General Certificate of Education (A/L) Examination
2004 - April
Biology I - Two hours

Important :

- *This question paper consists of 8 pages.*
- *Write your **Index Number** in the space provided in the answer sheet and then indicate your Index Number **by shading** the appropriate numbers in the grid immediatly below it*
- *Further instructions are given on the back of the answer sheet. Follow them carefully.*
- *You should answer **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 one of the following biological molecules is not a polymer?
   1. RNA
   2. Starch
   3. ATP
   4. Glycogen
   5. Cellulose

2. The hydrolysis of one molecule of sucrose produces
   1. two fructose molecules.
   2. one glucose molecule and one fructose molecule.
   3. two glucose molecules.
   4. one glucose molecule and one galactose molecule.
   5. one fructose molecule and one galactose molecule.

3. Which one of the following biological processes does **not** require energy in the form of ATP?
   1. Coversion of glucose to pyruvic acid in glycolysis.
   2. Coversion of starch to sugar during seed germination.
   3. Coversion of carbon dioxide to suger in photosynthesis.
   4. Coversion of amino acids to proteins during protein synthesis
   5. Transport of sugar from mesophyll cells to sieve tube elements in phloem translocation.

4. Which one of the following features of the DNA molecule determines the genetic information specific for a character?
   1. The spiral nature of the molecule.
   2. The sequence of bases of the molecle.
   3. The ratio of different bases
   4. The length of the molecule
   5. The nture of hydrogen bonds between base pairs

5. Which one of the following is the most accepted chrono'ogical sequence of origin of organisms on earth?
   1. heterotrophic bacteria, cyanobacteria, algae, fishes, trilobites
   2. bacteria, algae, invertebrates, aquatic vertebrates, terrestrial vertebrates
   3. green algae, cyanobacteria invertebrates, fishes, amphibians
   4. bacteria, algae, cartilaginous fishes, amphibians, bony fishes
   5. algae, invertebrates, fishes, reptiles, amphibians

6. Some categories of species considered in the study of biodiversity are as follows:
   A - Relict species; B - Keystone species; C - Endemic species; D - Flagship species
   Which one of the following sequences of organisms gives the correct examples for the categories in A, B, C and D?
   1. Lamp shell, Elephant, Dipterocarpus sp., Leopard
   2. Elephant, Leopard, Dipterocarpus sp., Lamp shell
   3. *Dipterocarpus* sp., Leopard, Lamp shell, Elephant
   4. Lamp shell, Leopard, *Dipterocarpus* sp., Elephant
   5. Elephant, Lamp shell, *Dipterocarpus* sp., Leopard

7. The following features were noted in an animal living in the marine environment.
   (a) A cylindrical body (b) Tentacles (c) A body without a shell
   To which one of the following classes, this animal may belong?
   1. Scaphopoda
   2. Echhinoidea
   3. Holothuroidea
   4. Hirudinea
   5. Scyphozoa

8. Which one of the following statements is correct?
   1. There are no critically endangered species in Sri Lanka.
   2. All critically endangered species kept in zoological gardens and botanical gardens are found in natural habitats.
   3. A species included in the endangered category may be in cluded in the vulnerable category in future.
   4. All critically endangered species are endemic to a small geographic area.
   5. Endangered species in Sri Lanka are mainly conserved by *ex-situ* conservation methods.

9. Which one of the following contains the highest percentage of non - living cells?
   1. Sapwood
   2. Bark
   3. Secondary xylem
   4. Secondary phloem
   5. Heartwood

10. Plants which show heteromorphic alternation of generations always
    1. have independent gametophytes and independent sporophytes.
    2. have morphologically dissimilar gametophytes and sporophytes.
    3. have sporophytes which are more differentiated than gametophytes.
    4. have sporophytes which are less differentiated than gametophytes.
    5. have small gametophytes and large sporophytes.

11. Which one of the following features distinguishes mosses from ferns?
    1. Presence of nutritionally independent gametophytes
    2. Presence of alternatin of generations in the life cycle
    3. Requirement of water for fertilization
    4. Lack of a well developed vascular system
    5. Absence of heterospory

12. Rapid mitotic division of cells can be best observed in a prepared slide of which one of the following structures?
    1. Epidermis of leaf
    2. Cortex of root
    3. Seminiferous tubules of human testes
    4. Endosperm of *Cycas*
    5. Onion root tip

13. Intevascicular cambium in most dicotyledonous stems
    1. is a primary meristem
    2. is of secondary origin
    3. consists of several layers.
    4. consists of parenchyma cells with large vacuoles.
    5. produces secondary medullary rays.

