

# 1. INTRODUCTION

Aquaculture has acquired a special significance not only because of its contribution to food resources but also for contribution to quality of our diet. India is getting good amount of foreign exchange by exporting the aqua products by adopting the scientific management techniques.

Aquaculture is a fast growing subject in AndhraPradesh, where adequate water facilities, infrastructure facilities and enterpreunership are abundantly available. This as resulted in the production of large quantities of fresh water carps, scampi and brackish water shrimps. Recently scampi culture and pearl culture are becoming popular. However, enough manpower at the field level is badly needed. Hence there is a need to design a special course covering the latest advancements along with the traditional methods in the field of fisheries and aquaculture for the 10 + 2 students. This course is also useful for self-employment for unemployed youth.

This is a 2 years course, consists of three theory and three practical papers per year. Enough provision is made for both the theory and practical aspects. Equal importance has been given for the theory and practical in all the papers.

## **2. OBJECTIVES OF THE COURSE**

- To develop manpower with scientific knowledge and skills for sustainable fish production.
- To develop capabilities for gain full employment.
- To provide the elements and principles of fish production.
- To develop all necessary skills in practical aquatic animal production.
- To develop abilities for organization of former meets, field days, seminars and such other extension facilities.
- To train students for developing entrepreneurship in seed production and agro input supply.
- To provide knowledge about the functioning of the co-operative societies.
- To provide knowledge about the credit facilities and supporting schemes.
- To acquaint with farm accounting record maintenance.

### **3. SKILLS TO BE PROVIDED TO THE STUDENTS**

- Identification of field problems- nature and extent.
- Identification of aquatic animals.
- Identification and quantification of various fisheries inputs.
- Methodology of fisheries input use.
- Safety measures in input use.
- Calibration of farm machinery.
- Assessment of labor requirement for farm operation.
- Lay out of field experiments.
- Identification of diseases.
- Calculation of requirement of manure and feed.
- Weighing the samples and chemicals, preparation of samples, laboratory reagents, handling and operation of lab equipment.
- Managerial skills, ability to convince, exposure to different communication media.

## 4. JOB OPPORTUNITIES

### ***[a]. Wage employment:***

- Field Assistant/ Farm Assistant/ Field Man/ Supervisor/ Sub-inspector including equivalent position in fish and shrimp farms.
- Field Investigator/Field demonstrator/ Village coordinator.
- Farm Manager.
- Laboratory Assistant in aqua farms, hatcheries and processing plants.
- Field marketing Assistant.
- Seed production Assistant.
- Farm storage Assistant.
- Jobs in fishery co-operatives.
- Opportunities in State Fishery Department.

### ***[b]. Self Employment:***

- Fishery input Supplier.
- Seed producer.
- Fish producer.

## 5. SCHEME OF INSTRUCTION & EXAMINATION

### Annual Scheme of Instruction and Examination for Vocational Courses 1st & 2nd Year

<b>Part - A</b>	Theory		Practicals		Total	
	Periods	Marks	Periods	Marks	Periods	Marks
1. English	185	75	-	-	185	75
2. G.F.C.	185	75	-	-	185	75
<b>Part - B</b>						
3. Vocational Subjects						
Paper - I	160	50	160	50	320	100
Paper - II	160	50	160	50	320	100
Paper - III	160	50	160	50	320	100
<b>Part - C</b>						
4. On the Job Training -		-	210	50	210	50
Total	840	300	690	200	1540	500

### Scheme of Instruction per week for Vocational Courses

<b>Part - A</b>	Theory	Practicals	Total
1. Communication Skills/English	6	-	6
2. G.F.C.	4	2	6
<b>Part - B</b>			
3. Vocational subjects			
Paper - I	5	5	10
Paper - II	5	5	10
Paper - III	5	5	10

