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).

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*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) The leaves of Mimosa droop by touch because the

A turgor pressure at the leaf base changes.

B plant has a nervous system.

C leaf tissues are injured.

D leaves are tender.

(ii) A person decides to live exclusively on a diet of milk, eggs and bread.

This person would suffer from

A rickets.

B scurvy.

C beri-beri.

D xeropthalmia.

(iii) Which hormone will be deficient, if both the ovaries of a female are removed?

A gonadotrophic

B oestrogen

C oxytocin

D prolactin

(iv) Parasitism is an interaction between two species in which

A both are harmed.

B both are benefited.

C one is benefited and the other is harmed.

D one is benefited and the other is neither benefited nor harmed.

(v) What is the mean arterial pressure in a person whose diastolic and systolic pressures are 100 mm and 140 mm of Hg respectively?

A 120 mm of Hg – 130 mm of Hg

B 100 mm of Hg – 110 mm of Hg

C 90 mm of Hg – 100 mm of Hg

D 80 mm of Hg – 90 mm of Hg

(b) Fill-in-the-blanks and write the correct answer only in your answer sheets. Donot copy the whole sentence. **[5]**

(i) In human karyotype, the chromosomes of a pair which are dissimilar in males and females are …….

(ii) All the three germ layers are formed at the end of ……. stage of development.

(iii) Cambium of root is an example of …….meristem.

(iv) Homologous structures are similar in …….

(v) Diet containing all the essential food materials in proper proportions is called a …….

(c) Match each item under Column A with that which is most appropriate in Column B. Rewrite the correct matching pairs in your answer sheet.

Column A	Column B
(i) Sieve tubes	a. xylem
(ii) White fibrous tissues	b. ovule
(iii) Vasa rectae	c. Z-band
(iv) Megasporangium	d. collagen fibres
(v) Actin filament	e. micturition
	f. counter-current mechanism
	g. phloem
	h. I-band

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

(i) Well watered plants transpire more rapidly during sunny and windy days than in cool and calm mornings.

(ii) A person unconsciously withdraws his/her hand suddenly with a jerk after touching a hot plate.

(iii) When apical bud is removed, the next axial bud begins to grow.

(iv) Photosynthesis is more effective in red light than in green light.

(v) Plants of the legume family usually contain more protein than other plants.

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

(i) Penicillin is used as an antifungal antibiotic.

(ii) Metamorphosis of a young tadpole is accelerated by the action of thyroxin.

(iii) Auxin is involved in the germination of light sensitive seeds.

(iv) Ethylene is used to induce early flowering in plants.

(f) ***Write the names of the scientists for the following contributions.***]

(i) Discovery of insulin hormone

(ii) Theory of Chemical Evolution

(iii) Introduction of pacemaker

(iv) Use and Disuse Theory

(g) ***Write the most significant function of the following.*** **[3]**

(i) Diaphragm

(ii) Leydig cells

(iii) ADH

(h) ***Differentiate between the following pairs.*** **[3]**

(i) Tropic movement and nastic movement

(ii) Tendon and ligament

(iii) Auxetic growth and multiplicative growth

(i) ***Expand the following.*** **[1]**

(i) ECG

(ii) PET

(j) ***Give the scientific term for the following.*** **[2]**

(i) The pressure that must be applied to a solution in order to prevent the flow of solvent through a semi-permeable membrane separating the solution and the pure solvent.

(ii) A circulatory system in which blood flows through two separate circuits as pulmonary and systemic.

(iii) The difference in diffusion pressure of pure water and water in a specific solution.

(iv) Any substance which inhibits the clotting of blood.

(k) ***Define the following.*** **[2]**

(i) Mutation

(ii) Phellogen

PART II

SECTION A (30 marks)

Answer any **three** *questions.*

Question 2.

(a) Briefly explain the 'Histogen theory of root apex' with the help of a diagram. **[3]**

(b) Explain the digestion of carbohydrate in the small intestine by the action of different types of enzymes. **[4]**

(c) Trace the events of the growth of pollen tube right from the deposition of pollen grain on the stigma upto fertilization in angiosperms. **[3]**

Question 3.

(a) If you drink a litre of water, what effect would this have on the osmotic pressure of the blood and how would the level of ADH change in your blood? **[2]**

(b) Explain active K^+ ion transport mechanism of opening and closing of stomata. **[5]**

(c) Describe the changes in the respiratory system during inspiration and expiration. **[3]**

Question 4.

(a) Write ***one*** function and ***one*** deficiency symptom of each of the following. **[2]**

(i) Potassium

(ii) Boron

(b) With a suitable diagram, explain the counter-current mechanism of urine concentration at the loop of Henle. **[4]**

(c) Give ***four*** important physiological functions of cytokinins in plants. **[2]**

(d) Write a short note on emergency hormone. **[2]**

Question 5.

(a) Demonstrate hydrotropism with an experiment. **[3]**

(b) Explain the mechanism of hearing. **[3]**

(c) Draw the schematic representation of cyclic photophosphorylation in plants. **[4]**

Question 6.

(a) (i) If your blood pressure is reported as '142 over 95', what are the diastolic, systolic and pulse pressure? Does this mean that you have hypertension?

(ii) Name the instrument used for measuring blood pressure. **[1]**

(b) Give an account of spermatogenesis. **[3]**

(c) Give ***one*** example each of a hinge joint, a pivot joint, axial skeleton and appendicular skeleton. **[2]**

(d) Briefly describe any ***four*** types of simple epithelium tissues in animals. **[2]**

SECTION B (30 marks)

Answer any two questions.

Question 7.

(a) Describe the steps by which simple inorganic substances may have undergone chemical evolution to yield complex organic molecules that would have eventually formed the living matter. **[4]**

(b) Mention ***four*** roles played by health centers in community health. **[4]**

(c) 'Industrial melanism in peppered moth is an excellent example of natural selection in recent history'. Explain. **[3]**

(d) 'The use of pesticides must be banned completely'. Comment. **[2]**

(e) Give ***four*** advantages of biogas over the other biofuels **[2]**

Question 8.

(a) (i) Define gene mutation. **[1]**

(ii) How can you apply the knowledge of mutations to improve the productivity in agriculture and animal husbandry? **[4]**

(b) What is vertical transmission of AIDS? **[1]**

(c) Write ***four*** preventions and treatments for the following diseases. **[4]**

(i) Cholera

(ii) Rabies

(d) What do you understand by DNA finger printing? Write ***six*** usages. [4]

(e) Give ***one*** difference between inborn immunity and acquired immunity.

Question 9.

(a) Compare homology and analogy. Give ***two*** differences with examples. **[3]**

(b) Write a short note on genetically modified crops. **[2]**

(c) Distinguish between sympatric speciation and allopatric speciation. **[2]**

(d) Explain the procedure of plant tissue culture. **[4]**

(e) (i) Starting with the oldest form, rearrange the following genera/species according to their sequence of appearance on earth. **[1]**

Homoerectus, Homosapiens, Ramapithecus, Homohabilis, *Australopithecus*

(ii) What are the chromosomal similarities found in apes and man? What do such similarities indicate? **[3]**

Question 10.

(a) Give ***two*** uses of each of the following: **[4]**

(i) til or sesame

(ii) citrus

(iii) rubber tree

(iv) Quinine

(b) Write the ***two*** most important advantages of using green manure. **[2]**

(c) Explain the various postulates of Darwinism. **[4]**

(d) (i) What are carcinogens? Give ***one*** example. **[1]**

(ii) Explain the term malignancy. **[1]**

(e) 'The skin acts as an external defense system'. Explain. **[3]**