proteases catalyze the conversion of peptides into small peptides.
- 3) Digestion process of the small intestine also occurs by the enzymes bound to the surface of the epithelium.
- 4) Hormones present in intestinal juice stimulate the release of bile.
- 5) Emulsification of fat occurs by the bile secreted by the gall bladder.

(18) Some statements about the circulatory systems seen in the animal kingdom are given below.

- (A) Leech - Blood is restricted to blood vessels and kept apart from the interstitial fluid.
- (B) Cockroach - There is no distinction between the circulatory fluid and the interstitial fluid surrounding cells.
- (C) Scorpion - Have comparatively O₂ deficient blood in the atrium and ventricle.
- (D) Crow - In systemic circulation, blood is supplied to all body cells and tissues effectively

Select the choice with the correct statement/s.

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

(19) Select the correct statement about respiration of the human

- 1) Main sensors involved in the regulation of breathing are present only at the aorta and the carotid artery.
- 2) CO₂ unloading and O₂ loading occur at internal respiration.
- 3) During inhalation, the diaphragm relaxes and the volume of the thoracic cavity increases.
- 4) Sensors which detect stretching of the lung tissues are found outer to the lungs.
- 5) In deep inspiration, additional muscle types raise the rib cage.

(20) Which of the following statements applies to the internal defense of innate immunity?

- 1) Molecular recognition of foreign agents occurs at the internal defense.
- 2) Interferons are not involved in phagocytic activity.
- 3) Complement proteins are normally active proteins present in blood plasma and plasma membranes.
- 4) Natural killer cells engulf and kill abnormal cells.
- 5) Neutrophils, activated in inflammation, release histamine-like signalling molecules.

(21) Select the correct statement regarding urine formation.

- 1) Drugs are actively reabsorbed into the proximal convoluted tubule.
- 2) Metabolised substances in the liver are passively secreted into the lumen of the proximal convoluted tubule.
- 3) Filtrate become more diluted as it passes along the descending limb of the loop of Henle.
- 4) Amount of K⁺, secreted at the distal convoluted tubule, may vary according to the needs of the body.
- 5) Some urea is actively reabsorbed into the interstitial fluid if it is high in the filtrate.

(22) Select the correct combination of the functions of the following parts of the human brain.

- | | |
|-----------------------|---|
| A - Hypothalamus | V - Sort sensory information for further processing |
| B - Cerebrum | W - Secretes PIH |
| C - Thalamus | X - Initiates voluntary muscle contraction |
| D - Medulla oblongata | Y - Coordinates skeletal muscle movements. |
| E - Cerebellum | Z - Controls involuntary reflexes. |

- | | |
|--|--|
| 1) A - W , B - X , C - V , D - Y , E - Z | 2) A - W , B - X , C - V , D - Z , E - Y |
| 3) A - Z , B - W , C - V , D - Z , E - Y | 4) A - V , B - X , C - Z , D - W , E - Y |
| 5) A - V , B - X , C - Y , D - Z , E - W | |

(23) Select the correct response about mechanoreceptors.

- 1) Merkel disc present deeper in the skin.
- 2) Pacinian corpuscles are not sensitive to deep pressure
- 3) Meissner corpuscles are only sensitive to light pressure.
- 4) Pressure receptors are present in the vestibule of the inner ear.
- 5) Mechanoreceptors are not only sensitive to pressure and touch, but also to stretch and motion.

(24) What is correct about the basic structure of the human eye?

- 1) Ciliary body - Secretes aqueous humour.
- 2) Choroid - Maintains the shape of the eye.
- 3) Iris - Allow penetration of excessive light.
- 4) Lens - Prevents the eyeball from collapsing.
- 5) Retina - Converts light rays into a membrane potential change by the outer pigmented epithelium.

(25) Select the pair of glands that can produce hormones required for the function of the reproductive system.

