# General Certificate of Education (Adv. Level) Examination, August 2008

## Biology I

### Two hours

**Important:**

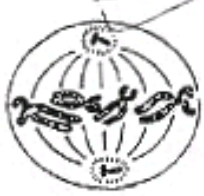
(i) *Answer **all** questions*

(ii) *Instructions are given on the back of the answer sheet. Follow those carefully.*

(iii) *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 given on the back of the answer sheet.*

1 Which one of the following stages of the cell cycle is seen in the diagram given below?

(1) Anaphase (2) Prophase (3) Metaphase (4) Telophase (5) Interphase



2 Which of the following three nitrogenous bases are common to both RNA and DNA?

(1) Cytosine, uracil and adenine
(2) Cytosine, uracil and thymine
(3) Guanine, adenine and thymine
(4) Cytosine, adenine and thymine
(5) Cytosine, guanine and adenine

3 Which of the following statements is **incorrect** regarding respiration?

(1) Glycolysis produces more ATP under aerobic conditions than under anaerobic conditions.
(2) Growth rate of yeast under aerobic conditions is higher than that under anaerobic conditions
(3) Glycolysis of muscle cells under aerobic conditions does not yield lactic acid.
(4) The net ATP production during aerobic respiration of glucose is less than 38 molecules per molecule of glucose in some cells.
(5) Carbohydrates, lipids and proteins can act as respiratory substrates in aerobic respiration.

4 Which of the following is an **incorrect** statement?

(1) Cytoskeleton is found only in eucaryotic cells.
(2) All organelles in eucaryotic cells are membrane bound.
(3) Mitochondria are believed to have originated from aerobic bacteria.
(4) Ribosomes found in mitochondria are different from those found in the cytoplasm
(5) All cell membranes have a lipid protein bilayer structure.

5 To which of the following phyla does *Selaginella* belongs?

(1) Chlorophyta (2) Bryophyta (3) Cycadophyta (4) Pterophyta (5) Lycophyta

6 Which of the following statements is correct regarding Cyanobacteria?

(1) All of them locomote by flagella.
(2) All of them are found in fresh water.
(3) All of them form colonies.
(4) All of them fix atmospheric nitrogen.
(5) All of them possess photosynthetic pigments other than chlorophyll

7 Sri Lankan elephants are considered to be

(1) critically endangered organisms
(2) endangered organisms.
(3) vulnerable organisms.
(4) conservation dependant organisms
(5) threatened organisms.

8. Of the following groups of organisms, which one became extinct first?
(1) Ammonites (2) Dinosaurs (3) Trilobites (4) Flying reptiles (5) Mammoths

9. Ophiuroids differ from other echinoderms because they
(1) possess pedicellaria (2) lack respiratory trees.
(3) possess spicules (4) Lack an anus (5) possess tentacles

10. Select the **incorrect** statement.
When compared to asexual methods of reproduction sexual reproduction is advantageous **because**
(1) it is faster than asexual reproduction.
(2) it increases genetic diversity within populations.
(3) it provides a method of eliminating harmful mutations from populations.
(4) it helps the propagation of species into new environmental niches.
(5) it makes the evolution a faster process.

11. Which of the following is **incorrect** regarding the embryo sac of angiosperms?
(1) The embryo sac contains a diploid nucleus. (2) Meiosis takes place inside the embryo sac
(3) Embryo sac is nourished by nucellus. (4) Embryo sac gives rise to endosperm.
(5) Embryo sac contains only one female gamete.

12. Which of the following statements of comparison between *Pogonatum* and *Nephrolepis* is **incorrect**?

| | ***Poganotum*** | ***Nephrolepis*** |
|---|---|---|
| (1) | Sporophyte is not differentiated into stem, root and leaves. | Sporophyte is differentiated into stem, roots and leaves. |
| (2) | Gaemetophyte is bisexual | Gametophyte is bisexual. |
| (3) | Male gametes are biflagellate | Male gametes are multiflagellate. |
| (4) | Sporangia are not produced in groups. | Sporangia are produced in groups. |
| (5) | Zygote does not produce and embryo | Zygote produces and embryo. |

13. Which of the following is a natural plant growth substance?
(1) IBA (2) NAA (3) MCPA (4) 2, 4-D (5) ABA

14. Which of the following statements is **incorrect** regarding *Cycas*?
(1) Sporophytes are unisexual.
(2) Megasporangium produces several female gametophytes
(3) Microsporangia open by annulus.
(4) Pollen tube is nourished by nucellus.
(5) Male gametes are multicilliate.

