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# **Department of Examinations, Sri Lanka**

අධ්‍යාපන පොදු සභාවික පත්‍ර (උසේ තොල) විභාගය, 2018 අනුස්ථාන

**கல்விப் பொதுத் தாநம் பதினாற் (2 ம் தா)ப் பாரி செ, 2018 ஒக்டோபர்  
General Certificate of Education (Adv. Level) Examination, August 2018**

**ବିଜ୍ଞାନ** I  
**Biology** I

09 E I

06.08.2018 / 1300 – 1500

பூர் தேவை  
இரண்டு மணித்தியாலம்  
*Two hours*

**Instructions:**

- \* Answer all questions.
  - \* Write your Index Number in the space provided in the answer sheet.
  - \* Instructions are given on the back of the answer sheet. Follow those 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) on the number of the correct option in accordance with the instructions given on the back of the answer sheet.

- Which of the following takes place in the metaphase of mitosis?
    - Formation of spindle
    - Condensation of chromosomes
    - Disappearance of nucleolus
    - Aligning chromosomes in the middle of the cell
    - Breaking down of nuclear membrane
  - Which of the following **cannot** be seen in a typical plant cell when observed under a light microscope?

(1) Chloroplasts	(2) Starch granules	(3) Nucleus
(4) Mitochondria	(5) Vacuoles	
  - Which of the following biochemical processes requires ATP?
    - Photolysis of water during photosynthesis
    - Absorption of  $K^+$  into root hair cells from soil solution
    - Diffusion of oxygen into living cells through cell membrane
    - Attaching a carbon dioxide molecule to RuBP in the Calvin cycle
    - Conversion of pyruvate to PEP in C4 pathway
  - Which of the following statements regarding the elements found in living matter is correct?
    - There are 92 naturally occurring elements in living matter.
    - Composition of elements in organisms is not constant.
    - Elements found in organisms in less than 0.1% in dry weight are considered as trace elements.
    - Iron is an example for a macroelement found in all organisms.
    - Carbon, hydrogen, oxygen, nitrogen, phosphorus and magnesium are the six most abundant elements of living matter.
  - Having strong adhesive and cohesive forces is an important physical property of water molecules. Which of the following functions of plants is **not** associated with this property?
    - Mechanical support in herbaceous plants
    - Absorption of water from soil
    - Turgor movements
    - Transport of water within plant
    - Dissolving of materials in protoplasm

6. All features given in which one of the following responses are present in a plant with trimerous flower parts?
- Parallel veins in leaves, embryos with one cotyledon, fibrous roots, branched lipids in cell membrane
  - Seeds in fruits, dominant sporophyte, several kinds of RNA polymerases, scattered vascular bundles in stem
  - Embryos with one cotyledon, photosynthetic gametophyte, vascular bundles in the stem without cambia, unbranched lipids in cell membrane
  - Parallel veins in leaves, heterospory, fibrous roots, protein synthesis that begins with formyl methionine
  - Scattered vascular bundles in stem, perianth, naked seeds, unbranched lipids in cell membrane
7. A unicellular protist without flagella
- could be sensitive to penicillin.
  - may contain fucoxanthin.
  - could be heterotrophic.
  - may belong to phylum Rhodophyta.
  - may contain phycocyanin.
8. Which of the following statements regarding classification of organisms is correct?
- Viruses do not belong to any kingdom as they do not have a well organized nucleus.
  - Protista is a natural kingdom where organisms with different evolutionary origins are included.
  - The number of common characteristics found within a genus is higher than that of a species.
  - The kingdom of plants was first identified by Carolus Linnaeus.
  - Robert Whittaker introduced the three domain classification.
9. Which of the following may be present in a bilaterally symmetrical coelomic animal with tentacles and without a ventral heart?
- Spines
  - Nerve ring
  - Antennae
  - Gills
  - Pinnules
10. Which of the following statements regarding the digestive system of man is correct?
- Longitudinal muscles in the stomach are located between the circular muscles and sub-mucosa.
  - Secretion of gastric juice is stimulated by parasympathetic nervous system.
  - Spaces between two microvilli in small intestine are called crypts of Lieberkuhn.
  - Secretin stimulates the contraction of gall bladder to release bile into duodenum.
  - Microvilli in small intestine are visible under low power of the optical microscope.
11. Which of the following statements regarding regulation of breathing in man is correct?
- It is regulated by the respiratory centres located in medulla oblongata and hypothalamus.
  - Due to stimulation of inspiratory centre of medulla oblongata, nerve impulses are sent to external intercostal muscles.
  - Increase in the pH of arterial blood stimulates chemoreceptors in aorta.
  - Stimulation of stretch receptors in lungs inhibits expiratory centre.
  - Stimulation of expiratory centre results in the contraction of diaphragm.
12. Transport of water and minerals in plants
- occurs in both directions.
  - is not aided by transpiration.
  - is an active process.
  - is explained by pressure flow hypothesis.
  - occurs under a negative pressure gradient.

