3 (Sem–6/CBCS) ZOO HC 1

2022

ZOOLOGY

(Honours)

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: ***(any seven)*** 1×7=7

   (a) Rolling of sheet of cells over other cells during gastrulation is called as :

   (i) Involution

   (ii) Ingression

   (iii) Epiboly

   (iv) Invagination

(b) Embryonic stem cells are derived from

(i) Undifferentiated inner mass of cells of embryo

(ii) Differentiated inner mass of cells of embryo

(iii) Undifferentiated trophoblast cells

(iv) Differentiated trophoblast cells

(c) The only cell that can give rise to a complete new organism is

(i) Pluripotent

(ii) Multipotent

(iii) Totipotent

(iv) Corticopotent

(d) In case of chick development, primary organizer is called

(i) Hensen's node

(ii) Dorsal lip of blastopore

(iii) Nieuwkoop centre

(iv) Primitive groove

(e) The type of regeneration found in hydra is

(i) Morphallaxis

(ii) Epimorphosis

(iii) Regeneration

(iv) Healing

(f) In developmental biology, morula is _____ cell stage

(i) 8 cell

(ii) 16 cell

(iii) 32 cell

(iv) Mass of cells

(g) In frog, cleavage is

(i) Holoblastic and equal

(ii) Holoblastic and unequal

(iii) Meroblastic and unequal

(iv) Meroblastic and discoidal

(h) The incubation period in chick tastes for about

(i) 11 days

(ii) 21 days

(iii) 24 days

(iv) 31 days

(i) The type of cleavage found in insect is

(i) Meroblastic

(ii) Discoidal

(iii) Superficial

(iv) Holoblastic

(j) The process in which the *three* germ layers form is called

(i) Cleavage

(ii) Gastrulation

(iii) Organogenesis

(iv) Metamorphosis

2. Write short notes on ***any four*** of the following: 2×4=8

(a) Stable cell interaction

(b) Homolecithal eggs

(c) Disco blastula

(d) Zonary placenta

(e) Frozen embryo

(f) Totipotent stem cells

(g) Meridional plane of cleavage

(h) Primary egg membrane

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

(a) Describe briefly the differential gene expression.

(b) Describe the process of spermatogenesis.

(c) Describe different types of egg with example.

(d) What are the fate of germ layers ?

(e) Types of placenta.

(f) Describe the metamorphic changes found in amphibians.

(g) Teratogenic agents.

(h) Biological theories of Aging.

4. Answer ***any three*** of the following : 10×3=30

(i) What is pattern formation ? Describe the process of patterning along the anterior-posterior axis of Drosophila embryo. 2+8=10

(ii) What is cytoplasmic determinant ? Describe the process of asymmetric segregation of cellular determinants. 2+8=10

(iii) Describe the mechanism of fertilization with labelled diagram. 7+3=10

(iv) Describe the process of early development of chick up to gastrulation. 10

(v) What is fate map ? Describe the fate map of a typical chordate blastula. 3+7=10

(vi) Describe the process of implantation of human embryo. 10

(vii) What is regeneration ? Describe the morphallactic regeneration found in Hydra. 2+8=10

(viii) What is IVF ? Describe the technique used in IVF. 2+8=10

3 (Sem–6/CBCS) ZOO HC 2

2022

ZOOLOGY

(Honours)

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 answers from the options : ***(any seven)*** 1×7=7

   (i) Coacervates were —

   (a) A colloidal systems formed during biochemical evolution,

   (b) Macromolecules

   (c) Proteins

   (d) Viruses formed in prebiotic soup

(ii) In 1953 Stanley Miller put the following mixture in his electrical spark discharge —

(a) HNO_3, CO_2, N_2 and H_2S

(b) CO_2, N_2, and NH_3

(c) CH_4, H_2, NH_3, H_2O

(d) C_2H_6, H_2S, H_2O

(iii) According to Darwin Origin of Species is the result of —

(a) Mutation

(b) Natural Selection

(c) Acquired character

(d) Hybridization

(iv) "Ontogeny recapitulates phylogeny" was established by —

(a) Cal von Nagaelish

(b) Von Bear

(c) Ernst Haeckel

(d) Frederick Muller

(v) Which digits of the surviving horse touches the ground ?

