UPSC
IFS (M)

Previous Year Paper
(Zoology) Paper-II
28 Nov, 2023 Shift 2

ZOOLOGY
Paper – II

*Time Allowed : **Three** Hours*

*Maximum Marks : **200***

Question Paper Specific Instructions

Please read each of the following instructions carefully before attempting questions :

*There are **EIGHT** questions in all, out of which **FIVE** are to be attempted.*

*Questions no. **1** and **5** are compulsory. Out of the remaining **SIX** questions, **THREE** are to be attempted selecting at least **ONE** question from each of the two Sections A and B.*

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.

All questions carry equal marks. The number of marks carried by a question/part is indicated against it.

Neat sketches may be drawn, wherever required.

*Answers must be written in **ENGLISH** only.*

SECTION A

Q1. (a) Illustrate the mechanism of initiation of DNA replication and formation of primosome in prokaryotes. *8*

(b) Diagrammatically compare paracentric and pericentric inversions. *8*

(c) Distinguish between sympatric and allopatric speciation. *8*

(d) Explain the inheritance pattern of an autosomal recessive congenital disease showing a three-generation pedigree. *8*

(e) Discuss the significance of cladistics in the field of taxonomy. *8*

Q2. (a) Explain the use of minisatellite DNA in the process of DNA fingerprinting. *15*

(b) Discuss the isolating mechanisms that prevent interspecific crosses. *15*

(c) Describe the composition of prokaryotic ribosomes and illustrate sequential assemblies of 30S and 50S subunits during the formation of translation initiation complex. *10*

Q3. (a) Diagrammatically describe prophase stages and differentiate between anaphase I and II of meiotic cell division. *15*

(b) Describe the factors which are known to affect the Hardy-Weinberg equilibrium. *15*

(c) Explain the genic balance theory of sex determination in Drosophila. *10*

Q4. (a) Illustrate fluid mosaic model of plasma membrane and explain the mechanism of active transport through the membrane. *15*

(b) Distinguish between founder effect and bottleneck effect. How do these forces affect gene frequency of a large population ? *10*

(c) Describe the role of multiple alleles in the inheritance of ABO blood group system in humans. *15*

SECTION B

Q5. (a) Explain the physiological role of cholesterol. *8*

(b) Compare the mechanism of osmoregulation in terrestrial and marine mammals with examples. *8*

(c) Describe the role of G protein-coupled receptors in the action of steroid hormone. *8*

(d) Justify the statement with examples "Coenzymes function as second substrate of concerned enzyme". *8*

(e) Discuss paedogenesis and neoteny with examples. *8*

Q6. (a) Draw the structure of F_oF_1-ATP synthase and explain the chemiosmotic concept of oxidative phosphorylation. *15*

(b) Illustrate actin myosin sliding mechanism of muscle contraction and relaxation. *15*

(c) Describe different types of placenta in eutherian mammals. *10*

Q7. (a) Discuss the process of teratogenesis in animals. *15*

(b) Describe the structure of IgG and the process of generation of antibody secreting cells. *15*

(c) Explain the countercurrent mechanism operating at vasa recta and its role in urine formation. *10*

Q8. (a) Describe hormonal regulation of menstrual cycle. *15*

(b) Explain the principle and protocol of *in vitro* fertilization in humans. *15*

(c) Describe alpha helix and tertiary structure of protein. *10*