

# 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 [ ].*

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#### **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) Cortex is found in the
- A roots, stems and leaves.
  - B stems and leaves.
  - C roots and stems.
  - D roots only.
- (ii) The fluid exuding from the cut surface of a twig of a tree is the
- A xylem sap.
  - B phloem sap.
  - C fluid of transpiration stream.
  - D cell sap from the broken cell vacuoles.

- (iii) The function of light in photosynthesis is the
- A production of organic food.
  - B activation of enzymes.
  - C assimilation of CO<sub>2</sub>.
  - D photolysis of water.
- (iv) Fertilization of the egg takes place inside the
- A helium.
  - B nucellus.
  - C pollen tube.
  - D embryo sac.
- (v) The discovery of Emerson effect has shown the existence of
- A photorespiration.
  - B photophosphorylation.
  - C two distinct photochemical reactions.
  - D light and dark reactions in photosynthesis.
- (vi) Which of the following is a mismatch?
- A epithelial tissue → protection and absorption
  - B connective tissue → binding and support
  - C muscular tissue → contraction and conduction
  - D nervous tissue → conduction and message sending
- (vii) Which one of the following is an incorrect match between structure and function?
- A lens → focusing
  - B sclera → protection
  - C choroid → location of cones
  - D iris → regulation of the amount of light

- (viii) What will happen if the temperature of the scrotum is artificially maintained to the level of abdominal temperature?
- A germinal epithelium will produce a large quantity of androgen secretion
  - B germinal epithelium will carry out normal spermatogenesis
  - C germinal epithelium will degenerate resulting in sterility
  - D germinal epithelium will produce more sperms
- (ix) The simple organic compounds that may have evolved in the direction of origin of life on earth were
- A proteins and nucleotides.
  - B protein and nucleic acids.
  - C amino acids and nucleotides.
  - D polysaccharides and nucleotides.
- (x) Haploid plantlets can be produced by
- A cotyledon culture.
  - B meristem culture.
  - C embryo culture.
  - D pollen culture.

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

[3]

- (i) All the dead tissues outside the active cork cambium are collectively known as ..... (bark, epidermis, phellem).
- (ii) The root pressure can be measured by ..... (osmometer, manometer, photometer).
- (iii) Oxygen released in photosynthesis is formed during ..... (cyclic photophosphorylation, non-cyclic photophosphorylation, oxidative phosphorylation).

- (iv) The epidermis of the skin is made-up of ..... (stratified cuboidal epithelium, stratified columnar epithelium, stratified squamous epithelium).
- (v) The walls of the left ventricle are relatively thicker because ..... (aorta arise from it, it is bigger than the right ventricle, it pumps blood to the entire body).
- (vi) Myelination of a neuron ..... (increases the speed of nerve impulse conduction, decreases the speed of nerve impulse conduction, has no effect on the speed of nerve conduction).

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

[4]

- (i) In roots the protoxylem is towards the periphery and metaxylem towards the centre.
- (ii) The ultimate electron donor in photosynthesis is water.
- (iii) Negative geotropism causes roots to grow downward.
- (iv) Hyper glycemia is due to deficiency of adrenalin.
- (v) The damage to the hind brain may led to breathing difficulty.
- (vi) In animals, growth is differential.
- (vii) The variability generated by the use of tissue culture cycle is termed as somaclonal variation.
- (viii) In recombinant DNA technology, the gene to be introduced into the chosen cultivar should always come from taxonomically related species.

(d) ***Mention one significant difference between each of the following pairs.***

[5]

- (i) Bleeding and guttation
- (ii) Chlorosis and necrosis
- (iii) Haemopoiesis and haemolysis
- (iv) Neurogenic heart and myogenic heart
- (v) Geographical and reproductive isolation

- (e) Match each item under Column A with the most appropriate item in Column B. Rewrite the correct matching pairs.

[5]

Column A	Column B
(i) Clones	a. leaves
(ii) Kranz anatomy	b. node of Ranvier
(iii) Ovary wall	c. decline in metabolic activity
(iv) Organs of photoreception	d. <u>Australopithecous</u>
(v) Saltatory conduction	e. ovule upright
(vi) Testosterone	f. quiescent centre
(vii) Ageing	g. ovule inverted
(viii) First man-ape	h. tegmen
(ix) Orthotropous	i. C <sub>4</sub> plants
(x) Inner seed coat	j. testa
	k. leydig cells
	l. pericarp
	m. <u>Dryopithecus</u>

- (f) Answer the following:

[9]

- (i) What is the effect of Frame-shift mutation?
- (ii) Why are proteases generally released in the inactive form?
- (iii) If the salivary glands were unable to secrete amylase, what affect would this have on starch digestion?
- (iv) If you hold your breath for 30 seconds, what is likely to happen to blood pH?
- (v) Why do terrestrial animals excrete hypertonic urine?
- (vi) Why is propagation through grafting not successful in monocots?
- (vii) Why is it not necessary to supply nitrogenous fertilizers to leguminous crops?
- (viii) When starch changes to sugar in a cell, what would be the effect on its

- water potential?
- (ix) Trace the changes in water and carbohydrate contents of the glomerular filtrate as it passes through the renal tubule of a diabetes mellitus patient.

