Veer Narmad South Gujarat University

M.Sc. I-Aquatic Biology

Teaching and Examination scheme for Semester – I

Theory Paper /Practical	Teaching schedule Hrs/ week	Exam Schedule			Total marks Theory/Practical
		Duration (hrs)	Internal marks	Theory / Practical (Uni)	
Theory papers :					
AQB:101 : Aquatic resources and their management	3	3	30	70	100
AQB:102 : Instrumentation and Research Methodology	3	3	30	70	100
AQB:103 : Aquatic Microbiology	3	3	30	70	100
AQB:104 : Planktonology	3	3	30	70	100
Practicals :					
AQB:105: Water analysis and Instrumentation	4	5	30	70	100
AQB:106: Study of Plankton and Microbiology	4	5	30	70	100
		Total	180	420	600

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Syllabus –Semester-I

AQB- 101 : Aquatic Resources and their Management

Unit – I **Hrs 10**

Origin, classification and distribution of rivers, lakes and ponds, Major river system of India, Thermal stratification & thermal exchange in lakes.
Classification and distribution of reservoir, transitional phases of reservoir. Recent advances in reservoir management

Unit – II **Hrs 7**

Classification, morphology and distribution of estuaries.
Lagoons and Coastal inlets

Unit-III **Hrs 10**

Origin, classification and distribution of ocean, seas bottom topography- Abyss, canyons, trenches, main physical (density, viscosity, surface tension, temperature and chemical (major and minor constituents) properties of sea water.
Tides, currents and waves, their effects in estuaries and coastal area.

Unit –IV **Hrs 13**

Important fin and shellfish resourses of Inland (major carps, Catfish, live fishes & prawn) brackish water (Hilsa, mullet, etroplus etc.) marine (demersal and pelagic), ornamental and sport fishes.
Seaweed, sea grasses and mangroves.

References:

- Bames R.S.K., (1999), Introduction to Marine Ecology, Blackwell Science.

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- Lecren, E.D. and Lowe-Mac Connel, R.H.(1980): The functioning of freshwater ecosystem. Cambridge University Press.

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- Perkins, E.J. (1980): The Biology of Estuaries and coastal water. Academic Press, London.

- Schwebel, J.: Methods of Hydrobiology. Pergamon Press, New York.

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Syllabus –Semester-I

AQB-102: Instrumentation and Research Methodology

Unit-I **Hrs 8**

Microscopy

Principle and construction of Microscopes
Types of microscopes: Simple, compound, Phase contrast, fluorescence, interference microscopes
Transmission and scanning electron microscopy

Unit-II **Hrs 10**

Photometry

Colorimeter laws of photometry
Types of Spectrophotometry
Single bean & double beam
Principle and application of infrared spectroscopy
Principle and application of NMR and Mass spectrometry
Principle and application of turbidometer

Unit-III **Hrs 7**

Centrifugation and density gradients

Types a centrifuges
Separation method
Differential centrifugation
Density gradient centrifugation

Unit-IV **Hrs 15**

(A) Chromatography & Electrophoretic techniques:

Principle of chromatography
Types of chromatography
Protein electrophoresis: SDS, PAGE, Western blotting

(B) Water quality analysers:

Turbidometer
Conductivity meter
pH meter
Salino meter
Do meter

References:

- Brown, S.B (1980) An introduction to spectroscopy for Biochemists, Academic press, London, New York.

- E.D.P. Robertis ,and E.M.F. Robertis (2001) cell and Molecular Biology, Lippincott Williams & Wilkins, London

- Hawcroft, D.M. (1996) Electrophoresis The Basics IRL press, Oxford.

- Jenning, W.G.(1993). Analytical Gas chromatography. Academic Press. New York.

- Skoogs, H, P.and Nieman, M (2006) Principle of Instrumental analysis. Thomson Inc Ltd.,

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Syllabus –Semester-I

AQB- 103 : Aquatic Microbiology

Unit –I **Hrs 10**

Microorganisms associated with aquatic ecosystem

General structure and characters of bacteria, fungi, algae and virus, General classification of microbes of water bodies, Microorganisms of aquatic ecosystem (fresh water, brackish and Marine water).

Unit-II **Hrs 10**

Methods of studying microorganisms

Quantitative estimation of microorganisms in aquatic system, Detection, isolation, cultivation and characterization of microorganisms, Study of Biofilm, Nutrition & growth of microorganisms,Physico-Chemical parameters affecting microbial growth.

Unit-III **Hrs 10**

Decomposition of organic matter in aquatic ecosystem

Carbon, nitrogen, Phosphorus and Sulphur cycles and their significance

Unit-IV **Hrs 10**

Quality control of fish

Microbial quality control of processed fishery products, Microbial spoilage of fish, Fish pathogens; their prevention and control

References:

- Frazier, W.C and Westnoff,D.C.(2008): Food microbiology,Tala McGraw hill publishing campany,New Delhi

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- Whitman, K.A. (2004): Finfish & shellfish bacteriology, CBS publishers, New Delhi.

- Willey,M.J.,Sherwood,L.M. and Woowerton,C.J.(2008) : Prescott, Harley and Klein’s microbiology, McGraw hill campany,New Delhi

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Syllabus –Semester-I

AQB- 104 : Planktonology

Unit-I **Hrs 10**

Introduction of plankton;
General classification, collection of plankton general account of instruments and nets employed, Methods of fixation and preservation of plankton,
Regional distribution of plankton and seasonal changes in plankton.

Unit-II **Hrs 10**

Adaptation of plankton – structural (weight, increases of surface area, floatation) and physiological (specific gravity, water content, fat content, defensive vacuoles) mechanisms

Interrelation of phytoplankton and zooplankton

Red tide phenomenon- its causes and effects

Luminous plankton

Unit-III **Hrs 10**

Effects of plankton production in aquatic environment.

Algae culture as a source of protein

Periphyton: Importance and significance, Role of Periphyton in aquatic environment.

Unit-IV **Hrs 10**

Method of estimation of Primary productivity, secondary and tertiary productivity, factors affecting productivity

Role of plankton in food web structure and nutrient cycle.

References:

- Edmondson, W.T.(1976) : freshwater Biology.2nd Ed.John Wiley (Ed) and sons Inc.
- Hutchinsn, G.E.(1976): A treatise on limnology.Vol.I & II John Wiley & Sons.
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- Peter McRoy, C.and G.Helferich, (1977): Sea grass Ecosystems. A scientific perspective. Marcel Dekker Inc. New York
- Sumich,J. l. (1999): Introduction to the biology of marine life 7th Edition. The McGraw hill Companies Inc.
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Syllabus –Semester-I (Practical)

AQB- 105 : Water analysis and Instrumentation

- Tritrimetic estimation of dissolved oxygen, carbon dioxide, alkalinity (PA & TA), hardness (total Ca & Mg) chloride

- Colorimetric edstimatimation of inorganic phosphate nitrate, ammonia and silicate

- Light penetration and TDS estimation

- Instrumentation
  Microscope, turbidometer, pH meter, colorimeter

- Demonstration : UV Spectrophotometer, HPTLC,PCR

- Field and Institutes visits

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Syllabus –Semester-I (Practical)

AQB- 106 : Study of plankton and Microbiology

- Collection, fixation and preservation of plankton
- Quantitative estimation of plankton (counting method) & chlorophyll
- Identification of Phytoplankton
- Identification of Zooplankton
- Isolation and identification of bacteria and fungi
- Assessment of microbiological quality of water bodies using SCS and NPN techniques
- Assessment of microbiological quality of fish products
- Estimation of *Staptococus ficalis* by membrane filter techniques
- Field and Institutes visits