15. Which one of the following helps the phloem translocation least"
(1) Mitochondria in the companion cells.
(2) Plasmodesmata between companion cells and sieve cells
(3) Sieve plants of sieve tubes.
(4) Transpiration.
(5) Hydrostatic pressure in sieve tubes.

16. Which of the following is an **incorrect** statement?
(1) Stomata open when guard cells absorb $K^+$ ions from neighbouring cells
(2) Guttation takes place when stomata are closed.
(3) Transpiration may take place through the cuticle.
(4) Rate of transpiration of a plant shoot can be estimated using a potometer.
(5) Transpiration helps to absorb water by roots.

17. Which of the following compounds is an intermediate in both respiration and photosynthesis?
(1) Malate (2) Phosphoglycerate. (3) Acetyl Co-A
(4) Lactate (5) Citrate

18. Which of the following **cannot** be considered as a trace element in plant composition?
(1) Mg (2) Mn (3) Cl (4) B (5) Mo

19. Which one of the following is **not** true regarding nastic movements?
(1) They take place in a part of a plant.
(2) They are growth or turgor movements.
(3) Direction of response does not depend on the direction of stimulus
(4) Mechanism of movement depends on the movement of auxin.
(5) Responding cells are located in special regions of the plant.

20. In man, simple squamous epithelial cells are found in
(1) inner lining of stomach. (2) alveoli (3) epidermis of skin.
(4) urinary bladder. (5) convoluted tubules of nephrons.

21. Which one of the following statements is **incorrect** regarding resting membrane potential of human motor neurone?
(1) It occurs in the plasma membrane of the neurone.
(2) It results from unequal distribution of ions across the plasma membrane of the neurone.
(3) It is about - 70 mV.
(4) Its maintenance requires ATP.
(5) It can move along the axon.

22. Select the correct statement regarding human eye.
(1) The wall of the eyeball consists of two layers of tissue.
(2) Fovea is the cone free area of the retina.
(3) Rods are very light sensitive.
(4) Vitamin D is connected with night blindness.
(5) Elongation of the eyeball could cause farsightedness.

23. In man, maturation of sperm takes place in
(1) seminiferous tubules (2) epididymis (3) vas deferens
(4) ejaculatory duct (5) seminal vesicles.

24. Which one of the following statements is **incorrect** regarding ovulation in women?
(1) It usually occurs around day 14 of the 28 day menstrual cycle.
(2) It is the ejection of the primary oocyte from the Graafian follicle.
(3) Progesterone suppresses ovulation.
(4) LH stimulates ovulation.
(5) It stops during pregnancy period.

25. A damage to which part of the human nephron given below is most likely to produce glucose positive urine?
(1) Proximal convoluted tubule (2) Descending limb of loop of Henle (3) Loop of Henle
(4) Ascending limb of loop Henle (5) Distal convoluted tubule.

26. Which one of the following statements is correct regarding human vertebral column
(1) It consists of 35 linearly arranged vertebrae.
(2) The sacral curve appears after birth.
(3) The first cervical vertebra is the axis.
(4) Lumbar vertebrae are the largest and the strongest.
(5) Sacrum is formed by the fusion of four vertebrae and three intervertebral discs.

27. Which one of the following statements is **incorrect** regarding human cortisol hormone?
(1) It is secreted by adrenal cortex. (2) It reduces blood glucose level.
(3) It stimulates breakdown of proteins. (4) It helps in withstanding stress.
(5) Both CRH and ACTH can regulate its secretion.

28 Which one of the following statements is **not** an action due to stimulation of parasympathetic nervous system?
(1) Constriction of pupil (2) Constriction of bronchioles (3) Stimulation of salivary secretion
(4) Stimulation of sweating (5) Increasing peristalsis of the gut

29 In man, receptors sensitive to pressure are not found in
(1) joints. (2) muscles. (3) mesenteries. (4) epidermis (5) dermis.

30 Following list indicates 5 different patterns of nonmendelian inheritance with one example for each. Only one of the examples given in correct. Select the pattern of inheritance with correct example.
(1) Polyallelism - inheritance of plumage color of chicken.
(2) Incomplete dominance - inheritance of ABO human blood groups.
(3) Sex-linked inheritance - inheritance of haemophilia.
(4) Epistasis - inheritance - inheritance of haemophilia.
(5) Aneuploidy - inheritance of flower color of *Mirabilis* plant

31 Which of the following statements is **incorrect** regarding Hardy Weinberg equilibrium in populations?
(1) Occurrence of mutations can disturb the equilibrium.
(2) Emigration of members does not affect the equilibrium.
(3) The equilibrium is maintained only in big populations.
(4) It is difficult to find natural populations in which this equilibrium is maintained.
(5) In evolving populations the equilibrium is not maintained.

