2013

M.Sc. Part–I Examination

ZOOLOGY

PAPER—III

Full Marks : 100

Time : 4 Hours

The figures in the 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 any *eight* questions.

Group—A

Answer any *four* questions taking *two* from each unit.

Unit—I

[Ecology]

1. Define Biosphere? Mention the hierarchy of ecological levels. Briefly discuss the cybernetics in ecosystem functioning. $2+3\frac{1}{2}+7$

2. Portray ecological niche of a species as a volume in n-dimensional space. Illustrate niche breadth and niche width in terms of resource utilization by species. Distinguish between fundamental niche and realized niche. What is niche complementarity? $3+5+2+2\frac{1}{2}$

3. What is life table? Comment on the different parameters of a life table. Compare the life history features of r-strategists and K-strategists. Elaborate mutualism and protocooperation as examples of population interactions. $(2+3)+3\frac{1}{2}+4$

4. (a) Write notes on (any *three*) : $4+4+4\frac{1}{2}$

(a) Gaia Hypothesis;

(b) Liebig's law of minimum;

(c) Density dependant and independent factor;

(d) Ecotones and Edge effect;

(e) Metapopulation.

Unit—II

[Ethology]

5. (a) What do you mean by proximate and ultimate causes of behaviour? Cite examples. $3+2\frac{1}{2}$

(b) Compare between egocentric and altruistic behaviour. 3

(c) Narrate briefly the two approaches for explaining the theory of habitat selection. 4

6. Discuss semelparity and iteroparity. Explain that reproductive effort is associated with allocation of energy. What are domestic bliss situation of Dawkin's and dear enemy recognition? $4+4+(2\frac{1}{2}+2)$

7. (a) Elucidate the different social strategies adopted by different groups of animals to reduce the risk of predation. 4

(b) What are the types of aggressive behaviour? Compare aggression and agonistic behaviour. $2+2\frac{1}{2}$

(c) Explain infanticide and siblicide with example. 2

8. Write any *three* questions of the following : $4+4+4\frac{1}{2}$

(a) Distinguish between Territory and Home range.

(b) Egocentric and altruistic behaviour.

(c) Game Theory.

(d) Proximate and ultimate cause.

(e) Distinguish between Primary sex ratio and operational sex ratio.

Group—B

Answer any *four* questions taking *two* from each unit.

Unit—I

[Immunology]

1. (a) What is Hapten ? Give example. Describe in brief the structural organisation of any Secondary lymphoid organ.

(b) Describe briefly the structure and function of IgM. Write the functional significance of Fab, Fc and hinge region of immunoglobulin (Ig) molecule.

$(2+4)+(5+1\frac{1}{2})$

2. (a) What do you mean by Antigen (Ag) Processing and Presentation ? Discuss the mechanism of Antigen (Ag). Processing by cytosolic pathway.

(b) What are the different types of receptors present in the surface of the T-Cell ? Illustrate your answer with suitable diagram.

$2+5\frac{1}{2}+5$

3. (a) Write the principle of Southern Blotting Hybridization (SBH). Describe in brief the procedure with labelled diagram.

Mention its biological application.

(b) What is the role of thymosin ?

$2+7\frac{1}{2}+2+1$

4. (a) Write notes on (any *two*) : 4+4

(i) Antibody Dependent Cell Mediated Cytotoxicity (ADCC);

(ii) Titer;

(iii) Monoclonal Antibody (MAb) ;

(iv) Cytokines.

(b) Write notes on : $4\frac{1}{2}$

Kinetics of primary and secondary Humoral response.

Or

Radio Immune Assay (RIA)

Unit—II

[Biostatistics]

5. (a) Write short notes on any *two*) : 4+4

(i) Frequency distribution;

(ii) Degrees of freedom;

(iii) Testing of hypothesis;

(iv) Level of significance.

(b) Write short notes on : $4\frac{1}{2}$

Normal distribution curve

Or

Correlation coefficient.

6. (i) What is random sampling ? Mention is advantages.

(ii) Find the median of the following data.

Class Boundaries	0-10	10-20	20-30	30-40	40-50
Frequency	14	23	27	21	15

(iii) The data shows a value of $N_1 = 15$ $N_2 = 10$ $\sum X_1 = 1331$, $\sum X_2 = 949$, $\Sigma X_1^2 = 8980.86$, $\Sigma X_2^2 = 2236.9$ Find out whether there is a significant difference between the data. Given value $\alpha_{0.05} = 1.71$. Draw your inference. $4+4+4\frac{1}{2}$

7. (i) What is analysis of variance? Explain the technique of analysis of variance for data with one way classification.

(ii) The weight of fishes reared in three different ponds with different types of foods are given below. Find out if these data suggest a difference in average weight of fishes reared in different ponds. Given value ($F_{0.05,\ 2,12} = 3.88$, $F_{0.05,\ 3,\ 12} = 3.49$, $F_{0.05,\ 3,14} = 3.34$, $F_{0.05,\ 3,\ 15} = 3.29$)

Pond - 1	20	26	24	22	20
Pond - 2	28	26	30	31	27
Pond - 3	20	19	23	22	26

Draw your inference. $2+3+(5\frac{1}{2}+2)$

8. (i) What is product moment correlation coefficient?

(ii) Explain $y = a + bx$.

(iii) Calculate the "Pearson Product Moment Correlation coefficient 'r' between shell height (in mm) and shell breath (in mm) of the snails *Physa acuta* sampled from ten randomly selected sites of Midnapore and test its significance ($\alpha = 0.05$) : Critical $t_{0.05(8)} = 2.306$

Sl. No.	1	2	3	4	5	6	7	8	9	10
Shell height (in mm)	7·0	9·5	10·6	12·8	6·8	5·6	9·3	9·6	9·0	5·9
Shell breath (in mm)	3·0	3·6	4·5	6·2	2·7	2·2	4·0	3·5	2·4	2·5

$2+3+7\frac{1}{2}$
