

POST GRADUATE DIPLOMA IN "PEARL- CULTURE"

INTRODUCTION

The syllabus for one year diploma in “Pearl Culture” is aim that generation of self employment through skill development. The main objective of framing this new syllabus is to give the students a holistic understanding of the subject giving substantial weight age to both the core content and techniques used in pearl culture. Adequate emphasis has been given on new techniques and understanding of the techniques. The syllabus has also been framed in such a way that the basic skills developed among the students will help in securing a job. Project Work along with practical the practical will be helpful in generating in practical aspect in this field.

The objective of this course is to cultivate among the students the innovative and new techniques in pearl culture for upbringing the vast potential of employment lying in this sector of Aquaculture.

The focus of this course is:

- 1) To understand the basic concept of pearl culture.
- 2) To provide the elementary knowledge regarding the Anatomical and Physiological aspects of fresh water oysters.
- 3) To familiarize with the various types of implantation methods and pearl culture surgery techniques.
- 4) Production of pearl and its marketing for economic gain.

Eligibility: Graduate from any recognized university in Biological or Agricultural sciences.

Course Duration: 01 year (02 semester)

Course Fees: Rs. 10000/-

Course Structure: The course have 09 papers (04 papers in each semester) and a practical. Each paper is of 04 credits and the total credit is of 36. The details of paper are as follows:-

Sr. No	Paper	Paper's Name	Credits
First Semester			
1.	First	Introduction to pearl culture	04
2.	Second	Soil and Water Management in pond	04
3.	Third	Pond Management	04
4.	Fourth	Hydrobiology and Limnology	04
5.	Fifth	Oyster morphology and anatomy	04
6.	Sixth	Implantation techniques	04
7.	Seventh	Post operation care and Marketing	04
8.	Eighth	Culture of micro organism	04
9.	Ninth	Practical and Project Work	02+02=04
10	Total		36

Each Paper and Practical shall contain 100 marks with the following break up:

(i) Theory - 80 Marks

(ii) Internal Assessment- 20 Marks

(iii) Practical and Project Work- 100 Marks

First Semester

First Paper

Introduction to pearl culture

Objective of the course in to help the student to acquire Knowledge regarding the importance and significance of pearl culture.

UNIT I:

Introduction to pearl culture. Global and national status of pearl culture, History of pearl culture ,Significance of pearl culture.

Unit II:

Water quality management in culture and hatchery practices, waste discharge standards. Role of micro-organisms in aquatic pond management.

Unit III:

Quantity and quality assessment, culture requirement, suitability of soil from stability and productivity point of view.

Unit IV:

Analysis of Turbidity of water, Dissolve oxygen in water Hardness of Soil quality parameters, pH of soil.

Assignments:

Soil sampling, permeability and hydraulic conductivity, pond filling, analysis of soil pH and texture; measurements of water temperature, pH, conductivity, salinity, transparency, turbidity and solids.

Reference Books:

- Adhikari S & Chatterjee DK. 2008. *Management of Tropical Freshwater Ponds*. Daya Publ.
- APHA, AWWA, WPCF. 1998. *Standard Methods for the Examination of Water and Wastewater*, 20th Ed.
- Boyd, C. E. and Tucker, C. S. 1992. *Water Quality and Pond Soil Analysis for Aquaculture*, Alabama Agricultural Experimental Station, Auburn University.
- Boyd CE. 1979. *Water Quality in Warm Water Fish Ponds*. Auburn University.
- ICAR. 2006. *Handbook of Fisheries and Aquaculture*. ICAR.
- Parsons TR, Maita Y &Lalli CM. 1984. *A Manual of Chemical and Biological Methods for Seawater Analysis*. Pergamon Press.

First semester
Paper second
Soil and Water Management in pond

Objective: To acquire Knowledge on effective soil and water quality management practices.

Unit I

Soil and water interaction: Physical and chemical properties of soil and water, productivity vs. nutrient quality and quantity of soil and water.

Unit II

Aquatic micro organisms and their role in carbon, nitrogen, phosphorus and sulphur cycles.

Unit III

Soil and water quality standards, organic and inorganic fertilizers, fertilizer grade, source, rate and frequency of application, bio fertilizers,

Unit IV

pH of water, Depth of water, Water temperature Medication of water to avoid infection, Light penetration in water.