**(g) Give the contributions of the following scientists. [2]**

- (i) F.F Blackman
- (ii) Lysenki
- (iii) Robert Koch
- (iv) Alexander Fleming

**(h) Write the most significant function of the following: [5]**

- (i) Florigen
- (ii) Prolactin
- (iii) Tendon
- (iv) Amniotic fluid
- (v) Ethylene

**(i) Expand the following. [2]**

- (i) NAA
- (ii) ECG
- (iii) ACTH
- (iv) SCID

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

*Answer any three questions.*

**Question 2.**

- (a) Mention the primary function of meristems. With the help of relevant diagrams, distinguish the three main categories of meristems on the basis of their position in the plant body. [3]
- (b) (i) Give an account of the different types of soil water. [3]  
(ii) Even when the field is thoroughly irrigated, plants wilt when salt concentration of the soil is too high. Why? [2]
- (c) With the help of a flow chart, summarize the events of blood clotting. [2]

**Question 3.**

- (a) Give the schematic representation of non-cyclic photophosphorylation. How is it different from cyclic photophosphorylation? [4]
- (b) Sonam had rice and boiled potatoes for breakfast. State the steps of digestion till it is made available to the body tissues. [4]
- (c) Some seeds when exposed to light germinate faster. Why? [2]

**Question 4.**

- (a) (i) Draw a nephron and label any *six* parts. [2½]  
(ii) State the most important functions of the following: [1½]  
1. glomerulus  
2. distal convoluted tubule  
3. descending limb of the loop of Henle
- (b) Write *six* important applications of gibberellins in agriculture. [3]
- (c) (i) The lymphatic system is said to be the middle man between blood and the tissue. Explain. [2]  
(ii) What is portal system? Give an example. [1]

**Question 5.**

- (a) Describe the events between pollination and fertilization in plants with the help of a labelled diagram.
- (b) Mention **one** hormone produced by each of the following and their role. [4]
  - (i)  $\beta$  – cells (pancreas)
  - (ii) thyroid
  - (iii) parathyroid
  - (iv) adrenal medulla
- (c) (i) What will be the consequence when a woman conceives and the implantation occurs in the fallopian tube? [2]
- (ii) A spermatogonial cell has 30 chromosomes. How many chromosomes will occur in a
  - 1. primary spermatocyte? [½]
  - 2. spermatid? [½]

**Question 6.**

- (a) (i) Impulses in a neuron travel only in one direction. Explain. [1]
- (ii) Name the parts through which a nerve impulse passes in a reflex arc. [2]
- (b) How is oxygen transported in the blood and released in the tissues? [3]
- (c) Mention **one** physiological role and a deficiency symptom associated with the following:
  - (i) magnesium [1]
  - (ii) copper [1]
- (d) Most voluntary muscles are found in antagonistic pairs. Explain with an example. [2]



**SECTION B (30 marks)**

*Answer any two questions.*

**Question 7.**

- (a) Discuss the most acceptable theory of the origin of life on earth. [4]
- (b) Explain 'industrial melanism in peppered moth' which is an excellent example of natural selection in recent history. [4]
- (c) (i) What is addiction? [1]  
(ii) State **four** reasons of drug addiction. [2]
- (d) Name the causative agent and give **one** symptom in each case for the following diseases. [4]
- (i) Malaria  
(ii) Typhoid  
(iii) Filaria  
(iv) Measles

**Question 8.**

- (a) Mammals and birds have evolved from reptiles. How does the comparative study of their embryology establish the validity of this statement? [4]
- (b) (i) What is sickle cell anaemia? [1]  
(ii) Why has natural selection not eliminated sickle cell anaemia? [2]
- (c) What is 'CT scan'? Mention **two** important applications of this technique. [2]
- (d) Artificial insemination is commonly practiced by animal breeders. Support the statement with **two** important reasons. [2]
- (e) (i) Mention **two** essential conditions for the economical use of microorganisms in industries. [1]  
(ii) Name the microbe associated in the manufacture of [2]
1. alcohol.
  2. vinegar.
  3. penicillin.
  4. citric acid.

- (iii) Name the instrument used to locate the position of a clot when a patient suffers from cerebral thrombosis.

**Question 9.**

- (a) What are the chromosomal similarities found in ape and man?  
What do such similarities indicate? [3]
- (b) Mutation is a significant factor in evolution. Justify. [3]
- (c) Distinguish between: [2]
- (i) Antibodies and interferons
- (ii) Active acquired immunity and passive acquired immunity
- (d) State in brief the propositions of Lamarck's theory of inheritance of acquired characters. [2]
- (e) (i) Name *two* exotic breeds of poultry. [1]
- (ii) What is meant by ARC? [1]
- (iii) What do you mean by mycorrhiza? [1]
- (iv) Mention *two* important roles of mycorrhiza. [1]
- (v) Name the main alkaloid present in tobacco which leads to addiction. [1]

**Question 10.**

- (a) What will be the result if mutation occurs in the zygote, [2]
- (i) after it has undergone division?
- (ii) before it has undergone division?
- (b) Genetically modified food is common these days but they should be released in the market only after conducting appropriate tests. Comment. [2]
- (c) The use of pesticides must be banned. Comment. [2]
- (d) Briefly classify the various types of cancer. Why is metastasis stage in cancer considered to be the most dangerous? [2]
- (e) What are the advantages if waste materials are used to produce biogas rather than using them directly as fuel or fertilizer? [2]

- (f) Give *one* importance of:
  - (i) cryopreservation
  - (ii) prosthesis
- (g) (i) When skin is transplanted onto burn wounds, the body usually rejects it. Why? How can the rejection be prevented? [2]
- (ii) What is sericulture? [1]
- (iii) Somatic cell fusion is not usually possible in plant cells. Why? [1]

