PART I (40 marks)

*Answer **all** questions.*

Question 1.

(a) ***For each question, there are four alternatives A, B, C and D. Choose the correct alternative and circle it. Do not circle more than ONE alternative. If there are more than one circled, NO score will be awarded.*** **[5]**

(i) The disease which develops an active immunity is
- A distemper
- B anaemia
- C mumps
- D rabies

(ii) The digestion of protein does not take place in the mouth because it lacks
- A lipase.
- B maltase.
- C proteases.
- D nucleotidases.

(iii) A myopic person cannot see distant objects clearly because the
- A cornea is irregular.
- B eye lens is opaque.
- C eye lens is thick.
- D eye lens is thin.

(iv) In plant propagation, which one of the following is **NOT** an advantage of the tissue culture method?
- A rapid propagation
- B weakens heterosity
- C production of disease free plants
- D production of large number of plants

(v) Lady's finger is a simple dry dehiscent fruit because the
- A pericarp does not rupture.
- B mesocarp becomes fleshy.
- C mesocarp does not rupture.
- D pericarp ruptures after ripening.

(b) ***Fill-in-the-blanks with appropriate words. Write the correct answers in the space provided.*** **[5]**

(i) The cells with recombinant DNA are called ……. cells.

(ii) The reappearance of ancestral characters after several generations is called ……

(iii) The raising of crops for the production of alcohol is known as ……. cropping

(iv) The field of biology that deals with the process of ageing is ……..

(v) The curve showing the rate of photosynthesis at different wave lengths of light is called ……. spectrum.

(c) ***Explain the following terms:*** **[4]**

(i) Variation

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(ii) Myogenic heart

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(iii) Sibling species

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(iv) Chelators

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(d) Expand the following: **[2]**

(i) 2, 4-D

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(ii) TLC

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(iii) NPK

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(iv) DDT

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(e) ***Match each item under Column A with the most appropriate item in Column B. Rewrite the correct pairs by writing the number and the corresponding alphabet in the spaces provided. For example(xi)-(m)*** **[5]**

Column A	Column B
(i) Excretion of urea	(a) nitrous acid
(ii) Nourishment of sperm	(b) uricotelism
(iii) Adjustment of plants to new locality	(c) Leydig cell
(iv) Cause of mutation	(d) forward mutation
(v) Excretion of uric acid	(e) ureotelism
(vi) Wild species under human management	(f) radial
(vii) Reduced transpiration	(g) acclimatization
(viii) Mutant to normal	(h) zona pellucida
(ix) Vascular bundle in root	(i) sertoli cells
(x) Non-cellular covering of ovum	(j) domestication
	(k) reverse mutation
	(l) sunken stomata

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(f) ***Mention one significant difference between each of the following pairs based on what is given in the bracket.*** **[4]**

(i) Chlorosis and necrosis (*symptom*)

Chlorosis	**Necrosis**

(ii) Dwarfism and pituitary myxoedema (*cause*)

Dwarfism	**Myxoedema**

(iii) Porogamy and chalazogamy (*entry of pollen tube*)

Porogamy	**Chalazogamy**

(iv) Typhoid and rabies (*causative agent*)

Typhoid	**Rabies**

(g) ***Write the significant contributions of the following scientists:*** **[2]**

(i) A.F. Huxely

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(ii) Karot Koff

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(iii) T.H. Morgan

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(iv) Sydney Fox

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(h) ***Correct the following statements by changing only the underlined word/s. Write only the correct word/s in the space provided. Do not copy the whole sentence.*** **[4]**

(i) Klinostate is used to measure plant growth.

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(ii) Oesophagus prevents collapsing of trachea.

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(iii) Bacteria acts as green manure.

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(iv) Eutrophification is an accumulation of pesticides in the body of an organism.

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(v) Contraction of adductor muscles causes a body part to rotate on its axis.

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(vi) Arteriosclerosis is the narrowing of the arteries due to the deposition of cholesterol.

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(vii) Ethological isolation is due to differences in the habitat.

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(viii) Methane is developed by the reaction of oxygen under the influence of UV radiation.

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(i) Write the most significant function of the following: **[3]**

(i) goblet cells

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(ii) companion cells

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(iii) hydathodes

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(j) Give reasons for the following: **[6]**

(i) Imbibition causes jamming of wooden door during rainy seasons.

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(ii) Defoliated short-day plants when exposed to a proper photoperiod do not flower.

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(iii) In humans, mature RBCs are devoid of nucleus.

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(iv) A person suffering from sickle cell anaemia does not get malaria.

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(v) Removal of apical bud initiates the growth of a lateral bud.

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(vi) Somatic mutation is insignificant for evolution.

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PART II
SECTION A (30 marks)
Answer any three questions.

Question 2.

(a) (i) Define the secondary growth in angiosperms. **[1]**

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(ii) Write the role of cork cambium during the secondary growth in stem. **[2]**

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(b) With the help of labelled diagrams show the discovery of auxin by Went. **[3]**

(c) Dark reaction cannot take place without light reaction. Why? **[2]**

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(d) 'Short night plant is an appropriate term for long day plant'.
Justify the statement. **[2]**

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Question 3.

