

## Programme Project Report for PROGRAM

### **I. GENERAL OBJECTIVES**

**a. Relevance of programme to the institution's mission and goals:**

- Distance education department, Rajiv Gandhi University is imparting education to otherwise primary educated persons to equip them with some field based knowledge on various subjects. Department of Zoology, since long, was conducting studies on hill stream fishes. Various research methodologies in particular reference to the identification, biology and propagation of these, have been developed by the Scientists and Scholar. In the backdrop of such advancement in the study and accumulation of scientific information it would be very much pertinent to disseminate the knowledge among the people, fishermen and persons engaged in piscatorial activities in the state through distance mode of education.

**b. Objectives of the programme:**


- 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 farmers meeting, field days, seminar 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 credit facilities and supporting schemes
- To acquaint with farm accounting record maintenance

**c. Nature of prospective target group of learners:**

- From person with school leaving certificate up to pass graduate equipped with primary science education, with preference to bioscience.

**d. Appropriateness of Open and Distance Learning mode for acquiring specific competencies or skills:**

- The open and distance learning mode offers flexibility to learner's so that persons involved in such learning program can pursue their course from home and by being involved with other activities. As much of the fisheries activities are seasonal or time bound so a distance mode of education in this field would be very much pertinent.

  
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## II. INSTRUCTIONAL DESIGN:

### a. Duration of programme

Name of the course	Short title	Total Duration	Period
Diploma in Mountain Fishery Science	D.M.F.Sc	Twelve (12) months (I & II semester)	January- December

### b. Faculty and support staff requirements:

- 03 faculty & 01 supporting staff

### c. Instructional delivery mechanisms:

- Lectures, Demonstration, Field visit, Interaction programme along with supply of study materials

### d. Identification of media and student support service systems:

- TV, Akashvani, Projector, Laptop, Desktop, Printer, Scanner etc.

### e. Procedure for admissions

- On the basis of merit
- Minimum qualification is HSSLC passed (Bio-Science)
- Deputation of the fisheries officials/workers by appropriate authority

### f. Curriculum transaction and evaluation

- Contact program (1 month for practical and 1 month for theoretical)
- Evaluation through semester exam
- Unit test and end semester exam

### g. Laboratory support required for the programme

- Laboratory support for collection, identification, morphology and biology of fishes
- Analysis of soil and water of natural habitat.
- Private fish farms, fish entrepreneurs, hatchery professionals both govt. farm and private
- Govt. fish seed farm/ production farms

### h. Library Resources:

- Books, journals, popular articles on fisheries and aquaculture are available in both IDE and university central library.

## III. FINANCIAL INVOLVEMENT:

### a. Cost estimate of the programme and the provisions therefore:

- Common Annual Budget is sanctioned every year for the current financial year for expenses against all courses. This allocation is in the following heads:
  - Development of Course Materials
  - Student Support Services (at HQ & Centres)

- iii. Staff Training and Development
- iv. Technology Support
- v. Library
- vi. Research & Development

b. Amount assigned for programme development, delivery and maintenance:

➤ As Above

c. Fee Structure:

Sl. No.	Particulars	Amount
1	Course Fees	1500.00
2	Admission fee	600.00
3	Registration/Renewal fee	300.00
4	Examination fee	800.00
5	Mark sheet fee	100.00
6	Self Learning materials	4500.00
7	Assignment and evaluation fee	600.00
8	On farm practical training fee	2250.00
9	On farm practical evaluation fee	250.00
10	Identity card fee	30.00
11.	Assignment Response Format fee	250.00
12	Centre Fee	150.00
Total:		11,350.00

#### IV. QUALITY ASSURANCE MECHANISM:

a. Expected programme outcomes:

- Quality of students can be identify through group discussion and interaction among themselves
- Participatory approach will help to us identify the skill of the4 individual students

b. Curriculum and detailed syllabi of the programme

#### ONE YEAR DIPLOMA COURSE ON DIPLOMA IN MOUNTAIN FISHERY SCIENCE DETAILS OF THE COURSE

**Name of the course:** Diploma in Diploma in Mountain Fishery Science

**Short title:** D.M.F.Sc

**Duration:** One (01) Year

**Course Structure:** Module I-3 theories + 1 practical (1<sup>st</sup> semester)  
Module II - 3 theories + 1 practical (2<sup>nd</sup> semester)

**Eligibility level:** The course is practically designed for the student of 10 + 2 level science students with biology as one of the subjects in combination. However, 1<sup>st</sup> degree level students with Zoology /Botany/biology may also be admitted in the course who wishes to take up fishery as their future profession and willing to developed professional skill in the subject. The curricula

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have been designed in such a manner that this programme will produce skilled field level personnel as well as it will generate self employment scopes in pond aquaculture, fish seed production technology, hatchery industry, fish feed industry, fabrication of fishery equipments, fishing devices, etc.

