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 இலங்கைப் பரீட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம் இலங்கைப் பரීட்சைத் திணைக்களம்
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අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2021(2022)
 கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீட்சை, 2021(2022)
 General Certificate of Education (Adv. Level) Examination, 2021(2022)

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 them carefully.
- * In each of the questions from 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 is a non-reducing sugar?
 (1) Ribose (2) Lactose (3) Maltose (4) Galactose (5) Sucrose
2. Which of the following statements regarding plasma membrane is correct?
 (1) It is mainly composed of carbohydrates, phospholipids and proteins.
 (2) Phospholipid molecules are movable and provide a fluid nature to the membrane.
 (3) Peripheral proteins are tightly attached to the outer surface of the membrane.
 (4) Phospholipid bilayer enables nearby cells to communicate with each other.
 (5) Hydrophobic tails of phospholipids attach to cytoskeletal fibers and help to maintain the shape of the cell.
3. Select the correct 'subcellular component - function' combination.
 (1) Glyoxysomes - Transport of residue materials out of the cell
 (2) Smooth endoplasmic reticulum - Production of transport vesicles
 (3) Rough endoplasmic reticulum - Metabolism of carbohydrates
 (4) Nucleus - Synthesis of glycoproteins
 (5) Peroxisomes - Photorespiration
4. Four events of meiosis are given below.
 A - Centrosomes move towards opposite poles forming spindle.
 B - Formation of synaptonemal complex
 C - Pairs of homologous chromosomes arrange on metaphase plate.
 D - Crossing over of chromatids
 Which one of the following is the correct sequence of occurrence of above events?
 (1) A, B, D, C (2) A, C, B, D (3) B, C, A, D
 (4) B, D, A, C (5) B, D, C, A
5. Which of the following statements regarding photosynthetic pigments is correct?
 (1) Chlorophylls absorb yellow and blue light and reflect green light.
 (2) Chlorophyll b prevents the formation of reactive oxidative molecules.
 (3) Chlorophylls and carotenoids are located on the membrane system of thylakoids.
 (4) Carotenoids and chlorophyll a absorb light corresponding to the same wave lengths.
 (5) According to action spectrum, chlorophyll b is more effective for blue and red light.

6. In the light dependant reaction of photosynthesis,
- (1) cyclic electron flow occurs in photosystem II.
 - (2) both linear and cyclic electron flows produce ATP and NADPH.
 - (3) primary electron acceptor of photosystem I reduces NADP and yields NADPH.
 - (4) photosystem I gets electrons from splitting of water in the linear electron flow.
 - (5) excited electrons at primary electron acceptor of photosystem I pass through an electron transport chain to photosystem II.
7. Which of following statements is most important in explaining the Darwin-Wallace theory?
- (1) Organisms acquire suitable adaptations according to the needs of the environment during their lifetime.
 - (2) Adaptations acquired during the lifetime are passed on to the next generation.
 - (3) Favourable characters are passed to offspring through genetic factors.
 - (4) Each species produce more offspring than the environment can accommodate.
 - (5) Adaptations result in changes in genetic material.
8. Three genera with circular chromosomes, histones associated with DNA and several kinds of RNA polymerases are respectively
- (1) *Thermococcus*, *Amoeba* and *Methanococcus*.
 - (2) *Methanococcus*, *Halobacteria* and *Nitrosomonas*.
 - (3) *Anabaena*, *Salmonella* and *Obelia*.
 - (4) *Halobacteria*, *Cycas* and *Nostoc*.
 - (5) *Pseudomonas*, *Anabaena* and *Cycas*.
9. Consider the statements A and B given below.
- A - Seedless vascular plants are evolutionarily closer to hornworts than to mosses.
- B - Seedless vascular plants bear spores.
- Which of the following is correct regarding the above statements?
- (1) A is correct and B is incorrect.
 - (2) A is incorrect and B is correct.
 - (3) Both A and B are incorrect.
 - (4) Both A and B are correct and A is supported by B.
 - (5) Both A and B are correct and A is not supported by B.
10. Four structures present in protists are as follows:
- A - Multicellular thallus
- B - Contractile vacuole
- C - Pellicle
- D - Cell wall
- Organisms having A, B, C and D are respectively
- (1) *Sargassum*, diatoms, *Amoeba* and *Ulva*.
 - (2) *Ulva*, *Euglena*, *Paramecium* and *Gelidium*.
 - (3) *Gelidium*, *Amoeba*, *Ulva* and diatoms.
 - (4) *Sargassum*, *Paramecium*, *Amoeba* and *Gelidium*.
 - (5) *Ulva*, *Euglena*, *Sargassum* and diatoms.
11. Which of the following indicate two features found in the organisms of the same phylum?
- A : Heart absent; endoskeleton present.
- B : Heart absent; jointed legs present.
- C : Anus absent; tentacles present around the mouth.
- D : Anus absent; show asexual reproduction.
- (1) A and B only.
 - (2) A and C only.
 - (3) A and D only.
 - (4) A, B and C only.
 - (5) A, C and D only.

