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கல்விப் பொதுத் தராதரப்பத்திர(உயர் தர)ப் பரீட்சை, 2000 ஓகஸ்த்  
General Certificate of Education (Adv. Level) Examination, August 2000

ජීව විද්‍යාව I

உயிரியல் I

Biology I

09

E

I

පැ දෙකයි / இரண்டு மணித்தியாலங்கள் / Two hours

**Important:**

- \* This question paper consists of **eight (8) pages**.
- \* Enter your **Index Number** in the space provided on the answer sheet.
- \* Further instructions are given on back of the answer sheet. Follow them carefully.
- \* You should attempt **all** the questions in this paper.

For each question there are **five** alternative responses of which only **one** is correct. When you have selected the response which you consider to be the best answer to a question, mark your response on the answer sheet according to the instructions given in it. Read and consider each question carefully but leave aside any which you find too difficult to answer and come back to it later if you have time.

1. Which of the following statements is **not** included in the cell theory?

- (1) All organisms are composed of one or more cells.
- (2) The basic structural unit of organism is the cell.
- (3) The cell is the basic functional unit of organism.
- (4) All cells arise from pre-existing cells.
- (5) All cells are microscopic.

2. Which of the following statements is **incorrect** regarding collenchyma cells?

- (1) They are living at maturity.
- (2) They have primary cell walls only.
- (3) They are capable of further cell division.
- (4) They are found in both primary and secondary plant bodies.
- (5) They have unevenly thickened cell walls.

3. This figure is an electronmicrograph of a

- (1) golgi complex.
- (2) cytoskeleton.
- (3) mitochondrion.
- (4) lysosome.
- (5) nucleus.



4. Which of the following compounds is most abundant in living matter?

- (1) Carbohydrates
- (2) Lipids
- (3) Proteins
- (4) Nucleic acids
- (5) Water

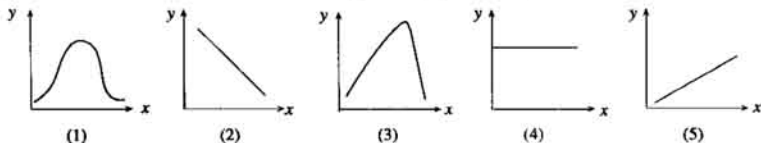
5. Which of the following biological conversions taking place in the cell yield the highest amount of energy in the form of ATP?

- (1) Glucose  $\rightarrow$  pyruvic acid
- (2) Glucose  $\rightarrow$  lactic acid
- (3) Glucose  $\rightarrow$   $\text{CO}_2 + \text{H}_2\text{O}$
- (4) Glucose  $\rightarrow$  ethyl alcohol
- (5)  $\text{CO}_2 \rightarrow$  Glucose

[See page two

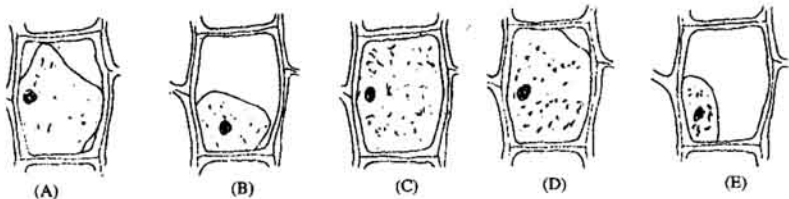
6. Which of the following is found only in procaryotic cells?  
(1) Cytoplasm containing membrane bound organelles  
(2) Intracellular matrix of proteins called cytoskeleton  
(3) Cell membranes made up of phospholipids and proteins  
(4) Ability to fix atmospheric nitrogen  
(5) Microbodies containing digestive enzymes
7. Which one of the following is the natural unit of classification?  
(1) Phylum / Division (2) Class (3) Order  
(4) Family (5) Species
8. A nematode can be easily distinguished from an annelid due to  
(1) cylindrical shape. (2) unsegmented body.  
(3) absence of suckers. (4) absence of external gills.  
(5) absence of appendages.
9. During a field survey, a student observed an animal with scaleless smooth skin and paired limbs in a fresh water pond. This animal is most likely to belong to the  
(1) Class Osteichthyes. (2) Class Chondrichthyes. (3) Class Amphibia.  
(4) Class Reptilia. (5) Class Mammalia.
10. The most significant cause of loss of biodiversity in Sri Lanka is considered as  
(1) global warming. (2) destruction of habitats.  
(3) destruction of the ozone layer. (4) human consumption of native plants for food.  
(5) accumulation of non-biodegradable chemicals along the food chains.
11. Which of the following comparisons between algae and bryophytes is correct?  
(1) Thallose mature vegetative body is found in algae but not in bryophytes.  
(2) The life cycles of all algae and all bryophytes show heteromorphic alternation of generations.  
(3) The gametophytic generation of both algae and bryophytes is autotrophic while sporophytic generation of both is totally dependant on gametophytic generation for nutrition.  
(4) All algae and all bryophytes contain chlorophyll a only.  
(5) Reproductive structures of algae are mostly unicellular while those of bryophytes are multicellular.