- 13.** Characteristics of two plant cells named P and Q are given below.  
Cell P: Thick secondary cell wall, isodiametric, pits in cell wall, large lumen  
Cell Q: Thick secondary cell wall, not isodiametric, no pits in cell wall, narrow lumen  
The cells P and Q are respectively  
(1) a companion cell and a vessel element.  
(2) a sieve tube element and a tracheid.  
(3) a vessel element and a sclerenchyma cell.  
(4) a vessel element and a tracheid.  
(5) a tracheid and a vessel element.

**14.** Which of the following statements regarding circulatory systems of animals is correct?  
(1) Open circulatory system with ventral heart is present in mollusks.  
(2) Closed circulatory system is found in nematodes.  
(3) Haemocyanin is the blood pigment of crustaceans.  
(4) AV node is the pacemaker of human heart.  
(5) In human heart, mitral valve is found between the left auricle and left ventricle.

**15.** Pons Varolii of humans is involved in  
(1) regulation of blood pressure.  
(2) recognition of sensory information.  
(3) regulation of ventilation of lungs.  
(4) regulation of the rate of heart beat.  
(5) regulation of reflex movements of eye muscles.

**16.** Select the correct statement regarding human ear.  
(1) Its normal hearing range is 40 - 20 000 Hz.  
(2) Incus is connected to the oval window.  
(3) Pinna is composed of hyaline cartilage.  
(4) Membranous labyrinth is filled with perilymph.  
(5) Organ of Corti is associated with auditory function.

**17.** In humans, parasympathetic stimulations  
(1) dilate the pupil of eye.  
(2) decrease the rate of heart beat.  
(3) increase secretion of sweat.  
(4) dilate bronchi.  
(5) increase conversion of glycogen to glucose in the liver.

**18.** Select the correct statement regarding action potential of a human neurone.  
(1) K<sup>+</sup> influx into the neurone occurs during repolarization phase of action potential.  
(2) Duration of an action potential is about 5 milliseconds.  
(3) Na<sup>+</sup> efflux from the neurone occurs during depolarization phase of action potential.  
(4) It is a transient reversal of polarity of the nerve cell membrane.  
(5) Immediately after one action potential, another action potential can be produced.

**19.** Select the correct statement regarding human hormones.  
(1) Insulin is secreted by α-cells of islets of Langerhans.  
(2) Aldosterone is the main glucocorticoid secreted from the adrenal cortex.  
(3) Parathyroid hormone reduces blood calcium level.  
(4) Thyroxine increases heat production of the body.  
(5) Inhibin stimulates the secretion of FSH.