## New Scheme Proposed Calculation of working periods

Number of working days per annum	=	220 days
Number of periods per annum $220 \times 7$	=	1540 periods
Periods allotted for OJT [30 days $30 \times 7$ ]	=	210 periods
Periods allotted to Communication Skills/ English	=	185 periods
Periods allotted to GFC [125 Theory + 60 Practicals]	=	185 periods
Periods allotted to Vocational subjects		
Paper I [Theory 160 + Practicals 160]	=	320 periods
Paper II [Theory 160 + Practicals 160]	=	320 periods
Paper III [Theory 160 + Practicals 160]	=	320 periods
 Total		 1540 periods

### Periods allotted per week

1.	Communication skills/English	=	6 periods
2.	G.F.C. [Theory 4 = Practicals]	=	6 periods
3.	Vocational Subjects		
	Paper I [Theory 5 + Practicals 5]	=	10 periods
	Paper II [Theory 5 + Practicals 5]	=	10 periods
	Paper III [Theory 5 + Practicals 5]	=	10 periods
	 Total Periods per week	 =	 42 periods

**6. SYLLABUS**  
**INTERMEDIATE VOCATIONAL COURSE**  
**I<sup>st</sup> YEAR**  
**FISH BIOLOGY AND ECOLOGY**  
**THEORY PAPER - I**

1. Introduction to fish biology and Ecology - Introduction to fish biology, General Characters of Fish and prawn, Classification of fishes and prawns, Introduction to Ecology — (8 Periods)
2. Morphology of fish and prawn - External parts and appendages Shape, Fin — (6 Periods)
3. Growth in fish and prawn — (4 Periods)
4. Skeleton and Integumentary system in fishes - scales, Skin, colouration — (8 Periods)
5. Digestive System of fish and prawn - Structure of alimentary canal - Digestive glands - food and feeding habits, Physiology of Digestion — (10 Periods)
6. Respiratory System of Fish and Prawn - Structure of gills - Mechanism of respiration - accessory respiratory organs — (10 Periods)
7. Circulatory System of Fish and Prawn - Blood, Heart, Arterial and venous systems — (10 Periods)
8. Nervous system of fish and prawn — (8 Periods)
9. Excretion and Osmoregulation - Fish Kidney; Physiology of excretion, Osmoregulation in fresh water and marine fishes — (10 Periods)
10. Reproductive system of fish and prawn - Reproductive organs, Development, life cycle, Fecundity of fish — (10 Periods)
11. Endocrine system of fish and prawn — (8 Periods)
12. Specialized organs in fish - Latero - acoustic system; olfactory and Electric organ — (6 Periods)

13. Ecosystem - Introduction, Types - Pond, Reservoir, Estuarine and Marine; Abiotic and biotic factors; Energy flow; food chain and web; Trophic levels and Ecological pyramids, productivity; Limnology - Introduction, Phytoplankton, Zooplankton, Nekton; Periphyton and Benthos.
14. Soil - Types - Abiotic and Biotic factors — (6 Periods)
15. Biogeochemical Cycles - Gaseous and sedimentary cycles —(6 Periods)
16. Population dynamics - Definition of fish population; Definition of fish population density and dynamics; significance of abundance; Estimation of population; population dynamics; Fish; Mortality — (12 Periods)
17. Aquatic pollution - Introduction; Water pollution; causes of water pollution; Types of water pollution and their related effects on fish fauna Common effects of aquatic pollution on fish fauna and flora. — ( 12 Periods)