● Questions 12 and 13 are based on the following set of graphs (1 - 5).



12. Which of the above graphs best shows the effect of temperature on the rate of enzyme activity?  
(x axis = temperature ; y axis = rate of enzyme activity)
13. Which of the above graphs best shows the effect of relative humidity on the rate of transpiration of plants  
(x axis = relative humidity ; y axis = rate of transpiration)
14. Three test tubes were prepared as given below :  
(I) Glucose solution  
(II) Sucrose solution + dilute HCl  
(III) Starch solution + Amylase  
After one hour, Benedict's solution was added to all three test tubes and heated gently in a water bath. A red precipitate was observed in  
(1) I only. (2) II only. (3) I and II only.  
(4) II and III only. (5) I, II and III.

15. Which of the following is correct regarding plant-water relationships?
- (1) Both entry of water into a plant and loss of water by transpiration take place along a water potential gradient.
  - (2) Water movement across the symplast requires expenditure of metabolic energy.
  - (3) Water moves across the apoplast while solutes do not.
  - (4) Water movement across vacuolar pathway can take place against a concentration gradient.
  - (5) Guttation is an active process requiring metabolic energy.
16. Which of the following is **incorrect** regarding xylem vessels?
- (1) They are non living tissues at maturity.
  - (2) They have lignified thick walls.
  - (3) The lumen of each vessel is continuous with that of adjacent ones.
  - (4) They conduct both water and synthesized food.
  - (5) They give mechanical support to the plant.
17. Which of the following classes of plant hormones play a major role in cell division?
- (1) Auxins
  - (2) Gibberellins
  - (3) Abscisic acid
  - (4) Cytokinins
  - (5) Ethylene
18. Which of the following **cannot** be considered as a symbiotic association?
- (1) Human skin and the normal microbiota living on its surface.
  - (2) A mango tree and the *Cuscuta* plant growing on it.
  - (3) Association of fungi with roots of higher plants.
  - (4) A leguminous plant and nitrogen fixing bacteria found in its root nodule.
  - (5) Lichens and the bark of the tree they are growing on.
19. Which of the following is the first stable product formed in  $C_4$  photosynthetic pathway?
- (1) Oxaloacetate
  - (2) Phosphoglyceric acid
  - (3) Glucose
  - (4) Starch
  - (5) Ribulose biphosphate
20. Which of the following statements about photosynthesis is **incorrect**?
- (1) Photosynthesis can be considered as an energy releasing process.
  - (2) Red and blue light are the most effective in photosynthesis.
  - (3) Chlorophyll is not the only pigment participating in photosynthesis.
  - (4) The oxygen released during photosynthesis originates from water.
  - (5) Carbon dioxide fixation can take place during day time.
21. The following figures show various stages of changes that can be observed when coloured epidermal peel of *Rhoeo* is placed in a concentrated solution of sugar.



Which of the following indicates the correct sequence of various stages?

- (1) C,A,D,E,B
  - (2) E,B,A,D,C
  - (3) E,B,C,A,D
  - (4) C,D,A,B,E
  - (5) A,D,E,B,C
22. Clotting of blood at injury is delayed due to the deficiency of
- (1) Vitamin A.
  - (2) Vitamin C.
  - (3) Vitamin D.
  - (4) Vitamin E.
  - (5) Vitamin K.

- Questions No. 23 and 24 are based on the following table. In this table column 1 indicates 3 digestive enzymes of man, column 2 indicates the main sites of their production and column 3 indicates the substrates on which they act.

