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இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka
Department of Examinations, Sri Lanka

අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2018 අගෝස්තු
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General Certificate of Education (Adv. Level) Examination, August 2018

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Biology	**I**	

06.08.2018 / 1300 – 1500

පැය දෙකයි
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** (×) on the number of the correct option in accordance with the instructions given on the back of the answer sheet.*

1. Which of the following takes place in the metaphase of mitosis?
(1) Formation of spindle
(2) Condensation of chromosomes
(3) Disappearance of nucleolus
(4) Aligning chromosomes in the middle of the cell
(5) Breaking down of nuclear membrane

2. 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

3. Which of the following biochemical processes requires ATP?
(1) Photolysis of water during photosynthesis
(2) Absorption of K^+ into root hair cells from soil solution
(3) Diffusion of oxygen into living cells through cell membrane
(4) Attaching a carbon dioxide molecule to RuBP in the Calvin cycle
(5) Conversion of pyruvate to PEP in C4 pathway

4. Which of the following statements regarding the elements found in living matter is correct?
(1) There are 92 naturally occurring elements in living matter.
(2) Composition of elements in organisms is not constant.
(3) Elements found in organisms in less than 0.1% in dry weight are considered as trace elements.
(4) Iron is an example for a macroelement found in all organisms.
(5) Carbon, hydrogen, oxygen, nitrogen, phosphorus and magnesium are the six most abundant elements of living matter.

5. 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?
(1) Mechanical support in herbaceous plants
(2) Absorption of water from soil
(3) Turgor movements
(4) Transport of water within plant
(5) Dissolving of materials in protoplasm

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6. All features given in which one of the following responses are present in a plant with trimerous flower parts?
   (1) Parallel veins in leaves, embryos with one cotyledon, fibrous roots, branched lipids in cell membrane
   (2) Seeds in fruits, dominant sporophyte, several kinds of RNA polymerases, scattered vascular bundles in stem
   (3) Embryos with one cotyledon, photosynthetic gametophyte, vascular bundles in the stem without cambia, unbranched lipids in cell membrane
   (4) Parallel veins in leaves, heterospory, fibrous roots, protein synthesis that begins with formyl methionine
   (5) Scattered vascular bundles in stem, perianth, naked seeds, unbranched lipids in cell membrane

7. A unicellular protist without flagella
   (1) could be sensitive to penicillin.
   (2) may contain fucoxanthin.
   (3) could be heterotrophic.
   (4) may belong to phylum Rhodophyta.
   (5) may contain phycocyanin.

8. Which of the following statements regarding classification of organisms is correct?
   (1) Viruses do not belong to any kingdom as they do not have a well organized nucleus.
   (2) Protista is a natural kingdom where organisms with different evolutionary origins are included.
   (3) The number of common characteristics found within a genus is higher than that of a species.
   (4) The kingdom of plants was first identified by Carolus Linnaeus.
   (5) 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?
   (1) Spines (2) Nerve ring (3) Antennae (4) Gills (5) Pinnules

10. Which of the following statements regarding the digestive system of man is correct?
   (1) Longitudinal muscles in the stomach are located between the circular muscles and sub-mucosa.
   (2) Secretion of gastric juice is stimulated by parasympathetic nervous system.
   (3) Spaces between two microvilli in small intestine are called crypts of Lieberkuhn.
   (4) Secretin stimulates the contraction of gall bladder to release bile into duodenum.
   (5) 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?
   (1) It is regulated by the respiratory centres located in medulla oblongata and hypothalamus.
   (2) Due to stimulation of inspiratory centre of medulla oblongata, nerve impulses are sent to external intercostal muscles.
   (3) Increase in the pH of arterial blood stimulates chemoreceptors in aorta.
   (4) Stimulation of stretch receptors in lungs inhibits expiratory centre.
   (5) Stimulation of expiratory centre results in the contraction of diaphragm.

12. Transport of water and minerals in plants
   (1) occurs in both directions.
   (2) is not aided by transpiration.
   (3) is an active process.
   (4) is explained by pressure flow hypothesis.
   (5) occurs under a negative pressure gradient.