## Practicals

1. Identification of fish and prawn (Museum Study)  
Scoliodon - Torpedo - Exocoetia - Hippocampus - Trygon - Amia - Anabas - Wallago - Tilapia - Stromateus - Chanos, Etroplus, Amblypharyngodon - Omok - Notopterus, Gobius - Puntius, Anguilla, Mystus, Mastacemba - Sardinella - Trichurus - Belone - Pristigaster - Zygenes - Sphyrna - Glyptocheilus - Atherina - Lates - Mugil - Paleomon - Penaeus monodon - Peneus indicus - Metapenaeus dohrnii - Macrobrachium oliveri - Macrobrachium rosenbergii — (40 Periods)
2. Identification of scales and fins - cycloid - ctenoid, - placoid - Gonoid, Pectoral - Pelvic - dorsal - anal and caudal fin and their modifications. — (30 Periods)
3. Dissection of fish and prawn - Digestive system - Nervous system - Swim bladder - Urinogenital system - Pituitary gland - Weberian ossicle — (8 Periods)
4. Identification of appendages of prawn — (10 Periods)
5. Identification of food materials in gut of fish and prawn — (10 Periods)
6. Estimation of fecundity in fish — (6 Periods)
7. Estimation of length - weight relation in fish — (10 Periods)
8. Collection of soil and water samples — (6 Periods)
9. Physico - Chemical parameters of water - conductivity - pH - Alkalinity - Salinity - Dissolved Oxygen - Free carbon dioxide - Total Hardness - Nitrates - Phosphates : Identification of Plankton — (30 Periods)
10. Study of soil types and estimation of soil pH - alkalinity - Nitrates, Phosphates — (10 Periods)
11. Visit to local fish markets — (7 Periods)
12. Visit to fish landing centres for identification — (7 Periods)

**1<sup>st</sup> YEAR**  
**THEORY PAPER II**  
**CAPTURE FISHERIES AND**  
**POST-HARVEST TECHNOLOGY**

1. Introduction for Capture fisheries and Post harvest technology — (6 Periods)
2. Classification of Fisheries — (6 Periods)
3. Capture fishery resources in India and A.P. — (6 Periods)
4. Riverine Fisheries - Fisheries of Ganga, Godavari, Krishna, Kaveri, Narmada and Tapi — (12 Periods)
5. Cold water and sport fisheries — (4 Periods)
6. Reservoir Fisheries - Reservoir ecology, Reservoirs in India and AP - Classification of Reservoirs - Management of Reservoir Fisheries — (14 Periods)
7. Over fishing, effect of dams and barrages on fisheries and fish migration — (10 Periods)
8. Fishing craft - and gear - Mechanised and non-mechanised crafts, craft and gear material, accessories, types of gear, fabrication of gear and gear preservation — (20 Periods)
9. Fishing Methods - Electric fishing - Line fishing, Trawling, Purse seining - Gill netting - (8 Periods)
10. Fish Processing and preservation and packaging, reasons for spoilage of fish; methods of fish preservation — (20 Periods)
11. By products of fishes and value addition for fishery Products — (20 Periods)
12. Marketing - Types of markets - Marketing intermediaries - flow channels and management of markets — (10 Periods)
13. Fishery Economics - Principles - Role of fisheries sector in India's Economic, development, potentials; Socio-economic status of the fishermen folk and co-operatives — (10 Periods)
14. Government Policies and programmes, employment generation in fisheries sector — (12 Periods)
15. Export and Quality Control — (10 Periods)

## **Practicals**

1. Identification of nets (Charts, Models) — (20 Periods)
2. Identification of Crafts (Charts, Models) — (13 Periods)
3. Fabrication of Nets — (20 Periods)
4. Preservation of specimens of local fishes — (21 Periods)
5. Field trips to — (21 Periods)
  - a) Kakinada (Boat Building yard and SIFT)
  - b) Kolleru Lake
  - c) Local reservoirs
6. Identification of By-products — (20 Periods)
7. Demonstration of marketing channels through charts — (20 Periods)
8. Demonstration of Preservation techniques through charts — (20 Periods)
9. Demonstration of Processing techniques through charts — (10 Periods)
10. Demonstration of packaging through charts — (10 Periods)
11. Field visits — (35 Periods)
  - a) Visit for processing units
  - b) Visit for preservation units
  - c) Visit for packaging units
  - d) Visit for export houses
  - e) Visit for value added industries

