

M.Sc.

2014

4th Semester Examination

ZOOLOGY

PAPER—ZOO—401

Full Marks : 40

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

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

Illustrate the answers wherever necessary.

Answer all questions of the following.

(Group-A)

(Animal Physiology)

1. Answer any *two* questions of the following : 2×2
- (a) Summarize the spread of cardiac impulse through the heart.
 - (b) State the Goldman-Hodgkin-Katz equation with explanation.

(Turn Over)

- (c) How hypoxia stimulates chemoreceptors ?
- (d) Name two Amino acid hormones and their source glands in vertebrates.

2. Answer any *two* questions of the following : 4×2

- (a) Describe the relationship of ECG with events of cardiac cycle (with the help of a graph).
- (b) Write down the sequential steps in synaptic transmission.
- (c) Explain the metabolic functions of Vitamin D. Name a biomolecule acting both as vitamin and a hormone.
- (d) State the role of spare receptors in the mechanism of hormone action. Write down the basic properties of neurotransmitters.

3. Answer any *one* question of the following : 8×1

- (a) i) Illustrate the effect of different degrees of sympathetic and parasympathetic stimulation on cardiac output curve.
- ii) Compare the action potential in a cardiac muscle with that in a skeletal muscle.
- (b) i) How hormones modulate adenylyl cyclase activity ?

- ii) Describe the activation of PKA by cyclic AMP.
- iii) How Atria functions as Primer pump ?

(Group-B)

(Adaption and Evolution)

4. Answer any *two* questions of the following : 2×2
- (a) Mention the methods by which gene tree can be made.
 - (b) Mention the role of antioxidants in oxidative stress mangement.
 - (c) What is the role of gene duplication in evolution ?
 - (d) What are the types of hypoxia ?
5. Answer any *two* questions of the following : 4×2
- (a) What is the role of parelog and ortholog in human and horse globin gene evolution ?
 - (b) Explain the pathway of destruction of free radicals.
 - (c) State the role of thyroid in thermoregulation.
 - (d) An allele 'A' is a hotspot of mutation and undergoes mutation at a frequency of 10^{-4} generation. If the frequency of reverse mutation from a to A is 10^{-7} per generation, what is the expected equilirbrium allele frequency of a ?

6. Answer any *one* question of the following : 8×1

(a)

Human	M	V	H	L	T	P	E	S	A	V	T	A	L	N	V	D	E	V	G
Baboon	N
Cow	.	.	.	.	.	A	.	A	.	.	.	E	K	.	.	.	.	.
Sheep	.	.	.	.	A	.	A	.	.	G	E	K	.	.	.	A	.	.
Mouse	.	.	.	.	D	.	A	.	S	G	.	A	.	.	.	.	.	.
Hamster	.	.	.	.	D	A	A	L	.	G	.	A	.	A	.	A	.	.
Chicken	.	.	W	.	A	.	Q	L	I	.	G	.	.	A	.	e	A	.	

Look at the sequence and make a distance matrix showing the number of differences between each pair of sequences. Make a gene tree inferred from the distance matrix using UPGMA method.

- (b) i) In an industrialized region, the fitness of *Biston bitularia* is 1 for Dark form (DD and Dd) and 0.47 for light form (dd). The allele frequencies at a certain time are $p=0.40$ (D allele) and $Q=0.60$ (d allele). Assume how the allele frequencies are:

i) $p = 0.10; Q = 0.90$

ii) $p = 0.90; Q = 0.10$

Calculate the corresponding value of ΔQ .

- ii) Describe the counter current heating mechanism in vertebrate.