(a) First digits

(b) Second and fourth digits only

(c) Only the third digits

(d) Third and fourth digits only

(vi) Fossilized foot prints of animals are called

(a) Sub fossils

(b) Pseudofossils

(c) Microfossils

(d) Ichnofossils

(vii) Which of the following fossil is reported from India —

(a) Handyman

(b) Taung baby

(c) Ramapithecus,

(d) Peking man

(viii) Primitive earth was absence of free

(a) NH_3

(b) CH_4

(c) O_2

(d) CO_2

(ix) Protohippus gave rise

(a) Orohippus

(b) Parahippus

(c) Amphitherium

(d) Hipparion

(x) What is the difference between micro- and macroevolution ?

(a) Microevolution describes the evolution of small organisms, such as insects, while macroevolution describes the evolution of large organisms, like people and elephants.

(b) Microevolution describes the evolution of microscopic entities, such as molecules and proteins, while macroevolution describes the evolution of whole organisms.

(c) Microevolution describes the evolution of organisms in populations, while macroevolution describes the evolution of species over long periods of time.

(d) Microevolution describes the evolution of organisms over their lifetimes, while macroevolution describes the evolution of organisms over multiple generations.

2. Answer ***any four*** of the following : 2×4=8

(i) Match the fossils of Group–A with the discovery site of Group–B

A. *(i)* Solo Man

(ii) Heidelberg Man

(iii) Terrifire Man

(iv) Zinjanthropus

(v) Lucy

(vi) Oreopithecus

B. *(i)* Tuscany

(ii) Ethiopia

(iii) Olduvai Gorge

(iv) Algeria

(v) Germany

(vi) Java

(ii) Describe a situation in which a population would undergo the Bottleneck effect and explain what impact that would have on the population's gene pool.

(iii) Explain why genetic drift is most likely favourable for small population.

(iv) What is the frequency of heterozygotes Aa in a randomly mating population in which the frequency of all dominant phenotypes is 0.19 ?

(v) What is the role of hereditary variation in evolution ?

(vi) Outline the probable causes of Mass Extinction.

(vii) Write down the role of Cyt-c in evolution.

(viii) Differentiate Microfossils and Macrofossils.

(ix) What is hot dilute soup ?

(x) What is genetic load ?

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

(i) Construct a Phylogenetic tree using UPGMA method.

	A	B	C	D	E
B	2				
C	4	4			
D	6	6	4		
E	6	6	6	4	
F	8	8	8	8	8

(ii) Construct a phylogenetic tree using any of the character-based method for the following multiple sequence alignment. Consider orangutan as outgroup.

Human	TTAGCTACT
Chimpanzee	CTAGCTCCC
Gorilla	CTGGCCACT
Orangutan	CTGGACCCT

(iii) In a large population of butterflies, the colour brown (B) is dominant over the colour white (b) ; 40% of all butterflies are white. Calculate the following—

(a) The percentage of individuals which are heterozygous.

(b) The frequency of the dominant allele 'B'.

(c) The frequency of the allele 'b'.

(d) The frequency of homozygous dominant individuals.

(e) The frequency of the possible phenotype where 'B' is completely dominant over 'b'.

(iv) Outline the evolutionary changes from ape like form to human form.

(v) Write short notes on Neo Darwinism.

(vi) List out the different periods and epochs of Cenozoic era, Mesozoic era and Palaeozoic era from the time of beginning of periods to present.

(vii) Write briefly on transitional forms.

(viii) What are the drawback of Lamarckian theory ?

(ix) Write short note on adaptive radiation in Galapagos Finches.

4. Answer ***any three*** of the following : 10×3=30

(i) What are the forces of evolution ? Briefly explain each of the forces. 2+8=10

(ii) Write *four* characteristics of modern horse. Write briefly the phylogeny of horse in Eocene and Oligocene period with suitable diagrams. 2+4+4=10

(iii) What are the modes of speciation ? Explain each with suitable examples. 1+9=10

(iv) Write elaborately about the evidences of evolution giving special emphasis on the fossil record. 10

(v) Define natural selection. Discuss each citing the graphical representation. 1+9=10

(vi) What is extinction ? Give a detailed account of K-T extinction. 2+8=10

(vii) What is macro-evolution? Give a detailed account of the essential features and patterns of macro-evolution. 2+4+4=10

(viii) Describe the conditions, which have to be in effect for Hardy-Weinberg equilibrium to be valid. 10

(ix) Write the different steps of Chemical origin of life. Describe Miller-Urey's experiment to prove the biochemical theory of origin of life. 5+5=10
