# General Certificate of Education (Adv. Level) Examination, April 2006
## Biology I
### Two hours

**Important:**

- *Answer **all** the 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 **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 (X)** on the number of the correct option in accordance with the instructions give on the back of the answer sheet*

1. Which one of the following is **not** a biological polymer?
(1) DNA (2) Protein (3) Cellulose (4) ATP (5) Starch

2. Which one of the following represents the monosaccharide composition of sucrose?
(1) glucose - glucose (2) glucose - ribose
(3) glucose-fructose (4) fructose - fructose
(5) glucose - galactose

3. Which one of the following organelles in cells is **not** bound by a membrane?
(1) Mitochondrium (2) Chloroplast (3) Ribosome (4) Lysosome (5) Golgi body

4. Which one of the following is **incorrect** regarding mitochondria?
(1) They contain enzymes (2) They contain ribosomes.
(3) They contain DNA. (4) They are found in all living organisms.
(5) They are found in large numbers in heart muscle cells.

5. In mitosis, the movement of chromosomes from the equatorial plane to the poles occur during
(1) prophase (2) metaphase (3) anaphase (4) telophase (5) interphase

6. Which one of the following is a type of **intercellular** connection found in plant cells?
(1) Desmosome (2) Gap junctions (3)Tight junctions (4) Middle lamella (5) Plasmodesmata

7. The international convention which helps to control the transboundary movement of hazardous waste is
(1) Basel convention (2) Ramsar convention (3) CITES
(4) Montreal protocol (5) Biodiversity convention

8. A student observed a legless animal with minute scales, under the debris in the home garden. This animal is most likely to
(1) have a spiral shell. (2) have muscles attached to the body wall.
(3) have an aquatic larval stage. (4) respire through epidermis.
(5) excrete uric acid.

9. Which of the following statements is **incorrect**?
(1) *Betle betle* (Betel) is a flagship species in Sri Lanka.
(2) All living resources in Sri Lanka are renewable resources.
(3) Many of the major environmental problems today are global in nature.
(4) Establishment of sanctuaries is an *in-situ* conservation method.
(5) There are no relict species in Sri Lanka because it is an island.

10. The information on the endemicity, abundance and feeding habit of five animal species named as A, B, C, D and E are as follows:
A : Endemic, found in large numbers, the numbers have reduced in the recent past, omnivorous diet.
B : Not endemic, found in large numbers, carnivorous, specialized dietary habit.
C : Endemic, found in small numbers, numbers have reduced in the recent past, herbivorous, specialized dietary habit.
D : Not endemic, found in small numbers, herbivorous, non-specialized dietary habit.
E : Endemic, found in small numbers, omnivorous diet.
Which of the above species is most likely to be endangered in near future?
(1) A (2) B (3) C (4) D (5) E

11. Which one of the following statements is **incorrect**?
(1) In many fungi, products of meiosis develop directly into spores.
(2) Purpose of spore production is always not reproduction.
(3) In some plants, spores are not released from the sporangium.
(4) Plant spores are always covered by a thick cell wall.
(5) Many plants produce more than one type of spores.

12. Which of the following is an **incorrect** statement?
(1) In mesophyll cells of $C_4$ plants, $CO_2$ is fixed by PEP.
(2) $C_4$ plants do not us RuBP for $CO_2$ fixation.
(3) Synthesis of starch in $C_4$ plants takes place in bundle sheath cells.
(4) RuBP carboxylase enzyme is found in the stroma of the chloroplast.
(5) In photorespiration, RuBP is oxidized by RuBP carboxylase.

13. Which of the following is an **incorrect** statement?
(1) In phloem sieve tubes, transport of sucrose may take place in both directions.
(2) Sucrose is the only organic substance transported in phloem.
(3) Sucrose is secreted into sieve tube elements of phloem by companion cells.
(4) ATP energy is used in the process of phloem loading.
(5) Sieve tube elements are living cells although they do not have nuclei.

14. Which of the following statements is **incorrect**?
(1) In photosystem II of photosynthesis, electrons from water molecules are transferred to $NADH^+$.
(2) Light energy absorbed by accessory pigments of photosynthesis should be transferred to chlorophyll-a molecules, if to be used in photosynthesis.
(3) Chloroplast can synthesize ATP only in the presence of sun light.
(4) Both red and blue light need not be present together for light reactions of photosynthesis to take place.
(5) ATP is synthesized by the thylakoid membranes of chloroplast.

15. Which of the following statements is **incorrect**?
(1) Water potential of stomatal guard cells increases in the presence of sun light.
(2) Transport of potassium ions into guard cells from adjoining epidermal cells helps to open the stomata in the presence of sun light.
(3) Pattern of cellulose thickenings in guard cells is involved in the mechanism of opening and closing of stomata.
(4) Stomata of plant leaves may close when the transpiration is excessive.
(5) In some plants, stomata are found mainly on upper epidermis of leaf.