- | | |
|-------------------------------------|----------------------------------|
| 1) Hypothalamus, Pancreas | 2) Adrenal gland, Thyroid gland. |
| 3) Pituitary gland, Thymus gland | 4) Thyroid gland, Pineal gland |
| 5) Hypothalamus, Parathyroid gland. | |

(26) Select the correct response about the homeostatic functions of the human body.

- 1) High peripheral temperature is detected by the hypothalamus.
- 2) Insulin does not stimulate the conversion of glucose into fatty acids.
- 3) Homeostasis of the human body is achieved by maintaining a variable at or near a particular value.
- 4) Only endocrine glands are involved in controlling the amount of water in the blood.
- 5) Iron storage is not a homeostatic function of the liver, but rather a digestive function.

- (27) What is happening with the implantation of the embryo?
- 1) LH rescues the corpus luteum.
 - 2) Completes the development of the placenta.
 - 3) Inner cell mass of the blastocyst orients outwards the endometrium and connects to it.
 - 4) Remove the negative feedback function on the hypothalamus by high progesterone and estradiol.
 - 5) Trophoblast begins to secrete hCG.
- (28) Select the correct statement regarding the human appendicular skeleton.
- 1) The distal end of the ulna articulates with the carpal bones of the proximal row.
 - 2) The number of bones belonging to the human upper limb is 30.
 - 3) The distal end of the humerus has one articular surface.
 - 4) Fibula does not participate in forming the ankle joint.
 - 5) The distal end of the femur articulates with the tibia and fibula to form the knee joint.
- (29) Select the correct statement.
- 1) Genes contribute to the development of one or more traits by coding for specific proteins or peptides.
 - 2) In certain traits, at heterozygous state, both alleles contribute equally to the expression of the phenotype, which is called polyallelism.
 - 3) The pointed contour of the hairline on the forehead is due to a human Mendelian characteristic inherited by a recessive allele.
 - 4) The alteration in the phenotypic expression of a gene of one locus due to the interference of another gene at a different locus is considered as codominance
 - 5) The occurrence of specific phenotypes related to a specific trait controlled by a genetic code is known as epigenetics
- (30) The genotypes of the two parent plants involved in a trihybrid cross are AaBBRr x aaBbRr. What is the probability of having heterozygotes for all three characters in the progeny of this cross according to Mendel's law of independent assortment?
- 1) $\frac{1}{16}$
 - 2) $\frac{1}{8}$
 - 3) $\frac{1}{4}$
 - 4) $\frac{1}{2}$
 - 5) 0
- (31) Several biomolecules required for DNA replication machinery and their functions are given below.

Biomolecules	Function
A - Helicase	P - Initiates DNA polymerization.
B - DNA ligase	Q - Separates the two strands of DNA.
C - SSB	R - Joins the adjacent DNA fragments.
D - DNA polymerase	S - Prevent re-pairing of the separated DNA strands.
E - Topoisomerase	T - Relieves the strain of two DNA strands.

The above biomolecules and their related functions are correctly stated in,

- | | |
|---------------------------|---------------------------|
| 1) AQ , CT , ES , BP , DR | 2) ET , AQ , CS , BP , DR |
| 3) EQ , AP , CS , DT , BR | 4) AQ , ET , CS , DP , BR |
| 5) AT , DQ , FP , BR , CS | |

(32) Some statements related to transcription are given below.

- (a) The strands rewind at the other end.
- (b) RNA polymerase falls off after passing the termination sequence.
- (c) Adding complementary ribonucleotides against the template strands.
- (d) Unwinding of the two DNA strands.
- (e) RNA processing.
- (f) RNA polymerase binds to the promoter site.

The transcription process is shown in the correct order.

- | | | |
|--------------------------|--------------------------|--------------------------|
| 1) d , f , a , c , b , e | 2) f , d , c , a , b , e | 3) d , f , a , c , e , b |
| 4) f , d , a , c , e , b | 5) d , a , f , c , e , b | |

(33) Several statements are given below.