14. Simple squamous epithelia in man are found in the
1. epidermis and buccal cavity.
2. ducts of sweat glands and ducts of salivary glands.
3. urinary bladder and Bowman's capsule.
4. alveoli and blood capillaries.
5. thyroid gland and convoluted tubules nephrons.

15. In man, which one of the following aortic arches becomes the carotid arteries?
1. First arch
2. Second arch
3. Third arch
4. Fourth arch
5. Sixth arch

16. The white blood cells associated with antibody production are
1. neutrophils.
2. basophils.
3. eosinophils.
4. monocytes.
5. lymphocytes.

17. Green glands are the excretory organs of
1. flat worms.
2. annelids.
3. molluscs.
4. crustaceans.
5. insects.

18. Which one of the following statements is correct regarding the human alimentary canal?
1. Intestinal glands are found in the villi.
2. Most of the consumed vitamins are absorbed in the small intestine.
3. Protein digestion begins in the buccal cavity.
4. Muscle layers are most developed in the small intestine.
5. Colon is the main site of production of vitamin B_{12}.

19. Which one of the following statements is **incorrect** regarding action potential?
1. It does not require ATP.
2. Its duration is extremely short.
3. During its occurrence, the polarity of the axon membrane reverses.
4. It can spread along an axon.
5. Na^+ and Ca^{++} are essential for its production.

20. Which one of the following is **not** involved in the regulation of blood glucose level in man?
1. Intestinal villi
2. Skeletal muscles
3. α cells of islets of Langerhans
4. Pituitary
5. Nephrons

21. Which one of the following statements is **incorrect** regarding the hypothalamus of man?
1. It is developed from the embryonic mid brain.
2. It is essential for thermoregulation.
3. All hormones secreted by it act on the pituitary.
4. It synthesizes oxytocin.
5. It is involved in the regulation of the rete of heart beat.

22. Which one of the following statements is incorrect regarding human teeth?
1. The number of deciduous teeth in man is 20.
2. Molars are not found among deciduous teeth.
3. Incisors have a single root each.
4. Pulp cavity contains blood vessels and nerves.
5. Destruction of enamel by acids decays teeth.

23. The number of oxygen molecules that combine with a single molecule of haemoglobin is
1. one.
2. two
3. three.
4. four
5. five.

24. The vertebral column of man
1. Provides surfaces for articulation of clavicles and ribs, and attachment of muscles
2. consists of 33 vertebrae of which 26 are movable.
3. Produces red blood corpuscles throughout the life in the red bone marrow contained within it.
4. consists of four arches of which three are primary arches
5. contains intervertebral discs made up of cartilage and gelatinous material to absorb shocks

- Questions **25** and **26** are based on the following data

A tall, hairy tomato plant was crossed with a short, hairless tomato plant. All plants in F_1 generation were tall and hairy. When a plant of the F_1 generation was crossed with short, hairless plant the following results were obtained.

tall, hairy	tall, hairless	short, hairy	short, hairless
18	19	17	20

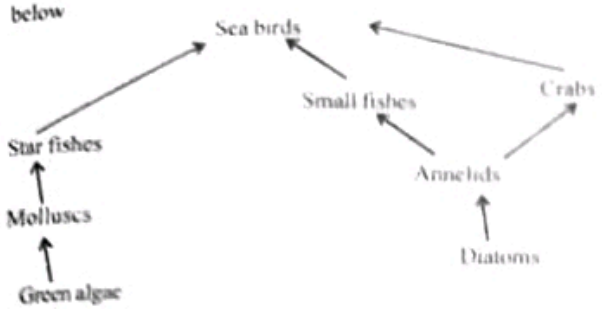
25 Which one of the following statements is incorrect about the above cross?
1. Tall, hairy are the dominant characters.
2. Cross between plants of the F_1 generation and short, hairless plants is a test cross.
3. Plants of the F_1 generation are heterozygous for both characters.
4. In F_2 generation tall, hairy plants are homozygous
5. Both characters show independent assortment

26. Which one of the following gives the correct percentage of short, hairy plants when a short, hairy plant in F_2 generation is crossed with a short, hairless plant?
1. 25%
2. 50%
3. 75%
4. 0%
5. 100%

27 Which of the following statements is **incorrect** regarding meiosis?
1. It ensures that the number of chromosomes of a species remains constant.
2. Pairing of homologous chromosomes occurs at prophase.
3. It occurs only in diploid and polyploid cells.
4. Prophase is the longest phase.
5. Centromeres divide during the anaphase.

