Government of India
Ministry of Environment, Forest& Climate Change
ZOOLOGICAL SURVEY OF INDIA
Andaman and Nicobar Regional Centre
Port Blair-744 102, A & N Islands

SYLLABUS - FISHERIES

Chapter - I: LIMNOLOGY

Origin and classification of water bodies – Rivers, lakes and ponds ● Major rivers and freshwater lakes of India ● Ecology of ponds, rivers and lakes – Structure and dynamics - energy flow ● Physical characteristics of water : Temperature, thermal stratification and thermal exchange – light – total hardness – pH. ● Major groups of organisms in freshwater bodies other than fish ● Ecological adaptations of freshwater fauna ● Plankton of freshwater biotopes – Phyto and Zooplankton, their structural dynamics, seasonal variation

Chapter - II: ESTUARINE AND MARINE BIOLOGY

Estuaries: Origin of estuaries - Structure of an estuary (Physico-chemical Features) ● Some typical estuarine habitats of India (Hoogly–Matlah, Mahanadi, Godavari, Krishna, Cauvery and West-coast Estuaries) ● Classification and topography of marine environment and salient features of different zones ● Physical environmental factors (temperature, light, pressure, currents, tides and waves) ● Chemical environmental factors (oxygen, carbon dioxide and carbonates, salinity, pH, nitrogen cycle) ● Classification of marine organisms and their characteristic features ● Aquatic Pollution

Chapter - III: TAXONOMY AND FUNCTIONAL ANATOMY OF SHELL FISH

General characters of coelenterates, crustaceans, mollusks and echinoderms ● Classification of Crustacea up to orders ● Classification of Mollusca up to sub-class ● Food, feeding habits and adaptations of cultured crustaceans ● Food, feeding habits and adaptations of cultured Molluscs ● Reproductive patterns in Molluscs, reproductive organs, gonad maturity, spawning and fertilization

Chapter - IV: TAXONOMY AND FUNCTIONAL ANATOMY OF FIN FISH

General characters and Classification of fishes up to sub-class ● Gross external anatomy of fishes: Skin and its derivatives, scales and their significance ● Major groups of Fishes: Major groups of living Fishes and extinct Fishes – Phylogeny of Fishes ● Natural food of fishes and feeding habits ● Feeding adaptations and stimuli for feeding ● 6. Anatomy and histology of digestive system and physiology of digestion ● Modes of reproduction, reproductive cycle, gonad maturity stages, spawning seasons and grounds, modes of spawning

Chapter - V: ICHTHYOLOGY

Basic fish anatomy – form and function of muscles, gills and gas bladder ● Skeleton – Endoskeleton – Neurocranium and visceral skeleton ● Locomotion in fishes: Body form and locomotion, fins and locomotion, swimming and non-swimming locomotion, migration of fishes, anadomous and catadromous migrations ● Age and growth in fishes: Determination of age, length-weight relationship, annual growth marks, bone marks, determination of growth and factors affecting the age and growth ● Genetics and Evolution: Inheritance, sexdetermination, hybridization, mechanism of evolution in fishes

Chapter - VI: FISHERY EDUCATION, EXTENSION AND ECONOMICS OF AQUACULTURE

Fisheries training and education in India : Training Institutes, Universities, Research Organisations, etc. ● Institutional funding to fisheries and aquaculture sector ● Socio-economic conditions of fishermen and fish farmers ● Fishermen Co-operative Societies ● Economics of aquaculture ● Economic viability, data requirement, analysis of data

Chapter - VII : GENETICS, MOLECULAR BIOLOGY AND BIOTECHNOLOGY

Principles of cell and molecular biology – Cell structure, Structure of DNA & RNA – Composition and properties ● DNA replication. Transcription in prokaryotes and eukaryotes ● Gene structure and function – Gene complementation, cistron , mutan, recon, molecular recombination, gene regulation ● Molecular hybridization. Labelling of nucleic acids, molecular markers ● Application of genetic engineering in fisheries : Genomic manipulation, gene transfer, hybridization, interspecific, intergeneric gynogenesis and androgenesis, polyploidy.

SUGGESTED READINGS

1. Welch, P.S. Limnology. McGrawHill, NY, 1952.
2. Hutchinson, G.E. A Treatise on Limnology, Vols. I & II. John Wiley & Sons, 1957.
3. Ruttner, F. Fundamentals of Limnology. Translated by D.G. Frey and F.E.Fry. University of Toronto Press, 1968.
4. Wetzel, R.G. Limnology. W.B. Saunders Co., 1975.
5. Reid, G.K. & R.D. wood. Ecology of inland waters and Estuaries. Van Nostrand Company, 1976.
6. Cole, C.A. Textbook of Limnology. The C.V. Mosby Co., 1983.
7. Friedrich, H.: Marine Biology Raymont, J.E.C.: Plankton and productivity in the Oceans, Volume 1.
8. Balakrishna Nair. N. and D.M. Thampy: A text book of Marine ecology
9. Sverdrup, H.V., M.W., Johnson and R.H. Fleming.: The Oceans – Their physics, chemistry and general biology. Prentice-Hall Inc. 1942
10. Sedgewick. A Student's textbook of Zoology, Vol. I & II.
11. Usinger. General Zoology, Vols. I & II.
12. Marshall & Williams. Textbook of Zoology. Vol.I.
13. Parker and Hasswell. Textbook of zoology, Vertebrates. Vol.II.
14. Day, F. The fishes of India.
15. S.S. Khanna. An introduction to fishes.
16. K.G. Lagler. Ichthyology.