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Part A - Structured Essay

Answer all questions on this paper itself.

(Each question carries 10 marks.)

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1. (A) (i) Water is an essential ingredient for life and it is the most abundant inorganic compound in living matter. State two major functions of water in living organisms.

(a) .....

(b) .....

(ii) Name two properties of water which help to moderate changes in temperature in living organisms.

(a) .....

(b) .....

(iii) Name two disaccharides which are reducing sugars.

(a) ..... (b) .....

(iv) Most enzymes become biologically inactive at high temperatures due to denaturation. State two physical changes of the enzyme molecule that contribute to this.

(a) .....

(b) .....

(v) Name the three components of a nucleotide.

(a) ..... (b) ..... (c) .....

(vi) Name the two nucleotides produced during light reactions of photosynthesis.

(a) ..... (b) .....

(vii) Name two organelles in a living cell which are involved in detoxification of some substances produced during metabolism.

(a) ..... (b) .....

(viii) State two major features of collenchyma.

(a) .....

(b) .....

(B) (i) What are conidia?

.....

.....

.....

(ii) Name the phylum of kingdom Fungi in which conidia can be seen.

.....

(iii) Name the other type of spore found in the phylum stated in (B)(ii) above and state its function.

Type of spore	Function
.....	.....

(iv) What is a zoospore?

.....

.....

(v) Name the phylum of kingdom Fungi in which zoospores are present.

.....

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(C) (i) Some structures found among animals are given below.
(a) Antennae (b) Tentacles (c) Poison stings/poison claws (d) Eyes (e) Setae
State which of the above structures is/are found in the following animals.

I. Centepede .....

II. Scorpion .....

III. Leech .....

IV. *Nereis* .....

(ii) State a major structural resemblance between brittle star and *Bipalium*.

.....

(iii) Name the vertebrate class/classes that shows/show the following characters.

(a) External fertilization

.....

(b) Digits ending with claws

.....

(c) Absence of teeth

.....

2. (A) (i) (a) What is nutrition?

.....

(b) What is the main difference between autotrophs and heterotrophs?

.....

.....

(ii) (a) What is commensalism?

.....

.....

(b) How does commensalism differ from mutualism?

.....

.....

(iii) (a) State two functions of fibre in the human diet.

.....

.....

(b) What are vitamins?

.....

.....

.....

(c) Deficiency of what vitamin is responsible for each of the following disorders of man?

Blindness .....

Cracking of skin around mouth .....

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(iv) (a) What is peristalsis?

.....

.....

(b) State the location of Auerbach's plexus in the human alimentary canal.

.....

.....

(v) (a) State two functions of enterogastrone?

.....

.....

(b) Name two digestive enzymes found only in enterocytes of the human villi.

.....

.....

(B) (i) What is excretion?

.....

.....

(ii) Name an invertebrate excretory structure which is in close contact with blood vessels.

.....

(iii) (a) Name the two types of human nephrons.

.....

(b) Through what cellular layers should fluid pass from glomerulus to enter into proximal convoluted tubule of human nephron?

.....

(iv) (a) Name an excretory product secreted into the human nephron.

.....

(b) Name two ions that are passively reabsorbed into the human nephron.

.....

(v) What is the site of obligatory reabsorption of water in the human nephron?

.....

(C) (i) (a) What is the main function of ventilation in man?

.....

.....

(b) What are the main muscles used in normal breathing in man at rest?

.....

(ii) (a) What is the average respiratory rate of a healthy adult man at rest?

.....

(b) State three respiratory functions of human nose.

.....

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(iii) (a) What is the main factor that controls breathing in man?

.....

(b) What is the essential feature of any respiratory pigment?

.....

.....

(iv) (a) State two functions of mucus of human respiratory tract.

.....

.....

(b) What cells line the human alveolus?

.....

(v) What is the relationship between body size of an animal and area of its respiratory surface?

.....

.....

3. (A) (i) What is a chemoautotrophic organism?

.....

(ii) Give one example for a chemoautotrophic bacterium.

.....

(iii) What are prions?

.....

(iv) Give one example for a disease caused by prions.

.....

(v) Name one laboratory culture medium used for the cultivation of each of the following.

(a) Heterotrophic bacteria .....

(b) Fungi .....

(c) Viruses .....

(vi) Pathogenic microorganisms enhance pathogenicity by producing exotoxins and endotoxins.

(a) What are endotoxins?

.....

(b) Give an example for a bacterium that produces endotoxins?

.....

(c) What are exotoxins?

.....

(d) Name three different types of exotoxins and name three different species of bacteria that produce them.

Type of exotoxin	Name of the bacterium
.....	.....
.....	.....
.....	.....