28 Which of the following statements is **incorrect** regarding a bacterial plasmid?
1. It is a circular DNA molecule.
2. It replicates and moves along with daughter cells during cell division.
3. It has only a small number of genes.
4. It performs useful functions.
5. It is essential for the existence of the cell.

- Questions **29** and **30** are based on the simple food web given below



29. Which one of the following would most probably happen if the population of sea birds decreases?
1. The small fish and annelids would decrease in number
2. The crabs and green algae would increase in number
3. The annelids and star fishes would decrease in number
4. The molluscs and diatoms would increase in number
5. The diatoms and green algae would decrease in number

30. Which of the following best describes the relationship between the crabs and small fishes?
1. Competition
2. Symbiosis
3. Predation
4. Commensalism
5. Parasitism

31. Soils of tropical rain forests are generally poor in nutrients because.
1. biomass of decomposing leaves on the forest floor is low.
2. microorganisms are less abundant in soils of these forests.
3. the decomposition of organic matter and assimilation of nutrients by plants are very rapid.
4. nutrient cycling is generally slow.
5. high rainfall leaches the soil nutrients.

32. Which one of the following features is common to both decomposers and producers in an ecosystem?
1. Both represent the first trophic level in different ecosystems.
2. Both require a source of nutrients and a source of energy.
3. Both produce oxygen for other organisms in the ecosystem.
4. Both supply organic food for the biosphere.
5. In aquatic ecosystems their numbers are more or less equal.

33. Which one of the following biomes has the highest animal diversity?
1. Taiga
2. Temperate deciduous forests
3. Grasslands
4. Tropical rain forests
5. Savannah

- Questions **34** and **35** are based on the trophic levels of a natural ecosystem given below.

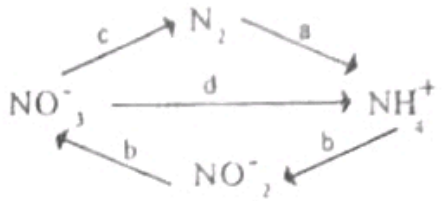
A - Primary producers
B - Primary consumers
C - Secondary consumers
D - Tertiary consumers
E - Decomposers

34. The trophic level which represents mosses growing an epiphytes on a tree trunk is
1. A
2. B
3. C
4. D
5. E

35. The trophic level which represents mushrooms occasionally seen growing on the base of the trunks of trees is
1. A
2. B
3. C
4. D
5. E

36. Chlorofluorocarbon mainly contributes to
1. global warming
2. ozone depletion
3. acid rain
4. decreased transparency of the atmosphere
5. climate change

- Questions **37** and **38** are based on the following diagram which represents some of the activities of the nitrogen cycle

