2023

ZOOLOGY — HONOURS

Paper : CC-13

(Developmental Biology)

Full Marks : 50

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer ***question no.*** **1** and ***any four*** questions from the rest.

1. Answer ***any five*** questions : 2×5

   (a) What do you mean by fate map?

   (b) What is meant by xenoplastic transplantation?

   (c) Mention the role of chordin in embryogenesis.

   (d) Name two markers of stem cell. CD 24, CD133

   (e) What is a fertilization cone?

   (f) State the functions of yolk.

   (g) What is the function of cumulus oophorus?

   (h) Explain emboly.

   (i) What is a foetal placenta?

   (j) What is a manchette?

2. (a) Give an illustrative account of spermiogenesis.

   (b) Classify placenta based on histological features. 5+5

3. (a) Write a brief note on acrosome reaction.

   (b) State the role of resact in species specific sperm attraction. What is first block to polyspermy? 5+(3+2)

4. (a) Briefly discuss the process of neurulation.

   (b) How do stem cells help in cartilage regeneration?

   (c) What is meant by potency of stem cells? 5+3+2

Please Turn Over

5. (a) Classify eggs on the basis of distribution of yolk.

   (b) Comment briefly on the different types of egg membranes. 5+5

6. (a) How many types of cleavage pattern can be observed based on the amount and distribution of yolk?

   (b) Mention the importance of primitive streak. What is amphimixis? 5+(3+2)

7. (a) How can a fate map be constructed using

   (i) Vital dye marking

   (ii) Radioactive technique?

   (b) What role do extraembryonic membranes play in the development of chick embryo? (2½×2)+5

8. Write brief notes on : 2½×4

   (a) Lens formation in chick embryo

   (b) Function of sertoli cells

   (c) In vitro fertilization (IVF)

   (d) Perivitellogenic growth of oocyte.

2023

ZOOLOGY — HONOURS

Paper : CC-14

(Evolutionary Biology)

Full Marks : 50

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer ***question no.*** **1** and ***any four*** questions from the rest.

1. Answer ***any five*** questions of the following : 2×5
   (a) Define species.
   (b) What is Darwinian fitness?
   (c) What do you mean by sibling species?
   (d) Define gene pool.
   (e) What is ring species?
   (f) What is reducing atmosphere?
   (g) What is Directional Selection?
   (h) What is cline?
   (i) What is 'hot dilute soup'?

2. Explain the difference between Lamarck and Darwin's theory of evolution. What do you mean by microevolution and macroevolution? Explain how adaptive radiation helps in speciation with special reference to Darwin finches. What is punctuated equilibrium? 3+3+3+1

3. What is fossil? Describe different types of fossils. Enumerate one method for determination of the age of fossil. 2+5+3

4. Describe the characteristic features of — (a) Neanderthal man (b) *Australopithecus* (c) *Equus* (d) *Eohippus*. 2½+2½+2½+2½

5. (a) Explain with example how behaviour difference helps in species isolation.
   (b) What is 'hybrid breakdown'?
   (c) Comment on the role of Geographical barrier in Speciation. 4+3+3

Please Turn Over

6. Distinguish between :
   (a) Homologous organ and Analogous organ.
   (b) Sympatric speciation and Parapatric speciation.
   (c) Anagenesis and Cladogenesis.
   (d) RNA world hypothesis and DNA world hypothesis. 2½+2½+2½+2½

7. (a) Briefly describe the chemical reactions that lead to peptide formation in primitive earth.
   (b) What is 'Coacervate'?
   (c) What is protocell?
   (d) What were the sources of energy in primitive earth? 4+2+2+2

8. (a) Mathematically prove that gene frequencies and genotype frequencies do not change from generation to generation in a Hardy-Weinberg equilibrium.
   (b) In a population frequency of straight hair individuals with homozygous genotype was 300, straight hair individuals with heterozygous genotype was 300 and curly hair individuals was 400. Test whether this population is in H-W equilibrium or not.
   (c) Mention the causes of K-T extinction. 4+4+2

2023

ZOOLOGY — HONOURS

Paper : DSE-A-3

(Animal Biotechnology)

Full Marks : 50

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Candidates are required to give their answers in their own words as far as practicable.

Answer ***question nos.*** **1** and **2**, and ***any three*** questions from the rest.