16. When a plant cell is at the stage of incipient plasmolysis
(1) its water potential is zero.
(2) its solute potential is zero.
(3) its pressure potential is zero.
(4) its solute potential is greater than water potential.
(5) its solute potential is less than water potential.

17. Which of the following statements is **incorrect**?
(1) Water entering a root hair cell of a plant root may pass into a pericyle cell through apoplast.
(2) Both cell membrane and cell wall of cortical cells are fully permeable to water.
(3) Mineral ions of soil solution cannot enter symplast of root hair cell by simple diffusion.
(4) Roots may absorb mineral ions against concentration gradient.
(5) Endodermis provides a barrier for passage of solutes to xylem from cortex.

18. Which of the following statemetns is **incorrect**?
(1) Nitrogen deficiency symptoms first appear in mature parts of the plant.
(2) Na, K, Ca, Mg are major nutrients of plants.
(3) Fe is necessary for synthesis of chlorophyll.
(4) Mg is used commonly as an enzyme activator.
(5) Ca is involved in the synthesis of cell walls of plants.

19. Which of the following is an **incorrect** statement?
(1) $CO_2$ may be produced without the use of $O_2$ in the respiration of some organisms.
(2) Mitochondria are not necessary for aerobic oxidation of glucose in some organisms.
(3) ATP is the most important product of respiration.
(4) Ethanol is the final product of glycolysis
(5) ATP is used to activate glucose before it is broken down in glycolysis.

20. Which of the following is the correct statement regarding neurones?
(1) Axolemma is depolarized when it is not conducting an impulse.
(2) Maintenance of the resting potential requires expenditure of energy.
(3) Axolemma is more permeable to sodium ions than potassium ions at resting conditions.
(4) Myelin is essential for conduction of nerve impulses.
(5) There is a large inward movement of potassium ions across the axolemma into the neurone during depolarization.

21. Which of the following is the correct statement regarding human digestive enzymes?
(1) Amylase converts starch into maltose and glucose.
(2) Pepsin converts proteins into peptones and amino acids
(3) Chymotrypsin converts proteins into peptides and amino acids.
(4) Lactase converts lactose into glucose and fructose.
(5) Renin converts caseinogen into polypeptides.

22. In man, a pair of foramen in the transverse processes can be seen in
(1) cervical vertebrae.
(2) thoracic vertebrae.
(3) lumbar vertebrae.
(4) sacral vertebrae.
(5) vertebrae of coccyx.

23. Which one of the following is an **incorrect** statement regarding human liver?
(1) It is the largest gland in the body.
(2) It is the main storage centre of the body.
(3) It aids in the digestion of lipids.
(4) It is involved in temperature regulation.
(5) The secretion of bile from it is stimulated by cholecystokinin.

24. Which of the following hormone is **not** synthesized in the hypothalamus?
(1) Oxytocin
(2) Prolactin inhibiting hormone
(3) GnRH
(4) ADH
(5) Growth hormone

25. The vitamin that is involved in the synthesis of RNA is
(1) vitamin A. (2) vitamin $B_2$. (3) vitamin $B_{12}$.
(4) vitamin C. (5) vitamin E.

26. Which one of the following statements is **correct** regarding human prenatal development?
(1) Implantation occurs at morula stage.
(2) Trophoblast develops into amnion.
(3) The placenta is formed from the chorion and allantois.
(4) By the end of the third month of pregnancy, foetus has no external ears.
(5) Close to birth, the production of progesterone by the placenta declines sharply.

27. Which of the following statements is **incorrect** regarding human blood pressure?
(1) The blood pressure of a normal healthy adult person at rest is 120/80.
(2) Systolic blood pressure is higher than diastolic blood pressure.
(3) Activity of the parasympathetic nervous system increases blood pressure.
(4) Deposition of fat in the walls of arteries can cause hypertension.
(5) Blood pressure is dependent on the elasticity of arterial walls.

28. Which of the following is the **incorrect** statement regarding respiration of animals?
(1) Gaseous exchange at the respiratory surfaces always occurs by diffusion.
(2) Book lungs are the respiratory structures of spiders.
(3) Haemocyanin is one of the respiratory pigments of annelids.
(4) Tidal volume of a normal healthy adult person at rest is about 500 ml.
(5) In man, stimulation of stretch receptors in the lungs causes inspiration to stop.

29. Budgie birds exist in 4 colour types. viz., blue, green, yellow and white. All these can be maintained in pure lines and following results were obtained when pure line types were crossed.
When a yellow one was crossed with a white one, all progeny were yellow.
When blue one was crossed with a white one, all progeny were blue.
When green one was crossed with white one, all progeny were green.
When a yellow one was crossed with a blue one , all progeny were green.

