3 (Sem–6/CBCS) ZOO HC 1

2023

ZOOLOGY

(Honours Core)

Paper : ZOO–HC–6016

(Developmental Biology)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Choose the correct answer of the following : 1×7=7

(a) In humans, fertilization occurs in

(i) vagina

(ii) ovary

(iii) fallopian tube

(iv) uterus

(b) Meroblastic cleavage is also known as

(i) partial

(ii) unequal holoblastic

(iii) equal holoblastic

(iv) superficial

(c) Mesoderm gives rise to all the structures except

(i) gonads

(ii) circulatory system

(iii) nervous system

(iv) muscular system

(d) In mammalian development, the embryo will form from

(i) the blastocyst

(ii) the inner cell mass

(iii) the trophectoderm

(iv) the blastocoel

(e) The process by which extracellular messages translate into intracellular changes is termed as

(i) cell signalling

(ii) cell adhesion

(iii) signal transduction

(iv) cell transformation

(f) In mammalian sperm, spirally arranged mitochondria are present in

(i) head portion

(ii) end piece of the tail

(iii) middle piece

(iv) principal piece of the tail

(g) In mammalian gonads, germ cells are produced by

(i) only mitosis

(ii) only meiosis

(iii) Both mitosis and meiosis

(iv) Without mitosis and meiosis

2. Write short notes on : 2×4=8

(a) Pluripotent cells

(b) Amphiblastula

(c) Radial cleavage

(d) Importance of fate map

3. Answer ***any three*** of the following : 5×3=15

(a) Describe the process of pattern formation.

(b) Application of Amniocentesis

(c) Describe the regional specificity of induction.

(d) Describe the process of construction of fate map by natural marking.

(e) Classify stem cells based on differentiation potential.

4. (a) What is cell-cell interaction ? Describe stable cell interactions with labelled diagram. 1+9=10

Or

(b) What is the importance of asymmetric segregation of cellular determinants ? Describe the process with diagram. 2+8=10

5. (a) Describe the process of gastrulation in chick embryo development with diagram. 6+4=10

Or

(b) Describe the process of complete metamorphosis in insect. Write the role of hormone involved in insect metamorphosis. 5+5=10

6. (a) Describe the structure of human placenta with diagram. Mention the functions of placenta. 6+4=10

Or

(b) Describe the process of Morphallactic regeneration in Hydra with diagram. 8+2=10

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3 (Sem–6/CBCS) ZOO HC 2

2023

ZOOLOGY

(Honours Core)

Paper : ZOO–HC–6026

(Evolutionary Biology)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Find out the correct answer from the following : 1×7=7

   (i) What was the mode of respiration for the prokaryotes during biological evolution ?

   (a) Aerobic

   (b) Cellular

   (c) Anaerobic

   (d) External

(ii) Evolution can be defined as

(a) History of race

(b) Development of race

(c) History and development of race with variation

(d) Progressive history of race

(iii) Which of the following principles is not part of Darwin's theory of evolution by natural selection ?

(a) Variation occurs among individuals in a population

(b) Mutations are the ultimate source of genetic variation

(c) Individuals that possess the most favourable variations have the best chance of reproducing

(d) More individuals are born than will survive

(iv) The factor that leads to founder effect in a population is

(a) Mutation

(b) Natural selection

(c) Genetic drift

(d) Genetic recombination

(v) Which is the earliest known ancestor of man ?

(a) Dryopithecus

(b) Homo erectus

(c) Homo habilis

(d) Australopithecus

(vi) The traditional use of phylogenetic analysis is to discover evolutionary relationships among species.

*(State True **or** False)*

(vii) A species inhabiting different geographical areas is known as

(a) Allopatric species

(b) Sympatric species

(c) Sibling species

(d) Biospecies

2. Answer the following : 2×4=8

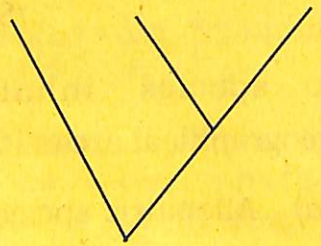
(i) What are coacervates ?

(ii) The following data shows four amino acids found across three species :

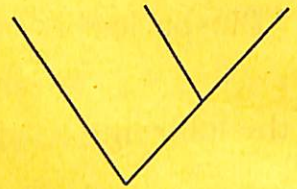
Species	Amino acid sequence
Dog	Ile–Cys–Trp–Ser
Monkey	Ile–Cys–Trp–Ser
Frog	Met–Cys–Trp–Arg

Which phylogenetic tree best represents the information in the chart ?

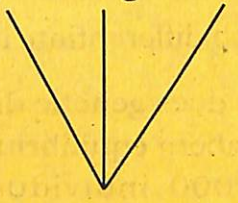
(a) Monkey Frog Dog



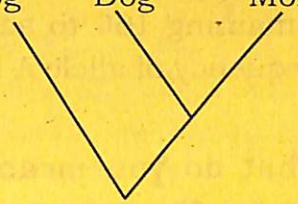
(b) Dog Monkey Frog



(c) Frog Dog Monkey



(d) Frog Dog Monkey



(iii) What is gene flow ?

(iv) Concept of kin selection.

3. Answer ***any three*** of the following : 5×3=15

(i) Explain the concept of "Three Domains of Life" as an evolutionary model of phylogeny.

(ii) Write short note on Neo-Darwinism.

(iii) Discuss adaptive radiation in the context of Darwin's finches.

(iv) What are the unique hominin characters which differentiate it from the primates ?

(v) How does genetic drift affect the Hardy-Weinberg equilibrium ? In a population of 1000 individuals 360 belong to genotype AA, 480 to Aa and the remaining 160 to aa. What will be the frequency of allele A in the population ?

4. (a) What do you mean by speciation ? Discuss the various modes of speciation. 2+8=10

Or

(b) Describe Stanley Miller's experiment and explain how does it prove the biochemical theory of origin of life. 10

5. (a) Discuss Hardy-Weinberg law of equilibrium citing the evolutionary forces that upset the law. 10

Or

(b) What is fossil ? Describe the process of fossilization. Enumerate the methods for determination of the age of a fossil. 1+5+4=10

6. (a) What are the major five mass extinction events that occurred in the history of Earth ? Discuss them with special emphasis on its causes and effects. 5+5=10

Or

(b) Give the concept of phylogenetic tree. What are the different methods of molecular phylogenetic analysis ? State the significance of phylogenetic trees in evolutionary biology. 2+6+2=10

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