Reference books:

- Environmental Management for Aquaculture.
- FAO. 2007. Manual on Freshwater Prawn Farming. Midlen & Redding TA. 1998.
- Kluwer. New MB. 2000. Freshwater Prawn Farming. CRC Publ.
- Pillay TVR. 1990. Aquaculture: Principles and Practices. Fishing News Books, Cambridge University Press, Cambridge.
- Welcomme RL. 2001. Inland Fisheries: Ecology and Management. Fishing News

First Semester
Third Paper
Pond Management

Objective: Is to impart management of pond through micro-organism soil and water quality maintenance.

UNIT I:

Management of pH of water, Depth of water, Water temperature, Medication of water to avoid infection.

UNIT II:

Light penetration in water. Turbidity of water. Soil quality parameters. pH of soil. Dissolve oxygen in water Hardness of water. Waste water treatment practices.

UNIT III:

Treated sewage for pond fertilization, ecological changes taking place after fertilization, primary and tertiary production, utilization of bio active compounds by micro organisms.

UNIT IV:

Soil and water quality management: Cat clay/pyrite soil, seepage and its control, zero water exchange system, water filtration devices, aeration, chlorination, ozonization and radiation.

Assignment:

Equipments used in soil and water analysis. Analysis of dissolved oxygen, free carbon dioxide, alkalinity, hardness, phosphorus and nitrogen. Estimation of chlorophyll and primary productivity. Application of inorganic fertilizers and organic manures. Bioassay tests, treatment plant; Design and fabrication of different filters.

Reference Books:

- ICAR. 2006. Hand Book of Fisheries and Aquaculture. ICAR.
- Jhingran VG & Pullin RSV. 1985. Hatchery Manual for the Common, Chinese and Indian Major Carps. ICLARM, Philippines.
- Midlen & Redding TA. 1998. Environmental Management for Aquaculture. Chapman & Hall.
- Landau M. 1992. Introduction to Aquaculture. John Wiley & Sons.
- Pillay TVR & Kutty MN. 2005. Aquaculture- Principles and Practices. Blackwell.

First Semester
Fourth Paper
Hydrobiology and Limnology

Objective: Is to give a comprehensive knowledge regarding the knowledge of physical, chemical and biological properties of Freshwater Ecosystems.

Unit I

Limnology- introduction, Tropical and temperate water bodies, lentic and lotic systems, Eutrophication and aquatic pollution, its management through eco technologies.

Unit II

Food webs and trophic levels in relation to ecosystem characteristics, dynamics of plankton and benthos in lotic and lentic ecosystems, macrophytes and insects.

Unit III

Nutrient cycles, status and their budgeting, role of primary productivity in aquatic eco system.

Unit IV

Physical, chemical and thermal stratification, energy flow in aquatic ecosystems and models for pond/lake dynamics.

Assignments:

Water and sediment analysis for their physico-chemical and biological properties, qualitative and quantitative estimation of plankton, periphyton and benthos, identification of aquatic weeds and insects, estimation of aquatic primary productivity and tertiary productivity, estimation of biochemical and chemical oxygen demand.

Reference Books:

- Limnology by Welch.
- Limnological Methods by Welch.
- Limnology by Wetzel.
- Freshwater Biology by Ward & Whipple.
- Freshwater Biology by Needham and Needham.
- A Treatise on limnology by Hutchinson

First Semester

Fifth Paper

Oyster morphology and anatomy

Objective: of this unit is to impart a comprehensive knowledge regarding morphology, anatomy, physiology, food and feeding behaviour, related diseases and its control measures of the mother Pearl Oyster.

UNIT I : Oyster in animal kingdom. Types of oysters Fresh water oysters.

Mantle cavity and gonadal identification, Morphology and heir taxonomic importance.. Internal anatomy: Alimentary canal and associated structure,

Unit II: Physiology. Fish Nutrition: Food and feeding habit of Oyster, : Respiratory and accessory respiratory organs, Heart and circulatory system, Reproductive system.

UNIT III: Formulation and preparation of artificial feeds for larval rearing, microparticulate diets,

Unit IV. Nutritional requirements of oyster micro organism culture for pond managemen and mass culture techniquesof important microalgae, rotifers, artemia,infusoria, cladocerans, copepods, oligochaetes, nematode and insects larvae.

Reference Books:

- Ganguly B.A.,Sinha A.K., Adhikari S., Goswami B.C.B.(2018). Biology of Animals(Vol I& II). NCBA 2. Khanna S.S.(214).
- Introduction to Fishes. Silver Line 3. Srivastava C.B.L.(2014). Fishery Science and Indian Fisheries.