12. Which of the following statements regarding companion cells is correct?
- (1) They are dead at maturity.
 - (2) They help in phloem unloading.
 - (3) They connect with adjacent cells by desmosomes.
 - (4) They are present alongside each sieve tube element in gymnosperms and angiosperms.
 - (5) Their cytoplasm is reduced and present as a thin layer close to the cell wall.
13. Select the correct statement regarding plant leaves.
- (1) Leaves are vertically arranged in some plants to capture light efficiently in low light conditions.
 - (2) In monocot leaves, chloroplasts are more abundant in palisade mesophyll cells than in spongy mesophyll cells.
 - (3) Angiosperms can be identified due to net-like venation of leaves.
 - (4) Arrangement of leaves on the stem is called leaf orientation.
 - (5) Plants inhabiting very cold environments bear smallest leaves.
14. Some events that occur at the source during phloem translocation of angiosperms according to pressure flow hypothesis are as follows.
- A : Flow of water into sieve tube from xylem
B : Generation of positive pressure inside the sieve tube
C : Reduction of water potential inside the sieve tube
- Correct sequence of the above events is
- (1) A, B and C.
 - (2) A, C and B.
 - (3) B, A and C.
 - (4) B, C and A.
 - (5) C, A and B.
15. Atmospheric air is the only source for which of the following elements required by plants?
- (1) Chlorine
 - (2) Nitrogen
 - (3) Hydrogen
 - (4) Oxygen
 - (5) Carbon
16. Some characteristics of two species of plants are given below.
- Species A : Sporophyte is dominant; gametophyte is reduced; sporophyte and gametophyte are photosynthetic and independent.
- Species B : Sporophyte is dominant and photosynthetic; gametophyte is reduced and partially dependent on sporophyte.
- Species A and B are respectively
- (1) *Nephrolepis* sp. and *Selaginella* sp.
 - (2) *Pogonatum* sp. and *Nephrolepis* sp.
 - (3) *Selaginella* sp. and *Cycas* sp.
 - (4) *Selaginella* sp. and *Nephrolepis* sp.
 - (5) *Nephrolepis* sp. and *Cycas* sp.
17. Release of which of the following hormones in plants is stimulated by water deficit?
- (1) Auxins
 - (2) Gibberellins
 - (3) Abscissic acid
 - (4) Cytokinins
 - (5) Ethylene
18. Which of the following 'tissue - location' combinations is correct regarding the human body?
- | Tissue | Location |
|------------------------------------|---------------------|
| (1) Loose connective tissue | Tendons |
| (2) Adipose tissue | Lining of the mouth |
| (3) Stratified squamous epithelium | Anus |
| (4) Simple cuboidal epithelium | Intestine |
| (5) Pseudostratified epithelium | Kidney tubules |
19. In which of the following, will the release of (i) result in the stimulation of (ii)?
- | | |
|-------------------------|--|
| A : (i) Gastrin | (ii) Production of gastric juice |
| B : (i) Cholecystokinin | (ii) Secretion of gastric juice |
| C : (i) Secretin | (ii) Release of bicarbonate ions from pancreas |
- (1) In A only.
 - (2) In C only.
 - (3) In A and B only.
 - (4) In A and C only.
 - (5) In B and C only.