Column 1 enzyme	Column 2 main site of production	Column 3 substrate
A = lipase	E = stomach	P = trypsinogen
B = rennin	F = small intestine	Q = lipids
C = enterokinase	G = pancreas	R = caseinogen

23. Which of the following indicates the correct order of main sites of production of enzymes A, B and C?  
 (1) F, G, E    (2) E, G, F    (3) G, E, F    (4) G, F, E    (5) F, E, G
24. Which of the following indicates the correct order of substrates of enzymes A, B and C?  
 (1) Q, P, R    (2) R, Q, P    (3) P, R, Q    (4) Q, R, P    (5) R, P, Q
25. Stimulation of sympathetic nervous system in man  
 (1) slows down the rate of heart beat.  
 (2) constricts the pupil of the eye.  
 (3) inhibits the contraction of the sphincter muscle of the urinary bladder.  
 (4) inhibits the secretion of intestinal juice.  
 (5) dilates the arterioles in the skin.
26. Which one of the following statements is correct regarding the regulation of body temperature in man?  
 (1) Lowering of the environmental temperature stimulates the thermoregulatory centre in the cerebellum.  
 (2) Rise in body temperature inhibits the secretion of hormones that increase the metabolic rate.  
 (3) Rise in environmental temperature contracts the hair erector muscles in the skin.  
 (4) Decrease in body temperature produces more sweat.  
 (5) Lowering of environmental temperature dilates the superficial blood vessels in the skin.
27. In a nephron of a normal healthy person,  
 (1) ultrafiltration takes place in the proximal convoluted tubule.  
 (2) sodium ions are completely resorbed before the filtrate reaches the distal convoluted tubule.  
 (3) all glucose in the filtrate is resorbed in the proximal convoluted tubule.  
 (4) permeability to water of the descending limb of the loop of Henle is increased due to ADH.  
 (5) resorption of amino acids in the filtrate is completed in the ascending limb of the loop of Henle.
28. In the human ear,  
 (1) the stapes is in contact with the round window.  
 (2) semicircular canals are important for the maintenance of body posture.  
 (3) the cells sensitive to sound waves are located in the vestibule.  
 (4) the middle ear is filled with perilymph.  
 (5) the organ of Corti is important in the detection of the movement of the head.
29. Which one of the following statements regarding respiration of man is **incorrect**?  
 (1) The basic rhythm of respiration is controlled by the respiratory centre located in the cerebrum.  
 (2) A respiratory cycle is composed of three phases.  
 (3) Respiratory gas exchange takes place in the alveoli and alveolar ducts.  
 (4) Inspiration is an active process while expiration is a passive process.  
 (5) The chemoreceptors sensitive to partial pressure of oxygen in the blood are present in the carotid arteries.
30. In the human female,  
 (1) oogenesis continues until menopause.  
 (2) the Graafian follicle contains a primary oocyte surrounded by several cell layers.  
 (3) outermost layer of the ovary is the stroma.  
 (4) the ovum is produced at fertilization.  
 (5) progesterone stimulates the growth of the Graafian follicle.

31. Which of the following is **not** correct regarding sexual reproduction of plants and animals?
- (1) It may produce offsprings identical to parents.
  - (2) Meiosis is an essential feature.
  - (3) It produces variations among offspring.
  - (4) It provides more chances for adaptability.
  - (5) It involves fusion of reproductive units.
32. Which of the following phenomena is **not** likely to cause an increase in phenotypic variation among the progeny of a genetic cross?
- (1) Independent segregation.
  - (2) linkage.
  - (3) crossing over.
  - (4) incomplete dominance.
  - (5) mutation.
33. In Pea plants red flower (R) is dominant to white flower (r) and green seed (G) is dominant to yellow seed (g). In order to determine the genotype of a plant which had red flowers and green seeds it was crossed with a plant which had white flowers and yellow seeds. The progeny obtained was of two types, red flowers with green seeds and white flowers with green seeds. The genotypes of the tested plant is likely to be
- (1) RRGG
  - (2) RrGG
  - (3) RrGg
  - (4) RRGg
  - (5) rrgg
34. Which of the following statements regarding mutations is correct?
- (1) Mutations always produce disadvantageous characters in organisms.
  - (2) Mutations occur more frequently in plants than in animals.
  - (3) Structural changes in DNA give rise to mutations.
  - (4) Mutations do not occur in viruses.
  - (5) Mutations cannot be induced in the laboratory
35. The point of attachment of two sister chromatids in the chromosome during prophase of mitosis is
- (1) centriole.
  - (2) centromere.
  - (3) basal body.
  - (4) spindle fibre.
  - (5) chiasma.
36. An eutrophic lake is
- (1) low in dissolved oxygen and rich in nutrients.
  - (2) rich in dissolved oxygen and poor in flora and fauna.
  - (3) rich in dissolved oxygen and low in nutrients.
  - (4) low in dissolved oxygen and low in nutrients
  - (5) rich in flora but poor in fauna and low in dissolved oxygen.
37. In a pyramid of numbers based on a food chain in an aquatic environment, which of the following shows a progressive decrease in numbers in the ascending trophic levels?
- | Primary producers           | Primary consumers  | Secondary consumers   |
|-----------------------------|--------------------|-----------------------|
| (1) Phytoplankton           | Zooplankton        | Fish                  |
| (2) Aquatic macrophytes     | Aquatic insects    | Nymphs of dragonflies |
| (3) Phytoplankton           | Snails             | Parasites of snails   |
| (4) Phytoplankton           | Bacteria           | Fish                  |
| (5) Unicellular green algae | Parasites of algae | Carnivorous fish      |
38. Which of the following statements regarding water is true?
- (1) Water enters the atmosphere through evaporation and transpiration.
  - (2) There will always be plentiful supply of fresh water on our planet.
  - (3) Ocean water can never become polluted.
  - (4) Fresh water is a non-renewable resource.
  - (5) Clean drinking water can be obtained when waste water is subjected to primary treatment.

