VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

M.Sc. Part – I

Aquatic Biology

The Department of Aquatic Biology is started recently in the South Gujarat University. Very few universities in India have this type of department. The M.Sc course lays special emphasis on the development and management aspects of Aquaculture and related fields of Aquatic Biology. It provides for systematic acquisition of knowledge on all-important technical and scientific aspects. The course has been carefully designed to increase job opportunities.

M.Sc. degree in Aquatic Biology includes two academic year course viz., M.Sc. I and II. The curriculum includes total eight theory papers, practicals, field work, excursion and dissertation based on original piece of work carried out by the student. Exposure to fields and visits to various organisations shall help student in gaining practical knowledge. Details of theory papers, practicals, field work and dissertation of curriculum are outlined below:

M, Sc. I

**Theory Papers:**
- Paper –I - Inland Environment
- Paper- II - Physical and Chemical Oceanography
- Paper-III - Planktonology and Microbiology
- Paper-IV - Physiology, Biochemistry and Genetics

**Practicals:**
- Practical - I- Hydrobiology
- Practical - II- Biology of plankton
- Practical –III- Histology, Biochemistry and Genetics.

**Journals**
VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

M.Sc. Part – I

Aquatic Biology

Paper – I Inland Environment

Unit-1 15 Hrs.
Origin and classification of rivers, lakes ponds, streams and estuaries including lagoons and coastal inlets.
Structure and dynamics of rivers, lakes, estuaries, lagoons and coastal inlets

Unit-2 15 Hrs.
Ecology and productivity of fresh water ponds: physical condition of water: depth, temperature, turbidity and light. Chemical condition dissolved oxygen, carbon dioxide, total hardness, dissolved solids, inorganic compounds and organic matters and biological condition; aquatic vegetation and planktons. Association of common Aquatic plants, Soil-types of soil and there role in productivity.

Unit-3 15 Hrs
Reservoirs: Multiple uses of reservoirs, Impacts of reservoir. Classification and distribution of Indian reservoir, transitional phases of reservoirs. Development of fisheries through reservoirs. Recent advances in reservoir management.

Unit-4 15 Hrs.
Brackish water environments in temperate and tropical region of India.
Morphology of estuarine basins, estuarine shores and estuarine lakes.

Unit-5 15 Hrs.
Tides, currents and waves in estuaries. Rainfall and rivers discharge.
Transportation and deposition of silt and sand in rivers reservoirs lakes, and estuaries.

Unit-6 15 Hrs.
Physical limnology; Thermal stratification and Thermal exchange, euphotic zone.
Oxidation-reduction potentials, accessory growth factors and ecology of wetland.
REFERENCES

- Edmondson, W.T/(1976): Freshwater Biology 2nd ED. John Wiley (Ed) and Sons Inc.
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Aquatic Biology

Paper- II - Physical and Chemical Oceanography

Unit-1 15 Hrs.
Introduction to oceanography; History of oceanography, origin of oceans, bottom to pography- Abyss, Canyons, trenches.

Unit- 2 15 Hrs
Physical properties of seawater, density, viscosity, surface tension, light in the sea; temperature distribution, temperature measuring devices, heat budget.
Currents, Waves- formation and properties tides and circulation of water in sea. Tidal effect in coastal areas. Refractive index and conductivity.

Unit-3 15 Hrs.
Sedimentation; origin and physical properties of sediments, classification of marine sediments,(lithogenous,biogeneous,hydrogenous and cosmogeneous).distribution and transport of sediments, determination of age of sediments.

Unit-4 15 Hrs.
History of chemical oceanography and its importance; origin of salts, properties of water (structure of water molecule, difference with freshwater molecule). Chemical composition of seawater.

Unit – 5 15 Hrs.
Ionic composition of seawater; major and minor constituents. Chlorinity and salinity in seawater; Methods for measurement of salinity and chlorinity.
Radio nucleides in sea, their origin and distribution.
BOD, COD, and oxygen and their importance.