**1<sup>st</sup> YEAR**  
**THEORY PAPER III**  
**PRINCIPLES OF AQUACULTURE**

1. Introduction of aquaculture - History, Purpose and need for aquaculture - Present status of Fisheries in India and A.P. — (10 Periods)
2. Types of aquaculture - Freshwater, - Brackish water, and Mariculture — (6 Periods)
3. Culture System — (10 Periods)
  - a) Open systems (Reservoir and large tanks)
  - b) Semiclosed systems (Cages, Pens)
  - c) Closed Systems (Ponds)
  - d) Recirculatory systems
4. Cultivable fauna in aquaculture - Criteria for selection of fish, cultivable fishes, prawns, Lobsters, Crabs, Molluscs, Frog — (20 Periods)
5. Cultivable flora in Aquaculture - Seaweeds - Azolla, Spirulina — (8 Periods)
6. Inputs in Aquaculture — (30 Periods)
  - a) Seed
  - b) Feed - Nutritional requirements, Supplementary feeds
  - c) Manures - Organic and inorganic manures and their application
  - d) Aerators - Types and their mechanism
  - e) Pumps
  - f) Filters - Mechanical and biological filters
  - g) Lime - Types and its application in aquaculture
7. Fish Biotechnology — (10 Periods)

Introduction, Cryopreservation of gametes, Transgenic fish; Hybridization

8. Periphyton based aquaculture — (10 Periods)  
Introduction, History, Periphyton production on added substrates  
Periphyton communities, Effect of periphyton on growth and  
production of fish and prawn.
9. Aquarium — (30 Periods)  
Types of aquarium, Fabrication, Accessories, Ornamental fishes  
and plants - Maintenance of aquarium and ornamental fish diseases  
and their control.
10. Fisheries Institutions and Extension services — (10 Periods)
11. Economic importance of aquaculture - Economics of model fish,  
shrimp and scampi farming — (12 Periods)
12. Institutional Credit and Insurance to aquaculture sector — (4  
Periods)

## **Practicals**

1. Identification of culturable fishes — (20 Periods)  
Major carps - Minor carps - Exotic Carps
2. Identification of culturable prawns — (10 Periods)
3. Identification of culturable Crabs - *Scylla serrata* - *tranquibarica* — (10 Periods)
4. Identification of Lobsters — (20 Periods)
5. Identification of culturable molluscs - *Unio* - *Mytilus* - *Pinctada* - *Sepia*, *Loligo* — (10 Periods)
6. Identification of Sea weeds — (6 Periods)
7. Identification of Aquatic weeds and Algae — (20 Periods)  
*Pistia* - *Eichornia* - *Typha* - *Ipomea* - *Najas* - *Nymphaea* - *Azolla* - *Spirulina* - *Marsilia* - *Juncus* - *Nelumba* - *Chara* - *Woolfia* - *Lemna*
8. Fabrication of aquarium — (10 Periods)
9. Identification of aquarium fishes (charts, preserved and live fishes — (30 Periods)
10. Identificaiton of aquarium plants (Charts, preserved and live plants) — (30 Periods)
11. Breeding of aquarium fishes — (30 Periods)
  - a) Gold fish
  - b) Guppies
  - c) Block Molies
  - d) Swordtail

**IIInd YEAR  
THEORY PAPER I  
FRESH WATER AQUACULTURE**

1. Introduction of fresh water aquaculture, fresh water culture systems — (8 Periods)
2. Seed Procurement — (12 Periods)  
Natural seed resources, Collection of seed from natural resources, factors effecting seed collection and seed seggregation
3. Seed Production technologies — (28 Periods)
  - a) Induced breeding technology - methodology with pituitary gland extract, HCG, Ovaprim, ovatide, ovopel, and other inducing agents, factors effecting induced breeding
  - b) Bundh breeding
  - c) Hatcheries - Types of hatcheries, Construction, equipment and management of Chines and 'D' Variety hatcheries
  - d) Transportation of brooders and seed, Brood Stock management
4. Layout of fish farms —(14 Periods)  
Site Selection Designing and Construction of pond
5. Management of Ponds — (24 Periods)  
Types of ponds, Pre-stocking, Stocking and post - Stocking management of nursery, rearing and stocking ponds - Aquatic weeds and their control - Aquatic insects and their control - predators and their control - Water quality management
6. Feed management — (18 Periods)  
Natural fish food organisms - Significance of plankton in aquaculture - feeding habits of cultivable fishes - Non-conventional feeds - Bio-energitic feeds - Supplementary feeds and feeding methods
7. Health Management — (20 Periods)
  - a) parasitic diseases - Viral, bacterial, fungal, protozoan, helmenthic, crustacean, algal diseases and their controlling measures.

