VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

M.Sc. Part – II

Aquatic Biology

THEORY PAPERS

Paper V - Aquatic Ecology and Zoogeography

Paper VI - Pollution and Toxicology

Paper VII - Fish Biology and Fishery Sciences

Pa per VIII -Aquaculture (Optional)

A. Animal Aqua Culture
B. Plant Aqua Culture

PRACTICALS

Practical IV - Aquatic Ecology and Pollution

Practical V - Fish Biology and Fishery Science

Practical VI - Dissertation and Field Visit

Journals

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

M.Sc. Part – II

Aquatic Biology

Paper – V Aquatic Ecology and Zoogeography

Unit-1 **10 Hrs.**

Scope of ecology and its relation to other sciences.

Ecological factors: Topographic, eadaphic, climatic and biotic,

Unit-2 **10 Hrs**.

Role of water in the ecological relations of organisms, method of meeting osmotic problem in stenohaline, euryhaline forms, water problem in amphibious situations.

Unit-3 **20 Hrs.**

Population; Age distribution, density, natality, mortality, biotic potential, environmental resistance, growth form fluctuations, space requirement, home range territory and population structure.

Population interaction; Symbiosis, Antagonism, Exploitation and mutualism.

The Community; Biocoenosis, Biotype and their relation to aquatic environment.

Unit-4 **15 Hrs.**

The Dynamics of ecosystem; The components, abiotic substances, producers, consumers, decomposerstransformers, produtions rates, energy flow structure and ecological pyramides.

Unit-5 **15 Hrs.**

Adaptation to special condition of life;

Ice fishes, deep-sea fishes, cave dwelling fishes, hill stream fishes, Homing of salmon and scooling of fishes.

Unit-6 **20 Hrs.**

Knowledge of flora and fauna of sandy shores, interstitial belt, rocky shore, muddy shore, mangroves, coral reefs, estuaries, fouling and boring organisms.

REFERENCES

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Aquatic Biology

Paper-VI - Pollution and Toxicology

Unit-1 **15 Hrs.**

Pollution: Definition, historical background, major pollutants, sources, dynamics, transport paths and agents.

Toxicology: lethal and sublethal effects of pollutants to organisms, evaluation of toxicity, tolereance, bicassays, factor influencing toxicity, interaction with other environmental factors.

Unit-2 **15 Hrs.**

Sewage, industrial and agricultural discharges, composition, disposal systems. (River drainage, piped disposal)

Nutrients: detergents, heavy metals and pesticides composition and fate in the marine environment, biological concern, toxicity and treatment methods.

Unit-3 **12 Hrs.**

Thermal pollution: Definition and sources, thermal stratification, effects of thermal pollution and Management of heat.

Radioactive pollution , Classification , sources of radio active substances biological effect of radiation disposal of waste and its alternative.

Unit-4 **18 Hrs.**

Oil pollution sources and fate composition and biological effects biodegradation and treatment procedures (Biological and Mechanical).

Acid rain and its effects on fisheries.

Bacteria and pollution, Bacterial contamination, Coliform bacteria, Testing, bacteria as decomposers.

Unit-5 **15 Hrs.**

Solid dumping effects of mining and dredging operations on organisms. Mining processes, mine fires, Water pollution due to mining, Noise pollution during, Mining Operation.

Nature of toxic effects of different pollutants on aquatic organism.

Unit-6 **15 Hrs.**

Role of pollution control Boards.

Environmental monitoring methods objectives – Status and limitation for critical pollutants-biological indicators of water pollution. Pollution prevention and abatement measures.

REFERENCES

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M.Sc. Part – II

Aquatic Biology

Paper – VII Fish Biology and Fishery Sciences

Unit-1 **15 Hrs.**

General morphology and outline classification of fishes, major group of fishes and their characterstics, Identification of commercially important fishes of South Gujarat.

Age and growth of fishes: Methods of study, application of age and growth determination in fish management.

Food and feeding habits of fishes.

Unit-2 **15 Hrs.**

Breeding Biology: Spawining and breeding habits.

Artificial breeding: Hypophysation; Selection, identification and rearing of brooders, extraction of pituitary extract, dose and preparation of injection, factors affecting hypophysation.

Hatcheries: Hatching hapa, eicular and Chinese hatcheries.

Unit-3 **15 Hrs.**

Carrying capacity of pond its enhancements.

Transportation of fish seeds, fingerline and breeders, causes of mortality during transportation, measures for reducing mortality.

Preservation of fish and prawn; Handling and cleaning of fresh fish and prawn, chilling freezing, salting, drying, smoking and pickling.

Unit-4 **15 Hrs.**

Fish pathology-parasitic and non-parasitic diseases and their control.