- (A) Drastic changes in polypeptides can occur as results of nonsense mutations.
- (B) Aneuploidy can occur when a gamete with one more chromosome fuses with a normal gamete.
- (C) Sick cell anaemia is a point mutation.

Which of the above statements is/are correct?

- | | | |
|-----------------|----------------|-----------------|
| 1) A only | 2) B only | 3) A and C only |
| 4) A and B only | 5) All correct | |

(34) Select the correct example of where the nutritional value of GM crops has been altered to improve the quality of agricultural products.

- 1) Seeds of GM Canola varieties with increased oleic acid content.
- 2) Increased amylopectin content in GM potato.
- 3) Production of GM soybeans with increased phytase enzyme to release a high content of phosphorus.
- 4) Production of GM apples with reduced softening rate to enhance flavour
- 5) Production of GM rice varieties with increased thermostability of amylase.

(35) Which of the following is not an effect of global warming and climate change?

- | | | |
|--------------------------------|--------------------------------|----------------------------|
| 1) Insect population increase. | 2) Decline in food production. | 3) Coral reef degradation. |
| 4) Loss of Biodiversity. | 5) Ozone layer depletion | |

- (36) Select the correct statement about the ecosystems of Sri Lanka.
- 1) Tropical moist evergreen forests are the only type of forests present in the intermediate zone of Sri Lanka.
 - 2) Plants with umbrella-shaped, rounded crowns and leathery, small leaves are characteristic of dry patana.
 - 3) *Diospyros ebenum* plants are naturally found in dry monsoon forests.
 - 4) According to the definition of Ramsar, Parakrama Samudraya, Kala wewa, like typical irrigations are considered as internal fresh wetlands.
 - 5) Wet patana is found at altitudes ranging from 500 m to 1500 m above sea level.
- (37) Select the correct option according to the IUCN Red Data Book categories for the following animal species.
- | | | |
|-----------------|--|--------------|
| A. Wesak orchid | B. Giant tortoise of Seychelles island | C. Maha madu |
| D. Buttercup | W. Dodo | |
- | | | |
|---------------------------|---------------------------|---------------------------|
| 1) EN , EW , CR , VU , EX | 2) EX , CR , EN , EW , VU | 3) EN , CR , EW , EX , VU |
| 4) VU , EN , EW , CR , EX | 5) EX , VU , EN , EW , CR | |
- (38) Given below are the microorganisms, disease and the organ/ system they infect.
- | Microorganism | Disease | Organ/ system |
|----------------------------------|--------------------|--------------------------|
| A. <i>Haemophilus influenzae</i> | I. Tetanus | P. Immune system |
| B. Rabies virus | J. Leptospirosis | Q. Nervous system |
| C. <i>Leptospira interrogans</i> | K. Hepatitis | R. Cardiovascular system |
| D. <i>Streptococcus pyogenes</i> | L. Rabies | S. Respiratory system |
| E. <i>Clostridium tetani</i> | M. Rheumatic fever | T. Skin |
- Which of the following correctly matches the microorganism, disease and the organ/ system they infect?
- | | | | | |
|--------|--------|--------|--------|--------|
| 1) AMS | 2) BLP | 3) CMQ | 4) DMR | 5) EIR |
|--------|--------|--------|--------|--------|
- (39) Which of the following is not correct about the role of soil microorganisms?
- 1) Mineralization helps to remove plant and animal debris from the earth's surface, allowing other organisms to live.
 - 2) Nitrifying bacteria living in soil reduce nitrogen in the ammonium ions.
 - 3) Free-living nitrogen-fixing bacteria live in the rhizosphere.
 - 4) *Pseudomonas*, *Agrobacterium* species live on sugars, amino acids and various aromatic compounds exuded by roots.
 - 5) Almost all land plants have a symbiotic association with one or more mycorrhizal fungi.
- (40) Which of the following is a use of stem cells?
- | | | |
|---|---------------------------------|---------------------|
| 1) Regulation of O ₂ level in blood. | 2) Repair blocked arteries | 3) Treat gastritis. |
| 4) Repair damaged spinal neurons. | 5) Replacement of broken bones. | |

For each of the questions 41-50, one or more of the response/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	A, C, D	A, B	C, D	Any other response or combination of responses is correct
Correct	Correct	Correct	Correct	

(41) Select the correct statement/s about the components of the cytoskeleton.