20. Which of the following is most likely to happen if tricuspid valve of the human heart does not close properly?
- (1) Right atrium will not completely empty during atrial systole.
 - (2) Left atrium will not completely empty during atrial systole.
 - (3) Amount of blood that flows into right atrium will be reduced.
 - (4) Amount of blood that flows into lungs will be reduced.
 - (5) Some amount of blood will flow into left atrium from left ventricle during ventricular systole.
21. In which of the following, is (ii) caused by (i) during the homeostatic control of breathing of man?
- A : (i) Carbon dioxide level in tissues increases.
(ii) Blood pH decreases.
- B : (i) Medulla oblongata detects decreasing pH of cerebrospinal fluid.
(ii) Depth of ventilation of lungs decreases.
- C : (i) Sensors in aorta detects high concentration of carbon dioxide in blood.
(ii) Medulla oblongata receives signals from aorta.
- (1) In A only. (2) In A and B only. (3) In A and C only.
(4) In B and C only. (5) In A, B and C.
22. B lymphocytes of humans
- (1) complete the development in thymus.
 - (2) are mainly responsible for cell mediated immunity.
 - (3) are not involved in naturally acquired active immunity.
 - (4) can differentiate into natural killer cells and helper cells.
 - (5) contain antigen receptors on plasma membrane.
23. Excretory structures of crustaceans, annelids and flat worms are respectively
- (1) green glands, body surface and flame cells.
 - (2) salt glands, body surface and nephridia.
 - (3) green glands, nephridia and body surface.
 - (4) salt glands, flame cells and nephridia.
 - (5) green glands, nephridia and flame cells.
24. Select the correct statement regarding human brain.
- (1) Brain stem is developed from embryonic mid brain and hind brain.
 - (2) Frontal lobes of the cerebral cortex contain visual sensory areas.
 - (3) Mid brain contains the fourth ventricle of the brain.
 - (4) Corpus callosum connects the two hemispheres of the cerebellum.
 - (5) Thalamus regulates the sleep and awake cycles.
25. Events that occur after the membrane potential of a neuron is changed above the threshold value are given below.
- A : K^+ channels open and K^+ outflow.
B : Na^+ channels open and Na^+ inflow.
C : Membrane becomes repolarized.
D : Membrane becomes depolarized.
- Select the correct sequence of above events.
- (1) A, D, B, C (2) B, C, A, D (3) B, D, A, C (4) C, A, D, B (5) D, B, C, A
26. Select the response with the correct match of the hormone and its main function.
- (1) Adrenalin – mediates long term stress responses
 - (2) Prolactin – stimulates milk ejection
 - (3) Melatonin – regulates innate immunity
 - (4) Thyroxin – increases metabolic rate
 - (5) LH – stimulates spermatogenesis

27. In women, meiotic division of the secondary oocyte released at ovulation is arrested at
(1) prophase I. (2) metaphase I. (3) prophase II. (4) metaphase II. (5) anaphase I.
28. In human development, amnion
(1) produces hCG.
(2) becomes the main fetal portion of placenta.
(3) protects the fetus from mother's immune responses.
(4) entirely surrounds the embryo.
(5) serves as the source of primordial germ cells in the developing gonads of the fetus.
29. After birth, anteriorly convex curvatures of the vertebral column of humans are developed in the
(1) thoracic and sacral regions. (2) thoracic and lumbar regions.
(3) cervical and lumbar regions. (4) cervical and sacral regions.
(5) lumbar and sacral regions.
30. Select the correct statement regarding human skeleton.
(1) Articulation of axis vertebra with the occipital bone permits nodding movements of the head.
(2) All carpal bones in the upper limb contribute to form the wrist joint.
(3) Osteoarthritis is a condition associated with reduction in bone density..
(4) Patella articulates with the lower end of femur.
(5) Maxilla is the only movable bone in the skull.
31. Certain plants of a particular species bear purple flowers while other plants of the same species bear white flowers. To explain the inheritance of the flower colour of this plant species
(1) a monohybrid cross is sufficient.
(2) a dihybrid cross is sufficient.
(3) a monohybrid cross and a dihybrid cross are necessary.
(4) knowledge of incomplete dominance is necessary.
(5) knowledge of gene linkage is necessary.
32. Non coding sequences and DNA segments without any identified function in the chromosomes of eukaryotes are respectively
(1) heterochromatin and introns.
(2) introns and intergenic DNA.
(3) heterochromatin and intergenic DNA.
(4) euchromatin and introns.
(5) euchromatin and intergenic DNA.
33. Select the correct statement regarding the synthesis of polypeptides.
(1) Except for having U in mRNA instead of T in DNA, the base sequences of DNA template and its mRNA molecule are similar.
(2) An mRNA molecule of a prokaryote cannot code a polypeptide in an eukaryote.
(3) Start codon of an mRNA molecule is AUG and it provides the code for methionine.
(4) There are 64 codons and 62 of them provide codes for amino acids.
(5) The first triplet of bases in a tRNA molecule is AUG.
34. Restriction maps are mostly important in
(1) identifying multiple copies of genes in a genome.
(2) determining evolutionary relationships of different species.
(3) constructing cloning vectors.
(4) diagnosing cancers.
(5) paternity testing.
35. Three animals that live in tundra are
(1) caribou, wolf and bear. (2) siberian tiger, fox and brown bear.
(3) reindeer, tiger and moose. (4) reindeer, siberian tiger and bear.
(5) musk oxen, fox and moose.