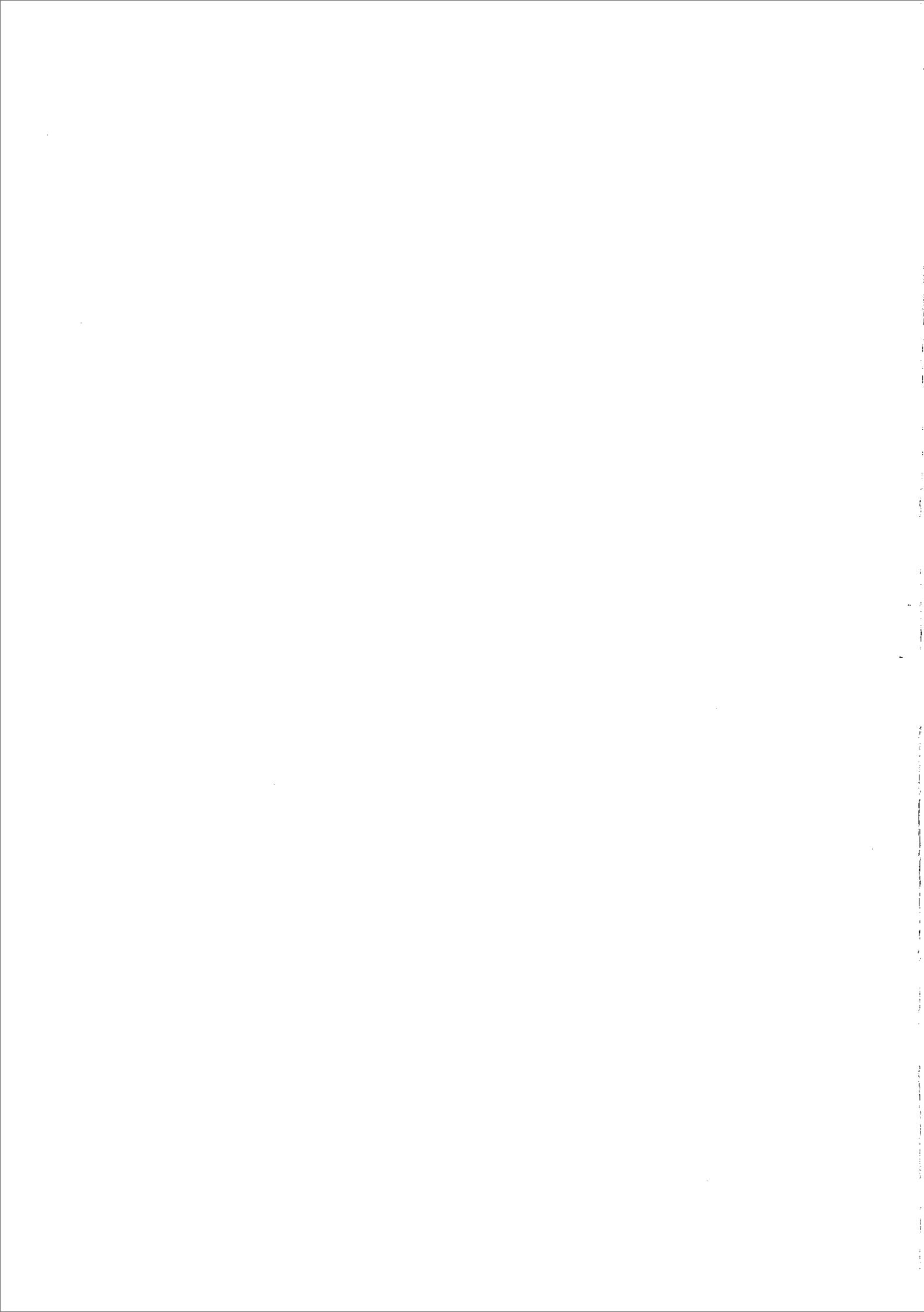
**20.** Select the plant growth substance which stimulates elongation of internodes and activates the enzymes in seed germination.  
(1) Ethylene  
(2) Abscisic acid  
(3) Cytokinin  
(4) Gibberellin  
(5) Auxin

21. Which of the following statements regarding excretion is correct?
- Simple excretory system with longitudinal canals are found in nematodes.
  - Nephridia are excretory structures found only in annelids.
  - In humans, kidney is the main site of urea synthesis.
  - Water conservation is highest when urea is produced as the nitrogenous excretory product.
  - Ammonia is the main nitrogenous excretory product of marine bony fishes.
22. Which of the following is **not** likely to be found in human milk?
- Vitamin B<sub>12</sub> and vitamin D
  - Casein
  - Galactose
  - Fatty acids
  - Calcium
23. Select the correct statement regarding human ribs.
- They are short and curved bones.
  - Superior surface of ribs is deeply grooved.
  - There are 14 pairs of ribs.
  - The first eight pairs of ribs articulate directly with the sternum.
  - All ribs articulate posteriorly with the vertebral column.
24. Which of the following statements regarding human upper limb is correct?
- Humerus is the longest and heaviest bone in the body.
  - Radius is longer than ulna.
  - Head of radius articulates with ulna.
  - Wrist is made up of seven carpal bones.
  - Distal end of humerus articulates only with ulna.
25. In humans, inhibin is secreted by
- prostate glands.
  - epididymis.
  - seminal vesicles.
  - testes.
  - Cowper's glands.
26. Select the correct statement regarding thigmotropism.
- It can be seen in male gametes of some plants.
  - Auxins are not involved in it.
  - Unequal elongation in different regions of plant can occur during it.
  - Pollen tube growing towards ovule is an example for it.
  - Cytokinins are involved in it.
27. The male gametophyte of a flowering plant is the
- pollen sac.
  - microspore.
  - sperm cell.
  - microspore mother cell.
  - pollen grain.
28. When a red flowered plant of a certain species is crossed with a white flowered plant of the same species, all progeny were pink flowered. This type of inheritance results in due to
- Mendelian inheritance.
  - polygenic inheritance.
  - codominance.
  - incomplete dominance.
  - polyallelism.
29. This question is based on the statement with three blanks given below.  
 "Variants of genes, which are called ..... , arise due to ..... that occur as a result of mistakes in ..... ."  
 Which of the following indicates in correct order, the terms that are best suited to fill the blanks of the above statement?
- genotypes, variations, DNA replication
  - alleles, mutations, transcription
  - alleles, mutations, DNA replication
  - mutants, variations, protein synthesis
  - heterozygotes, mutations, meiosis

