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கல்விப் பொதுத் தராதரப் பத்திர(உயர் தர)ப் பரீட்சை, 2009 ஓகஸ்ற்
General Certificate of Education (Adv. Level) Examination, August 2009

ජීව විද්‍යාව I உயிரியல் I Biology I	පැය දෙකයි இரண்டு மணித்தியாலங்கள் Two hours

Important :

(i) *Answer all questions.*
(ii) *Write your Index Number in the space provided in the answer sheet.*
(iii) *Instructions are given on the back of the answer sheet. Follow those carefully.*
(iv) *In each of the questions* **1** *to* **60**, *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 substances is found only in animals?
(1) Chitin (2) Glycogen
(3) Lactose (4) Pectin
(5) Hyaluronic acid

2. Which one of the following features of eucaryotic cells, supports the theory of endosymbiotic origin?
(1) Presence of a phospholipid cell membrane.
(2) Presence of 70S ribosomes in mitochondria.
(3) Presence of DNA in the nucleus.
(4) Presence of a cytoskeleton.
(5) Occurrence of Kerbs cycle.

3. Which one of the following molecules on oxidation will yield the greatest amount of energy for a cell?
(1) Ethanol (2) ATP (3) Glucose
(4) Sucrose (5) Pyruvic acid

4. Which one of the following is the best example for genetic diversity?
(1) Thilapia fish of different colour patterns contributing to fresh water fisheries in Sri Lanka.
(2) Shrimps with different growth rates used in aquaculutre in Sri Lanka.
(3) Sri Lankan wild elephants with and without tusks.
(4) Unicellular parasites that cause malaria in Sri Lanka.
(5) Edible mushrooms of different sizes and shapes found in Sri Lanka.

5. The five kingdoms of organisms, and the characteristics used to group the organisms into these kingdoms, are given below. Which combination is **incorrect**?

Kingdom	Characteristics
(1) Monera	Unicellular or multicellular, prokaryotic, cells not differentiated into tissues.
(2) Fungi	Unicellular or multicellular, eukaryotic, cells not differentiated into tissues.
(3) Protista	Unicellular or multicellular, eucaryotic.
(4) Plantae	Multicellular, eucaryotic, cells differentiated into tissues.
(5) Animalia	Unicellular or multicellular, eukaryotic, cells differentiated into tissues when multicellular.

6. Which one of the following features is **not** unique to Phyllum Echinodermata?
(1) Locomotion by tube feet.
(2) Presence of ambulacral regions.
(3) Respiration by respiratory trees.
(4) Deuterostomic development.
(5) Presence of water vascular system.

7. Which organism is **not** found in a marine ecosystem?
(1) Jelly fish (2) Grey mullet
(3) Tilapia (4) Barnacle
(5) Oyster

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8. Which one of the following **does not affect the diversity of** forest ecosystems in Sri Lanka?
(1) Temperature (2) Altitude (3) Rainfall
(4) Wind (5) Latitude

9. Which is the **true** statement regarding an endemic species?
(1) It is a species that has not changed over several millions of years.
(2) It is a species that will **not** be subjected to further evolutionary changes.
(3) It is a species confined to a certain region of the world.
(4) It is a species that has a very high threat of extinction.
(5) Its removal will result in the collapse of the ecosystem.

10. Which of the following is **not** caused by changes of water potential?
(1) Absorption of K^+ by root cells.
(2) Wilting of plant leaves in dry days.
(3) Sleep-movements of legume leaves in the evening
(4) Opening of stomata in the morning.
(5) Transpiration through the cuticle of leaves.

11. Which of the following types of cells is usually **not** found in primary roots of plants?
(1) Meristamatic cells
(2) Collenchyma cells
(3) Storage paranchyma cells
(4) Cells with suberised walls
(5) Cells with lignified walls.

12. Which statement of comparison between cellular respiration and photorespiration is **incorrect?**
(1) Cellular respiration is a useful process while photorespiration is a wasteful process.
(2) In both processes, carbohydrate is oxidised by O_2.
(3) Both processes need mitochondria.
(4) Cellular respiration occurs in all plants but photorespiration occurs in only some plants.
(5) PGA is an intermediate in both processes.

13. Which of the following statements of comparisons between photophosphorylation and oxidative phosphorylation is **incorrect?**
(1) Photophosphorylation takes place in chloroplasts while oxidative phosphorylation takes place in mitochondria.
(2) Photophosphorylation may be accompanied by release of O_2 while oxidative phosphorylation is accompanied by the utilisation of O_2.
(3) Photophosphorylation may be accompanied by reduction of co-enzymes while oxidative phosphorylation is accompanied by oxidation of reduced co-enzymes.
(4) Both processes use ADP as an electron acceptor.
(5) Photophosphorylation can take place only in the presence of light while oxidative phosphorylation can take place at any time.