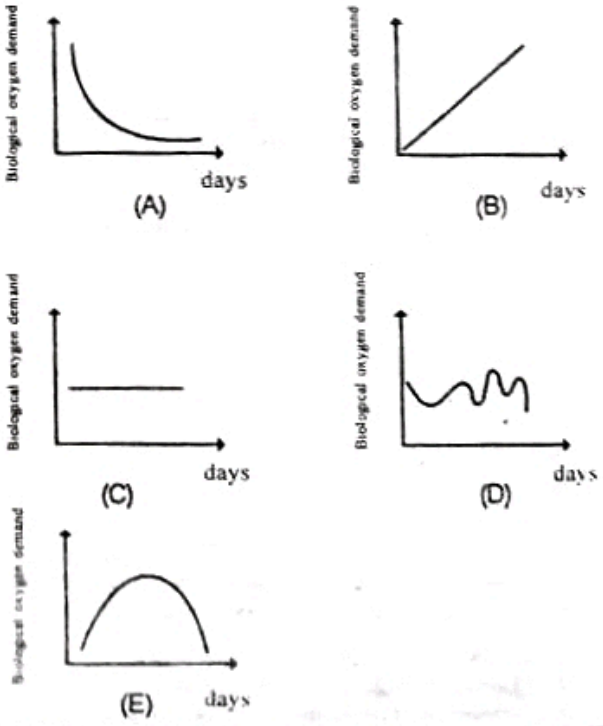


37. The processes *a*, *b*, *c* and *d* shown in the above diagram are known respectively as
1. Denitrification, nitrogen fixation, nitrification and ammonification
2. Nitrogen fixation, nitrification, denitrification and nitrate reduction.
3. Denitrification, nitrification, nitrate reduction and nitrogen fixation
4. Nitrogen fixarion, nitrification, nitrate reduction and ammonification
5. Ammonification, nitrification, nitrate reduction and denitrification.

38. Which of the following organisms are responsible for the process *a*
1. *Rhizobium* and *Azotobacter*
2. *Nitrobacter* and *Azotobacter*
3. *Rhizobium* and *Acetobacter*
4. *Anabaena* and *Pseudomonas*
5. *Nitrosomonas* and *Acetobacter*

39. Which one of the following bacteria produces a neurotoxin?
1. *Salmonella typhi*
2. *Clostridium tetani*
3. *Pseudomonas aeruginosa*
4. *Corynebacterium diphtheriae*
5. *Vibrio cholerae*

40.



Which of the above graphs best represents the changes of Biological Oxygen Demand (B.O.D.) with time in an activated sludge reactor in a waste water treatment plant?

1. A
2. B
3. C
4. D
5. E

41. Antimicrobial activity of penicillin depends on
    1. inhibition of DNA replication in bacteria.
    2. inhibition of synthesis of cell walls of bacteria.
    3. inhibition of protein synthesis in bacteria.
    4. inhibition of folic acid synthesis in bacteria.
    5. inhibition of membrane transport systems in bacteria.

42. The metabolic activities of which of the following organisms are used in the industrial manfacture of wine?
    1. *Acetobacter aceti*
    2. *Lactobacillus bulgaricus*
    3. *Aspergillus niger*
    4. *Saccharomyces cerevisiae*
    5. *Streptococcus lactis*

43. Which one of the following characteristics is common to all bacteria, fungi and viruses?
    1. DNA is the genetic material
    2. Non photosynthetic organisms
    3. Cannot be observed with the light microscope
    4. The most widespread organisms in the biosphere
    5. Causative agents of large number f diseases in plants and animals

44. Which one of the following methods is usually used to sterilize water in a microbiological laboratory?
    1. Boiling at 100°C
    2. Heat at 121°C for 15 minutes in an autoclave
    3. Filter using bacterial filbers.
    4. Expose to ultravialet light for 10 minutes.
    5. Pasteurize using high temperature short term method.

45. Some insect pests in Sri Lanka and a statement on the symptoms of damage caused by them are given below. Which one of these statements regarding the symptoms of damage stated against the name of the pest is **incorrect**?
    1. Red weevil - drying of tender leaves of coconut palm
    2. Coconut caterpillar - scattered greyish brown spots on coconut leaflets
    3. Yellow stem borer - dead hearts in paddy plants.
    4. Case worm - white or brown patches on paddy plams
    5. Black beetle - rotting and falling of crowns of coconut palms

46. The most suitable species combination for polyculture in a freshwater pond in Sri Lanka is
    1. *Oreochromis niloticus* and *Cirrhinus mrigala*.
    2. *Oreochromis mossambicus* and *Catla catla*.
    3. *Cirrhinus mrigala* and *Penaeus monodon*.
    4. *Catla catla* and *Penaeus indicus*.
    5. *Oreochromis niloticus* and *Labeo rohita*.

47. Some characteristics of weeds are given below.
    A - Efficient dispersal
    B - Fast growth
    C - Production of large number of seeds

    Which one of the following sequences of weeds gives the correct sequence of examples for the characteristics A, B and C?
    1. *Cyperus* sp., *Cynodon* sp., *Echinochloa* sp.
    2. *Cyperus* sp., *Echinochloa* sp., *Cynodon* sp.
    3. *Cynodon* sp., *Echinochloa* sp., *Cyperus* sp.
    4. *Echinochloa* sp., *Cynodon* sp., *Cyperus* sp.
    5. *Echinochloa* sp., *Cyperus* sp., *Cynodon* sp.