- (A) Microfilaments are made up of two intertwined subunits of actin.
 (B) Microtubules are hollow tubes with a wall that consists of 12 columns of tubulin molecules.
 (C) Some intermediate filaments are made up of a fibrous protein called keratin.
 (D) Arrangement of microtubules is similar in centrioles and the basal bodies.
 (E) Microfilaments are involved in moving chromosomes when necessary.

(42) Which of the following character/s can be seen in all seed plants?

- (A) Have tracheids to transport water and minerals.
 (B) Gametophytes are dependent and unisexual.
 (C) Microspores develop into pollen grains with a pollen tube within the sporangium.
 (D) Food is provided to the embryo by the endosperm.
 (E) Megasporangium is retained inside the carpel.

(43) Select the correct statement/s that correctly match the functions of plant hormones.

- (A) Auxin- Retards leaf abscission. (B) Cytokinin - Delays leaf senescence.
 (C) Absciscic acid - Inhibits leaf abscission. (D) Ethylene - Promotes leaf abscission.
 (E) Gibberellins - Promotes leaf senescence.

(44) Select the correct statement/s regarding respiratory cycle, lung volumes and capacities.

- (A) Functional residual capacity is a collection of three lung volumes.
 (B) Vital capacity is the maximum volume of air which can be inhaled by a person.
 (C) The volume of air that remains in the lungs even after a forceful expiration is known as residual volume.
 (D) Anatomical dead space is involved to prevent the collapse of the alveoli after expiration.
 (E) Total lung capacity is about 6000ml.

- (45) Select the correct statement/s about the acquired immunity.
- (A) Blood cells never act as antigens.
 - (B) The effector forms of T lymphocytes do not affect the function of B lymphocytes.
 - (C) Cytotoxic T cells directly kill the cells with invading antigens.
 - (D) Antibodies neutralize the specific toxins present in lymph.
 - (E) Genes encoding microbial proteins induce artificially acquired passive immunity.
- (46) Select the correct statement/s about human ear.
- (A) Semicircular canals as well as the cochlea, are continuous with the vestibule.
 - (B) Cochlear hair cells synapse with the dendrites of sensory neurons.
 - (C) The cochlear duct is a part of the bony labyrinth and is filled with endolymph
 - (D) Ear ossicles transmit sound vibrations to the round window.
 - (E) Semicircular canals have a gelatinous material in which calcium carbonate particles are embedded.
- (47) Select the correct response/s regarding pregnancy and its duration.
- (A) First trimester - The implanted embryo secretes hormones.
 - (B) Second trimester - The placenta only produces progesterone.
 - (C) Third trimester - Fetal activity decreases.
 - (D) First trimester - Fetus is well differentiated.
 - (E) Second trimester - Begins the development of fetal organ systems.
- (48) Select the most widely used genetic principle/s in animal and plant breeding.
- (A) Polyploidy
 - (B) Artificial selection
 - (C) Genetic modification
 - (D) Mutation breeding
 - (E) Inbreeding
- (49) Select the correct combination/s about methods of sterilization and used substances
- | Sterilization methods | Used substances |
|------------------------------|--|
| (A) Direct flaming | - Hospital waste, surgical equipments |
| (B) Boiling | - Inoculating loops, inoculating needles. |
| (C) Hot-air sterilization | - Petri plates, beakers |
| (D) Filtration | - Heat-sensitive solutions, solutions containing antibiotics |
| (E) UV radiation | - Nurseries, culture media |
- (50) The process(es) that take place in a drinking water treatment plant is/are,
- (A) Removal of pathogens in water.
 - (B) Enhance sedimentation, producing a sticky precipitate.
 - (C) Growth of aerobic bacteria and rapid microbial oxidation.
 - (D) Always use activated carbon to remove toxic chemical substances.
 - (E) Remove sludge.

