

ZOOLOGY

(Paper II)

Time Allowed : Three Hours
Maximum Marks : 250

QUESTION PAPER SPECIFIC INSTRUCTIONS

(Please read each of the following instructions carefully before attempting questions)

There are EIGHT questions divided in two Sections.

Candidate has to attempt FIVE questions in all.

Question Nos. 1 and 5 are compulsory and out of the remaining, any THREE are to be attempted choosing at least ONE question from each Section.

The number of marks carried by a question/part is indicated against it.

Wherever any assumptions are made for answering a question, they must be clearly indicated.

Word limit in questions, wherever specified, should be adhered to.

Attempts of questions shall be counted in sequential order. Unless struck off, attempt of a question shall be counted even if attempted partly. Any page or portion of the page left blank in the Question-cum-Answer Booklet must be clearly struck off.

SECTION 'A'

1. (a) Characterize with suitable examples, the following features of genetic code: (i) Degeneracy (ii) Universality of genetic code and add a note on Wobble hypothesis. 10
 - (b) Illustrate and narrate structure of F_1-F_0 particles of mitochondria. How do they facilitate movement of protons across the mitochondrial membrane leading to ATP generation? 10
 - (c) Give an illustrated account of Lac Operon in E. Coli. 10
 - (d) Define and differentiate between Genomics and Proteomics. Add a note on their biomedical applications. 10
 - (e) Complete the table given below by inserting 0, 1, 1/2 or 1/4 for the probability of each genotype of progeny for each type of mating. Give reasons. 10
- | Mating | Genotype of progeny: AA | Genotype of progeny: Aa | Genotype of progeny: aa |
|---------|-------------------------|-------------------------|-------------------------|
| AA × AA | | | |
| AA × Aa | | | |
| AA × aa | | | |
| Aa × Aa | | | |
| Aa × aa | | | |
2. (a) Describe the molecular basis of the following inherited diseases and their manifestations in humans: (i) Cystic fibrosis (ii) Sickle cell anemia (iii) Hunting chorea 15
 - (b) Identify the five important evolutionary changes led to evolution of modern Homo sapiens from the ancestral stock during various Geological era and epochs. 15
 - (c) Compare the events during mitotic and meiotic cell cycles. Add a note on role of stage-specific macromolecules and enzymes in such cycles. 20
 3. (a) Describe the process of DNA finger printing and indicate which of the following is used in DNA finger printing: (i) Palindromic sequences of DNA (ii) V.N.T.R (iii) Shine Dalgrano sequences (iv) TATA boxes 15
 - (b) Give an illustrated account of evolution of horse, mentioning the relevant geological time periods. 15
 - (c) State and explain Hardy Weinberg's law of genetic equilibrium. What are its limitations? Calculate the allele frequencies of L^M and L^N genes from the following blood group data of a population on the basis of this law. 20
- | | Blood type | Genotype | Number of individuals |
|--|------------|----------|-----------------------|
| | | | |

1	M	$L^M L^M$	1787
2	MN	$L^M L^N$	3039
3	N	$L^N L^N$	1303

4. (a) Give an illustrated account of protein synthesis in eukaryotic cell. Compare this with similar events in a prokaryotic. Add a note on the mechanisms that lead to migration of such proteins in the lumen of endoplasmic reticulum. **20**
- (b) What are the various vectors used in genetic engineering? Write and compare the protocol for each. **15**
- (c) Define continental drift. Explain the processes by which this has impacted upon the geographical distribution of fauna restricting it to certain regions only. **15**

SECTION 'B'

5. (a) What are nucleic acids? Describe the structure and functions of various types of RNAs. **10**
- (b) Name the enzymes and hormones released by liver and pancreas. Discuss their functions in digestion of food and maintenance of blood glucose balance. **10**
- (c) What is I.V.F.? Make a flow chart of steps in I.V.F. Add a note on its applications. **10**
- (d) Give evidence in favour of mitochondrial theory of aging. What are its limitations? **10**
- (e) What are vitamins? Name and give the functions of water soluble vitamins. Tabulate the diseases that occur in humans due to hypo and hypervitaminosis. **10**
6. (a) What do you mean by neurotransmitters? Describe adrenergic, cholinergic and peptidergic neurotransmitters and write an illustrated account of their functions in synaptic transmission. **15**
- (b) Describe the process of formation of three germinal layers. Draw sequential diagrams and narratives to show formation of eye in frog or chick. **15**
- (c) What is haematopoiesis? Indicate the site and the stages by which erythrocytes, various types of leucocytes and platelets are formed. Which chemical factor(s) coordinate and control these events? **20**
7. (a) What is pedomorphosis? How does it differ from Neoteny? Add a note on its significance in evolution of Homo sapiens. **15**
- (b) What are immunoglobulins? Describe the structure of IgG and add a note on its diversity. **20**
- (c) What do you mean by anticoagulant? Describe the structure and functions of natural and synthetic anticoagulants. **15**
8. (a) Haeckel propounded the concept (law), "Ontogeny recapitulates phylogeny". Give evidence and examples that negates it or favours it. **15**
- (b) What is apoptosis? What are its stages? Write about the molecular mechanism of apoptosis. **20**
- (c) What is cladistics? Discuss its applications in understanding the evolution of different life forms and phylogeny. **15**