14. Which statement regarding phloem, is **incorrect?**
(1) Loading sucrose into sieve tubes is done by transfer cells using respiratory energy.
(2) Osmosis is not an important factor for transport of phloem sap
(3) Transport of phloem sap within sieve tubes can take place in both directions at different times.
(4) Sieve tube elements contain cytoplasm but no nuclei.
(5) Phloem also transports amino acids, growth substances and chemicals applied to plants, in addition to sucrose.

15. Which statement is **incorrect** regarding reproduction of fungi?
(1) Zygospore of *Mucor* is multinucleate.
(2) In sexual reproduction of *Aspergillus*, fusion of nuclei takes place in ascogonium.
(3) An ascus usually produces eight haploid spores.
(4) *Agaricus* does not produce sexual organs.
(5) Most fungi are heterothallic.

16. Which of the following statements of comparison between tropic movements and nastic movements of plants, is **incorrect?**
(1) Tropic movements involve a part of a plant, while nastic movements involve the whole plant.
(2) In tropic movements, the direction of response is related to the direction of stimulus, but in nastic movements, there is no such relationship.
(3) Nastic movements are mediated through specialized organs while tropic movements are not.
(4) Both these movements may be mediated through hormones.
(5) Nastic movements are mediated through turgor changes of cells, while tropic movements are not.

17. Which statement regarding nutrition of plants, is **incorrect?**
(1) Deficiency of nitrogen causes chlorosis.
(2) Magnesium is necessary for the formation of chlorophyll.
(3) Calcium helps in maintaining osmotic balance of cells.
(4) Sulphur helps in the formation of some co-enzymes.
(5) Phosphorous is transported from older leaves to younger ones.

18. Select the **incorrect** statement regarding human saliva.
(1) It is a mixture of salivary and oral mucus-gland secretions.
(2) It contains more than one enzyme.
(3) Some nitrogenous waste products are found in it.
(4) It aids in speech.
(5) It is essential for complete digestion of starch.

19. Which one of the following is **not** a function of connective tissue
(1) Support (2) Transport (3) Absorption
(4) Storage (5) Immuno-protection

20. Which is the **incorrect** statement regarding a transverse section of human testis?
(1) Several seminiferous tubules can be seen there.
(2) In a seminiferous tubule, spermatogonia are seen peripherally.
(3) Spermatids are seen attached to Sertoli cells.
(4) Leydig cells are seen scattered in the germinal epithelium.
(5) Sperms are seen in the centre of the seminiferous tubule.

21. Select the **incorrect** statement regarding the proximal convoluted tubule of the human nephron.
(1) It is connected to the Bowman's capsule.
(2) Its lumen is lined with cuboidal epithelium.
(3) It is the site of obligatory reabsorption of water..
(4) It actively reabsorbs Na^+.
(5) It secretes K^+.

22. Select the **correct** statement regarding human skeletal muscle fibres.
(1) They are cylindrical, short fibres.
(2) They are multinucleate.
(3) They never get fatigued.
(4) They are interconnected cells.
(5) Their contraction requires autonomic nervous stimulations.

23. Select the **incorrect** statement regarding nervous systems.
(1) Neurone is the structural unit of the nervous system.
(2) Reflex arc is the functional unit of the vertebrate nervous system.
(3) In echinoderms, there is a nerve net.
(4) Synapse is an anatomical junction between excitable cells.
(5) Nerve cord in annelids is double, solid and ventral.

24. Which statement is **correct**, regarding lumber vertebrae of man?
(1) There are seven lumber vertebrae.
(2) They have two vertebraterial canals.
(3) They are the largest and strongest vertebrae.
(4) Each vertebra minimises forward and backward bending of the body.
(5) They have very long neural spines.

25. Select the **correct** statement regarding human ADH.
(1) It is synthesised in the posterior pituitary.
(2) It is a trophic hormone.
(3) It facilitates water reabsorption in the proximal convoluted tubules and collecting ducts of the kidney.
(4) It can increase blood pressure.
(5) Excessive release of it, causes diabetes insipidus.

26. Which one of the following is an **incorrect** statement regarding human ventilation?
(1) It is the mechanical process that moves air in, and out of the lungs.
(2) The diaphragm relaxes during inspiration.
(3) Under resting conditions, expiration is a passive process.
(4) Normal ventilation is rhythmic and involuntary.
(5) Respiratory centre in the medulla oblongata inhibits inspiration and stimulates expiration.

27. Select the **correct** response regarding human lactation and milk.
(1) Oxytocin stimulates milk production.
(2) Pro lactin controls release of milk.
(3) Release of milk starts immediately after birth.
(4) Sodium content of milk is low.
(5) Milk is rich in glucose.

