M.Sc. 4th Semester Examination, 2011

ZOOLOGY

PAPER—Z-401

Full Marks : 40

Time : 2 hours

The figures in the right-hand margin indicate marks

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

Illustrate the answers wherever necessary

Write the answers to questions of each Group in separate books

GROUP – A

(*Animal Physiology*)

[*Marks* : 20]

1. Answer any *two* questions out of the four : 2 × 2

(*a*) What do you mean by Neuromodulator ?

(*b*) Mention the name of mineral, acting as 'alkalising agent'. What is its (weight) requirement content in the body ?

(*c*) Describe the determinants of cardiac output.

(*d*) Explain the reason for the 'plateauphase' in the conduction of impulse in Purkinje fibre.

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

(*a*) Draw and describe the structure of a synapse with special reference to DOCKING COMPLEX and the proteins present in the 'active zone'. 2 + 2

(*b*) (*i*) Briefly state the biochemical roles of vitamin B_2 along with its deficiency.

(*ii*) Name the vitamins associated with blood formation in body. 2 + 2

(*c*) How do hormones modulate the activity of adenylate cyclase ? 4

(*d*) Explain how Hypothalamus-Pituitary-Gonadal axis acts on vertebrate ? 4

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

(*a*) (*i*) Define Action Potential. Why is it propagated in a single direction ? Justify with diagram and with various functional states of voltage-gated ion channel. $1 + 2 + 2$

(*ii*) In brief, write down the effect of sympathetic and parasympathetic stimulation, along with the receptors involved, on the control of Heart Rate. 3

(*b*) Write short notes on any *four* : 2×4

(*i*) Role of Baroreceptors in controlling blood pressure

(*ii*) Frank-Starling mechanism

(*iii*) EC 50

(*iv*) Nernst equation

(*v*) Factors affecting nerve conduction velocity

(*vi*) Hormone secreted by pineal gland and its function

(*vii*) Cardiac cycle.

GROUP – B

(*Adaptation & Evolution*)

[*Marks* : 20]

1. Answer any *two* questions : 2 × 2

(*a*) State the deleterious effect of ROS.

(*b*) Mention the differential effects of two thyroid hormones in thermoregulation.

(*c*) Mention the features require to construct phylogenetic tree.

(*d*) What is directional selection ?

2. Answer any *two* questions : 4 × 2

(*a*) Write a note on diving Bradycardia and hypoxia.

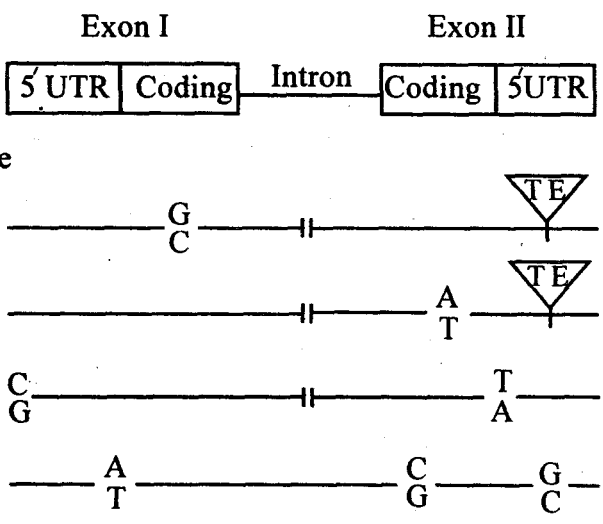
(*b*) Explain the two hypothesis on functioning of set point.

(*c*) The mean tooth height of *Mesohippus* was 8·36 mm and of *Merychippus* was 34·08 mm. The two species were separated by 15 million years with a generation time of 3 years. Calculate the average rate of change per generation.

(*d*) How many generations are required to reduce the frequency of albino rabbits in a population from 25% to 1% by removing all albino rabbits before they reproduce ? Assume that the population is in HWE and the albino rabbits are homozygous for a recessive allele.

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

(*a*)



Make a rooted phylogenetic tree with proper explanation. 8

(*b*) (*i*) In a region where industrial pollution has been under control for a number of years, the fitness of Biston moth is 0·47 for dark form and 1 for light form. Calculate the change in allele frequency, Δp, after one generation of selection when (1) $p = 0{\cdot}40$, (2) $p = 0{\cdot}10$ and (3) $p = 0{\cdot}90$. 4

(*ii*) DNA-DNA hybridization among 4 species (A-D) yielded following information :

	A	B	C
B	0·4		
C	0·35	0·45	
D	0·6	0·7	0·55

Calculate the estimated evolutionary distance among species A-D and draw phylogenetic tree showing their evolutionary relationship. 4