Department of Education - Western Province

General Certificate of Education (Adv. Level) Final Term Evaluation 2026

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Time } Three hours and ten minutes

විභාග අංකය -
Index No.

Paper	Marks	Percentage
Paper I		
Paper II		
Total		

Part A - Structured Essay

- **Answer all the questions.** (Each question carries **100** marks)

(01) A) i) a) Which form of aldose sugar contributes to the formation of a non-reducing disaccharide?

.....

b) What is the monomer of the polysaccharide that makes up the cell wall of fungi?

.....

ii) a) What specimen can be used to observe the stages of mitotic division under a light microscope in the school laboratory?

.....

b) What is used to prevent air bubbles from entering the specimen mentioned in (ii) a above, when preparing it for observation?

.....

iii) What is considered as the denaturation of proteins?

.....

.....

.....

iv) Mention **three** functions of proteins present in the plasma membrane.

.....

.....

.....

v) a) Mention **two** types of lipids synthesized by the smooth endoplasmic reticulum.

.....

b) Which subcellular component produces the organelle that is involved in digesting food particles received by phagocytosis within a cell?

.....

B) i) a) Mention the structure of the intermediate filaments of the cytoskeleton

.....

.....

b) Write **two** other functions performed by cilia in addition to acting as locomotor appendages

.....

.....

ii) a) What is the most common glycoprotein in the extracellular matrix of most animal cells?

.....

b) How is the protein mentioned in (ii) (a) above bound to the plasma membrane?

.....

iii) a) The pairs of chromatids of the chromosomes in a cell at metaphase of meiosis II may not be genetically identical. This is due to which process occurred during which stage of cell division?

Stage -

Process -

b) How is the process mentioned in (iii) (a) important for the survival of a species?

.....

iv) What is the significance of ATP molecule being a mobile molecule?

.....

.....

v) a) What is the importance of the induced fit mechanism?

.....

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.....

.....

b) Write **two** anatomical differences between the chloroplasts of the mesophyll cells and the bundle sheath cells of C_4 plants.

.....

.....

.....

c) State the product produced in photosystem I during the linear electron flow of the light reaction and indicate which reaction in the Calvin cycle it is used for.

.....

.....

C) i) a) Write **two** factors that should be kept constant when investigating how the rate of photosynthesis changes with light intensity using the Audus apparatus.

.....

b) What is the main limiting factor for the process of photosynthesis under normal conditions?

.....

ii) In the citric acid cycle, state the products formed when one glucose molecule undergoes aerobic respiration and their amounts

.....

.....

.....

.....

iii) State how long ago the following incidences occurred

a) Finding fossils similar to red algae

b) Colonization of land by fungi

iv) a) Mention **two** other characteristics used, in addition to molecular biological characteristics for natural classification.

.....

.....

b) Write the taxonomic hierarchy in order of increasing common characteristics.

.....

.....

v) What was the first major split in the history of life during the evolutionary process?

.....

(02) A) This question is based on the following groups of organisms.

Yeast , *Hydra* , Jelly fish , *Fasciola* , Pin worm , Earthworm , Sea star , Cockroach, Snail , Frog

i) Select and state the organism from the list given above that exhibits the following characteristic/s

a) Endoskeleton consisting of plates

b) Bisexual triploblastic organism

c) Body is covered with thin, moist glandular skin

d) Branched gastrointestinal cavity

e) Body is covered by a tough cuticle and does not show distinct cephalization.

f) A well-developed nervous system with a primitive dorsal brain.

ii) State **four** main characteristics found in terrestrial plants that are not found in green algae.

