

**M.Sc. (Previous) ZOOLOGY - 2005-06**

**PAPER-III  
ENVIRONMENTAL BIOLOGY AND QUANTITATIVE  
BIOLOGY**

**Duration : 3 hours**

**M.M. 100**

**UNIT-I**

- 1 A brief introduction to Environmental Biology. The history and scope of Environmental Biology.
- 2 Adaptation:
  - (a) Levels of adaptation.
  - (b) Mechanisms of adaptation.
  - (c) Significance of body size.
  - (d) Acclimation and acclimatization.
  - (e) Concept of homeostasis.
- 3 Resource management, Waste management control, Sustainable development, Conservation biology & Bioremediation and biomass utilization.

**UNIT-II**

- 3 Organization at Population level:
  - (a) General properties of population
  - (b) Population growth, forms and forces shaping the population growth.
- 4 Reproductive strategies of different populations- ecology and evolution of sex and mating systems, optimal body size, r-and k- selection

**UNIT-III**

- 5 Population fluctuation, irruptive and cyclic fluctuation, causes of fluctuation.
- 6 Different biotic interactions and their models:
  - (a) Parasitism.
  - (b) Predation.
  - (c) Competition.
  - (d) Mutualism.

**UNIT-IV**

- 7 Organization at the Community level:
  - (a) Concept of biotic community
  - (b) Patterns in communities: stratification, zonation, food chains and food webs
  - (c) Succession in communities : types of succession, concept of climax, monocl意思 versus polyclimax theory, barriers in succession.
- 8 The ecological niche and its parameters :
  - (a) History of niche concepts.
  - (b) Intraspecific and interspecific competition.

**UNIT-V**

- 9 Biostatistics:
  - (a) Probability theory

- (c) Hypothesis testing
- (d) Experimental design and sampling theory (t-test and chi-square test)
- (e) Analysis of variance
- (f) Co-relation and regression
- 10 Mathematical modelling
  - (a) Types of models: Statistical, empirical, mechanistic, simulation etc.
  - (b) Properties of models: Generality, precision, realism.
  - (c) Detailed treatment of selected specific models from different areas of Biology.
- 11 Computer application in Zoological studies.

**REFERENCE BOOKS (LATEST EDITIONS) :**

- 1 Odum : Ecology (Amerind).
- 2 Odum : Fundamentals of Ecology (Saunders).
- 3 Ricklefy : Ecology (W.H.Freeman).
- 4 Turk and Turk : Environmental Sciences (W.B. Saunders)
- 5 Cherrett, J.M.Ecological concepts. Blackwell Sci. Publication Oxford, U.K.

- 7 Ricklefs, R.E. and G.Miller. Ecology, W.H. Freeman and Co. New York.
- 8 Batschelet, E. Intdoduction to Mathematics for Life Scientists. Springer-Verlag, Berling.
- 9 Jorgensen, S.E. Fundamentals of Ecological Modeling. Elsevier, New York.
- 10 Swartzman, G.L., and S.PO.Kaluzny. Ecological simulation primer. Macmillan, New York.
- 11 Lendren, D. Modelling in behavioral Ecology. Chapman and Hal, London, UK
- 12 Sokal, R.R. and F.J. Rohlf. Biometry. Freeman San Francisco.
- 13 Snedecor, G.W. and W.G. Cochran. Statistical Methods. Affilited East-West Press, New Delhi (Indian Ed.)
- 14 Green, R.H. Sampling design and statistical methods for environmental biologists. John Wiley and Sons, New York.
- 15 Murray, J.D. Mathematial Biology. Springer-Verlag, Berlin.
- 16 Pielou, E.C. The interpretation of ecological data : A primer on classification and ordination.