PG/IVS/ZOO-401/13

M.Sc. 4th Semester Examination, 2013

ZOOLOGY

PAPER – ZOO-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

Write the answers to questions of each Group in separate books

GROUP – A

(*Animal Physiology*)

[*Marks* : 20]

1. Answer *two* of the following : 2 × 2

(*a*) Frank-Starling mechanism.

(*b*) Why is conduction of nerve impulse faster in myelinated nerve fibres than in unmyelinated ones ?

(*c*) Name an inhibitory neurotransmitter and describe its action.

(*d*) EC_{50}.

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

(*a*) Explain the role of Ca-ion in synaptic transmission. Provide necessary figure. 4

(*b*) Draw and describe the conduction pathway of heart. State why SA-node acts as pacemaker. 3 + 1

(*c*) What is Cardiac cycle ? Explain with figure. 4

(*d*) State briefly on the basic differences between a classical neurone and a neurosecretory neurone. 4

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

(*a*) (*i*) Define Homeostasis. Explain positive and negative feedback with example. 1 + 3

(*ii*) List two important hormones and their function that are secreted in invertebrates and in mammals. 2 + 2

(*b*) (*i*) Define Action Potential. Explain the sequence of events in the propagation of action potential in a nerve fibre with proper graph. 1 + 3

(*ii*) Mention important phases of ECG. 4

GROUP – B

(*Adaptation and Evolution*)

[*Marks* : 20]

4. Answer *two* questions : 2 × 2

(*a*) Mention the general features of Free Radicals.

(*b*) State the difference between Adaptation and Acclimatization.

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

(*d*) What is the role of gene duplication in evolution ? Give an example of gene duplication.

5. Answer *two* questions : 4 × 2

(*a*) Let's suppose the allele frequency of *A* is 0·7 in the donor population and 0·3 in the recipient population. A group of 20 individuals migrate and joins the recipient population, which originally had 80 members. Calculate rate of migration (m) and the allele frequency of *A* in the conglomerate population.
Note : After migration has occured, the new population is called a conglomerate. 4

(*b*) In a large experimental drosophila population, the fitness of a recessive phenotype is calculated be 0·90 and the mutation rate to the recessive allele is 5×10^{-5}. If the population is allowed to come to equilibrium, what allelic frequencies can be predicted ? 4

(*c*) Distinguish between sweating and panting. How paralogous genes are derived ? 3 + 1

(*d*) Draw and describe the oxygen dissociation curve for oxyhaemoglobin and oxymyoglobin. 4

6. Answer *one* from the following : 8 × 1

(*a*) Consider the hypothetical homologous sequences. Generate a distance matrix that describes the pairwise relationship of all the sequences presented. Use the UPGMA method to generate a tree that describes the relationship between these sequences. 8

A GCCGTTTAGTCTCAA
B GCCGTCAAATCTCAA
C GGCGTTATATCTAGA
D GCTGTCATGCCTAAC
E GCTATCATGACTCAA

(*b*) (*i*) Two alleles of a loans, *A* and *a* can be interconverted by mutation :

$$A \underset{v}{\overset{u}{\rightleftarrows}} a$$

where u is a mutation rate of $6{\cdot}0 \times 10^{-7}$ and v is a mutation rate of $6{\cdot}0 \times 10^{-8}$. What will be the frequencies of A and a at mutational equilibrium assuming no migration and no drift occurs

(*ii*) Explain the hormonal regulation of body temperature in brief. 4 + 4