30. Turner syndrome is best illustrated in which of the following persons?
- A girl born with a gene mutation on X chromosome
  - A boy born with a gene mutation on Y chromosome
  - A boy or a girl born with only one X chromosome
  - A girl born with only one X chromosome
  - A boy born with an additional Y chromosome
31. A genetically modified organism is different from other members of the same species because
- it carries an extra chromosome.
  - it carries a gene or genes from another organism.
  - it is generated by cloning of another organism.
  - it cannot produce fertile offspring by interbreeding with other members of the same species.
  - its gene expression is well regulated.
32. Select the **incorrect** statement regarding an expert in genetic counselling.
- He is knowledgeable on genetic disorders of humans.
  - He advises persons with genetic disorders about the nature of the problem.
  - He advises to abort a foetus if one of the parents is a carrier of a genetic disorder.
  - He helps family members of the person with genetic disorder to manage the situation.
  - He explains the persons with genetic disorder and family members how the disorder is inherited.
33. In an ecosystem, gross primary productivity and the amount of energy available at the third trophic level were determined to be  $2000 \text{ kJ m}^{-2} \text{ year}^{-1}$  and  $11 \text{ kJ m}^{-2} \text{ year}^{-1}$  respectively. If 90% of energy is lost when flows from one trophic level to the next, the amount of energy used for respiration by the primary producers in this ecosystem is
- |  |  |  |
|--|--|--|
| (1) $900 \text{ kJ m}^{-2} \text{ year}^{-1}$ .  | (2) $990 \text{ kJ m}^{-2} \text{ year}^{-1}$ .  | (3) $1010 \text{ kJ m}^{-2} \text{ year}^{-1}$ . |
| (4) $1100 \text{ kJ m}^{-2} \text{ year}^{-1}$ . | (5) $1800 \text{ kJ m}^{-2} \text{ year}^{-1}$ . |  |
34. Clearing of forests contributes to
- increase the concentration of heavy metals in plants.
  - skin cancer.
  - eroding of limestone monuments.
  - sea level rise.
  - reduce the range of spread of tropical diseases.
35. Experiments of Stanley Miller
- provided evidence for the theory of spontaneous generation of life.
  - showed that primordial soup contained a large amount of organic molecules.
  - showed that organic molecules can be formed from inorganic gases.
  - provided evidence for the theory presented by Schleiden, Schwann and Virchow.
  - showed that life originated about 3500 million years ago.
36. *Nitrosomonas* is
- a chemoautotroph which reduces  $\text{N}_2$  to  $\text{NH}_4^+$ .
  - a chemoheterotroph which oxidises  $\text{NH}_4^+$  to  $\text{NO}_2^-$ .
  - a chemoautotroph which oxidises  $\text{NH}_4^+$  to  $\text{NO}_2^-$ .
  - a chemoautotroph which reduces  $\text{NO}_3^-$  to  $\text{NO}_2^-$ .
  - a chemoheterotroph which reduces  $\text{N}_2$  to  $\text{NH}_4^+$ .







கிடை ம ரிகிள் ஆவிர்ணி/முழுப் பதிப்புரிமையுடையது/All Rights Reserved]

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கல்விப் பொதுந் துறைப் பகுதி (பர் நா)ப் பரிசீ, 2018 ஒகஸ்ட்

**General Certificate of Education (Adv. Level) Examination, August 2018**

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III

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II

09

E

II

07.08.2018 / 1300 – 1610

ஏடு ஓக்டை  
மூன்று மணித்தியாலம்  
*Three hours*

அமுலர் கியவில் காலை	- தீவிரமாக 10 நிமிடங்கள்
மேலதிக வாசிப்பு நேரம்	- 10 நிமிடங்கள்
<b>Additional Reading Time</b>	<b>10 minutes</b>

**Use additional reading time** to go through the question paper, select the questions and decide on the questions that you give priority in answering.