(a) (i) What is rigor mortis? **[1]**

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(ii) Explain antagonistic nature of bicep and tricep muscles in humans. **[2]**

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(b) Pancreas is an endocrine gland as well as an exocrine gland. Why? **[2]**

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(c) (i) Conduction of a nerve impulse is faster through a myelinated nerve fibre. Give reasons. **[1]**

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(ii) Write ***two*** differences between an unconditioned reflex and a conditioned reflex. **[2]**

Unconditioned reflex	**Conditioned reflex**

(d) Draw labelled diagrams of the two types of agranulocytes. Write ***one*** function of each. **[2]**

Question 4.

(a) Define auxetic growth. **[1]**

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(b) People who do not eat on time may suffer from peptic ulcer. Why? **[2]**

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(c) What are the counter-current mechanisms of urine concentration occurring in loop of Henle? **[3]**

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(d) (i) Compare a nuclear endosperm and a cellular endosperm. **[2]**

Nuclear endosperm	**Cellular endosperm**

(ii) Draw a neat diagram of an anatropus ovule and label the funicle and embryo sac. **[2]**

Question 5.

(a) (i) Why does the osmotic pressure of a solution increase upon adding a solute? **[1]**

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(ii) Give reasons for the opening of a stomata in the presence of light. **[3]**

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(b) Paddy requires a lot of nitrogen for healthy growth. Which one of the following plants would you prefer to grow before the paddy cultivation, maize or clover? Support your answer. **[2]**

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(c) (i) What is a pulmonary ventilation? **[1]**

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(ii) Explain the conduction of heart beat in humans. **[3]**

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Question 6.

(a) Give an account of the sequential development of an embryo from zygote to grastula in humans. **[3]**

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(b) Why does gas exchange continue to occur even after a forceful expiration? **[2]**

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(c) (i) Describe the role of an ammonifying bacteria. **[1]**

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(ii) Write ***four*** differences between the cyclic and non-cyclic photophosphorylation. **[2]**

Cyclic	**Non-cyclic**

(d) Compare the types of germination in bean and pea seeds. **[2]**

Bean	**Pea**

SECTION B (30 marks)

Answer any two questions.

Question 7.

(a) (i) What is the genetic material of HIV? **[1]**

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(ii) Explain the preparation of yogurt. **[2]**

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(b) How does Archaeopteryx support the evolution of bird from reptile? **[3]**

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(c) Show with diagrams the deletion and inversion of chromosomal mutation. **[2]**

(d) Write ***four*** advantages of biofertilizers. **[2]**

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(e) Compare Lamarckanian and Darwinian views on evolution of the long necked giraffe. **[3]**

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(f) Which is the root cause of social problems in Bhutan, tobacco or alcohol? Justify. **[2]**

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Question 8.

(a) (i) What is an explant? **[1]**

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(ii) Why are haploid plants important in agriculture? **[2]**

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(b) Explain cultural and biological control of pest management. **[2]**

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(c) Write ***six*** evidences in support of the common ancestry of human and ape. **[3]**

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(d) Suggest ***four*** ways to introduce genetic variation. **[2]**

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(e) (i) Explain how a missing link differs from a connecting link. **[1]**

Missing link	**Connecting link**

(ii) Why are wings of bat and bird considered homologous? **[2]**

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(f) Mutation is the raw material for evolution. Why? **[2]**

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Question 9.

(a) Define the following terms: **[2]**

(i) Transition substitution mutation

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(ii) Interferon

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(b) Mention ***three*** advantages of biogas. **[3]**

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(c) Suggest ***four*** ways to prevent cancer. **[2]**

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(d) How does industrial melanism support natural selection? **[3]**

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(e) How were the conditions of the experimental set-up of Urey and Miller similar to that of the primitive earth? **[3]**

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(f) Justify whether aminocenthesis should be banned or not. **[2]**

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Question 10.

(a) Define the following terms: **[2]**

(i) Gene pool

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(ii) Incubation period

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(b) Differentiate between the following pairs: **[2]**

(i) T-cell and B-cell

T-cell	**B-cell**

(ii) Klinefelter's syndrome and Turner's syndrome

Klinefelter's syndrome	**Turner's syndrome**

(c) Explain how Darwin's finches support the adaptive radiation of evolution. **[2]**

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(d) Write appropriate terms for the following: **[2]**

(i) The management of insects for silk.

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(ii) Production of fishes for commercial purpose.

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(iii) The process of mating among closely related individuals.

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(iv) Injecting the semen of a desirable and superior bull into the genital tract of local cow.

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(e) Explain how allopatric speciation differs from sympatric speciation. **[3]**

Allopatric speciation	**Sympatric speciation**

(f) Mutation in diploid organisms cannot be detected easily. Give ***two*** reasons. **[2]**

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(g) ‘Germplasm can be preserved by storing seeds as well as tissue culture’.

Which method is better? Justify. **[2]**

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