Which of the following hypothesis **cannot** be made from these results regarding the inheritance of the colour?
(1) More than one gene is involved in the determination of the colour.
(2) This is an example for polyallelism.
(3) White colour is a double recessive character.
(4) Green colour is a double dominant character.
(5) Green colour can be produced by heterozygous genotype.

30. Down's syndrome in man is caused by
(1) a change in a base pair sequence of a gene.
(2) loss of one of the X chromosomes from nucleus.
(3) addition of an extra autosome to the nucleus.
(4) a double recessive condition of a mutant gene.
(5) a polyploid condition in nucleus.

31. Which of the following features of populations contribute least for the evolution of a species?
(1) Intra-specific competition
(2) Inter-specific competition
(3) Adaptation of different ecological niches
(4) Adaptive radiation
(5) Specialization to a specific environment

32. When a *Drosophila* fly with long wings and red eyes was crossed with a fly with vestigial wings and brown eyes, all the $F_1$ progeny flies had long wings and red eyes. When the $F_1$ progeny flies were test crossed, the second progeny had only two types of flies. One type was long winged and red eyed and the other type was vestigial winged and brown eyed.

If the $F_1$ progeny flies were mated among themselves, which one of the following types of progenies will be the most likely result?

| | Long winged brown eyed | Vestigial winged brown eyed | Long winged red eyed | Vestigial winged red eyed |
|---|---|---|---|---|
| (1) | 25% | 25% | 25% | 25% |
| (2) | 50% | 50% | 0 | 0 |
| (3) | 0 | 0 | 50% | 50% |
| (4) | 55% | 20% | 20% | 5% |
| (5) | 20% | 5% | 55% | 20% |

33. Which of the following statements is least acceptable?
(1) In the early stages of earth, the atmosphere had no oxygen.
(2) First organisms evolved on earth respired anaerobically.
(3) All organisms on earth have evolved from a single stock of organisms.
(4) Life arose from non-living matter due to natural causes in early stages of earth.
(5) Life can arise from non-living matter due to natural causes at any time.

34. Some of the conditions of earth at different periods in the past were as follows:
(A) Oceans with photosynthetic organisms as the only living forms
(B) Presence of primitive bony fish
(C) Presence of trilobites
(D) Atmosphere with hydrogen as the major component
(E) Atmosphere with carbon dioxide, methane and ammonia

Which one of the following gives the correct chronological order of the above conditions?
(1) D, E, A, B, C (2) E, D, A, C, B (3) D, A, E, B, C (4) D, A, E, C, B (5) D, E, A, C,B

35. The sustainable development is best defined as the development
(1) which lasts for a very long period of time.
(2) which fulfils the needs of the present generations without compromising the ability to meet those of future generations.
(3) which is carried out with least usage of renewable resources.
(4) which is aimed at developing natural resources for the use of future generations.
(5) which is aimed at conserving biological diversity.

36. Which one of the following was responsible for the first human impact on the environment?
(1) Domestication of cattle (2) Growing of crop plants (3) Urbanization
(4) Industrialization (5) Use of CFCs

37. Which one of the following is a non-living renewable resource?
(1) Solar energy (2) Iron (3) Timber (4) Fresh water (5) Coal

38. An ecological pyramid of biomass is often an inverted pyramid in which one of the following ecosystems?
(1) Mangroves (2) Grasslands (3) Tropical rain forests (4) Tundra (5) Oceans

39. Which one of the following combinations of chemical elements often limit primary productivity of the terrestrial agricultural ecosystems?
(1) carbon, nitrogen, phosphorous (2) nitrogen, potassium, phosphorous
(3) sulphur, nitrogen, carbon (4) sulphur, nitrogen, phosphorous
(5) nitrogen, potassium, sulphur

40. Microorganisms were first observed and recorded by
(1) Louis Pasteur in France. (2) Robert Koch in Germany.
(3) Anton Van Leewenhoek of Holland (4) Robert Hook in England
(5) Paul Ehrlich in Germany.

41. Which of the following terms best describes organisms which fix atmospheric $CO_2$ and obtain energy from inorganic chemicals?
(1) Chemoheterotrophs (2) Chemotrophs (3) Chemoautotrophs
(4) Photoautotrophs (5) Photoheterotrophs

42. Which of the following organisms is responsible for infections due to the production of endotoxins in food spoilage?
(1) *Salmonella typhi* (2) *Vibrio cholerae* (3) *Shigella dysenteriae*
(4) *Staphylococcus aureus* (5) *Clostridium botulinum*

Questions No.43 and 44 are based on the following genera of microorganisms.
(A) *Saccharomyces* (B) *Anabaena* (C) *Chlamydomonas*
(D) *Mucor* (E) *Clostridium*