Second Semester

Sixth Paper

Implantation techniques

Objective: To give a comprehensive knowledge regarding various kinds of implantations in Oyster and also insertion of beads for the formation of Pearl.

UNIT I:

Pearl oyster Surgery, Selection of Oyster, Half round Pearl culture.

UNIT II:

Nucleus implantation, Surgery and precautions. Beads insertion.

UNIT III:

Graft tissue preparation , Surgery and precautions Insertion of beads.

UNIT IV:

Spherical Pearl implantation and Surgical Operation. Surgery and precautions. Beads in sertion in Oyster.

Assignmet: Introduction to Oyster surgery, Types of surgical instruments, Application of Surgical instruments.

Reference books:

- Haws Maria (March2002) The basics of pearl farming : a Layman's manual: (U.S.A). CTSA publications.
- Alexander E .Farn (march1986) pearls :(U.S.A.).Butterworth Heinemann publications.
- Le Jia Li(2014)New technologies to promote freshwater pearl culture(China) Ocean Press publications.

Second Semester
Seventh Paper
Post operative care and marketing

Objective : To give a comprehensive knowledge regarding post- operative caring and harvesting management, processing, sorting and marketing of the Pearl produced.

UNIT 1:

Post operative care. Precautionary measures of Pearl Culture. Quality improvement.

UNIT II:

Pearl culture period. Caring of pearl oyster. Harvesting of Pearl.

UNIT III:

Pearl culture establishment Pearl processing. Management and administration.

UNIT IV:

Sorting of Pearl. Marketing and economics concerned with Pearl Culture. Generation of funds.

Assignment: Raft formation..Longlines and Fencelines Trestles culture system

Designed Pearl formation Tools and material. Techniques and Precautions.

Biofouling. Boring organism related to pearl culture . Predators and its control.

Reference Books:

- Beveridge, M.C.M. (1987) Cage aquaculture. Fishing News.
- Davy E.B. and M.Graham Eds (1982) Bivalve culture in Asia and Pacific. IDRC Asia Regional Office Singapore.
- Bardach, J.E.W (1972) Aquaculture farming and husbandry of freshwater and
Sorting of Pearl. Marketing and economics concerned with Pearl Culture.
Generation marine organisms

Second Semester
Eight Paper
Culture Of micro organism

Objective :- Is to give a comprehensive knowledge regarding types of microorganism its culture and management for a healthy environment the pearl culturing.

UNIT I:

Introduction to Micro organism. Types of Micro organism. Significance of Micro organism in Pearl culture.

UNIT II:

Types of Phytoplanktons. Types of Zooplanktons. Benthos in culture pond.

UNIT III:

Culture of phytoplankton. Culture of Zooplankton. Culture of Benthos

UNIT IV:

Maintenance of micro organism . Use of chemicals for healthy culture medium
Eradication of harmful microbes.

Assignment:

Culture of Micro organism phytoplankton Zooplankton Benthos.

Reference book:

- Austin, B. and Austin, D.A. (1987) Bacterial Fish Pathogens(Diseases in Farm and Wild). Ellis Horwood1. Rath R. K. 2000. Freshwater Aquaculture. Scientific Publ.
- Lionel E. Mawdesley-Thomas (1972) Diseases of Fish. Zoological Society of London.
- Ronald J. Roberts (1978) Fish Pathology. Cassell Ltd., London.
- Valerie Inglis, Ronald J. Roberts and Niall R. Bromage (1993) Bacterial Diseases of Fish. Balckwell Scientific Publication, London

Second Semester

Ninth Paper

Practical and The Project work

Objective : To give a comprehensive knowledge regarding the practically employing the various techniques mentioned in the diploma course of Pearl Culture and also The project Work which aims to achieve a desired outcome of culture Pearl through employing a specific amount of resources and techniques related to it.

Framework for Project work

Introduction

Relevance of study (Topic)

Review of Literature

Methodology

Discussion

Conclusion

Reference

Objective: To give a comprehensive knowledge regarding practical application application pearl culture with employing Lab work.

- Technique for Measurement of soil and water;
- Culture technique of microorganism for pond maintenance. Surgical techniques;
- Graft tissue preparation; Implantation techniques; Post operation care;
- Designed pearl culture techniques; Bleaching; collection of pearls; Cleaning of pearls;
- Sorting of pearls; Marketing of pearl. ions.

Reference Books:

- David Dobilet(1995)Pearl farming(Australia)Nat Geographic Mag publication
- Yuan Cha Da (2014)Environmental effects Pearl farming (China)Jiangxi People publishing house.

