Part A

Structured Essay

Answer all questions on this paper itself

(Each question carries 100 Marks)

1. (A) (i) About how many years ago did life originate on earth?

(ii) Metabolism, growth and development are some characteristics of organisms. What is meant by each of them?

(a) Metabolism :

(b) Growth :

(c) Development :

(iii) (a) State the <u>three</u> main methods by which food production can be sustainably maintained.

(b) What mainly contributes for overuse of natural resources of earth?

(iv) In which geological eon, did the concentration of oxygen in earth's atmosphere start to increase?

(v) Name the eras in which each of the following took place.

(a) Colonization of land by plants :

(b) Dominance of gymnosperms :

(c) Appearance of first seed plants :

(B) (i) What is known as classification of organisms?

(ii) What are the important criteria used in modem systematics?

(iii) State four structural features that can be seen only in arthropods.

(iv) State three structural features unique to class Mammalia.

(v) What is the main physiological feature common to birds and mammals?

(C) (i) State the phylum of seedless plants that has a more recent common ancestor with seed plants and name a genus that belongs to this phylum.

(a) Phylum :
(b) Genus :

(ii) State two features of microphylls that can be used to distinguish them from megaphylls.

(iii) State a structure common to sporophytes of bryophytes and angiosperms other than sub cellular components, cells, stems and leaves.

(iv) What is the structural feature used to divide plants into two major groups?

(v) State the cell wall composition of organisms belonging to each of the following domains.

(a) Bacteria :
(b) Archaea :
(c) Eukarya :

2. (A) (i) (a) What is the property of water that helps in transporting dissolved minerals through vascular tissues in plants?

(b) Name a protein that has a defensive role in man.

(c) Name the monomer of a polysaccharide, which is a component of the fungal cell wall.

(ii) State an event that occurs in mitosis and meiosis II, but does not occur in meiosis I of the eukaryotic cell cycle.

(iii) (a) State where CO_2 is first fixed in C4 plants.

(b) Give <u>two</u> reasons for PEP carboxylase in C4 pathway of photosynthesis being more efficient than RuBP carboxylase enzyme in C3 pathway.

(iv) (a) What is known as secondary growth in plants?

(b) State <u>two</u> factors that are responsible for opening of stomata other than light.

(c) What is the special feature of soil in which *Nepenthes* is grown?

(v) (a) What happens to the triploid nucleus formed after double fertilization in angiosperms?

(b) State the specific location of statoliths in plants.

(B) (i) (a) State the protein-carbohydrate complex found in the matrix of cartilage tissue and name the type of cells that secretes it.

Protein-carbohydrate complex :
Type of cells :

(b) State a major function of cartilage tissue other than providing support.

(ii) What is known as each of the following?

(a) Protein sparing :

(b) Non-essential fatty acids :

(c) Balanced diet :

(iii) Name <u>two</u> nonessential amino acids.

(iv) What is the normal value of each of the following in a healthy adult person?

(a) Blood pH :
(b) Life span of erythrocytes :
(c) Blood pressure at rest :

(v) What is known by each of the following?

(a) Cardiac cycle :
(b) Hypertension :

(C) (i) (a) What is known as anatomical dead space?

(b) What is the volume of the anatomical dead space of a normal healthy adult person?

(ii) State how the coordination through nervous system is faster when compared with coordination through the endocrine system.

(iii) (a) Name the <u>three</u> major functional areas of the cerebral cortex of man.

(b) State <u>two</u> differences between sympathetic and parasympathetic division of the autonomic nervous system.

Sympathetic division	Parasympathetic Division

(iv) Name the disease that causes severe mental deterioration characterized by confusion and memory loss in man.

(v) (a) State an advantage of binocular vision.

(b) What is the function of the Eustachian tube?

3. (A) (i) Name a phylum that contains animals with hydrostatic skeleton.

(ii) (a) State one function of each of the following in the human skull

Fontanelles:

Sutures:

(b) Which human vertebrae contain a foramen in each transverse process?

(c) Give two examples for hinge joints found in the human lower limb.

(III) Name a group of animals which possesses salt glands for excretion.

(iv) (a) Name two substances that are secreted by the distal convoluted tubule of human nephron.

(b) State the two sites of action of ADH in the human kidney.

(v) State the roles of helper T cells in immunity.

(B) (i) What is the reason for developing Type I diabetes in man?