43. Which of the above shows eucaryotic cellular organization?
(1) A, B, C and D only (2) C and D only (3) A, C and D only
(4) B and C only (5) B, C and D only

44. Which of the above can be cultivated under anaerobic conditions?
(1) A, B and E only (2) A and E only (3) E only
(4) A only (5) B and E only

45. The presence of which one of the following bacteria is examined routinely in the confirmatory test for sanitary quality of drinking water?
(1) *Salmonella typhi* (2) *Vibrio cholerae* (3) *Pseudomonas aeruginosa*
(4) *Shigella dysenteriae* (5) *Escherichia coli*

46. In intensive aquaculture
(1) several species are cultured together providing supplementary feeding
(2) water quality is maintained at controlled conditions to some extent and supplementary feeding is provided.
(3) stocking density is high and water quality is maintained at desired levels.
(4) stocking density is low and supplementary feeding is provided.
(5) water quality is maintained at desired levels and yield is low due to high mortality caused by diseases.

47. Which one of the following diseases in paddy is caused by a fungus?
(1) Sheath blight (2) Root knot disease (3) Leaf blight (4) Leaf mosaic (5) Chlorosis

48. Which one of the following fish could be identified due to the presence of dorsal finlets?
(1) Grey mullet (2) Tuna (3) Tilapia (4) Rohu (5) Catla

49. The chi square value used to assess the significance of the difference between observed frequencies (O) and expected frequencies ($E_i$) is calculated as

(1) $\frac{\Sigma(O_i - E_i)^2}{\Sigma E_i}$ (2) $\frac{\Sigma(O_i - E_i)^2}{E_i}$ (3) $\frac{\Sigma(O_i - E_i)^2}{\Sigma E_i^2}$ (4) $\frac{\Sigma(O_i - E_i)}{\Sigma E_i}$ (5) $\frac{\Sigma(O_i - E_i)^2}{E_i^2}$

50. If the marks obtained by 30 000 students for Biology at one of the G.C.E.(Advanced Level) Examinations held recently are normally distributed with a mean of 45 and a standard deviation of 125, the number of students who have scored between 60 and 75 is approximately

(1) 9650 (2) 8100 (3) 4825 (4) 1500 (5) 4050

**For each of the 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?
(A) Biological diversity is higher in tropical rain forests than in savannahs.
(B) Deciduous forests are present in temperate regions as well as in tropical regions.
(C) Grasslands are confined to tropical regions of the world.
(D) In wet evergreen forests, the annual rainfall is above 2000 mm.
(E) In temperate evergreen forests, the entire winter season is without daylight.

52. Which of the following taxa contains terrestrial organisms?
(A) Crustacea
(B) Chondrichthyes
(C) Bryophyta
(D) Cyanobacteria
(E) Echinodermata

53. Select the **incorrect** statement/statements.
(A) Plant growth substances are involved in the regulation of plant movements.
(B) IBA is a natural plant growth substance.
(C) Unilateral light affects the distribution of IAA in tips of plant shoots
(D) IAA stimulates the growth of axillary buds of plants.
(E) IBA is used to induce adventitious roots in stem cuttings.

54. Which of the following statements is/are correct regarding human skeletal muscle fibres?
(A) They are long and cylindrical cells.
(B) They are striated.
(C) They are uninucleate.
(D) They get fatigued.
(E) They are involuntary.

55. Which of the following vitamins is/are synthesized by intestinal bacteria?
(A) Biotin (B) Vitamin K (C) Vitamin E
(D) Vitamin $B_6$ (E) Vitamin A

56. Which of the following statement/statements is/are correct regarding human hormones
(A) GnRH is a trophic hormone.
(B) Prolactin secretion can be both stimulated and inhibited by the hypothalamus.
(C) Calcitonin increases calcium level in blood.
(D) Aldosterone acts on nephron.
(E) FSH stimulates testosterone production.

57. Which of the following gases is/are responsible for acid rain?
(A) Carbon dioxide.
(B) Carbon monoxide
(C) Sulphur dioxide
(D) Nitrogen dioxide
(E) Ozone

58. Which of the following statements is/are correct regarding viruses?
(A) All viruses are parasitic.
(B) Some viruses contain enzymes.
(C) All viruses contain RNA.
(D) Some viruses contain both RNA and DNA
(E) Viruses can be found only in living cells.

59. Which of the following insect pests has/have piercing and sucking mouth parts?
(A) Case bearer
(B) Yellow stem borer
(C) Paddy bug
(D) Brown hopper
(E) Coconut leaf miner

60. The infections of which of the following parasite/parasites could be most prevalent among the people living in areas of poor sanitary conditions?
(A) *Entamoeba histolytica*
(B) *Necator americanus*
(C) *Wuchereria bancrofti*
(D) *Ascaris lubricoides*
(E) *Plasmodium falciparum*

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