

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]