**Index No. :** .....

## **Instructions:**

- \* This question paper consists of 10 questions in 9 pages.
  - \* This question paper comprises Part A and Part B. The time allotted for both parts is three hours.

**PART A – Structured Essay (Pages 2 - 8)**

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

**PART B – Essay (Page 9)**

- \* Answer **four** questions only. Use the papers supplied for this purpose. At the end of the time allotted for this paper, before handing over to the supervisor tie the two parts together so that Part A is on the top of Part B.
  - \* You are permitted to remove only Part B of the question paper from the examination hall.

**For Examiners' Use Only**

<b>Part</b>	<b>Question No.</b>	<b>Marks</b>
<b>A</b>	<b>1</b>	
	<b>2</b>	
	<b>3</b>	
	<b>4</b>	
<b>B</b>	<b>5</b>	
	<b>6</b>	
	<b>7</b>	
	<b>8</b>	
	<b>9</b>	
	<b>10</b>	
<b>Total</b>		
<b>Percentage</b>		

## **Final Marks**

In Numbers	
In Letters	

## **Code Numbers**

Marking Examiner 1	
Marking Examiner 2	
Marks checked by :	
Supervised by :	

**Part A - Structured Essay**

*Answer all questions on this paper itself.  
(Each question carries 10 marks.)*

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1. (A) (i) Following are some of the characteristics seen in living organisms. Explain what is meant by each of these characteristics.

(a) Growth

.....  
.....

(b) Development

.....  
.....

(c) Reproduction

.....  
.....

- (ii) There are four main types of organic compounds found in organisms. State the mostly found main type of organic compound in each of the following.

(a) Egg white: .....

(b) Coconut milk: .....

(c) Primary cell walls: .....

(d) Arthropod exoskeleton: .....

- (iii) Name a laboratory test used to identify the following.

(a) Main type of organic compound found in egg white

.....  
.....

(b) Main type of organic compound found in coconut milk

.....  
.....

(c) Main storage substance of Chlorophyta

.....  
.....

(d) Reducing sugars .....

- (B) (i) Name **four** monosaccharides according to the number of carbon atoms and give an example for each of them.

**Monosaccharide****Example**

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

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

(c) ..... .....

(d) ..... .....

- (ii) What is a disaccharide?

.....  
.....

(iii) (a) State the common characteristic of all monosaccharides and some disaccharides.

.....

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(b) Describe a simple laboratory test used to identify sugars with the characteristic stated as the answer for (iii) (a) above.

.....

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.....

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.....

(C) (i) State the generic names of **two** homosporous, seedless plants with vascular tissues.

.....

(ii)



(a)



(b)



(c)



(d)



(e)



(f)

Complete the following dichotomous key using appropriate numbers and letters to distinguish the animals shown in the diagrams (a)-(f) above.

(1) Tentacles present .....  
Tentacles absent .....

(2) Suckers present .....  
Suckers absent .....

(3) Hooks present .....  
Hooks absent .....

(4) Segmented body .....  
Unsegmented body .....

(5) Large foot present .....  
Large foot absent .....

(iii) Structures known as pedicellaria are present in some echinoderms such as starfishes.  
Draw the external appearance of a pedicellaria.

(iv) Name **two** classes of phylum Echinodermata that do **not** have pedicellaria.

.....

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2. (A) (i) Name a class which has animals with an incomplete alimentary canal other than coelenterates and flat worms.

.....

- (ii) (a) What is radula?

.....

- (b) What is the use of radula?

.....

- (iii) (a) Why are some plants insectivorous?

.....

- (b) State the generic name of an insectivorous aquatic plant. ....

- (iv) (a) Write in correct order, the passage of air from outside to alveoli in man.

.....

.....

- (b) What is the role of goblet cells present in human respiratory tract?

.....

- (v) (a) What is respiratory cycle?

.....

.....

- (b) What is the volume of air that enters the respiratory system during one normal respiratory cycle of a healthy adult man at rest? ....

- (B) (i) (a) What is meant by ultrafiltration that takes place during urine formation?

.....

.....

- (b) Name an ion that is secreted into the lumen of human nephron.

.....

.....

.....

- (ii) State **three** functions of human kidney other than urine formation.

.....

.....

.....

- (iii) Name the skin receptors involved in thermoregulation in man.

.....

.....

.....

