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 Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka Department of Examinations, Sri Lanka

ශ්‍රී ලංකා විද්‍යා මණ්ඩලයේ
 உயிரியல்
 Biology



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 (x) 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 chemical elements is the most abundant in living organisms by mass?
 (1) Hydrogen (2) Carbon (3) Sodium (4) Oxygen (5) Nitrogen
2. Which of the following polymers is found only in plants?
 (1) Glycogen (2) Chitin
 (3) Ribonucleic acid (4) Inulin
 (5) Keratin
3. Which of the following is **incorrect** regarding living cells?
 (1) All organisms are composed of cells.
 (2) The basic structural unit of life is the cell.
 (3) The basic functional unit of life is the cell.
 (4) All cells have a cytoskeleton.
 (5) Any organisational level of matter below the level of the cell is **not** considered as living.
4. Which of the following processes takes place in the inner membrane of mitochondria?
 (1) Conversion of pyruvate to acetyl co-enzyme A
 (2) Production of NADH (3) Ethanol fermentation
 (4) Oxidative phosphorylation (5) Release of CO₂
5. At which of the following stages of the cell cycle does DNA synthesis take place?
 (1) Interphase (2) Prophase (3) Metaphase
 (4) Anaphase (5) Telophase
6. Following features were observed in a plant which is commonly found in moist terrestrial environments.
 (a) Vascular tissue
 (b) Dominant sporophyte
 (c) Requirement of external water for fertilization
 This plant may most likely belong to the phylum
 (1) Bryophyta. (2) Lycophyta.
 (3) Cycadophyta. (4) Coniferophyta.
 (5) Anthophyta.
7. Which of the following features is **not** found in class Monocotyledoneae?
 (1) Perianth (2) Trimerous flower parts
 (3) Parallel venation in leaves (4) Tap root system
 (5) Scattered vascular bundles in the stem
8. Which of the following features can be used to distinguish an annelid from a nematode?
 (1) Well developed body cavity (2) Cuticle
 (3) Hydrostatic skeleton (4) Gonads with ducts
 (5) Cerebral ganglia

9. Which of the following animal groups is poikilothermic, oviparous and possesses 12 pairs of cranial nerves?
 (1) Chondrichthyes (2) Osteichthyes
 (3) Amphibia (4) Reptilia
 (5) Aves
10. In a molar tooth of man
 (1) outer covering is composed of dentine and enamel.
 (2) the thickest layer is dental cement.
 (3) root is longer than the crown.
 (4) nerve endings extend to dentine.
 (5) the most abundant substance is enamel.
11. Which of the following is incorrect regarding insectivorous plants?
 (1) They are photoautotrophic.
 (2) They are saprophytic.
 (3) They obtain nitrogen by digesting insects.
 (4) Some of them are aquatic.
 (5) They often grow in soils that do not have sufficient amount of nitrogen.
12. Which of the following may not be a reason for hypotension?
 (1) Shock (2) Addison's disease
 (3) Weakening of heart (4) Heavy haemorrhage
 (5) Kidney damage
13. Which of the following best represents the number of eosinophils present in 1 mm^3 of blood of a healthy adult person?
 (1) 25 - 100 (2) 100 - 175 (3) 60 - 600 (4) 200 - 250 (5) 250 - 350
14. Which of the following is incorrect regarding transport of plant growth substances?
 (1) IAA is transported through parenchyma cells from stem apices.
 (2) Cytokinins are transported from root apices through xylem.
 (3) Gibberellins produced in young leaves are transported through xylem.
 (4) Abscissic acid produced in root caps is transported through xylem.
 (5) Ethylene produced in fruits is transported in phloem.
15. Synapses were first developed in
 (1) cnidarians. (2) flat worms. (3) annelids. (4) echinoderms. (5) arthropods.
16. Which of the following occurs due to stimulation of parasympathetic nervous system?
 (1) Increase in urine output (2) Reduction in sweating
 (3) Relaxation of hair erector muscles (4) Dilation of skin arterioles
 (5) Contraction of anal sphincter
17. Some endocrine glands of man and their locations in the body are given below. Which of the following combinations is correct?
 (1) Hypothalamus - Anterior region of the mid-brain
 (2) Pituitary - Immediately below the corpus callosum
 (3) Thyroid - Mid region of trachea
 (4) Thymus - Immediately above the heart
 (5) Parathyroid - Anterior surface of thyroid
18. Pons varolii of the human brain
 (1) forms a bridge between the fore-brain and hind-brain.
 (2) is located in the mid-brain.
 (3) controls reflex movements of the head.
 (4) controls blood pressure.
 (5) regulates ventilation of lungs.
19. In the human eye
 (1) reflex movements are controlled by mid-brain.
 (2) choroid lines about $\frac{3}{4}$ of the inner surface of sclera.
 (3) ciliary body is the anterior continuation of retina.
 (4) vitreous humour is found between the lens and cornea.
 (5) the number of rods is about ten times as that of cones.