.....

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.....

.....

iii) State **two** terrestrial plant genera with dominant gametophytes.

.....

.....

iv) Mention **two** places where the collenchyma cells of plants are found as strands.

.....

.....

v) Write **two** structural features that differentiate the vascular bundles of monocotyledonous plant stems from the vascular bundles of dicotyledonous plant stems.

.....

.....

B) i) Briefly explain how dissolving solutes in pure water can cause a negative effect on water potential.

.....

.....

.....

ii) a) What are the methods by which water and minerals are transported from the symplast to the apoplast?

.....

b) State **two** factors on which the thickness of the diffusion shell around the stomata depends.

.....

.....

iii) State how root pressure is generated.

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iv) What is known as seed dormancy?

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.....

.....

v) a) Mention the importance of double fertilization of angiosperms.

.....

.....

b) Write a difference between the endosperm of angiosperms and the endosperm of gymnosperms.

.....

.....

c) What is the hormone that is important to promote the movement of nutrients into the sink tissues of plants?

.....

C) i) State the location of sinusoids and bile ducts in the lobule of the liver

Sinusoids -

Bile ducts -

ii) a) State why a closed circulatory system is more important than an open circulatory system for active and large animals.

.....

.....

b) How does it ensure that blood flows in only one direction in the heart and in the large vessels?

.....

.....

iii) What are known as complement proteins?

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.....

iv) a) Mention what are known as allergens.

.....

b) What are the effects of acute allergic conditions?

.....

.....

- v) Mention a type of major signalling molecule that contributes to initiating the inflammatory response.

.....

(03) A) Answer the following questions regarding the renin-angiotensin system in relation to the homeostasis of the human body.

- i) a) When what condition in the human body changes, the kidneys begin to secrete renin?

.....

- b) What function is performed by the secretion of Renin?

.....

.....

- c) Write the function of the hormone secreted by the adrenal cortex in relation to the above renin-angiotensin system.

.....

.....

- ii) a) State how the nervous system of *Planaria* is organized.

.....

- b) Mention **two** places where cerebrospinal fluid is present.

.....

.....

- c) What factors are involved to maintain the resting membrane potential of neurons?

.....

.....

.....

- iii) a) Name the parts that make up a 'tastebud'

.....

.....

.....

- b) Name the locations of the chemoreceptors that are capable of detecting the concentration of CO₂ in the circulating blood.

.....

.....

- iv) Name **three** layers that make up the wall of the eye in order from outside to inside.

.....

.....

.....

v) What is the main cause of 'glaucoma'?

.....

B) i) Name the hormone that stimulates the synthesis of glucose from non-carbohydrate sources.

.....

ii) Name the **three** main chambers of the cochlea of the inner ear in order from top to bottom.

.....

.....

.....

iii) Among the chambers mentioned in (B) ii above, name the chamber/chambers that contain the endolymph.

.....

iv) Name the specific site where hormones secreted by the posterior pituitary are produced.

.....

v) Mention **two** target sites of the hormone oxytocin.

.....

C) i) a) Name the main hormone that is important for maintaining pregnancy.

.....

b) State the types of blood vessels contained in the placenta and their amounts.

.....

.....

ii) a) Name the paired bones that contribute to the formation of the skull.

.....

b) What individual bones contribute to the formation of the face?

.....

iii) a) What types of bones are involved in building up the thoracic cavity?

.....

.....

.....

b) Write **two** characteristics that differentiate the Atlas vertebrae from a typical vertebrae.

.....

.....

iv) What is the function of Ca^{2+} in muscle contraction in relation to the sliding-filament theory?

.....

v) In pea plants, tall (T) is dominant to short (t) and red colored flowers (R) are dominant to white colored flowers (r). A heterozygous tall, red flower-bearing pea plant was test-crossed.

a) What are the genotypes of parental plants?