32 Which of the following statements is **incorrect**?
(1) Bacterial plasmids are used as vectors in gene cloning.
(2) Bacterial genes have been introduced into some crop plants using genetic engineering techniques
(3) Ligase enzymes can cut long DNA molecules into short pieces.
(4) DNA probes are used to detect DNA molecules with similar nucleotide sequences
(5) Bacteriophages can be used to make vectors for gene cloning.

33 Which of the following statements is **incorrect** regarding mutations?
(1) Most mutations cause sterility. (2) Most mutations are recessive.
(3) Most mutations are caused by errors of DNA replication. (4) Occurrence of mutations can be useful
(5) UV radiation causes mutations.

34 In cats, presence of white patches is a dominant character while single colour is recessive. Short hair is a dominant character while long hair is recessive. When a cat with white patches and short hair was crossed with a cat with single colour and long hair, four kittens were born; one with white patches and short hair, one with white patches and long hair, one with single colour and short hair and one with single colour and long hair. Which of the following conclusions is **incorrect** regarding the above cross?
(1) This cross is equivalent to a test cross.
(2) This cross involves two independently segregating genes.
(3) The kitten with white patches and short hair in the progeny is homozygous with regard to both genes.
(4) One of the two parents is heterozygous with regard to both genes.
(5) The kitten with white patches and long hair in the progeny is heterozygous with regard to white patches character.

35 White Wyandotte and white leghorn are two breeds of chicken with fully white feathers. Both are true breeding types. When white leghorns are crossed with white Wyandotte, all $F_1$ birds are white. When the $F_1$ birds are inbred, the $F_2$ progeny has white birds and coloured birds at 13: 3 proportion Which of the following conclusions is **incorrect** regarding this inheritance
(1) Inheritance of feather colour involves at least two genes.
(2) This is an example for epistasis.
(3) Two complementary genes are involved in this inheritance
(4) $F_1$ birds should have heterozygous genotypes.
(5) Both parental types have homozygous genotypes

36 Which one of the following is **least** affected by clearing of forests?
(1) Biodiversity (2) Global temperature (3) Rainfall pattern
(4) Soil pH (5) Siltation of water bodies

37 Which one of the following statements is **incorrect?**
(1) Living resources can be managed in such a way that they are always renewable
(2) Hydroelectricity is a renewable energy resource.
(3) Every person has a responsibility in looking after the well being of the environment
(4) The problem of sea level rise has to be solved by individual countries.
(5) Development projects cannot be carried out without harming the natural environment

38 When compared with tropical biomes, the temperature biomes.
(1) have a higher biological diversity.
(2) have a higher density of plants.
(3) have trees which do not show annual growth rings
(4) show clear stratification in plants.
(5) have more deciduous plants.

39 Which one of the following activities of man affects the carbon cycle **least**?
(1) Hydroelectric power generation. (2) Use of fossil fuels. (3) Lime industry
(4) Disposal of garbage. (5) Clearing of forests.

40 Which one of the following may **not** occur due to overuse of water in agriculture?
(1) Increase productivity (2) Increase in soil salinity (3) Eutrophication
(4) Aquatic pollution (5) Water logging

41 An encapsulated pathogenic bacterium can be more virulent because the capsule
(1) is made up of polypeptide or polysaccharide material
(2) acts as an endotoxin
(3) destroys host tissue.
(4) interferes with physiological processes
(5) resists phagocytosis.

42. The type of immunity produced in an individual following injection of tetanus toxoid is known as
(1) naturally acquired passive immunity. (2) naturally acquired hereditary immunity
(3) naturally acquired active immunity. (4) artificially acquired passive immunity
(5) artificially acquired active immunity.

43 Which one of the following groups of microganisms is found in highest numbers in one gram of fertile agricultural soil?
(1) Fungi (2) Cyanobacteria (3) Bacteria (4) Unicellular algae (5) Protozoa

44 Indian carps are widely used for aquaculture in Sri Lanka mainly because
(1) they can be easily caught by pole and line.
(2) they are capable of reproducing naturally
(3) they produce large number of eggs.
(4) they have red firm flesh preferred by consumers.
(5) they feed on lower trophic levels of the ecosystem.

