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ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கைப் பரீட்சைத் திணைக்களம்
Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka
ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
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General Certificate of Education (Adv. Level) Examination, August 2017

ජීව විද්‍යාව I உயிரியல் I Biology I	09 E I	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. The major role of trace elements in living organisms is to act as
   (1) cofactors of enzymes. (2) components of cell structure.
   (3) constituents of hormones. (4) components of chlorophyll.
   (5) reactants in metabolism.

2. In eukaryotic cells, in addition to nucleus, DNA is present in
   (1) ribosomes and centrioles. (2) mitochondria and chloroplasts.
   (3) nucleolus and peroxisomes. (4) microbodies and Golgi bodies.
   (5) glyoxisomes and endoplasmic reticulum.

3. Which of the following is not a function of epithelial tissues?
   (1) Support (2) Transport (3) Protection (4) Secretion (5) Absorption

4. Which of the following compounds would yield the maximum amount of energy to a cell by oxidation of one molecule?
   (1) Citric acid (2) Oxaloacetic acid (3) NADH
   (4) Sucrose (5) Pyruvic acid

5. Which of the following is not a function of smooth endoplasmic reticulum?
   (1) Storing of Ca^{2+} (2) Packaging of materials
   (3) Synthesis of lipids (4) Synthesis of carbohydrates
   (5) Synthesis of proteins

6. Which of the following does not occur in the chloroplast during the light reaction of photosynthesis?
   (1) Release of electrons from photosystems I and II
   (2) Photorespiration
   (3) Cyclic photophosphorylation
   (4) Non-cyclic photophosphorylation
   (5) Photolysis

7. Which of the following is the best combination of cell junction, its location and function?
   (1) Tight junction, gut epithelium, communication
   (2) Anchor junction, skin epithelium, preventing leakage
   (3) Tight junction, gut epithelium, preventing leakage
   (4) Gap junction, nervous tissue, preventing leakage
   (5) Anchor junction, skin epithelium, communication

8. Which of the following groups contains a genus that has branched lipids in the cell membrane?
   (1) *Lyngbya*, *Halobacterium*, *Cycas* and *Agaricus*
   (2) *Clostridium*, *Streptomyces*, *Fasciola* and *Chloroxylon*
   (3) *Melursus*, *Staphylococcus*, *Allomyces* and *Garcinia*
   (4) *Rhizopus*, *Hevea*, *Salmonella* and *Gelidium*
   (5) *Macrognathus*, *Mucor*, *Thiobacillus* and *Caryota*

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9. Presence of internal fertilization and a nerve ring, and absence of a larval stage are the features of which of the following animals?
(1) *Arenicola* (2) *Oecophylla* (3) Earthworm
(4) *Bipalium* (5) Spider

10. When preparing a dichotomous key in the practical class to distinguish scorpion, millipede, cockroach, prawn and centipede, which of the following may be least useful?
(1) Exoskeleton (2) Antennae (3) Eyes (4) Wings (5) Legs

11. A genus that does not show heterotrophic nutrition is
(1) *Plasmodium*. (2) *Loris*. (3) *Nitrosomonas*.
(4) *Pleurotus*. (5) *Chitala*.

12. Which of the following is found both in pancreatic juice and intestinal juice?
(1) Amylase (2) Lipase (3) Sucrase
(4) Ribonuclease (5) Trypsinogen

13. Which of the following occurs during inspiration?
(1) Relaxation of external intercostal muscles
(2) Relaxation of the diaphragm
(3) Forward movement of the sternum
(4) Increase in the pressure of the pleural cavity
(5) Inflow of inter-cellular fluid into alveoli

14. Which of the following factors least affects the rate of transpiration in plants?
(1) Humidity (2) Wind
(3) Available water in soil for plants (4) Light
(5) Texture of soil

15. Which of the following statements regarding phloem transport according to pressure-flow hypothesis is correct?
(1) Transfer cells secrete sucrose into sieve tubes along a concentration gradient.
(2) Pressure inside the sieve tube is greatest at the sink.
(3) Mass flow takes place from source to sink along a pressure potential gradient.
(4) Phloem transport is a passive process.
(5) Water potential in the sieve tube increases due to phloem loading.