.....
.....

b) What are the phenotypic ratios of (F₁) obtained from this cross?

.....
.....

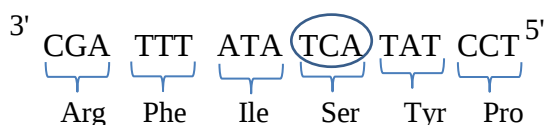
(04) A) i) a) Why does only one strand of double-stranded DNA act as a template for transcription in the mechanism of polypeptide synthesis?

.....
.....

b) What stimulates the formation of peptide bonds in the translation of polypeptide synthesis?

.....

ii) The diagram below shows a portion of the DNA coding chain showing the nucleotide sequence for a polypeptide and its corresponding amino acids.



a) Write the mRNA nucleotide sequence that corresponds to the DNA coding sequence given above.

.....

b) Name the type of specific point mutation that would occur if A were to substitute C in the 3' - TCA-5' triplet circled in the DNA coding sequence shown above.

.....

iii) a) State the two methods by which DNA copies can be multiplied in gene technology, when a large number of copies of DNA are required.

.....
.....

b) What are the advantages of using 'YACs' as vectors?

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.....

iv) Briefly explain what type of primer is used in the PCR mixture.

.....
.....

v) What is called 'genetic pollution' in environmental issues related to the use of GMOs?

.....

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B) i) a) Write the levels of organization of the environment in order.

.....

.....

b) Briefly explain why the number of trophic levels in a food chain is limited to four or five.

.....

.....

.....

ii) a) State the **two** factors that determine the type of 'Biome' that can exist in a particular area.

.....

.....

b) Why is the diversity of shrubs and plants in northern coniferous forests is lower than in temperate broadleaf forests?

.....

.....

iii) Name the type of ecosystem in Sri Lanka where the following grass species are commonly found.

a) Pangiri mana

b) Iluk

iv) a) What is the main reason for the large-scale destruction of mangrove biodiversity in the Negombo and Puttalam lagoons?

.....

b) Name the alien invasive plant that produces toxins that inhibit germination and seedling growth of plants

.....

v) a) What is known as 'Ozone depletion'?

.....

.....

b) Name **two** types of manmade industrial greenhouse gases with a very high global warming potential.

.....

.....

C) i) a) What are known as 'bioaerosols'?

.....
.....

b) State the carbon source and energy source used in the nutrition of purple non-sulfur bacteria.

Source of carbon -

Source of energy -

ii) a) State the reasons why viruses depend on the protein synthesis mechanisms of host cells.

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

b) Name one type of enzyme of microorganisms that is used to perform the following functions.

- Destroy host body tissues
- Change the metabolism of host

iii) a) What is considered as 'bio-fertilizers'?

.....
.....

b) Name a genus of free-living nitrogen-fixing bacteria that is present in high concentrations at rhizosphere.

.....

iv) a) What is the source of 'embryonic stem cells'?

.....

b) State the **two** main characteristics of 'human embryonic stem cells'.

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.....
.....

v) a) Name the microbicide that has been developed using nanotechnology to prevent the entry of HIV and HSV to the body.

.....

b) Mention the scientific name of the parasite of filariasis.

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Part B - Essays

Instructions.

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

- (05) Introduce allosteric regulation of enzymes and briefly explain the mechanisms that regulate enzyme activity in a cell.
- (06) a) Briefly describe the type of cell that transports water and minerals in all vascular plants.
b) Describe the upward movement of water and minerals in plants.
- (07) Describe the structure of human skin and state its functions.
- (08) a) Explain the process of parturition of humans and the positive feedback mechanism associated with it.
b) Describe the temporary birth control methods commonly used by humans and their physiological processes.
- (09) a) Briefly describe the main enzymes used in gene technology and their functions.
b) Describe the applications of microorganisms in environmental management.
- (10) Write short notes on,
a) Tropical montane forests.
b) Cystic fibrosis
c) Preservation of food through radiation.