

ZOOLOGY (Paper II)

Time Allowed : Three Hours

Maximum Marks : 300

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.

SECTION 'A'

1. (a) Discuss the role of various oxidoreductases in metabolism of glucose (aerobically/anaerobically) to differentially release ATP molecules. 15
(b) Using skin colour as an example of polygenic inheritance, work out the results of F_1 and F_2 from a mating between pure black Negro man and white woman in qualitative and quantitative terms. 15
(c) Enumerate the selection pressures that led to bipedal locomotion in hominids. 15
(d) Differentiate between electrical and chemical synapse. How does summation occur at the axon hillock? 15
2. (a) What is H-antigen? Illustrate its role in the emergence of Bombay phenotype. 20
(b) Construct and compare the 'fate maps' of gastrula of frog and chick. Tabulate the tissues/organs that differentiate and develop from the three germinal layers. 20
(c) Give the chemical composition of human haemoglobin and discuss its role in O_2/CO_2 transport during various physiological states. 20
3. (a) Discuss the role of molecular taxonomy in coding of biodiversity. 20
(b) Write the sequence of stages for production of clonal and non-clonal embryos by in vitro fertilisation (IVF) for transfer in recipient female(s)/surrogate(s). 20
(c) Compare the neuroendocrine basis of puberty and menopause in humans. 20
4. (a) Mention the principal steps in the biosynthesis of insulin in β -cells of the islets of Langerhans. Add a note on the reasons for hypoglycemia and hyperglycemia, and their effects on body functions. 20
(b) Differentiate between DNA fingerprinting and ribozyme technologies. Add a note on their applications. 20
(c) Identify the resources and techniques for procuring and maintaining stem cells, and their cell lines in culture. Add a note on their biomedical applications. 20

SECTION 'B'

5. (a) Compare the sex-determining mechanism of *Drosophila* and humans. Add a note on the genic balance theory. 15
(b) Discuss the role of cosmids and artificial chromosomes as vectors in recombinant DNA technology. 15

	(c)	Trace the development of heart from the primordial cells during development of chick.	15
	(d)	Draw a labelled diagram of a metanephric neuron to explain (i) ultrafiltration, (ii) absorption and (iii) secretion. Define the role of hormones in these processes.	15
6.	(a)	Write the characteristics of principal stages of menstrual cycle and explain its neuroendocrine regulation cyclically.	20
	(b)	What is haemophilia and how is it inherited? Work out the results of F_1 and F_2 mating (with reasons) between: (i) Haemophilic woman $\times$ Normal man (ii) Haemophilic man $\times$ Normal woman (iii) Carrier woman $\times$ Haemophilic man (iv) Carrier woman $\times$ Normal man	20
	(c)	Compare the functions of prostaglandins and histamine. Give reasons for their being considered as hormones.	20
7.	(a)	Draw a labelled flow chart of β -oxidation of fats to display the types of enzymes that catalyze the formation of intermediates and step-wise release of ATP.	20
	(b)	With suitable examples, compare genetic and induced teratogenesis.	20
	(c)	Discuss the role of continental drift in the geographical distribution of animals with suitable examples.	20
8.	(a)	Compare the manner in which genes are expressed in prokaryotes and eukaryotes.	20
	(b)	How many alleles are concerned with the determination of A, B, AB and O blood groups? Tabulate the genotype and phenotype of parents to work out the genotype of offsprings resulting from mating of A, B, AB and O blood groups.	20
	(c)	Draw a labelled diagram of cross-section of human eye, and explain the mechanisms of image formation, ability to see in dark and discriminate colour. Add a note on the main defects of human eye and how they can be corrected.	20