28. Assume that A, B, C and D represent dominant alleles of four independently segregating genes of a plant species and a, b, c and d are their respective recessive alleles. If a plant of genotype AabbCcDd was self pollinated, what will be the ratio between the numbers of phenotypes to genotypes among the progeny plants?
(1) 2:3 (2) 3:8 (3) 8:3
(4) 8:27 (5) 16:81

29. In a plant species, fruits can be either red or yellow. Both these types can be obtained as pure lines. When two plants with yellow fruits were crossed, all F_1 plants produced red fruits. When F_1 plants were inbred, F_2 progeny had 27 plants with red fruits and 21 plants with yellow fruits. Which of the following statements is **incorrect** with regard to this inheritance?
(1) Colour of fruits could be produced by the interaction of two genes.
(2) This is an example of epistasis.
(3) Dominant alleles of two genes may be necessary to produce red colour.
(4) All plants with red fruits in F_2 progeny may be pure lines.
(5) All plants with yellow fruits in F_2 progeny may not be pure lines.

30. Red-green colour blindness is a rare sex linked character among people. A woman whose husband is normal, gave birth to a son who is colour blind. What is the probability that their next child will be colour blind?
(1) 1 (2) 0.75 (3) 0.5
(4) 0.25 (5) 0.125

31. Which of the following statements is **incorrect**?
(1) Most mutations are produced at the time of DNA replication.
(2) Mutations are usually harmful.
(3) Albinism is caused by non-disjunction of chromosomes at meiosis.
(4) Klineefelter's syndrome is caused by aneuploidy.
(5) Some mutations can be identified by examining chromosomes under the microscope.

32. Which is **not** an observation made by Darwin or Wallace in natural populations?
(1) Natural populations have high reproductive potential.
(2) Gene pools of populations stay unchanged over long periods.
(3) Individuals in a population show variations.
(4) There is much competition among members of a population.
(5) Many individuals of a population do not reproduce.

33. Which of the following is **not** an example of an application of genetically modified organisms?
(1) Production of crop plants like soya bean resistant to weedicides.
(2) Production of golden rice rich in nutrients like vitamin A.
(3) Large scale production of hepatitis B vaccine,using yeast cells.
(4) Growing cotton plants that can produce insecticidal proteins.
(5) Extraction of copper, using *Thiobacillus ferrooxidans* from low grade ores.

34. Which one of the following is a **non renewable** resource?
(1) Soil (2) Coal (3)Timber
(4) Fish (5) Fresh water

35. Primary productivity of the biosphere is highest in
(1) tropical rain forests (2) oceans (3) grasslands
(4) agricultural lands (5) temperate deciduous forests

36. Which of the following is **correct** regarding the energy flow in the biosphere?
(1) Energy is cycled in the biosphere.
(2) All autotrophic organisms in the biosphere do not use solar energy for carbohydrate synthesis.
(3) Approximately 90% of solar energy that falls on the biosphere is converted into chemical energy, by plants.
(4) Energy may flow in both directions between two trophic levels.
(5) The amount of energy fixed in the highest trophic level is higher than the energy fixed at the lower trophic level.

37. Which one of the following, forms the basis of classification of bioclimatic zones of Sri Lanka?
(1) Rainfall. (2) Rainfall and temperature.
(3) Rainfall temperature and sunlight.
(4) Rainfall, temperature and natural vegetation type.
(5) Rainfall, temperature and altitude.

38. Which combination of eyepiece x objective lens combination is the best to clearly observe stomata of a leaf?
(1) 5 × 10 (2) 5 × 40 (3) 10 × 100
(4) 10 × 10 (5) 10 × 40

39. Which unit of measurement is usually used to indicate the size of a virus?
(1) Micrometre (2) Millimetre (3) Nanometre
(4) Picometre (5) Angstrom

40. Which enzyme in the body fluids of humans can destroy bacterial cell walls?
(1) Lecithinase (2) Hyaluronidase
(3) Lysozyme (4) Phospholipase (5) Amylase

41. Coliform bacteria are used as indicator organisms of faecal pollution because
(1) they are intestinal pathogens.
(2) they ferment lactose.
(3) they are the major inhabitants in the human intestine.
(4) they grow well in culture media within 48 hours.
(5) their major habitats are water and soil.

42. Which of the following takes place under aerobic conditions?
(1) Nitrogen fixation in legume root nodules.
(2) Biogas production in a sludge digestion system.
(3) Denitrification in aquatic environments.
(4) Production of botulin toxin by *Clostridium botulinum*.
(5) Microbial reduction of BOD in a trickling filter system.

43. Which of the following types of immunity develops in a person recovering from an infectious disease like measles?
(1) Naturally acquired active immunity.
(2) Naturally acquired passive immunity.
(3) Artificially acquired active immunity.
(4) Artificially acquired passive immunity.
(5) Genetically acquired passive immunity.