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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 trachied.
(3) a vessel element and a sclerenchyma cell.
(4) a vessel element and a trachied.
(5) a trachied 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) Haemoerythrin 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^+ influx into the neurone occurs during repolarization phase of action potential.
(2) Duration of an action potential is about 5 milliseconds.
(3) Na^+ 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

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21. Which of the following statements regarding excretion is correct?
(1) Simple excretory system with longitudinal canals are found in nematodes.
(2) Nephridia are excretory structures found only in annelids.
(3) In humans, kidney is the main site of urea synthesis.
(4) Water conservation is highest when urea is produced as the nitrogenous excretory product.
(5) 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?
(1) Vitamin B_{12} and vitamin D (2) Casein (3) Galactose
(4) Fatty acids (5) Calcium

23. Select the correct statement regarding human ribs.
(1) They are short and curved bones.
(2) Superior surface of ribs is deeply grooved.
(3) There are 14 pairs of ribs.
(4) The first eight pairs of ribs articulate directly with the sternum.
(5) All ribs articulate posteriorly with the vertebral column.

24. Which of the following statements regarding human upper limb is correct?
(1) Humerus is the longest and heaviest bone in the body.
(2) Radius is longer than ulna.
(3) Head of radius articulates with ulna.
(4) Wrist is made up of seven carpal bones.
(5) Distal end of humerus articulates only with ulna.

25. In humans, inhibin is secreted by
(1) prostate glands. (2) epididymis. (3) seminal vesicles.
(4) testes. (5) Cowper's glands.

26. Select the correct statement regarding thigmotropism.
(1) It can be seen in male gametes of some plants.
(2) Auxins are not involved in it.
(3) Unequal elongation in different regions of plant can occur during it.
(4) Pollen tube growing towards ovule is an example for it.
(5) Cytokinins are involved in it.

27. The male gametophyte of a flowering plant is the
(1) pollen sac. (2) microspore.
(3) sperm cell. (4) microspore mother cell.
(5) 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
(1) Mendelian inheritance. (2) polygenic inheritance. (3) codominance.
(4) incomplete dominance. (5) 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?
(1) genotypes, variations, DNA replication
(2) alleles, mutations, transcription
(3) alleles, mutations, DNA replication
(4) mutants, variations, protein synthesis
(5) heterozygotes, mutations, meiosis

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30. Turner syndrome is best illustrated in which of the following persons?
(1) A girl born with a gene mutation on X chromosome
(2) A boy born with a gene mutation on Y chromosome
(3) A boy or a girl born with only one X chromosome
(4) A girl born with only one X chromosome
(5) A boy born with an additional Y chromosome

31. A genetically modified organism is different from other members of the same species because
(1) it carries an extra chromosome.
(2) it carries a gene or genes from another organism.
(3) it is generated by cloning of another organism.
(4) it cannot produce fertile offspring by interbreeding with other members of the same species.
(5) its gene expression is well regulated.

32. Select the **incorrect** statement regarding an expert in genetic counselling.
(1) He is knowledgeable on genetic disorders of humans.
(2) He advices persons with genetic disorders about the nature of the problem.
(3) He advices to abort a foetus if one of the parents is a carrier of a genetic disorder.
(4) He helps family members of the person with genetic disorder to manage the situation.
(5) 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 $2000\,kJ\,m^{-2}\,year^{-1}$ and $11\,kJ\,m^{-2}\,year^{-1}$ 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) $900\,kJ\,m^{-2}\,year^{-1}$.
(2) $990\,kJ\,m^{-2}\,year^{-1}$.
(3) $1010\,kJ\,m^{-2}\,year^{-1}$.
(4) $1100\,kJ\,m^{-2}\,year^{-1}$.
(5) $1800\,kJ\,m^{-2}\,year^{-1}$.

34. Clearing of forests contributes to
(1) increase the concentration of heavy metals in plants.
(2) skin cancer.
(3) eroding of limestone monuments.
(4) sea level rise.
(5) reduce the range of spread of tropical diseases.

35. Experiments of Stanley Miller
(1) provided evidence for the theory of spontaneous generation of life.
(2) showed that primodial soup contained a large amount of organic molecules.
(3) showed that organic molecules can be formed from inorganic gases.
(4) provided evidence for the theory presented by Schleiden, Schwann and Virchow.
(5) showed that life originated about 3500 million years ago.

36. *Nitrosomonas* is
(1) a chemoautotroph which reduces N_2 to NH_4^+.
(2) a chemoheterotroph which oxidises NH_4^+ to NO_2^-.
(3) a chemoautotroph which oxidises NH_4^+ to NO_2^-.
(4) a chemoautotroph which reduces NO_3^- to NO_2^-.
(5) a chemoheterotroph which reduces N_2 to NH_4^+.