- Questions 39 and 40 are based on the following trophic levels of an ecosystem.
- A - Primary producers                      B - Primary consumers  
C - Secondary consumers                  D - Tertiary consumers  
E - Decomposers
39. Which of the above trophic levels is represented by edible mushrooms growing in a tropical rain forest?  
(1) A                      (2) B                      (3) C                      (4) D                      (5) E
40. Which of the above trophic levels is likely to accumulate the highest concentration of non-biodegradable insecticides?  
(1) A                      (2) B                      (3) C                      (4) D                      (5) E
41. Which of the following substances in motor vehicle exhaust fumes cause the most immediate harmful effect on humans?  
(1) lead compounds.                      (2) nitrogen oxides.                      (3) carbon monoxide.  
(4) carbon dioxide.                      (5) sulphur dioxide.
42. Which of the following is correct regarding chemo-autotrophic bacteria?  
(1) They use organic compounds as the source of energy.  
(2) They obtain carbon from organic compounds.  
(3) They use light as the source of energy.  
(4) Some use nitrate as the source of energy.  
(5) All fix atmospheric nitrogen.
43. Which of the following is **incorrect** regarding viruses?  
(1) They do not show a cellular organization.  
(2) They are obligate parasites.  
(3) DNA or RNA may exist as a double stranded or single stranded form in the viral genome.  
(4) Some viruses contain enzyme polymerase in the capsid.  
(5) They are not found in the natural habitats like soil or water.
44. Microorganisms are made use of in the production of the following.  
A - Wine                      B - Lactic acid                      C - Bread
- Which of the above make use of *Saccharomyces cerevisiae*?  
(1) A only                      (2) A and B only                      (3) A and C only  
(4) C only                      (5) A, B and C
45. Fungi differ from bacteria because fungi  
(1) are saprophytic.                      (2) have absorptive nutrition.  
(3) produce antibiotics.                      (4) are eucaryotic.  
(5) reproduce asexually.
46. Which of the following is **incorrect** regarding microorganisms and diseases?  
(1) Microorganisms are found also in the intestine of healthy humans.  
(2) Extracellular enzymes produced by some microorganisms are responsible for disease production.  
(3) Endotoxins produced by bacteria are heat labile.  
(4) Human skin prevents the establishment of some pathogenic microorganisms.  
(5) Inflammatory response is a mechanism for prevention of the spread of an infection from the original site.
47. Various steps involved in the simple staining procedure of microorganisms in a sample of toddy are given below in an incorrect sequence.  
A - Preparation of a thin smear on a slide  
B - Heat fixing of the smear  
C - Addition of methylene blue stain and leaving for 30 seconds  
D - Air drying of the smear.  
E - Washing the smear with water, drying and microscopic examination
- Which of the following represents the correct order of the steps of the simple staining procedure?  
(1) A,B,C,D,E                      (2) A,D,C,B,E                      (3) A,C,D,B,E                      (4) A,D,B,C,E                      (5) A,B,D,C,E

48. A student observed the following features in a marine food fish

- A - spindle shape body  
 B - several dorsal finlets and anal finlets  
 C - several dark longitudinal bands in the trunk region

This fish could be a

- (1) tuna. (2) carangid. (3) skate.  
 (4) shark. (5) trenched sardine.