1. Answer ***any five*** questions : 2×5

(a) Define Neo-schizomer and Isoschizomer with examples.

(b) How plasmid differs from cosmid?

(c) How DNA polymorphism differs from mutation?

(d) Draw and describe a bacteriophage replacement vector.

(e) Write the purpose of using serum in animal cell culture.

(f) Define adaptors for cloning.

(g) What is HEPA filter?

(h) What is HAC (human artificial chromosome)?

2. Write short notes on ***any two*** of the following : 5+5

(a) cDNA libraries with diagram

(b) DNA Fingerprinting

(c) knock-in mice

(d) Colony Hybridization.

3. (a) With proper Diagrammatic presentation explain how Western blot help in the determination of over or under expression of a protein in a tissue sample.

(b) What is the principle of poly-acrylamide gel electrophoresis?

(c) What is the significance of addition of SDS and beta marcapto-ethanol in sample buffer of SDS PAGE? 4+3+3

4. (a) Define adherent and suspension cell cultures with example along with respective aims of the cultures.

   (b) What are the major challenges of animal cell culture?

   (c) How molecular diagnosis of sickle cell anaemia can be done? (2+2)+2+4

5. (a) Briefly discuss the process of retrovirus mediated transgenesis. Write one advantage and one disadvantage of the same.

   (b) Mention briefly one physical method of gene delivery for gene therapy.

   (c) Write any two uses of transgenics in pharmaceuticals. (4+1+1)+2+2

6. (a) Explain the organization of *E.coli* genome.

   (b) Explain insersional inactivation and its utility in recombinant DNA technology with specific example and diagrammatic presentation.

   (c) How RFLP can be utilised in disease detection? 4+4+2

7. (a) Schematically explain any one process of gene knock out in mice.

   (b) During Southern blot electrophoresis DNA is exposed to a short depurination treatment followed by alkali. — Why?

   (c) 3′ end of any PCR primer is more important than 5′. — Why? 5+3+2

8. Write short notes on (***any four***) : 2½×4

   (a) Ti plasmid

   (b) Organisation of *Drosophila* sp. genome

   (c) α-Complementation

   (d) Satellite DNA

   (e) DNA supercoiling in bacteria

   (f) ARS and MCS

   (g) Drug farming.

2023

ZOOLOGY — HONOURS

Paper : DSE-B-3

(Animal Behaviour and Chronobiology)

Full Marks : 50

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer ***question no.*** **1** and ***any four*** questions from the rest.

1. Answer ***any five*** questions : 2×5

(a) State the characteristic features of eusocial insects.

(b) What do you mean by Zugunruhe?

(c) What is thermotaxis?

(d) What do you mean by circadian rhythm? Give one example.

(e) What is polyandry? Give one example.

(f) Comment on classical conditioning.

(g) What do you mean by imprinting?

(h) Distinguish between orthokinesis and klinokinesis.

2. (a) What is operant conditioning? Give example. State its significance.

(b) Distinguish between habituation and sensitization with suitable example.

(c) What do you mean by zeitgeber? (2+1+2)+3+2

3. (a) How sign stimulus plays specific role in FAP? Describe with suitable example.

(b) Distinguish between endogenous and exogenous rhythms.

(c) Comment on role of pheromones in communication of honey bees. (3+2)+2+3

4. (a) Describe the nest building behaviour of *any five* fishes.

(b) What is sibling rivalry? Give example. Mention its significance. 5+(2+1+2)

5. (a) Comment on endocrine control of bird migration.

(b) What is reciprocal altruism? Explain with an example.

(c) What do you mean by stereotyped behaviour? 3+(2+3)+2

Please Turn Over

6. (a) Discuss the role of SCN in regulating biological rhythm. State its role in melatonin production.
   (b) Comment on the concept of haplodiploidy in honey bee. (4+2)+4

7. (a) Describe parent offspring conflict with an example.
   (b) What do you mean by entrainment?
   (c) What do you mean by Sexual dimorphism? Give one example.
   (d) What do you mean by an amplitude of biological rhythm? 4+2+2+2

8. Write short notes on : 2½×4
   (a) Coefficient of relatedness
   (b) Male-male rivalry
   (c) Associative learning
   (d) Lunar and Tidal rhythms.