

BIOLOGY

Paper – 1

(THEORY)

(Botany and Zoology)

Three hours and a quarter

(The first 15 minutes of the examination are for reading the paper only.

Candidates must NOT start writing during this time).

Answer all questions in Part I and five questions from Part II, choosing three questions from Section A and two questions from Section B.

All workings, including rough work, should be done on the same sheet as, and adjacent to; the rest of the answer.

The intended marks for questions are given in brackets [].

PART I (40 marks)

Answer all questions.

Question 1.

(a) *Read the following questions carefully. For each question there are four alternatives A, B, C and D. Choose the correct alternative and write it in your answer sheet.* [5]

- (i) A cell that lacks chloroplast does not
- A evolve carbon dioxide.
 - B utilize carbohydrate.
 - C liberate oxygen.
 - D require water.
- (ii) The rate of growth of a stem of a plant is measured by means of a
- A clinostat.
 - B potometer.
 - C hydrometer.
 - D auxanometer.
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This booklet contains 8 pages.

- (iii) Myopia can be corrected by
 - A convex lens.
 - B concave lens.
 - C cylindrical lens.
 - D cornea replacement.

- (iv) Ammonia is converted into urea in the
 - A liver.
 - B spleen.
 - C kidney.
 - D stomach.

- (v) Interferons inhibits the infection of
 - A virus.
 - B bacteria.
 - C protozoan
 - D helminthes.

(b) *Complete the following statements by choosing the correct alternative from those given in brackets. Write the correct answers in your answer booklet. Do not copy the whole sentence.*

[3]

- (i) The water potential of pure water is bar. (zero, one, two)

- (ii) The conversion of ammonia to nitrates is called (ammonification, nitrification, denitrification)

- (iii) An uninterrupted dark period is required by plants. (short day, long day, intermediate)

- (iv) The involuntary muscular movement of the alimentary canal is called (peristalsis, dialysis, autolysis)

- (v) The process which transforms zygote to blastula is called (cleavage, gastrulation, implantation)

(vi) is the method of sexual reproduction in larval stage.
(parthenogenesis, paedogenesis, gametogenesis)

(c) **State whether the following statements are True or False.** [2]

- (i) The branch of Biology dealing with ageing is called gerontology.
- (ii) Urine reaches the bladder from the kidney through the urethra.
- (iii) Semi-lunar valves open during ventricular diastole.
- (iv) Red light is more effective than blue light in the process of photosynthesis.

(d) **Mention one significant difference between each of the following pairs:** [5]

- (i) Benign tumor and Malignant tumor
- (ii) Down's syndrome and Turner's syndrome
- (iii) Homologous organs and Analogous organs
- (iv) Absorption spectrum and Action spectrum
- (v) Phytochrome and Cytochrome

(e) **Match each item under Column A with that which is most appropriate in Column B. You must rewrite the correct matching pairs.** [4]

| Column A | Column B |
|--------------------------------|---------------------|
| (i) Conditioned reflex | a. Hugo de Vries |
| (ii) Tunica Corpus theory | b. Hanstein |
| (iii) Histogen theory | c. Schmidt |
| (iv) Mutation theory | d. I.V.Pavlov |
| (v) Germplasm | e. Karl Landsteiner |
| (vi) Recapitulation theory | f. Weissmann |
| (vii) Theory of biogenetic law | g. Von Boer |
| (viii) Grouping of human blood | h. Ernst Haeckel |
| | g. Darwin |
| | i. Lamarck |

(f) **Answer the following:**

- (i) What is Blackman's law of limiting factors?
- (ii) What is the full form of IAA and IBA?
- (iii) How are annual rings inductive of the age of a tree?
- (iv) Why is the term 'long day plants' a misnomer?
- (v) Why is the growth of long bones bi-directional?

(g) **Define the following.**

[4]

- (i) All or none law
- (ii) Cleistogamy
- (iii) Chelators
- (iv) Plasmolysis

(h) **Give the contributions of the following scientists:**

[4]

- (i) M.S. Swaminathan
- (ii) Calvin
- (iii) T.R Malthus
- (iv) Marcello Malpighi

(i) **Mention the most significant function of the following:**

[3]

- (i) Thyroxine
- (ii) Oxytocin
- (iii) Lacteals

PART II**SECTION A (30 marks)**

Answer any three questions.

Question 2.

- (a) Describe briefly the *four* different types of vascular bundles in angiosperms. [4]
- (b) Why is transpiration in higher plants considered a necessary evil? [2]
- (c) Explain the role of pancreas in digestion of various food materials [4]

Question 3.

- (a) Describe the chemical events associated with muscle contraction. [4]
- (b) Explain the *three* principle types of growth and give one example each. [3]
- (c) (i) List *three* general functions of mineral elements in the life of a plant. [1½]
- (ii) What is meant by essentiality of an element? [1½]

Question 4.

- (a) (i) List the steps involved in C₄ pathway of carbon dioxide fixation. [3]
- (ii) Why is the photosynthesis rate higher in C₄ plants than C₃ plants? [1]
- (b) Draw a labeled diagram of the V.S of an ovule just before fertilization. [3]
- (c) (i) Define cardiac out put.
- (ii) Describe the mechanism regulating heart beat. [3]

Question 5.

- (a) 'Fertilization is a physico-chemical process'. Explain the statement. [4]
- (b) How is carbon dioxide taken up from the tissues and transported to the lungs? [3]

- (c) Describe an experiment to demonstrate that growth stimulating hormone is produced at the tip of the coleoptile. [3]

Question 6.

- (a) Draw a labelled diagram of a myelinated neuron. [3]
- (b) How is the regulation of urine formation under hormonal control? [2]
- (c) Define the following terms. [5]
- (i) Vernalization
 - (ii) Double fertilization
 - (iii) Differentiation
 - (iv) Viviparous germination
 - (v) Apical dominance

SECTION B (30 marks)

Answer any two questions.

Question 7.

- (a) (i) What are coacervates? How were they held together? [3]
- (ii) What are vestigial organs? How do they support the doctrine of organic evolution? [3]
- (b) (i) Explain the role of Biology in the amelioration of human problems. [3]
- (ii) Explain the term polyploidy, auto-polyploidy and allotetraploidy. [3]
- (c) Why is it necessary to test the blood group of a patient before blood transfusion? [3]

Question 8.

- (a) (i) Explain briefly the theory of natural selection with suitable examples. [3]
- (ii) Describe Lederberg's replica plating experiment to explain genetic basis of adaptation in bacteria. [3]

- (b) (i) Why are biofertilizers preferred to chemical fertilizers? [3]
(ii) What is meant by social forestry? What are the advantages in terms of energy supply? [3]
- (c) What are Darwin's finches? [3]

Question 9.

- (a) (i) Describe the significance of archaeopteryx in the study of organic evolution. [3]
(ii) Give *three* features in which human beings are considered more advanced than ape. [3]
- (b) (i) Explain the meaning of gene pool, gene bank and genetic conservation. [3]
(ii) Explain the role of tissue culture in germplasm storage and exchange. [3]
- (c) What are the *three* broad categories of mental illness? [3]

Question 10.

- (a) (i) What are mutagens? Describe the various mutagenic agents which induce changes in genetic materials. [3]
(ii) How does the sickle cell carrier have an advantage over the rest of the human population in a malaria infested area? [3]
- (b) (i) How are mules produced? Explain their benefits and limitations. [3]
(ii) What are antibiotics? Name the classes of organisms that produce antibiotics. [3]
- (c) Give *three* uses of jute. [3]