16. Which of the following statements regarding human blood cells is correct?
(1) About 90% of all blood cells are erythrocytes.
(2) Basophils are the largest of white blood cells.
(3) Neutrophils are the only type of leucocytes which show phagocytosis.
(4) Eosinophils are involved in elimination of blood parasites.
(5) Lymphocyte count of a normal healthy adult person is 1.5×10^6 to 3.5×10^6 per litre of blood.

17. Select the correct statement regarding the blood circulatory systems of animals.
(1) Nematodes and echinoderms do not have blood circulatory systems.
(2) Insects and tapeworms possess open blood circulatory systems.
(3) Annelids and fishes have closed blood circulatory systems.
(4) Chlorocruorin functions as a respiratory pigment in crustaceans.
(5) Atrioventricular (AV) node functions as the pacemaker of the human heart.

18. Which of the following statements regarding the human brain is correct?
(1) Corpora quadrigemina is derived from embryonic hind-brain.
(2) Pons Varolii regulates breathing rate.
(3) Forebrain controls reflex movements of eye muscles.
(4) Cerebellum controls sneezing and coughing.
(5) Cerebrum is involved in sensory perception of pain.

19. Select the incorrect statement regarding physiology of neurones.
(1) Sodium-potassium pump is essential to maintain resting membrane potential.
(2) Resting membrane potential is about –70 mV.
(3) Duration of an action potential is about 2 ms.
(4) In a myelinated axon, action potential is formed only at the nodes of Ranvier.
(5) K^+ influx occurs during repolarization phase of the action potential.

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20. Which of the following statements regarding human calcitonin hormone is incorrect?
(1) It is secreted by follicular cells of the thyroid gland.
(2) It lowers the blood calcium level.
(3) It increases the storage of calcium in bones.
(4) It inhibits the reabsorption of calcium in the nephron.
(5) Its effects are opposite to those of parathyroid hormone.

21. Select the correct statement regarding human hormones.
(1) Cholecystokinin acts both on pancreas and liver.
(2) Thymus influences the development of B lymphocytes.
(3) Glucagon is secreted by β cells of the islets of Langerhans.
(4) Aldosterone stimulates the reabsorption of Na^+ and K^+ in the nephron.
(5) ADH acts on distal convoluted tubule and collecting duct of kidney tubules.

22. Which of the following statements regarding excretion is incorrect?
(1) Excretion is essential to maintain homeostasis.
(2) Excretion is the removal of nitrogenous waste from the body.
(3) In humans, bile pigments are excreted by kidneys and gut.
(4) Nephridia are excretory structures of annelids and molluscs.
(5) The first product of nitrogenous excretion in mammals is ammonia.

23. Select the correct statement regarding human vertebrae.
(1) The body of axis vertebra has a superior process.
(2) Atlas vertebra has a rudimentary spinous process.
(3) Sacrum is formed of six vertebrae.
(4) Thoracic vertebra has a bifid spinous process.
(5) Largest vertebral foramen is found in lumbar vertebrae.

24. Select the correct statement regarding the menstrual cycle.
(1) During the cycle, peak progesterone level is seen 2–3 days prior to menstruation.
(2) It is initiated by pituitary hormones.
(3) During the cycle, peak FSH level is higher than the peak LH level.
(4) The lengths of proliferative phase and secretory phase are the same.
(5) Steady decline of oestrogen and progesterone levels leads to menstruation.

25. Which of the following statements regarding human fallopian tube is incorrect?
(1) It is a duct with a funnel-like opening at the distal end.
(2) Its lumen is lined by a ciliated epithelium.
(3) It propels ovum from the ovary to uterus.
(4) Its secretions nourish both ovum and sperms.
(5) Fertilization normally occurs in its lower ⅓ region.

26. Select the incorrect statement regarding human epididymis.
(1) It is a highly coiled tube.
(2) It is connected to the testis and vas deferens.
(3) It stores sperms before ejaculation.
(4) Within it, sperms acquire the ability to fertilize.
(5) Hyperactivation of sperms occurs within it.

27. Which of the following statements regarding the development of human foetus and growth of infant is correct?
(1) By the end of the third month of pregnancy, heart beat of the foetus can be detected.
(2) By the end of the third month of pregnancy, fine hair cover the body of the foetus.
(3) Vocalization of an infant usually starts after two months of birth.
(4) Infant can sit on its own by the end of three months after birth.
(5) By the age of 10 months, infant should be fed on the usual diet of other members of the family.