20. Which of the following statements regarding excretory structures of animals is correct?
- (1) Salt glands of turtles are located near the cloaca.
 - (2) Sweat glands of man are located in the deep layers of the epidermis also.
 - (3) Green glands of crustaceans are found anterior to oesophagus.
 - (4) Malpighian tubules of insects open in the ventral surface of the body.
 - (5) Flame cells are found in flat worms and cnidarians.
- Question No. 21 is based on the following ions.
- (a) Na^+ (b) Cl^- (c) HCO_3^- (d) K^+ (e) H^+
21. Which of the above ions are reabsorbed in the distal convoluted tubule of the human nephron?
- (1) (a) and (c) only.
 - (2) (a), (b) and (c) only.
 - (3) (b) and (c) only.
 - (4) (c), (d) and (e) only.
 - (5) (a), (b) and (e) only.
22. Which of the following is a supporting tissue in plants that does not contain lignin?
- (1) Parenchyma
 - (2) Collenchyma
 - (3) Epidermis
 - (4) Sclerenchyma
 - (5) Chlorenchyma
23. Which of the following statements regarding the exoskeleton of animals is correct?
- (1) Molluscs are the major group of animals that possess an exoskeleton.
 - (2) Sea urchins are different from other echinoderms as they have an exoskeleton.
 - (3) Body of some reptiles is supported only by the exoskeleton.
 - (4) Exoskeleton of arthropods contains carbohydrates, proteins and calcium carbonate.
 - (5) Body of some free living nematodes are covered by an exoskeleton.
24. In a typical vertebra of man
- (1) two processes that originate from the vertebral body project laterally forming transverse processes.
 - (2) each transverse process bears an articular surface.
 - (3) two pairs of articular processes are present in the neural arch.
 - (4) each transverse process contains a foramen for the vertebral artery.
 - (5) neural spine is bifid.
25. In which of the following structures do the sperms of man develop the ability to fertilize an ovum?
- (1) Seminal vesicle
 - (2) Vagina
 - (3) Urethra
 - (4) Vas deferens
 - (5) Epididymis
26. Which of the following is an early sign of pregnancy in some women?
- (1) Constipation
 - (2) Decrease in the frequency of urination
 - (3) Lightening of the colour of nipples
 - (4) Enlargement of abdomen
 - (5) Increase in the firmness of breasts
27. The maximum life expectancy of a human sperm after ejaculation is
- (1) 12 hours.
 - (2) 24 hours.
 - (3) 48 hours.
 - (4) 72 hours.
 - (5) 96 hours.
28. Which of the following statements regarding the human ovum is correct?
- (1) In a cross section, it is oval in shape.
 - (2) It contains a minute amount of yolk.
 - (3) It contains lysosomes.
 - (4) Its life span is about 12-18 hours.
 - (5) It becomes haploid as soon as a sperm penetrates it.
29. Which of the following is incorrect regarding parthenocarpy?
- (1) Parthenocarpic fruits do not contain seeds.
 - (2) Parthenocarpy is the development of a fruit from an ovary without fertilization.
 - (3) Parthenocarpy can be induced by artificial methods.
 - (4) Parthenocarpy is the development of fruits with infertile seeds.
 - (5) In some species of plants parthenocarpy occurs naturally.

30. In the pea plant, tall trait (T) is dominant and dwarf trait (t) is recessive; purple flower colour (P) is dominant and white flower colour (p) is recessive; round seed shape (R) is dominant and wrinkled seed shape (r) is recessive. In an F_2 progeny produced by mating two F_1 plants heterozygous for all three genes, what proportion will show the fully recessive phenotype?
- (1) $\frac{1}{4}$ (2) $\frac{1}{8}$ (3) $\frac{1}{16}$ (4) $\frac{1}{64}$ (5) $\frac{1}{256}$
31. Five enzymes involved in DNA replication are given below. Which of them catalyses the unwinding of the double stranded structure of DNA?
- (1) Helicase (2) DNA polymerase
(3) Primase (4) Ligase
(5) DNA gyrase
32. Which of the following is incorrect regarding protein synthesis?
- (1) Each amino acid in a protein is determined by a particular codon.
(2) Protein synthesis is regulated by 'start' and 'stop' codons.
(3) Base sequence of DNA determines the amino acid sequence in proteins.
(4) RNA polymerase catalyses the production of a copy of the DNA in transcription.
(5) Amino acids are brought to the ribosome surface by m-RNA during protein synthesis.
33. Which of the following experimental conditions would reduce transpiration without affecting photosynthesis?
- (1) Transferring the plant to dry soil
(2) Increasing the level of CO_2 around the plant
(3) Decreasing the relative humidity around the plant
(4) Injecting K^+ into guard cells
(5) Injecting ABA into guard cells
34. Which of the following is most likely to occur if a plant cell with a solute potential of -0.3 MPa and a pressure potential of 0.2 MPa is placed in pure water?
- (1) Water will move out of the cell.
(2) Water will move into the cell.
(3) Solutes will move out of the cell.
(4) There will be no net movement of water either into or out of the cell.
(5) Water may move into or out of the cell depending on the direction of the water potential gradient.
35. The growth of which one of the following is responsible for continued growth and elongation of leaves of grass in a lawn, following mowing by machine or grazing by animals?
- (1) Apical meristem
(2) Lateral meristem
(3) Intercalary meristem
(4) Axillary buds
(5) Interfascicular cambium
- Q Question No. 36 is based on the following sections of the atmosphere.
- (a) Troposphere (b) Stratosphere (c) Mesosphere
36. Which of the above sections of the atmosphere participates/participate in the occurrence of acid rain?
- (1) (a) only. (2) (a) and (b) only. (3) (b) only.
(4) (a) and (c) only. (5) (a), (b) and (c).
37. Which of the following pairs of organisms are most similar when biodiversity aspects are considered?
- (1) *Puntius nigrofasciatus* and *Oreochromis mossambicus*
(2) Giant panda and *Lingula*
(3) Indian pitta and snakehead
(4) *Lantana camara* and *Chitala chitala*
(5) Blue magpie and *Hevea brasiliensis*
38. Which of the following combinations is correct in relation to the nitrogen cycle?
- (1) *Thiobacillus* - conversion of atmospheric nitrogen to nitrates
(2) *Pseudomonas* - conversion of ammonia to nitrites
(3) *Nitrosomonas* - conversion of nitrites to nitrates
(4) *Azotobacter* - conversion of nitrates to atmospheric nitrogen
(5) *Clostridium* - conversion of atmospheric nitrogen to ammonia