- b) Non-parasitic diseases - Environmental and nutritional diseases and their control
  - c) Health Management - Disease diagnosis, therapeutic methods, Prophylactic measures and chemotherapy.
8. Composite and Integrated fish farming — (22 Periods)
- a) Composite fish culture, Monoculture, Polyculture
  - b) Integrated fish farming
    - i) Fish-cum-agriculture - paddy, wheat, Azoll, horticulture
    - ii) Fish-cum-livestock - cattle, poultry, duck, pig, earthworm
9. Types of culture — (14 Periods)
- a) Airbreathing fish culture, Trout Culture
  - b) Sewage fed fish culture, Use of biogas slurry in fish culture, cage culture, pen culture

## **Practicals**

1. Identification of hatchlings, spawn, fry and fingerlings of major carps — (8Periods)
2. Identification of diseased fish and prawns — (10 Periods)
3. Study of health status of fish seed — (8 Periods)
4. Identification of fish parasites — (18 Periods)
5. Use of aeration devices — (10 Periods)
6. Fabrication of cages — (10 Periods)
7. Culture practices - Trail Netting - Stock manipulation - Recording of data — (20 Periods)
8. Use of water testing and soil testing kits — (10 Periods)
9. Demonstration of preparation of Pitutary extract and induced breeding extract— (10 Periods)
10. Methods of feeding and preparation of feeds — (18 Periods)
11. Preparation of models for ideal fish seed farm, fish culture farm — (10 Periods)
12. Preparation of models for integrated fish culture farm — (10 Periods)
13. Field Visits — (18 Periods)
  - a) Visit for fish seed production farms
  - b) Vist for fish culture farms
  - c) Visit for fresh water prawn hatcheries

**IInd YEAR  
PAPER II  
SCAMPI AND SHRIMP FARMING**

1. Introduction of Scampi and Shrimp farming — (10 Periods)  
History - Present status of scampi and shrimp fishery in India and A.P. Criteria for selection of scampi and shrimp.
2. Scampi and Shrimp resources in India and A.P. — (6 Periods)
3. Feeding habits, moulting, reproduction and life cycle of scampi and shrimp — (8 Periods)
4. Scampi and Shrimp seed procurement and production - seed collection from natural resources, Brood stock Management, Scampi and shrimp, hatchery types, Site selection, construction, equipment and management, induced maturation in shrimp, transportation of brooders and seed.
5. Lay-out and construction of Scampi and shrimp farms - site selection- Designing and construction — (14 Periods)
6. Morphotypes in scampi and their role in scampi farming, scampi farming in natural waters — (10 Periods)
7. Pond management - Nursury and stockin pond management — (10 Periods)
8. Feed Management — (20 Periods)  
Natural prawn Food Organisms - Culture of Artemia , Chaetoceros, Lab-Lab, Brachionus and Moina - Nutritional requirements, Supplementary feeds, application of feeds.
9. Health Management - Parasitic and non-parasitic diseases and their controlling measures in scampi and shrimp, disease diagnosis, collection of samples, Therapeutic measures, Use of probiotics, Vaccines, antibiotics and Sanitisers — (30 Periods)
10. Types of Scampi cultures - Monoculture, Polyculture, Continous Culture, Batch culture — (10 Periods)
11. Types of Shrimp culture — (10 Periods)  
Monoculture, Polyculture, Integrated paddy cum shrimp farming
12. Post-harvest technology —(10 Periods)  
Processing and preservation, prawn by-products, Marketing.