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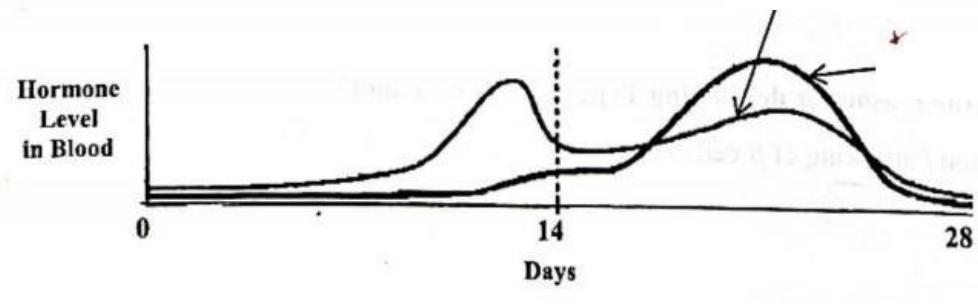
(ii) Construct a flow chart to show the feedback mechanism related to the action of oxytocin on mammary glands of humans.

(iii) State <u>two</u> advantages of asexual reproduction seen among invertebrates.

(iv) (a) Write in correct sequence, the entire process of production of sperm in man starting from spermatogonial stem cells.

(b) From which portion of the blastocyst, does the fetal portion of placenta develop in humans?

(v) (a) Indicate below, how the levels of ovarian hormones in the blood are changed during the typical 28 days reproductive cycle of a mature woman.



(b) State the actions of Depo-Provera injection in human females.

(C) (i) (a) What are known as microaerophilic organisms?

(b) Name a microaerophilic bacterial species.

(ii) Why do heterocysts have thick walls?

(iii) (a) State <u>two</u> methods where dry heat is used for sterilization of materials in a microbiological laboratory.

(b) State <u>two</u> methods of disinfection used in drinking water treatment.

(iv) Name a fungal species and a bacterial species that cause food intoxication.

Fungal species :

Bacterial species :

(v) (a) State <u>two</u> differences between sub-unit vaccines and live attenuated vaccines.

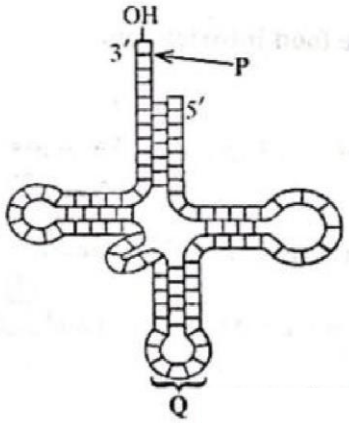
(b) State in correct sequence, the <u>two</u> steps in the production of vinegar using fruit juice and name <u>one</u> species of microorganisms used in each of these steps.

Step	microorganism Species

4 (A) (i) What are the <u>two</u> types of signals that are responsible for epigenetics?

(ii) State a major function of signal peptides present in certain polypeptides.

(iii) Identify the molecule given in the diagram and name the parts labelled as <u>P</u> and <u>Q</u>.



Molecule : .....

P : .....

Q : .....

(iv) What is the property of the genetic code that allows a gene isolated from one organism expressing the same polypeptide when inserted into another organism?

(v) State <u>two</u> methods used to introduce a foreign DNA molecule into a plant cell.

(B) (i) Name the <u>three</u> biomes that are located closest to the equator.

(ii) (a) State the <u>two</u> dominant vegetation types in villus.

(b) State <u>two</u> locations in Sri Lanka where villus are common.

(iii) What is meant by each of the following?

(a) Population:

(b) Trophic level:

(c) Food chain:

(iv) (a) Name <u>two</u> invasive alien plants found in the reservoirs of Sri Lanka.

(b) Name <u>two</u> common sea grass genera in Sri Lanka.

(v) Why are coral reefs considered as rain forests of the sea?

(C) (i) State <u>five</u> important environmental services provided by biodiversity.

(ii) State <u>five</u> human activities that contribute to desertification.

(iii) (a) Many legislations and policies are formulated by the Sri Lankan government for environmental conservation. What is meant by legislation and a policy?

Legislation:

Policy:

(b) State a key legislation available in Sri Lanka for environmental conservation.

(iv) State the main concept on which tissue culture is based.

(v) How does addition of sugar preserve food?