[see page 6]

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(B) (i) At what stage does meiosis occur in each of the following?

(a) Human males .....

(b) Higher plants .....

(c) *Selaginella* .....

(ii) Indicate with a cross (×) in the appropriate column, which of the following structures are present or processes occur during meiosis **only** or during **both** mitosis and meiosis.

	In meiosis only	In both meiosis and mitosis
◦ Bivalents	.....	.....
◦ Centrioles	.....	.....
◦ Centromeres	.....	.....
◦ Chiasmata	.....	.....
◦ Chromatids	.....	.....
◦ Cytokinesis	.....	.....
◦ Microtubules	.....	.....
◦ Aster	.....	.....
◦ Spindles	.....	.....
◦ Telophase	.....	.....

(iii) The table below shows that the fruit shape of a *Cucurbita* sp is determined by alleles of two genes (Aa and Bb) that assort independently.

Genotype	Shape of fruit
A–B–	disc
A–bb or aaB–	spherical
aabb	elongate

(a) A plant of genotype AaBb was crossed with a plant of genotype Aabb. What proportion of the offspring has elongated fruits?

.....

(b) Two plants with spherical fruits were crossed. All of the offspring have disc shaped fruits. What are the genotypes of the two parent plants?

.....

(iv) What is a genetically modified organism?

.....

(v) Give two medical reasons which caused some countries to raise objections to using genetically modified crops in agriculture.

.....

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(C) (i) Name the four sections of the atmosphere, in correct order from the surface of earth to outer space.

.....

.....

(ii) In which section of the atmosphere, the ozone layer is found?

.....

(iii) What is the advantage of the ozone layer?

.....

(iv) What is the main substance that destroys the ozone layer?

.....

(v) What are the adverse impacts of the destruction of the ozone layer?

.....

.....

.....

4. (A) (i) What are the changes that have taken place in mammalian aortic arches from the basic plan of vertebrate aortic arches?

.....

.....

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.....

(ii) Name the two iron containing respiratory pigments found among animals other than haemoglobin.

(a) ..... (b) .....

(iii) What is the haemoglobin concentration in the blood of a normal healthy adult male person?

.....

(iv) Name four vitamins required for the formation of blood components in man.

.....

(v) State the importance of determining erythrocyte sedimentation rate (ESR).

.....

(B) (i) What is lymph?

.....

.....

(ii) Name the two main vessels in the lymphatic system of man.

.....

[see page 8]

Do not write in this column

(iii) At which location does the lymphatic system join with the blood circulatory system in man?

.....

(c) (a) State the prominent structural similarity between lymph vessels and veins in man.

.....

(b) State two main structural dissimilarities between the blood circulatory system and lymphatic system in man.

.....

.....

(c) How is lymph transported in lymph vessels in man?

.....

.....

(d) (i) Name the methods of water movement in plants and give one example for each of them.

Method	Example
.....	.....
.....	.....
.....	.....
.....	.....

(ii) State the major steps followed in the determination of solute potential of cells of an epidermal peel of *Rhoeo* leaf.

.....

.....

.....

.....

.....

(iii) What is the role of casparian strip in the endodermis of root in transportation of water and solutes?

.....

.....

.....

(iv) Why does the rate of absorption of mineral ions into plant roots slows gradually when roots are deprived of oxygen supply?

.....

(v) Some plants have developed mutual relationships with microorganisms to assist roots to absorb minerals. State two such examples.

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[See page nine

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கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2014 ஓகஸ்ற்
General Certificate of Education (Adv. Level) Examination, August 2014

ජීව විද්‍යාව	II
உயிரியல்	II
Biology	II

09 E II

Instructions:

Part B - Essay

* *Answer four questions only.*
Give labelled clear diagrams where necessary.
(Each question carries 15 marks.)

5. (a) Describe the typical structure of a chloroplast.
   (b) Explain the role of chloroplast in CO_2 fixation in photosynthesis.

6. (a) Describe the structure of human ovary.
   (b) Briefly explain how reproductive hormones regulate ovarian events of the menstrual cycle.

7. (a) What is waste water?
   (b) What are the adverse effects of discharging large amounts of waste water into natural water bodies?
   (c) Describe the principles and the major steps in the treatment of industrial waste water.

8. (a) Describe the structure of DNA.
   (b) Describe the structure of genes and its relationship with chromosomes.

9. (a) What are plant growth substances?
   (b) Name the major types of plant growth substances and explain their role in plants.
   (c) Briefly describe the agricultural applications of plant growth substances.

10. Write short notes on the following.
   (a) Exoskeleton of animals
   (b) Major features of the life cycle of *Pogonatum*
   (c) Loss of biodiversity

* * *