IAS Mains Zoology Paper-II 2011

Time Allowed: Three Hours

Maximum Marks: 300

Instructions

Each question is printed both in Hindi and in English.

Answer must be written in the medium specified in the Admission Certificate issued to you, which must be stated clearly on the cover of the answer-book in the space provided for the purpose. No marks will be given for the answers written in a medium other than that specified in the Admission Certificate.

Candidate should attempt Question Nos. 1 and 5 which are compulsory, and any three of the remaining questions selecting at least one question from each Section.

The number of marks carried by each question is indicated at the end of question.

Illustrate your answer with suitable diagrams, wherever necessary.

Section A

1. Answer the following questions
   a. Discuss the role of various oxidoreductases in metabolism of glucose (aerobically/an aerobically) to differentially release ATP molecules. 15
   b. Using skin colour as an example of polygenic inheritance, work out the results of F1 and F2 From a mating between pure black Negro man 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. Answer the following questions
   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 O2/CO2 transport during various physiological states. 20
3. Answer the following questions

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 fertilization (IVF) for transfer in recipient females (s) ⁄surrogate (s) . 20

c. Compare the neuroendocrine basis of puberty and menopause in humans. 20

4. Answer the following questions

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 finger-printing and ribozyme technologies. Add a note on their applications. 20

c. Identify the reasources and techniques for procuring and maintaining stem cells, and their cell lines in culture. Add a note on their biomedical applications. 20

Section-B

1. Answer the following questions

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. ultra filtration

ii. absorption

iii. secretion.

- Define the role of hormones in these processes. 15

2. Answer the following questions

a. Write the characteristics of principal stages of menstrual cycle and explain its neuroendocrine regulation cyclically. 20

b. What is hemophilia and how is it inherited? Work out the results of F1 and F2 mating (with reasons) between: 20

i. Haemophilic woman x Normal man

ii. Haemophilic man x Normal woman

iii. Carrier woman x haemophilic man

iv. Carrier woman x Normal man

c. Compare the functions of prostaglandins and histamine Give reasons for their being considered as hormones. 20

3. Answer the following questions
    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