Unit-6 15 Hrs.
Inorganic nutrients; Phosphates, Silicate and Nitrate, their cycle N: P ration and its signification, wealth of the sea – minerals.
Corrosion its prevention and protection, fouling and its prevention.
Instruments use in oceanography.
REFERENCES

- Scientific American Resource Library: Reading in the Earth Sciences Vol.I to III.
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M.Sc. Part – I
Aquatic Biology

Paper – III Planktonology and Microbiology

Unit-1 15 Hrs.
Classifications of plankton based on size, mode of life, life cycle and feeding habits.
Luminous plankton, biology of important plankton.
Phyton and Zooplankton- Method of collection of plankton and estimation of primary, secondary and tertiary productivity, factors affecting productivity, regional differences and seasonal variations.

Unit-2 15 Hrs.
Adaptation of plankton –structural (weight increases of surface area, floatation) and physiological (specific gravity, water content, fat content, defensive vacuoles) mechanisms.
Phytoplankton and Zooplankton inter relations.
Red tide phenomenon- its causes and effects.

Unit-3 15 Hrs.
A general account of marine fungi, Seaweeds and seagrasses.
Periphyton: Importance and significance, Different types in lotic and lentic factors influencing periphyton. Role of periphyton in aquatic system.

Unit-4 15 Hrs.
Modern concept of prokaryotic and eukaryotic organisms.
Microbial biotechnology –Introduction of Halophiles, Metranogems. Thermophiles, and their significances. SCP. Microbial nutrition and growth structure of bacteria and viruses.

Unit-5 15 Hrs.
Micro organisms in river, estuarine, sea and sewage water.
Decomposition of organic matter, recycling of nutrients and their significance in pond ecology.
Unit-6

15 Hrs.

Microbial spoilage of fish

Microbial quality control aspects of processed fishery products.

Aquatic bacteriology –Pathogens, distribution preventiona and control.

REFERENCES

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M.Sc. Part – I

Aquatic Biology

Paper – IV   Physiology, Biochemistry and Genetics

Unit-1          15 Hrs.
Nutrition; Nutritional requirements of Aquatic organisms, measurement of energy, energy foods (Carbohydrates, proteins, fats), non-energy foods (Minerals Vitamins, water).

Digestion: Feeding and digestion mechanisms.

Unit-2          20 Hrs.
Respiration: Structure of gills, respirations mechanisms in aquatic organisms, Accessary respiration organs in fishes.
Circulatory system: Anatomy of heart, electric and mechanical properties, blood volume, and blood distributions.
Properties of fish haemoglobins. Structural properties, oxygen transports.

Unit-3          10 Hrs.
Excretion; Structure and function of the kidney, nitrogenous end products and pattern of their excretion, water and electrolyte regulation in marine, freshwater and estuarine fishes.
Osmatic and ionic regulation in aquatic animals.

Unit-4          15 Hrs.
Reproduction; The gonads, types of reproduction endocrine regulation of reproduction.
Development: Eggs and larvae, fecundity and egg size, events in development (fertilization, incubation, hatching, larva, metamorphosis), metabolism and growth (rate of development, yolk utilization).
Unit-5 15 Hrs.

Biochemical composition of fish.

Intermediary metabolism in fish; Glucose metabolism, lipid, metabolism and protein metabolism.

Importance of lipids in fish rancidity, mechanism of auto oxidation, use of anti-oxidants in controlling rancidity.

Unit-6 15 Hrs.

Chromosomes manipulation and sex control in fish.

Historical perspectives of fish chromosomes and evolutionary significance, Fish biotechnology, fish as a cytogenetic model various methods of studying fish chromosomes.

REFERENCES

- Cherfas, B.I.(1978) Genetics, Selection and hybridzation of fish,Jersulam,Israel Prog.for scientific Translations ,JPST Cal,No.600 424.
• Halver, J.E. (1972): Fish nutrition, Academic Press London,
• Vernberg, W.B. and Vernberg, F.J. (1972): Environmental physiology of Marine animals. Springer Verlag-Stuttgart.
VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

M.Sc. Part – I

Aquatic Biology

PRACTICALS –I: HYDROBIOLOGY


PRACTICALS –II; BIOLOGY OF PLANKTON

Identification of phyto and Zooplankton, Quantitative estimation of plankton, Determination of primary and Secondary productivity, Study of freshwater/ marine algae, fungi and seagrasses, Identification, of microbes, Isolation and maintenance of pure culture staining- bacteria.

PRACTICALS – III; HISTOLOGY, BIOCHEMISTRY AND GENETICS