## **Practicals**

1. Identification of commercially important fresh-water and brackish - water prawns — (20 Periods)
2. Identification of larval and post larva stages of scampi and shrimp — (5 Periods)
3. Identification of natural prawn and shrimp food organisms — (10 Periods)
4. Identification of different morpho types in Scampi —(5 Periods)
5. Identification of diseased prawn and shrimp — (5 Periods)
6. Identification of predators in scampi and shrimp ponds — (5 Periods)
7. Identification of aquatic weeds in the pond — (10 Periods)
8. Identification of aquatic insects in the pond — (5 Periods)
9. Identification of prawn and shrimp feeds —(5 Periods)
10. Culture of Phyto plankton and Zooplankton — (10 Periods)
11. Culture of Chaetoceros - Brachionus - Moina - Artemia — (10 Periods)
12. Demonstration of induced maturation in shrimps — (10 Periods)
13. Demonstration of cull harvesting in scampi — (8 Periods)
14. Demonstration of culture practices in prawns and shrimp — (20 Periods)
15. Field trips to the scampi and shrimp hatchery units, processing center, feed manufacturing units - SIFT Kakinada — (32 Periods)

**IInd YEAR**  
**THERORY PAPER III**  
**BRACKISH WATER AND MARINE FISHERIS**

1. Introduction to brackish water and marine fisheries, oceanic zones, upwelling —(10 Periods)
2. Brackish water resources in India and Andhra Pradesh, traditional brackish water farms — (6 Periods)
3. Construction of brackish water fish farm - site selection, design, and construction — (6 Periods)
4. Seed Collection of brackish water fishes and seggregation of seed — (6 Periods)
5. Pond Management — (6 Periods)  
Nursery and Stocking pond management
6. Aeration in aquacultue - Utilization of wind energy in coastal aquacultue — (6 Periods)
7. Types of culture — Mullet, Milk Fish, Seabass, Crab, Lobsters, pearl, Edible Oysters, Seamussel, Sea cucumber, roe of sea urchins — (24 Periods)
8. Physico-chemical parameters of sea water — (10 Periods)
9. Flora and Fauna of Marine Water — (10 Periods)
10. Marine landing centers — (12 Periods)  
Fishing harbours, Jetties Types, Management of fishing harbours, fish aggregating devices
11. Sea Weeds — (6 Periods)  
Types, Culture and products
12. Sea Safety measures - use of VHF sets, life saving appliances, seamanship — (6 Periods)
13. Marine trash fish, Identification and utilization — (10 Periods)
14. Pelagic and demersal fisheries of India and A.P. — (10 Periods)
15. Cyclones, Cyclone warning signals, Cyclone preparedness, depressions and floods — (10 Periods)
16. Motorization and Navigation - Types of Engines and their maintainance - use of motorization in marine fishing - Navigation and it's principles — (12 Periods)

## **Practiclas**

1. Identification of Brackish water and marine fishes - Chanos, Mugil, Liza, Lates, Sardinella, Trichiurus, Rastregeller, Scambomerus, Tuna, Caranx, Stromatius, Muronsox, Herpedon, Hilsa Epinepholus— (40 Periods)
2. Identification of shrimps - Peneaus monodon, P-indicus, P-semisulcatus, P.japanicus, Metapeneaus affinis, M.dobsoni, M.brevicornis, Papapeneapsis
3. Water quality analysis of brackish water pond — (10 Periods)  
pH, Dissolved oxygen, Salinity, Alkalinity, Hardness
4. Plankton analysis of brackish water farm — (20 Periods)
5. Identification of seed of brackish water fishes — (10 Periods)
6. Identification of marine plankton and Nekton — (10 Periods)
7. Use of VHF Walki talkies — (4 Periods)
8. Collection of statistical data of marine landings — (10 Periods)
9. Estimation of Physico - Chemical parameters of Sea — (8 Periods)
10. Identification of cyclone warning signals through charts
11. Field visits to marine landing centre, fishing harbours, Boat building yards, Brackish water farms — (28 Periods)