49. A researcher sampled the yield of two varieties of paddy and calculated the following.

- A - Mean of the samples of each variety.  
 B - Standard deviation of the samples of each variety.  
 C - Standard error for the samples of two varieties

In order to determine whether the yield of two varieties significantly differ from each other, the researcher needs to consider

- (1) A only. (2) B only. (3) C only. (4) A and B only. (5) A and C only.

50. Which of the following is **not** a method of artificial vegetative propagation of plants?

- (1) use of stems cuttings (2) Layering (3) Tissue culture  
 (4) Propagation by bulbils (5) Grafting

- For each of the questions Nos. 51 to 60 one or more of the responses is / are correct. Decide which of the response / responses is / are correct and then select.

- 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

51. Which of the following is/are least likely to have contributed to the dominance of flowering plants on earth?  
 (A) Autotrophic mode of nutrition  
 (B) Large size of the plants  
 (C) Evolution of seeds  
 (D) Presence of cutin on the aerial surface of plants  
 (E) Efficient mechanisms for dispersal of spores and seeds
52. Which of the following statements is/are **incorrect** regarding *Nephrolepis*?  
 (A) Plant body is differentiated into roots, stem and leaves.  
 (B) Possesses multicellular reproductive structures.  
 (C) No thallus phase is present in the life cycle.  
 (D) Shows heterospory.  
 (E) Vascular tissues are present.
53. Which of the following statements regarding the transport of organic food material in the phloem is/are **incorrect**?  
 (A) The food material transported is mainly glucose.  
 (B) Transport of food material through the sieve tubes of phloem requires metabolic energy.  
 (C) Transport of food material can occur in both directions within the phloem.  
 (D) Transport of food material is stopped when phloem is treated with respiratory inhibitors.  
 (E) The rate of transport of food material may vary within the day.

54. Which of the following hormones is/are secreted by the anterior pituitary of man?  
(A) FSH (B) Growth hormone  
(C) ADH (D) Prolactin  
(E) Oxytocin
55. Which of the following statements regarding the blood circulatory systems is/are correct?  
(A) All vertebrates have a closed blood circulatory system.  
(B) Presence of a blood circulatory system is a characteristic feature of all animals.  
(C) All animals that have double circulation possess a ventral heart.  
(D) The blood circulatory systems of vertebrates have evolved from a basic plan.  
(E) In man, the systemic arch is derived from the third aortic arch of the basic plan of aortic arches of vertebrates.
56. Which of the following features of the human skeleton is/are important for the upright posture?  
(A) Presence of four curves in the vertebral column  
(B) Presence of intervertebral discs  
(C) Presence of a broad foot  
(D) Presence of a basin shaped pelvis  
(E) Presence of a large cranium
57. Which of the following parasites **do/does not** require a vector for transmission to man?  
(A) *Entamoeba histolytica* (B) *Plasmodium vivax*  
(C) *Necator americanus* (D) *Ascaris lumbricoides*  
(E) *Wuchereria bancrofti*
58. Which of the following statement/statements is/are correct?  
(A) Economic injury level is the density of the pest population at which loss cannot be tolerated economically.  
(B) In agriculture, the density of the pest population should be maintained below the economic injury level.  
(C) Control measures should be applied when the density of the pest population reaches the economic injury level.  
(D) Economic injury level depends on the value of the crop.  
(E) Economic injury level is the stage at which the pest population density starts to increase rapidly.
59. Which of the following statements on extensive and intensive aquaculture in Sri Lanka is / are correct?  
(A) Intensive aquaculture of fin fish is widely practised in Sri Lanka.  
(B) Supplementary feeding is usually carried out in extensive aquaculture.  
(C) Yield per unit area from intensive aquaculture is higher than that from extensive aquaculture.  
(D) In intensive aquaculture, water quality is maintained within the desirable range of the cultured organisms.  
(E) Stocking density is higher in extensive aquaculture than in intensive aquaculture.
60. Which of the following is/are most likely to show a normal distribution?  
(A) Height of adult males in Sri Lanka.  
(B) Number of nuts plucked from each coconut palm in an estate.  
(C) Number of persons in different age groups in Sri Lanka.  
(D) Height of tea plants in a regularly pruned plantation.  
(E) Number of motor vehicles of different makes registered in Sri Lanka in a particular year.