

**Developmental Biology, Ecology and Economic Zoology (Theory)**

Marks: 75  
Time: 3 Hours

- Unit-1:** Gametogenesis: Spermatogenesis and oogenesis; Fertilization; Partheno-genesis. Types of eggs; Cleavage and types of cleavage; Process of blastulation, fate map and Gastrulation in frog up to the formation of three germinal layers; Metamorphosis in insects and frog.
- Unit- 2:** Ecology: Concepts, subdivisions, scope and importance; Levels of organization in the biosphere. Structure of ecosystem - Ecological factors (biotic and abiotic); Trophic structure: Food chains, food webs and energy flow; Trophic relationships – ecological pyramids. Productivity.
- Unit 3:** Ecological niche. Population: Growth and regulation. Concepts of biotic community. Inter and intraspecific interactions. Resources (renewable and non-renewable) and their management. Environmental pollution (air, water and soil).
- Unit 4:** Pisciculture: Culturable fish species of India; Culture and management of fish with reference to composite fish culture; Induced breeding.  
Sericulture: Different species of silk moth; Life history of *Bombyx mori* and methods of culture; Product of sericulture and its economic importance.
- Unit 5:** Apiculture: Species of honey bees; Life history and social organization; Methods of bee keeping, economic importance.  
Integrated pest management (physical, chemical, hormonal and biological).

**Suggested Readings:**

1. Ayyar, T. V. R. (1984). Handbook of Economic Entomology. International Books and Periodical Supply Service.
2. Balinsky, B. I. (1981). An Introduction to Embryology, 5<sup>th</sup> Edition. Saunders College Publishing, Holt-Saunders.
3. Beeby, A. and Brennan, M. A. (2008), First Ecology - Ecological Principles and Environmental Issues, 3<sup>rd</sup> Edition. Oxford University Press, India.
4. Cain, M. L., Bowman, W. D. and Hacker, S. D. (2011). Ecology, 2<sup>nd</sup> Edition. Sinauer Associates, Inc. Publishers.
5. Carlson, B. M. (2006). Foundations of Embryology. McGraw Hill Education (India) Ltd.
6. Gilbert, S. F. (2010). Developmental Biology, 9<sup>th</sup> Edition. Sinauer Associates, Inc. Publishers
7. Gupta, S. K. and Gupta, P. C. (2003). General and applied Ichthyology (Fish & Fisheries). S. Chand & Co.

8. Kalthoff, K. (2000). Analysis of Biological Development, 2<sup>nd</sup> Edition. McGraw-Hill Professional.
9. Kendeigh, F. C. (1984). Ecology with Special Reference to Animal and Man. Prentice Hall Inc.
10. Kormondy, E. J. (1996). Concepts of Ecology, 4<sup>th</sup> Edition. Prentice Hall of India Pvt. Ltd.
11. Little, V. A. (1972). General and Applied Entomology, 3<sup>rd</sup> Edition. Oxford and I. B. H. Publishing Co.
12. Odum, E. P. & Barrett, G. W. (2006). Fundamentals of Ecology. 5<sup>th</sup> Edition. Cengage Learning India.
13. Odum, E. P. (1971). Fundamentals of Ecology, 3<sup>rd</sup> Edition. W. B. Saunders Company.
14. Ricklefs, R. E. (2010). Economy of Nature, 6<sup>th</sup> Edition. W.H. Freeman.
15. Sharma, P. D. (1990). Ecology and Environment, 7<sup>th</sup> Edition. Rastogi Publications.
16. Shukla, G. S. and Upadhyay (2003). Economic Zoology, 4<sup>th</sup> Edition. Rastogi Publications.
17. Stiling, P. D. (2012). Ecology Companion Site: Global Insights and Investigations. McGraw Hill Education.
18. Wolpert, L. and Tickle, C. (2011). Principles of Development, 4<sup>th</sup> Edition. Oxford University Press.

### Paper 4B (Practical)

#### Developmental Biology, Ecology and Economic Zoology

Marks: 25

Time: 4 Hours

1. Study of the types of eggs in vertebrates.
2. Study of larval forms (crustacean, molluscan and echinoderm) from permanent slides.
3. Study of the stages of development of frog from permanent slides in whole mount/sections (cleavage, blastula and gastrula).
4. Preparation of permanent slides of non-chordate larval forms (Mysis, Nauplius, mosquito larva).
5. Study of metamorphosis in Amphibia (using Charts/Models).
6. Estimation of dissolved oxygen in water samples.
7. Estimation of carbon dioxide in water samples.
8. Estimation of total alkalinity in water samples.
9. Qualitative study of plankton from fresh water samples.
10. Study of the life cycle of silk moth.
11. Study of different castes of honey bee.
12. Identification of Indian major carps and common exotic carps.

#### Distribution of Marks

1. Developmental Biology
2. Ecology
3. Spotting (slides/charts/models)
4. *Viva Voce*
5. Laboratory Record

**Total**

**25 (Internal test – 7 + End semester test - 18)**