## 7. LIST OF EQUIPMENT

- Dissection Microscope
- Compound Microscope
- Centrifuge with 6 tubes
- Refrigerator –165 ltrs
- Balances
- Monopan Balance
- Calorimeter
- PH Meter
- Salinometer
- Sechi Disc
- Aquariums with all accessories
- Dissection Box
- Plastic Pools
- Oven
- Thermometers
- Air Compressor
- Water Pump
- Inland fish breeding kit
- D-Variety hatchery
- Binocular Microscope

### **ADDRESS:**

Systronics, 2-2-647/A/3, II Floor,  
Shivam Road, New Nallakunta,  
Hyderabad-13.  
Phone. No.27423584; 27663064.

Elico tdt, 209, Model House,  
6-3-456/A/1, Punjagutta,  
Hyderabad – 500 082.  
Phone. No. 335 1568; 335 0840.

## **8. [A]. COLLABORATION INSTITUTIONS FOR CURRICULUM TRANSACTION :**

- State Institute of Fisheries Technology (SIFT), Jagannaikpur, Kakinada, East Godavari (Dist).
- CIFE, Beach Road, Kakinada.
- CMFRI, beach Road, Vishakapatnam.
- All Universities in the State.

### **[b]. On the Job Training Centres:**

- O/o The Commissioner of Fisheries, Matsya Bhavan, Street No-4, Shanti Nagar, Masab Tank, Hyderabad - 28.
- State Institute of Fishery Technology (SIFT), Jagannaikpur, Kakinada.
- Institute of Fisheries Training Centres, Warangal, Badampudi (West Godavari), Kurnool.
- Fisheries Training Institute, Machilipatnam.
- Assistant Director of Fisheries, Rajendernagar, Hyderabad.
- Fish seed farm LMD, Karimnagar.
- Fish seed farms in the private sector in Krishna and West Godavari districts.
- Fish landing centers and Fishing harbours at Kakinada and Visakapatnam.
- Research stations of ANGARU at Palair and Kakinada.
- EMPEDA, Visakapatnam and Vijayawada.
- Primary Fishermen co-operative Societies.
- CIFA Station, Vijayawada.

## 9. QUALIFICATION FOR LECTURERS:

The following qualifications are required for a lecturer to handle this course.

M.Sc Zoology with Fisheries and aquaculture as specialization or M.F.Sc.

## 10. VERTICAL MOBILITY:

**[a]. With Bridge Course** - Admission into BSc(BZC)/FZC; B.F.Sc; Biotechnology/Microbiology.

**[b]. Without Bridge Course** - B.A; B.Com.

## 11. REFERENCE BOOKS:

1. Fish and Fisheries - V.G. Jhingran, Hindustan Publishing Corporation.
2. Inland Fishes - Vol-1&2 - P.K.Talwar and A.G. Jhingran.
3. Aquaculture, principles and Practices - T.V.R. Pillay, Fishing News Books.
4. Prawn and Prawn Fisheries - Kurian. C.V and V.O.Sebastian - Hindustan Publishing House.
5. Marine Fisheries - D.V.Bal and K.V.Rao- Tata Mc Grawhill Publishing Company.
6. The Wealth of India - Vol-IV, Fish and Fisheries -CSIR.
7. The Fishes of India Vol-1&2- Francis Day.
8. Fisheries and Aquaculture - Ravi Shankar Piska- Lahari Publication, Hyderabad.
9. Concepts of Aquaculture- Ravi Shankar Piska , Lahari Publication, Hyderabad.
10. Fish Biology - IVC Ist year Book - Ravi Shankar Piska and Divakara Chary - Telugu Academy, Narayanaguda, Hyderabad.
11. Fish Ecology - IVC Ist year Book - Jithender Kumar Naik and Ravi Shankar Piska- Telugu Academy, Narayanaguda, Hyderabad.
12. Marine Fisheries - IVC IInd year Book- Jithender Kumar Naik and Ravi Shankar Piska- Telugu Academy, Narayanaguda, Hyderabad.