39. Which of the following is incorrect regarding fungi?

- (1) All fungi are saprophytic.
- (2) All fungi show asexual reproduction.
- (3) All fungi contain glycogen as a storage material.
- (4) All fungi have cell walls made up of chitin.
- (5) All fungi are not terrestrial.

40. Growth of which of the following groups of organisms is not desirable in the production of compost?

- (1) Thermophilic bacteria
- (2) Ammonifying bacteria
- (3) Denitrifying bacteria
- (4) Nitrifying bacteria
- (5) Proteolytic bacteria

○ 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 summarized				
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. Carbohydrates are commonly stored as starch in plant storage organs. Which of the following properties of starch make/makes it a useful storage material?

- (A) It is osmotically inactive.
- (B) It is easily translocated.
- (C) It is chemically non-reactive.
- (D) It is insoluble in water.
- (E) It is a macromolecule.

42. Which of the following processes in cellular metabolism require/require energy in the form of ATP?

- (A) Glycolysis
- (B) Light reactions of photosynthesis
- (C) Reactions of Krebs cycle
- (D) Dark reactions of photosynthesis
- (E) Electron transport in aerobic respiration

43. Human stomach

- (A) is located in the upper right region of the abdominal cavity.
- (B) contains endocrine and exocrine tissues.
- (C) secretes enzymes that are functionally similar to those in saliva.
- (D) absorbs a small amount of end-products of lipid digestion.
- (E) contains a fluid which has a pH value of around 4-5.

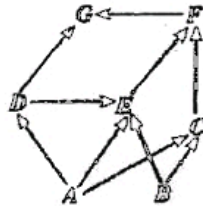
44. Which of the following is/are correct?

- (A) All terrestrial plants have vascular tissues.
- (B) All terrestrial plants are heterosporous.
- (C) All terrestrial plants have reproductive organs protected by a sterile cell layer.
- (D) All terrestrial plants except angiosperms do not show double fertilization in the life cycle.
- (E) All terrestrial plants produce seeds as an adaptation to terrestrial life.

45. Which of the following is/are considered as non-specific defence mechanism/mechanisms of human body?

- (A) Development of antibodies as a result of a natural microbial infection
- (B) Antibodies transferred from the mother to the foetus through placenta
- (C) Development of inflammatory response to general infections or tissue damage
- (D) Production of interferon in blood as a result of a viral infection
- (E) Development of antibodies as a result of vaccination of attenuated microbial cells

46. The bacterium which causes tetanus in man
 (A) is an aerobic organism. (B) produces an enterotoxin.
 (C) is an obligate anaerobic organism. (D) produces a neurotoxin.
 (E) is a facultative anaerobic organism.
47. Which of the following features is/are common to insects and diplopoda?
 (A) Body divided into head, thorax and abdomen
 (B) Presence of one pair of antennae
 (C) Presence of three pairs of legs in thorax
 (D) Absence of legs in the abdomen
 (E) Presence of an exoskeleton with chitin and calcium carbonate
48. Which of the following respiratory structures is/are found in vertebrates as well as in invertebrates?
 (A) Internal gills (B) Book lungs
 (C) Body surface (D) External gills
 (E) Trachea
49. Which of the following statements regarding the movement of organisms is/are correct?
 (A) Pseudopodial movement is found in vertebrates.
 (B) Flagellar movement is found in the spores of some fungi.
 (C) Transport of excretory fluid in some nematodes involves ciliary movement.
 (D) Ciliary movement is found in flat worms.
 (E) Blood is circulated within the haemocoel of some crustaceans by ciliary movement.
- Question No. 50 is based on the following food web of a terrestrial ecosystem.



50. Which of the following statements regarding the above food web is/are correct?
 (A) Removal of E may result in an increase of D.
 (B) There are three species belonging to the third trophic level.
 (C) F may be an insectivore.
 (D) E is an omnivore.
 (E) D may be cobra.