48. Which one of the following statements regarding *Plasmodium vivax* is correct?
    1. Its vector lays eggs in well lit fast flowing water
    2. The infective stage is the merozoites
    3. Rupture of infected liver cells causes fever in the host.
    4. Fertilization of gametes occurs in the mid gut of the vector.
    5. Schizont stage is found only in red blood cells.

49. Two samples of shrimps, each with 40 individuals were obtained from two acquaculture ponds. The mean weights of shrimps in the two samples were 36 g and 38 g and the standard error was 0.92. Which one of the following statements regarding the shrimps in the two ponds is correct?
    1. Mean weights of shrimps in the two ponds are significantly different from each other.
    2. The difference observed in the mean weights of shrimps is due to chance.
    3. Since the values for variances are not given, no inferences can be made on the shrimps in the two ponds.
    4. Chi square test has to be carried out to determine whether the mean weights of shrimps in the samples significantly differ from those of the shrimps in the ponds.
    5. Without the percentage of shrimps in each weight class, no inferences can be made on the mean weights of shrimps in the two pouds.

50. The mean and the standard deviation of marks obtained for Biology at one of the past G.C.E. (A/L) examinations by 28900 students are 44 and 15 respectively. If these marks are normally distributed, the number of students who had scored more than 74 marks is approximately
    1. 100
    2. 700
    3. 1400
    4. 4600
    5. 9200

- **For each of questions 51 to 60 one or more of the responses is/ are correct. Decide which of the 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

51 Which of the following statements is/are correct regarding endoplasmic reticulum?
    (A) It consists of a bilayer of lipids and proteins.
    (B) It regulates the exit of waste material from the cell.
    (C) It is responsible for lipid synthesis and detoxification of toxic substaces.
    (D) It maintains osmotic balance of cells.
    (E) It receives information and generates signals to coordinate activities between cells

52. Which of the following has/have mainly a structural role in living organisms?
(A) Starch
(B) Glycogen
(C) Cellulose
(D) Phospholipid
(E) Acetylcholine

53. Which of the following tests is/are useful in determining the presence of protein in a sample of food?
(A) Biuret test
(B) Millons test
(C) Fehling's test
(D) Sudan III test
(E) Benedict test

54. Which of the following ecosystems in Sri Lanka is/are protected by law with respect to biodiversity?
(A) Horton plain
(B) Sinharaja forest
(C) Thambalagam bay
(D) Peak wilderness
(E) Galle Face Green

55. Which of the following is/are the major criterion/ criteria used in classifying organisms into five Kingdoms?
(A) Type of nutrition
(B) Type of reproduction.
(C) Cellular organisation
(D) Differentiation into true tissues.
(E) Evolutionary trends.

56. Which of the following is/are **not** considered as advanced evolutionary feature/features unique to angiosperms?
(A) Development of photosynthetic tissues.
(B) Absence of the need of water for fertilization
(C) Development of vascular tissues.
(D) Development of dominant sporophyte in the life cycle.
(E) Development of the flower.

57. In man, activation of the sympathetic nervous system
(A) increases rate of heart beat.
(B) occurs in stressful conditions.
(C) constricts pupil.
(D) slows down peristalsis.
(E) stimulates tear production.

58. Which of the following is/are correct regarding epistasis?
(A) Each allele will have a certain degree of expression.
(B) Intermediate phenotypes are generated.
(C) There is a distinct detectable expression of two alleles.
(D) One allele suppresses the expression of others.
(E) There is an additive expression of alleles.

59. Which of the following organisms obtains/obtain carbon requirements from inorganic carbon?
(A) *Nitrobacter*
(B) *Anabaena*
(C) *Chlamydomonas*
(D) *Pseudomonas*
(E) *Aspergillus*

60. Which of the following parasitic infections could be controlled by sanitary methods?
(A) *Entamoeba histolytica*
(B) *Necator americanus*
(C) *Wuchereria bancrofti*
(D) *Ascaris lumbricoides*
(E) *Plasmodium falciparum*