45 Which one of the following statements is **incorrect** regarding *Wuchereria bancrofti*?
(1) The females are larger than the males.
(2) The females do not lay eggs.
(3) No development takes place within the mosquito.
(4) Adult stage is reached in the lymph nodes of man
(5) Larvae show nocturnal periodicity

46. In the life cycle of *Plasmodium vivax*,
(1) meiosis occurs in the oocyst within the mid gut wall of the mosquito.
(2) sporozoites produced in the liver cells are released into the blood stream in large numbers.
(3) exo-erythrocytic phase includes the stages in the liver cells and mosquito.
(4) gametocytes are produced from the merozoites within the mid gut of mosquito.
(5) large number of merozoites enter the human blood when mosquitoes bite.

47. Which one of the following features seen in an insect pest could be used to identify a coleopteran?
(1) Presence of biting and chewing mouth parts.
(2) Presence of three pairs of legs.
(3) Presence of two pairs of wings.
(4) Presence of heavily thickened forewings
(5) Presence of a rostrum.

48. A shark differs from a skate due to the presence of
(1) spiracles
(2) ventral mouth
(3) heterocercal caudal fin
(4) lateral eyes
(5) ventral fins.

49. In a statistical analysis, the chi square value was calculated to be 3.86 and the critical chi-square value from the table for the relevant class value at 5% level of significance was 3.84. Which one of the following statements is correct regarding the data that were analysed?
(1) Data are normally distributed.
(2) Observed frequencies are significantly different from the expected frequencies at 5% level.
(3) Observed and expected frequencies are not significantly different from each other at 5% level.
(4) Standard deviation of observed frequencies is higher than that of the expected frequencies by 5%.
(5) Observed frequencies are significantly higher than the expected frequencies at 5% level.

50. If the standard deviation and number of observations of one data set is 9 and 3, and those of the other data set is 6 and 4 respectively, the standard error of these data is

(1) $\frac{117}{7}$ (2) 6 (3) 4.5 (4) $\sqrt{4.5}$ (5) $\frac{15}{7}$

- **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 characteristics is/are found only in procaryotic organisms?
(A) Anaerobic respiration
(B) Mucopeptides in the cell wall.
(C) Presence of naked circular DNA in the cytoplasm
(D) Ability to fix atmospheric nitrogen
(E) Reproduction by binary fission

52. In a plant cell, ATP synthesis can occur in the
(A) cytoplasm.
(B) cell membrane.
(C) chloroplast
(D) mitochondria
(E) endoplasmic reticulum.

53. Which of the following statements is/are correct regarding protists?
(A) They are unicellular.
(B) Some of them are procaryotes.
(C) They live in aquatic and terrestrial habitats.
(D) Their cell wall is composed of cellulose
(E) They are either absorptive or photosynthetic

54. Both cardiac and smooth muscle fibres
(A) are involuntary.
(B) are myogenic
(C) are uninucleate
(D) cannot be fatigued.
(E) are striated.

55. Which of the following statement/s is/are correct regarding homoiothermy in man?
(A) It is regulated by negative feed back mechanisms.
(B) Hypothalamus is essential for homoiothermy.
(C) Elevation of temperature is sensed by Krause's bulbs.
(D) Erection of hair plays a major role in reducing heat loss.
(E) Homoiothermy is achieved mainly by involuntary mechanisms.

56. Which of the following **cannot** be considered as a population?
(A) Nematodes in the alimentary canal of an infected person.
(B) Mangroves in Mannar district.
(C) Elephants in the Wilpattu National Park.
(D) Shrimps in Negombo lagoon.
(E) *Oreochromis mossambicus* in Parakrama Samudra.

57. Which of the following is/are a weed/weeds that is most likely to be found in dry lands?
(A) *Eupatorium* sp.
(B) *Lantana* sp.
(C) *Eichhornia* sp.
(D) *Drosera* sp.
(E) *Nepenthes* sp.

58. Which of the following bacteria is/are important causative agent/agents of diseases transmitted through drinking water?
(A) *Mycobactrium tuberculosis*
(B) *Clostridium tentani*
(C) *Salmonella typhi*
(D) *Shigella flexneri*
(E) *Staphylococcus aureus*

59. Fungi differ from bacteria in that the fungi
(A) are heterotrophic organisms.
(B) produce extra-cellular enzymes.
(C) have cell walls made up to chitin.
(D) are non motile organisms.
(E) show mutualistic associations with other living orgahisms.

60. Agar added to microbial culture media.
(A) acts as a source of nutrients for microrganisms.
(B) is a polysaccharide.
(C) is used to make the medium coloured.
(D) solidified approximately at 40°C after liquification.
(E) provides substratum to observe colony formation of bacteria and fungi

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