- (iv) (a) What is the functional unit of human liver? ....

- (b) State **four** homeostatic functions of human liver.

.....

.....

.....

- (v) (a) What are the **three** factors that contribute to the resting membrane potential of neurones?

.....  
.....  
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- (b) Which lobe of the human cerebrum controls muscle movement needed for speech?

.....

- (C) (i) (a) What is a hormone?

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

- (b) Where does ADH act on the kidney tubules of man?

.....

- (ii) State **two** main differences between nervous coordination and endocrine coordination.

.....  
.....

- (iii) (a) Briefly describe what are known as sinuses located in some bones of the human skeleton.

.....  
.....

- (b) Name a bone that contains sinuses but does not take part in the formation of human cranium. ....

- (iv) State **two** functions of sinuses.

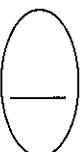
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- (v) Name the **two** processes found in human mandible and state the function of each of them.

**Process**

**Function**

.....  
.....



3. (A) (i) State the location of the pacemaker in the human heart.

.....

- (ii) Name the arteries that arise first from the aorta and state the structure to which they supply blood.

**Arteries**

**Structure**

.....

- (iii) State how blood circulatory system contributes to maintain constant body temperature in man.

.....

.....

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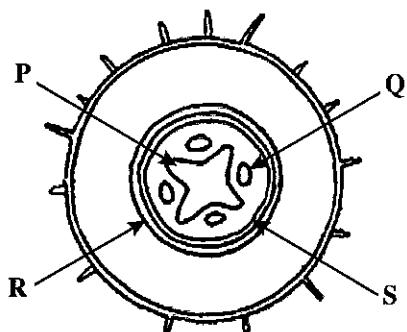
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- (iv) Considering the ABO blood groups and Rh factor, state the blood groups of the following persons.

Universal donor ..... .....

Universal recipient ..... .....

(B)



- (i) Identify the structure shown in the above diagram.

.....

- (ii) (a) Name the tissues labelled as **P**, **Q**, **R** and **S** in the above diagram.

**P** ..... **Q** .....

**R** ..... **S** .....

- (b) What is the tissue of the above diagram that appears in red when stained with safranine?

.....

- (iii) Draw and label a few cells of tissue **R** when it is at matured stage.

- (iv) What are the features of gymnosperms that enable them to be more successful on terrestrial habitats than bryophytes?

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

- (v) State **three** uses of plant tissue culture other than the propagation of plants with desired characteristics.

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

- (C) (i) What is the main purpose of examining a bacteria smear stained with methylene blue under the high power of a light microscope.

- (ii) (a) Name the forms of arrangement of cells of cocci shown in the diagrams A-D given below.



A



B



C



D

A ..... B .....

C ..... D .....

- (b) What are the **two** types of arrangement of cells of bacilli?

.....

- (iii) (a) What are prions?

.....

- (b) How could prions be transmitted from human to human?

.....

.....

- (iv) Some microorganisms in the normal microbiota of humans may become pathogenic when general resistance of the body is lowered. How are these microorganisms called?

- (v) Give **four** reasons for lowering the general resistance of the human body against microbial infections.

.....

.....

.....

.....

4. (A) (i) (a) What is placenta?

.....

.....

- (b) What is the type of placenta found in humans?

.....

- (ii) (a) Name a material that passes from mother to foetus and from foetus to mother through placenta. ....

- (b) Name a virus that can pass from mother to foetus through placenta.

.....

- (iii) (a) Name a hormone secreted only by the human placenta.

.....

- (b) State **two** functions of placenta other than hormone secretion and exchange of material between mother and foetus.

.....

.....

- (iv) (a) What is lactation?

.....

- (b) Name **two** hormones that are directly involved in lactation.

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(v) What is the reason for menopause?

.....

(B) (i) Where does oxidative phosphorylation take place in an eukaryotic cell?

.....

(ii) State the events that take place during oxidative phosphorylation in an eukaryotic cell.

.....

.....

.....

(iii) Name **three** enzymes involved in DNA replication and state one function of each of them.

Enzyme

Function

.....

.....

.....

(iv) State **three** traits introduced to agricultural crops by genetic modification for crop protection.

.....

.....

.....

(C) (i) Why is it important to study environmental science?

.....

.....

.....

.....

(ii) What is *in-situ* conservation?

.....

.....

.....

.....

(iv) What is Ramsar convention?

.....

.....

.....

(v) Name **two** Ramsar sites located in the north-west of Sri Lanka.

.....

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