Remote sensing for fish availability.

Sampling techiniques, Biometry of fish percentage co- efficient of variation’t’ test co-efficient or Regression, Test of signification of regressions, analysis of variance.

Unit-5 **15 Hrs**

Gears and Crafts of India.

Marketing of aquatic animal products of India- local, state, national and international trade.

Unit-6 **15 Hrs.**

Structure and functioning of fishermen cooperatives.

Fisheries education, training and extension in India.

Legislative provisions for protection and conservation of fisheries in India.

Marine Park and sanctuaries.

REFERENCES

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M.Sc. Part – II

Aquatic Biology

Paper – VIII - Animal Aquaculture

Unit-1 **15 Hrs.**

Introduction to main fishery resources; Inland: freshwater, estuarine and marine, fisheries of important species / group.

History of Aquaculture in the world, general principals aquaculture, its scope and importance.

Unit-2 **15 Hrs.**

Survey of site soil and water requirement, preparation of nursery, rearing and stocking ponds, eradication of weed, control of predatory and weed fishes, liming and manuring control of aquatic insects, procurement of fish seeds, stocking rate, supplementary feeding and harvesting.

Unit-3 **15 Hrs.**

Composite pisci-culture: Principle, techniques and significance, culture of Indian major carps and exotic carps.

Cold water culture of trout and mahaseer; culture methods and management.

Unit-4 **15 Hrs.**

Pen and cage culture of airbreathing and catfishes in stagnant and running waters.

Sea wage fed fish culture, treatment of seawage for fish culture, seawage fed fisheries in India.

Unit-5 **15 Hrs.**

Methods for freshwater prawn culture. Marine water prawn culture.

Fish culture in reservoir, oxbow lakes and wetland.

Modern brackish water culture system: Ecology of brackish water.

Unit-6 **15 Hrs**.

Farm, procurement of stocking material of cultivable species of fish and prawn, mono and mixed culture, management of farm.

Mariculture; Culture of edible and pearl oyster, prawn, lobster clams etc.

REFERENCES

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Aquatic Biology

Paper – VIII Plant Aqua Culture

Unit-1 **15 Hrs**

History of aquaculture in the world, general principles of aquacultre, its scope and importance.

Unit-2 **15 Hrs.**

Seaweed culture: Introduction to Marine plants, general taxonomy, morphology, and reproduction, life cycle and distribution, commercial marine plants, production and utilization- Review of Maine plants in India and abroad, prospects of culture.

Unit-3 **15 Hrs.**

Taxonomy of economically important seaweeds. Distribution and Zonation, succession, morphology, histology reproduction, life cycle, growth physiology.
Culture of freshwater edible plants.

Unit-4 **15 Hrs.**

Factors of affecting growth general chemistry for seaweeds.
Culture and Nutrition of Algae. Economic Importance of Algae.

Unit-5 **15 Hrs.**

Marine Algae physiology. Light relationship, temparature relationship, and response to osmotic changes, responses to PH, and Mineral nutrition in sea water, trace elements, micro nutrition’s.

Unit-6 **15 Hrs.**

Marine angiosperm, Salt Marshes, Spermatophytes.
Practical aspect collection of algae, preservation, plankton collection – counting.
Economics of Marine plants.

REFERENCES

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M.Sc. Part – II

Aquatic Biology

PRACTICALS

PRACTICAL - IV; AQUATIC ECOLOGY AND POLLUTION

- Measurement of aquatic animals by vernier callipers.
- Quadrat study of population.
- Study of flora and fauna in different aquatic habituates.
- Determination of Median Tolerance Limit (TLm 50).
- Histopathological study of various orgains of fishes.
- Identification of aquatic angiosperm and seaweeds, Epiphytic plant and animal forms of aquatic weeds and seaweeds.

PRACTICALS –V- FISH BIOLOGY AND FISHERY SCIENCE

- Identification of commercially important fishes of South Gujarat.
- Dissection of prawn, nervous system of sepia and teleost to study various systems.
- Fishery Bionomics; length weight relationship, fecundity and GSI.
- Biometry of fishes.
  Study of Growth.
- Food and feeding habit of fishes (Buccopharynx.)
- Oxygen consumption of fish with reference to temperature, salinity and weight.
- Osmotic change in estuarine crab.
- Visit to fish farm for demonstration of induce breeding and reservoir fishery.
- Visits to Fisheries Department, in the state and country to learn the preservation and processing of Prawn and Fish, Gears and Crafts etc

PRACTICAL – VI – DESSERTATION

- Dissertation Based on topics out lined in the syllabus related to Aquatic Biology.