36. Select the response that indicates a relict species and a species endemic to Sri Lanka respectively.
- (1) *Acanthus ilicifolius* and *Dipterocarpus zeylanicus*
 - (2) *Panicum maximum* and *Garcinia quaesita*
 - (3) *Ichthyophis* sp. and *Salacia reticulata*
 - (4) *Crudia zeylanica* and *Puntius nigrofasciatus*
 - (5) *Lingula* sp. and *Loris tardigradus*
37. Three gases that contribute to acid rain, global warming and ozone layer depletion are respectively
- (1) carbon dioxide, perfluorocarbon and helene.
 - (2) sulphur dioxide, hydrofluorocarbon and methyl bromide (MeBr).
 - (3) nitrous oxide, methane and carbon monoxide.
 - (4) nitric oxide, helene and chlorofluorocarbon.
 - (5) nitrogen dioxide, sulphur hexafluoride and methane.
38. Which of the following antibiotics inhibits the synthesis of DNA/RNA in bacteria?
- (1) Rifampin
 - (2) Daptomycin
 - (3) Penicillin
 - (4) Erythromycin
 - (5) Tetracycline
39. Which of the following statements regarding microorganisms is correct?
- (1) Pathogenic fungi in a rhizosphere obtain nutrients from compounds exuded from plant roots.
 - (2) Some bacteria secrete alkaline compounds that contribute to release of phosphorus to soil solution.
 - (3) Actinomycetes carry out composting more efficiently under anaerobic conditions.
 - (4) Rhizobia form symbiotic associations with both leguminous plants and *Azolla*.
 - (5) Vitamin C can be produced by *Azotobacter* spp.
40. Which of the following is a step in the primary treatment of purification of industrial waste water?
- (1) Spraying over a bed of rocky material
 - (2) Removal of oil and grease
 - (3) Mechanical aeration
 - (4) Anaerobic decomposition
 - (5) Disinfection

- 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 is/are common to both ethyl alcohol fermentation and lactic acid fermentation?
- (A) One molecule of glucose is converted to two molecules of pyruvate.
 - (B) Two molecules of ATP and two molecules of NADH are released.
 - (C) NADH is used to reduce acetaldehyde.
 - (D) Final hydrogen acceptor is an organic compound.
 - (E) One molecule of carbon dioxide is released.
42. During the primary growth of roots,
- (A) root apical meristem produces new cells to both sides.
 - (B) the cells produced outward by the root apical meristem form root cap.
 - (C) vascular tissues are produced by vascular cambium.
 - (D) some cells produced outward by the root apical meristem elongate and push the root through soil.
 - (E) epidermis splits due to being pushed outward.

43. Which of the following statements is/are correct regarding blood circulation of vertebrates?
- Animals with single circulation do not have lungs.
 - In single circulation, blood flows from respiratory organs to other organs under a reduced pressure.
 - Animals with single circulation have two or three chambers in the heart.
 - In double circulation, blood flows through lungs twice during a complete circulation through the body.
 - Myoglobin is not present in the muscles of animals having a single circulation.
44. Sensory receptors
- are connected with the nervous system.
 - include specialized glands designed to receive specific stimuli.
 - show sensory adaptation.
 - can amplify the sensory signal.
 - detect the stimuli that arise only in the external environment.
45. Leydig cells
- secrete testosterone.
 - produce the fluid required for transport of sperm.
 - nourish the cells in different stages of spermatogenesis.
 - are located in the connective tissue among seminiferous tubules.
 - provide attachment for cells in different stages of spermatogenesis.
46. Which of the following could be the reason/reasons for cystic fibrosis?
- Y-linked inheritance
 - X-linked recessive inheritance
 - Pleiotropy
 - Autosomal recessive inheritance
 - Autosomal dominant inheritance
47. Which of the following ecological pyramids could be inverted?
- Pyramid of biomass in a forest
 - Pyramid of numbers in the ocean
 - Pyramid of biomass in the ocean
 - Pyramid of numbers in a parasitic system
 - Pyramid of biomass in a parasitic system
48. Select the response/responses with the correct match of feature and example of microorganisms.
- Icosahedron symmetry – Adeno virus
 - Obligate aerobic respiration – *Clostridium* sp.
 - Reproduce in leaf hoppers and plants – Phytoplasma
 - Reproduce by budding and binary fission – Mycoplasma
 - Photoheterotrophic nutrition – Purple sulphur bacteria
49. Stem cells
- can give rise to cells of the same type.
 - can divide without a limit.
 - are of three types.
 - are undifferentiated cells.
 - divide rapidly.
50. Which of the following could be used to control dengue vector as well as filaria vector?
- Construction of buildings without roof gutters
 - Mosquito proofing of domestic wells
 - Preventing creation of vector breeding sites
 - Use of fish that feed on mosquito larvae
 - Repairing broken septic tanks