13. Fish Industry and Post harvest technology - Ravi Shankar Piska and Jithender Kumar Naik - Telugu Academy, Narayanaguda, Hyderabad.
14. Fresh water Aquaculture - R.K. Rath- Scientific Publications
15. Fish Biology and Indian Fisheries - R.P.Parihar- Central Publishing house.
16. Fisheries (Telugu) - Ravi Shankar Piska and Others- Telugu Academy, Narayanaguda, Hyderabad.
17. Fisheries - Open University, Hyderabad.
18. An Introduction to Fisheries- S.S.Khanna, Central Book Depot, Allahabad.
19. Ecology and Environment - P.D.Sharma, Rastogi Publications, Meerut.
20. Fish Breeding- NCRT Publications, New Delhi.
21. Fish Culture - NCRT Publication, New Delhi.
22. Prawn Culture- Ravi Shankar Piska, Telugu Academy, Hyderabad.

**For Second Year:**

Paper –I (Fresh Water Aquaculture)

— *Dr. Ravi Shankar Piska*  
(Editor)

*Dr. S. Jithender Kumar*  
*Naik (Author)*

*Dr. Ravi Shankar Piska*  
(Author)

Paper-II (Scampi and Shrimp Farming)

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Paper-III (Brackish Water and Marine Fisheries)

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**Practicals:**

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# **VOCATIONAL CURRICULUM-2005**

**(With effect from the Academic Year 2005-2006)**

**CURRICULUM OF INTERMEDIATE VOCATIONAL  
COURSE IN**

# **FISHERIES**



**STATE INSTITUTE OF VOCATIONAL EDUCATION &  
BOARD OF INTERMEDIATE EDUCATION A.P.  
Nampally, Hyderabad**



## **FOREWORD**

The National Policy on Education (1986) while proposing educational reorganization, placed high priority on the programme of vocationalisation of education. It emphasized that well planned, systematic and rigorously implemented vocational education will create a distinct stream to prepare students for identified occupations encompassing several areas of activity. The primary aim of vocational courses was to cut across several occupational fields and prepare students with employable skills in organized sectors and self employment. Vocationalisation through re-orientation of educational strategies focused on creating a talent pool of skilled youth who are trained in courses relevant to the market and emerging needs of the various sections of the economy.

Inspired by this vision of the National Policy, the Government of Andhra Pradesh introduced Vocational Education at +2 level with an aim to diversify a sizeable segment of students at the senior secondary stage to the world of work. The State Government aimed at reducing the pressures on higher education through empowering youth by harnessing their capabilities. The requirement of skilled manpower industry is being fulfilled by charting a student's career with right options based on aptitude and talent. An right alternative to medical and engineering courses is envisaged in vocationalisation of education in the State.

In view of the changing needs of the students and growing demand for a spectrum of skill competencies in the economy, the Board of Intermediate Education has reviewed the curriculum of Vocational Courses in order to re-orient them based on their viability and practicability. The revised curriculum for Vocational Courses at Intermediate Level will come into effect from the Academic Year 2005-06 1st Year and from Academic Year 2006-07 for 2nd Year students.

I am confident that the revised curriculum will attract more and more students into vocational stream and help them train in need-based, productive courses leading to gainful employment.



**SHASHANK GOEL**

Secretary, BIE



## CONTENTS

	<b>Page No.</b>
I. Introduction	1
II. Objectives of the Course	2
III. Skills to be provided	4
IV. Job opportunities	
[a] Wage Employment	
[b] Self Employment	
V. Scheme of Instruction & Examination	5
VI. Syllabus	7
[a] Theory	
[b] Practicals	
VII. List of equipment	22
VIII. [a] Collaboration Institutions for curriculum transaction	23
[b] On the Job Training Centres	23
IX. Qualification for Lecturers	24
X. Vertical Mobility	24
[a] With Bridge Course	
[b] Without Bridge Course	
XI. Reference Books	24
XII. Model Question Papers	27
XIII. Equivalency Courses	41
XIV. List of Subject Committee Members	42