28. Opening of some flowers in the day and closing at night is an example of
(1) tactic movement.
(2) thigmonastic movement.
(3) nyctinastic movement.
(4) phototropic movement.
(5) thigmotropic movement.

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29. Which of the following statements regarding plant tissue culture is incorrect?
(1) Plant tissue culture is the growing of plant tissues in sterile culture media with IAA under *in vitro* conditions.
(2) Many plant cells have the ability to generate a total plant when suitable conditions are provided.
(3) Different parts or tissues of a plant can be used as explants to initiate tissue culture.
(4) Callus is a mass of undifferentiated and dividing cells produced from the explant in tissue culture.
(5) A benefit of tissue culture is producing large number of plants with the same genotype rapidly in a small space.

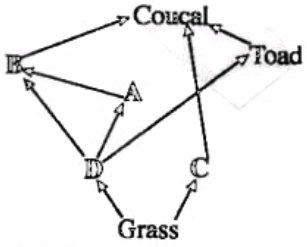
30. Which of the following features is not found in the plant given against it?
(1) Horizontally growing underground stem, bearing aerial shoots – *Solanum*
(2) Short swollen underground stem growing vertically, bearing aerial shoots – *Colocasia*
(3) Lateral branches growing horizontally from axillary buds of the erect stem – *Centella*
(4) Axillary buds of the aerial stem growing into small shoots with leaves and separating from main stem to produce new plants – *Dioscorea*
(5) Buds arising from vegetative parts other than the stem – *Bryophyllum*

31. Restriction endonuclease enzymes are capable of
(1) cutting DNA randomly.
(2) restricting protein synthesis.
(3) cutting DNA at specific base sequences.
(4) adding nucleotides to a growing nucleic acid chain.
(5) joining DNA molecules.

32. A genotype consisting of only one type of alleles for a character is
(1) homozygous for that character.
(2) homogenous for that character.
(3) heterozygous for that character.
(4) heterogenous for that character.
(5) monoallelic for that character.

33. Which of the following statements best explains the evolutionary advantage of meiosis?
(1) Meiosis is necessary for sexual reproduction.
(2) Meiosis contributes to maintain a constant number of chromosomes from generation to generation.
(3) Meiosis alternates with mitosis from generation to generation.
(4) Due to meiosis same genes are transmitted from generation to generation.
(5) Genetic recombinations are possible due to meiosis.

○ Question No. 34 is based on the following food web seen in a home garden ecosystem.



34. Which of the following statements regarding the above ecosystem is correct?
(1) There are two primary consumers and three secondary consumers in this ecosystem.
(2) The longest food chain in this ecosystem has four trophic levels.
(3) A is a keystone species in this ecosystem.
(4) Removing C will reduce the population of coucals.
(5) B may be a lizard and C may be a snail.

35. Which of the following air pollutants does not affect agricultural production?
(1) Carbon dioxide
(2) Carbon monoxide
(3) Sulphur dioxide
(4) Chlorofluorocarbons
(5) Oxides of nitrogen

36. Which of the following microorganisms is not directly used as food or food supplements?
(1) *Aspergillus*
(2) *Agaricus*
(3) *Lentinus*
(4) *Pleurotus*
(5) *Spirulina*

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37. Which of the following statements is not a reason for choosing microorganisms as an ideal tool for biological studies?
(1) They can be easily grown in small containers using simple techniques.
(2) They grow and reproduce rapidly.
(3) Their reproductive units are always identical.
(4) All of them are fundamentally similar in metabolism.
(5) They require very little space in laboratories due to small size.

38. Which of the following 'antibiotic-inhibitory action' combinations is correct?
(1) Erythromycin – Inhibition of synthesis of bacterial cell walls
(2) Ciprofloxacin – Inhibition of synthesis of bacterial DNA
(3) Clotrimazole – Inhibition of synthesis of bacterial cell membranes
(4) Polymyxin – Inhibition of synthesis of fungal cell membranes
(5) Penicillin – Inhibition of synthesis of bacterial DNA

39. Which of the following is not related to prions?
(1) They are infectious particles made up of proteins.
(2) They can exist and replicate without nucleic acids.
(3) Protein coats give them a characteristic symmetry.
(4) They can be transmitted by transfusion of contaminated blood.
(5) They replicate with the help of mammalian genes that encode their proteins.