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37. If a component in a culture medium is liable to be destroyed when exposed to high temperature, the best way to prepare that culture medium is to
(1) heat the medium at 80°C for two hours.
(2) autoclave the medium and filter through a membrane filter with 0.45 μm pores.
(3) autoclave the medium without the heat labile component and the solution of heat labile component separately, and mix them after cooling.
(4) autoclave the medium without the heat labile component, filter the solution of heat labile component through a membrane filter with 0.45 μm pores and mix after cooling.
(5) mix all components of the medium in a glass flask and sterilize using ultraviolet radiation.

38. A characteristic feature of fungi is
(1) having cell walls made up of glycopeptides.
(2) having heterotrophic absorptive nutrition.
(3) ingestion of food and digestion.
(4) storing food as starch.
(5) reproduction by endospores.

39. Which of the following statements regarding the use of sanitary landfills is correct?
(1) It is not a good choice due to high operational costs.
(2) It involves dumping of municipal solid waste to wetland areas for land filling.
(3) It is a method of reducing the volume of solid waste.
(4) It is limited due to low ground water level in many regions.
(5) It does not involve decomposition of waste.

40. Food preservation is based on the following principles.
a - Prevention of entry of microorganisms into food
b - Prevention of growth and activity of microorganisms in food
c - Removal or killing of microorganisms in food
Canning of food is based on which of the above principles?
(1) **a**, **b** and **c** (2) **a** and **b** only. (3) **a** and **c** only.
(4) **b** and **c** only. (5) **c** only.

● **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 indicates/indicate the examples for some hierarchical levels of biological organization in correct order?
(A) DNA, nucleus, muscle fibre, circular muscles, stomach
(B) Crow, flock of crows, flock of birds, home garden, biosphere
(C) Neurilemma, axon, neurone, brain, nervous system
(D) Amino acids, endoplasmic reticulum, neutrophils, blood vessels, blood
(E) Toad, Amphibia, Chordata, Animalia, Eukariya

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42. Glycolipids are synthesized by which of the following organelle/organelles?
(A) Lysosome (B) Microbody (C) Golgi complex
(D) Endoplasmic reticulum (E) Mitochondrium

43. Which of the following is/are found only in plant tissues?
(A) Glyoxisomes (B) Plasmodesmata (C) Lysosomes
(D) Peroxisomes (E) Tight junctions

44. A poikilothermic animal with urea as the major nitrogenous waste may have which of the following structure/structures?
(A) Gills (B) Four-chambered heart (C) Neck
(D) Lungs (E) Beak

45. Which of the following statements regarding the absorption of end products of digestion in man is/are correct?
(A) Glucose is absorbed actively in the small intestine.
(B) Triglycerides are synthesized in the epithelial cells of villi of small intestine.
(C) Amino acids are absorbed into blood capillaries of villi of small intestine by diffusion.
(D) Fatty acids and glycerol are absorbed into lymphatic vessels of villi of small intestine.
(E) Maltose is absorbed actively into the epithelial cells of villi of small intestine.

46. Which of the following statements regarding human erythrocytes is/are correct?
(A) They are produced in red bone marrow.
(B) They transport both oxygen and carbon dioxide.
(C) Their diameter is about 10 μm.
(D) They are destroyed in the spleen.
(E) The normal range of erythrocyte count in a healthy adult man is 3.8 – 5.8 million/mm^3.

47. In the proximal convoluted tubule of human nephron, which of the following is/are actively reabsorbed?
(A) Na^+ (B) K^+ (C) Amino acids
(D) Glucose (E) Urea

48. Which of the following statements regarding skeletal muscle is/are correct?
(A) They have gap junctions.
(B) They fatigue easily.
(C) Each of their fibres contains several sarcomeres.
(D) They are extensible.
(E) Their fibres are short, cylindrical and unbranched.

49. Regarding human uterus, which of the following statements is/are correct?
(A) Both oestrogen and progesterone stimulate contractions of myometrium.
(B) Uterine secretions nourish the foetus.
(C) Oestrogen stimulates the formation of oxytocin receptors in the myometrium.
(D) Implantation of embryo in the uterus commences by about seventh day following fertilization.
(E) Endometrium is made up of stratified squamous epithelial cells.

50. Which of the following indicates/indicate a characteristic feature of each of the savannas, dry mixed evergreen forests, tropical rain forests and montane forests in correct order?
(A) Fire resistant trees, no clear stratification, continuous canopy, evergreen trees
(B) Evergreen trees, deciduous plants, clear stratification, trees with twisted trunks
(C) Grass, evergreen trees, no clear stratification, xerophytic plants
(D) Grass, fire resistant trees, evergreen trees, no clear stratification
(E) Evergreen trees, no clear stratification, stunted trees, trees with twisted trunks

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