44. *Clostridium tetani* is best described as
(1) an obligate anaerobe. (2) a facultative anaerobe.
(3) an aerotolerant anaerobe. (4) an obligate aerobe.
(5) a micro-aerophilic organism.

45. A fish commonly reared in aquaria has two filamentous pelvic fins. This fish is
(1) a guppy. (2) a carp. (3) a gouramy.
(4) a sword tail. (5) an angel fish.

46. Fishing gear used in inland reservoirs of Sri Lanka are
(1) pole and line, gill nets and cast nets.
(2) seine nets, gill nets and purse seines.
(3) purse seines, gill nets and cast nets.
(4) seine nets, gill nets and cast nets.
(5) pole and line, gill nets and seine nets.

47. Which of the following statements is **correct** regarding the coconut leaf miner and coconut caterpillar?
(1) They are controlled by systemic insecticides
(2) They lay eggs on coconut leaves.

(3) Both larva and adult are harmful.
(4) General cleanliness of the field is needed for their control.
(5) They belong to the Order Coleoptera.

The questions **48** and **49** are based on the following parasites.

(A) *Wuchereria bancrofti* (B) *Plasmodium vivax*
(C) *Necator americanus* (D) *Entamoeba histolytica*
(E) *Ascaris lumbricoides*

48. Which of the above does **not** enter the human blood stream during its life cycle?
(1) A (2) B (3) C (4) D (5) E

49. Which of the above could be identified by examining a stool sample?
(1) C (2) D (3) C & E
(4) D & E (5) C,D &E

50. Marks obtained for a particular subject in an exam is normally distributed with a mean of 42 and a standard deviation of 13.If the total number of students who sat for this subject was 13000, the approximate number of students who scored between 29 and 68 is
(1) 6350 (2) 8850 (3) 9750
(4) 10650 (5) 12350

For questions **51** to **60**, one or more of the responses is/are correct. Decide which response or responses is/are correct and then select the corresponding correct number form the table.

(1)	(2)	(3)	(4)	(5)
ABD correct	ACD correct	AB correct	CD correct	Any other response or combination of responses correct

51. Select the correct symbolic base pairing of DNA.
(A) A=T (B) C=G (C) A=G
(D) C=T (E) A=U

52. Which of the following carbohydrates give/gives a positive reaction with Fehling's test?
(A) Glucose (B) Sucrose (C) Fructose
(D) Maltose (E) Lactose

53. Which of the following requires/require ATP?
(A) Glycolysis in aerobic respiration.
(B) Calvin cycle in photosynthesis.
(C) Photolysis in photosynthesis.
(D) Electron transport system in aerobic respiration.
(E) Krebs cycle in aerobic respiration.

54. Which of the following is/ are **not** true regarding the structure of monocotyledonous stems?
(A) Well differentiated cortex and pith.
(B) Vascular bundles arranged in several rings.
(C) No cambium in vascular bundles.
(D) Protoxylem in the vascular bundle may break down to form a cavity.
(E) Vascular bundles enclosed by a ring of sclerenchyma cells.

55. Which of the following is/are **true** about dicotyledonous stems after secondary thickening?
(A) All tissues outside the vascular cambium form the bark.
(B) Vascular cambium forms a ring of several layers of meristematic cells.
(C) Pith of the stem has disappeared.
(D) Cells of medullary rays transport substances radially in the stem
(E) Sapwood as well as heart wood, transport water.

56. Which of the following structures in the human brain is/are important in the control of movements involving skeletal muscles?
(A) Basal ganglia (B) Cerebellum
(C) Medulla oblongata (D) Corpus callosum
(E) Red nuclei

57. Which of the following is/are **correct** regarding regulation of blood glucose level in man?
(A) Fasting blood glucose level is 80-120 mg/100ml blood.
(B) Blood glucose level is regulated by negative feedback mechanisms.
(C) Rise in blood glucose level inhibits insulin secretion.
(D) Glucagon stimulates conversion of glycogen to glucose.
(E) Distal convoluted tubule of nephron plays an important role in glucose homoeostasis.

58. Which of the following is/are **not** considered as major global environmental issues?
(A) Increase in CO_2 content in the atmosphere.
(B) Acid rain.
(C) Use of chemical pesticides.
(D) Use of inorganic fertiliser.
(E) Depletion of ozone layer in the upper atmosphere.

59. Pollution of water bodies by sewage leads to
(A) Increase of cyanobacteria.
(B) Increase in primary productivity.
(C) Increase in chemical oxygen demand.
(D) Reduction of dissolved oxygen content.
(E) Increase of primary consumers.

60. Paddy bug
(A) lays eggs on the leaves of paddy plants.
(B) is mainly harmful to young paddy plants.
(C) can be controlled using trap crops.
(D) transmits viral diseases.
(E) is harmful only during the nymph stage.