40. Which of the following is not associated with pathogenicity of microorganisms?
(1) Ability to invade host cells
(2) Ability to live within the body of the host
(3) Ability to produce RNA poiymerase
(4) Ability to produce toxins
(5) Ability to disrupt the normal functions of the host

○ **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. Seedless vascular plants that do not bear flowers can be seen in which of the following phylum/phyla?
(A) Pterophyta (B) Lycophyta
(C) Coniferophyta (D) Cycadophyta
(E) Bryophyta

42. Which of the following groups contain/contains animals without bony skeleton?
(A) Chordata (B) Aves
(C) Nematoda (D) Arthropoda
(E) Mammalia

43. Which of the following influence/influences the blood glucose level of a normal healthy adult person?
(A) Thyroid gland (B) Hypothalamus
(C) Parathyroid gland (D) Glucagon
(E) Aldosterone

44. Which of the following can be present in a urine sample of a normal healthy adult person?
(A) H^+ (B) Amino acids
(C) Creatinine (D) K^+
(E) White blood cells

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45. Which of the following statements regarding cardiac muscles is/are correct?
(A) They possess intercalated discs.
(B) They possess long, cylindrical, branched cells.
(C) They have gap junctions.
(D) They are myogenic.
(E) Each muscle cell consists of one sarcomere.

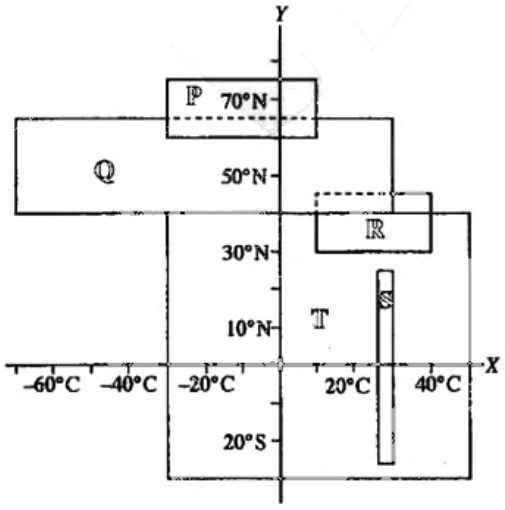
46. Which of the following statements regarding animal skeletons is/are correct?
(A) Both the endoskeleton and exoskeleton provide protection.
(B) Radiolarians possess endoskeletons.
(C) All skeletons store calcium.
(D) Hydrostatic skeleton is found in annelids and nematodes.
(E) Molluscs have only exoskeletons.

47. Which of the following disorders result/results in due to a change in the number of chromosomes?
(A) Downs syndrome (B) Klinefelter syndrome
(C) Sickle cell anaemia (D) Cystic fibrosis
(E) Thalassemia

48. In meiosis, a daughter cell differs from the mother cell as well as from other daughter cells due to which of the following?
(A) Independent assortment (B) Crossing-over
(C) Synapsis (D) Segregation
(E) Formation of the spindle

49. Some periods of the history of earth and several groups of organisms are given below. During one or more of these periods, at least one of the groups of organisms indicated against it/them was not living. Select that period/periods.
(A) Permian period : conifers, insects, mammals
(B) Triassic period : reptiles, mammals, modern fish
(C) Cretaceous period : flowering plants, conifers, dinosaurs
(D) Carboniferous period : gymnosperms, trilobites, amphibians
(E) Cambrian period : terrestrial plants, crustaceans, molluscs

50. Approximate ranges of temperature (X-axis) of five major terrestrial biomes labelled as ℙ, ℚ, ℝ, 𝕊 and 𝕋 and the latitudes of their distribution (Y-axis) are shown in the following diagram.



Which of the following statements regarding the biomes ℙ, ℚ, ℝ, 𝕊 and 𝕋 is/are correct?
(A) Dominant plants in biome ℚ are conifers.
(B) If the annual rainfall is above 1 000 mm, biome with the highest biodiversity is 𝕊.
(C) Largest terrestrial biome is 𝕋.
(D) Dominant plants in biome ℝ are small trees and shrubs.
(E) Longest food chains are found in biome ℙ.

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