

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 [].

Balanced equations must be given wherever possible and diagrams where they are helpful.

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) Hydroponics is

- A growing of floating aquatic plants.
- B growing of plants inside the house.
- C soil less cultivation of plants.
- D growing of aquatic plants.

(ii) Which sequence best describes inspiration?

- A contraction of diaphragm → decrease in thoracic cavity → increase in pressure
 - B contraction of diaphragm → increase in thoracic cavity → decrease in pressure
 - C relaxation of diaphragm → decrease in thoracic cavity → increase in pressure
 - D relaxation of diaphragm → increase in thoracic cavity → decrease in pressure
-

(iii) The following are the effects of genetic drift theory *EXCEPT*

- A produces adaptive changes.
- B elimination of allele/alleles.
- C fixation of new allele/alleles.
- D produces non-adaptive changes.

(iv) In monocot stems each vascular bundle is surrounded by

- A bundle sheath.
- B annual ring.
- C endodermis.
- D pericycle.

(v) The correct sequence of embryogenesis in vertebrates is

- A cleavage → morula → gastrula → blastula.
- B cleavage → gastrula → morula → blastula.
- C cleavage → morula → blastula → gastrula.
- D cleavage → blastula → gastrula → morula.

(b) ***Fill in the blanks and write the correct answers only in your answer sheet. Do not copy the whole sentence.***

[5]

- (i) The exudation of water droplets through present at the margins of leaves is called
 - (ii) Growth occurs in organism when is greater than
 - (ii) When cancer cells from present body, they reach new place and multiply, this is called secondary growth or
 - (iii) The valves close shortly after the start of ventricle systole while valves close shortly after diastole starts.
 - (v) is produced by corpus luteum in early months of pregnancy and by in the later months.
-

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

Column A	Column B
(i) Edible banana	a. transitional epithelium
(ii) Guava	b. myoglobin
(iii) Ethylene	c. stratified epithelium
(iv) Urinary bladder	d. fruit ripening
(v) Fast muscle fibres	e. parthenocarpy
	f. berry
	g. drupe
	h. more starch

(d) **Give reasons for the following:** [10]

- (i) It is not necessary to supply nitrogenous fertilizers to the legumes.
- (ii) Nerve impulse flow only in one direction.
- (iii) Cuttings of woody stems are dipped in auxins before planting.
- (iv) A fall in plasma proteins leads to oedema.
- (v) Mammals can excrete hypotonic or hypertonic urine according to the need of the body.

(e) **Write one important function of the following:** [5]

- (i) Lacteals
- (ii) Heparin
- (iii) Vagus nerve
- (iv) Purkinje fibres
- (v) Iris

(f) **Give the important contribution of the following scientists:** [2]

- (i) Sachs
- (ii) Nawaschin
- (iii) Lysenko
- (iv) Hanstein

- (g) **Give the scientific term for the following:**
- (i) The production of CO₂ in the presence of light.
 - (ii) The phenomenon of formation of more than one embryo in one seed.
 - (iii) The phenomenon of producing photoperiodic influence on flowering of plants.
 - (iv) The vascular arrangement where phloem is surrounded by xylem.
- (h) **Define the following terms:** [2]
- (i) Cryopreservation
 - (ii) Chlorosis
- (i) **Elaborate the following:** [2]
- (i) RuBP
 - (ii) EPSP
 - (iii) 2,4 D
 - (iv) ESR
- (j) **Differentiate between the following pairs based on what is given in brackets.** [2]
- (i) Capillary water and gravitational water (availability to plants)
 - (ii) Transition and transversion (nucleotide substituted)

PART II

SECTION A (30 marks)

Answer any three questions.

Question 2.

- (a) Briefly describe the tunica corpus theory on shoot apex development. Give *two* differences between shoot apex and root apex. [4]
- (b) Explain Dixon and Jolly's theory on ascent of sap. Give *two* evidences in support of this theory. [3]
-

- (c) (i) If a tobacco plant is kept in short day conditions in summer for more than 12 hours of day light, how would this effect the flowering of the plant? [2]
- (ii) Name the part of the plant that receives the following stimulus for flowering: [1]
- a) light
- b) cold treatment

Question 3.

- (a) 'The anatomy of leaves of C_4 plants help them to have higher rate of photosynthesis than C_3 plants.' Give reasons to support the statement. [4]
- (b) Describe the flow of blood through the heart during the different phases of the cardiac cycle. [3]
- (c) Name and describe the method of artificial vegetative propagation employed by gardeners and farmers for the following: [3]
- (i) lemon
- (ii) strawberry
- (iii) rose

Question 4.

- (a) A person unconsciously withdraws his hand on touching a hot pot. [5]
- (i) Draw a schematic diagram to represent the flow of impulse to this response.
- (ii) What is this response called? How is it different from conditioned reflex?
- (b) Define turgor pressure. Explain *four* significance of turgidity in plants. [3]
- (c) Describe the changes in the female reproductive system during the secretory phase of menstrual cycle. [2]
-

Question 5.

- (a) Give the site of secretion and *one* function of the following hormones: [4]
- (i) Antidiuretic hormone
 - (ii) Mineralocorticoids
 - (iii) Relaxin
 - (iv) Insulin
- (b) List *six* physiological effects of auxins. [3]
- (b) Describe briefly the cellular changes during the process of ageing. [3]

Question 6.

- (a) With the help of a diagram, describe the exchange of gases in the lungs. [4]
- (b) Name *one* function and *one* deficiency symptom of each of the following: [3]
- (i) Nitrogen
 - (ii) Iron
 - (iii) Molybdenum
- (c) Briefly describe the sliding filament theory of muscle contraction. [3]

SECTION B (30 marks)

Answer any two questions.

Question 7.

- (a) With the help of a labelled diagram, explain Miller and Urey's experiment to support the concept of origin of life by Oparin and Haldane. [4]
- (b) 'Polyploidy is a genetic mechanism that leads to origin of new species.'
Support the above statement with the example of origin of hexaploid wheat. [3]
-

- (c) Name *one* physical and *one* chemical mutagen. What are their effects on genetic materials? [2]
- (d) DDT was once an effective insecticide against mosquitoes. Why are mosquitoes DDT resistant nowadays? [2]
- (e) Define bio-concentration. Give an example of bio-concentration impact in living organism. [4]

Question 8.

- (a) 'Phylogenic study shows that man and ape had common ancestor.' Support this statement with *three* evidences. [3]
- (b) Describe the humoral and cell mediated immune reactions towards the entry of antigens. [4]
- (c) Define the following: [2]
 - (i) Energy cropping
 - (ii) Aneuploidy
- (d) Write the full form of NMR. Give *three* points to prove that it is better than CT scan. [2]
- (e) Name the causative organisms and symptoms of the following diseases: [4]
 - (i) Diptheria
 - (ii) Leprosy

Question 9.

- (a) Draw a well labeled diagram of Lederberg's replica plating experiment to
-

show the genetic basis of adaptation. Summarize the experiment in a few lines
[5]

(b) Write down the effect of *two* classes of drugs. Give *one* example under each class.

[4]

(c) Give the potential uses of the following plants:

[2]

(i) Guayule

(ii) Jojoba

(d) What is artificial insemination? Give *two* advantages of artificial insemination in cattle?

[2]

(e) Why do the Bhutanese have a greater chance of getting mouth cancer? Give *two* reasons.

[2]

Question 10.

Write short notes on the following:

[15]

- (i) Role of mutation in evolution
- (ii) AIDS, its transmission and control measures
- (iii) Cromagnon-man
- (iv) Use of fungi as biofertilizers
- (v) Vestigial organs