### DETAILS OF THE CURRICULA

	Course No	Papers & Titles	Marks	Internal Assessment
Module I (1 <sup>st</sup> Semester)	PF / 01	Fundamental of Mountain fish and fisheries (theory)	80	20
	PF / 02	Freshwater resources and natural fisheries (theory)	80	20
	PF / 03	Fishing techniques and Post harvest technology (theory)	80	20
	PF / 04	Practical (based on theory papers)	120	30
Module II (2 <sup>nd</sup> Semester)	PF / 05	Hill Aquaculture and its management (theory)	80	20
	PF / 06	Seed production and hatchery management (theory)	80	20
	PF / 07	Socio economics and fishery extension (theory)	80	20
	PF / 08	Practical (based on theory papers)	120	30

#### Module I (1<sup>st</sup> Semester)

PF / 01: FUNDAMENTALS OF MOUNTAIN FISH AND FISHERIES

#### UNIT-1

History of ichthyology in India, Classification of fishes, Freshwater fishes of India with special emphasis to Arunachal Pradesh, Fish identification: Techniques and application

#### UNIT-2

A. Bantock, P. Singh

Morphology of fish and production, Anatomical features of fishes and production: Respiration, Reproductive, Digestive, Circulatory, integumentary and locomotory system, Endocrine systems: Pituitary, hypothalamus, pineal organ

#### UNIT-3

Digestive physiology, feeding habit and adaptation in freshwater fishes, Reproductive cycle, Role of hormone in gonadal maturation, Fertilization and developmental stages in fish and production

#### UNIT-4

Principles of fish genetics: Hybridization, sex determination and sex reversal in fishes, Karyotypes of cultivable fishes; Application of modern genetics in fisheries, Fish immune system and fish diseases

#### UNIT-5

Fish - Nutritional composition and human health. Aquaculture - Means of livelihood and poverty alleviation. Ornamental fishes - Aesthetic value and commercial importance. Fish seed production - Emerging business

### PF/02: FRESHWATER RESOURCES AND NATURAL FISHERIES

#### Unit-I

Concept of fish capture and resource exploitation. Fish catch status from inland open waters of India, Fish habitat, ecosystem diversity and fishery resources, Coldwater fisheries sports & commercial importance

#### Unit-II

Riverine ecosystem and resource diversity; River zonation, Brahmaputra river system and fishery resources, Dams and their effects on riverine fishery of India, High Altitude Rivers and wild fishes of NE India

#### UNIT-3

Lakes, beels and reservoir fisheries: An overview Beels of Assam and production levels. Limnological features of beel and reservoirs, Management of beel and lake fisheries in North-East India, Culture based fisheries in coldwater lakes of India

#### UNIT-4

Natural seed sources: Carps & prawns, collection & production, Methods of improvement of natural fish stocks, Concept of fish conservation and conservation strategies, Stocking policy in inland open waters and optimum exploitation

#### UNIT-5

Water pollution and its effects on capture fisheries, Fishing and exploitation of aquatic resources in tribal lives of Arunachal Pradesh, Coldwater fisheries in Arunachal Himalaya, Ornamental fishes in streams and river of Arunachal Pradesh, and their scope for commercial exploitation

### PF / 03: FISHING TECHNIQUES AND POST HARVEST TECHNOLOGY

#### UNIT-I

Classification of fish catching methods of the world, Basic principles of fish catching

Fishing gears in freshwater fishing of India, Angling in sport fisheries

#### UNIT-2

Nets and choice of netting materials, net mending, use of floats, anchor, sinkers, Fabrication of fishing gear, operation techniques, Indigenous fishing contraptions of North-East India: devices & their techniques of operation

#### UNIT-3

Harvesting of freshwater fishes, Grading of fish, Packing, storage and transportation of harvested fish, Principles of chilling and freezing, methods of chilling, Quality control during freezing and chilling

#### UNIT-4

Fundamentals of fish preservation: drying, Smoking, curing, salting, fermentation, Fish canning: Principles and processing, Value addition to freshwater fishes, Introduction to fish paste products (Fish sausage, liam etc)

#### UNIT-5

Fishery by product: Fish meal, bone meal, fish oil, surgical sutures, Production methods of fish meals, machinery specification, packing and storage, Fish protein concentrate: Different methods of production, functional properties and uses, Pearl fishery and pearl processing

### PF / 04: PRACTICALS

#### UNIT - 1: Fundamentals of mountain fish and fisheries

- 1) Taxonomy and classification of edible and ornamental fishes with special reference to Arunachal Pradesh: Carps, cat fishes, Prawn, Glass fishes, Mahseers, Minnows, berbs, Loaches, Perches, etc.
- 2) Fish diagnostics and identification methods.
- 3) Morphology and sexual dimorphism: Cat fishes, crops, Prawn
- 4) Dissection: Digestive system, reproductive systems of crops circulatory systems of Murrells, Appendage, of prawns
- 5) Anatomy of fishes: Digestive system, Pituitary hepato-pancreas, gonads, gills

#### UNIT - 2 : Fresh water resources and natural fisheries.

- 6) Identification: Crabs, Prawns, Turtles, Oyster, Molluscs, Aquatic plants.
- 7) Fish habitat characterization and Assessment:
- 8) Physical characters of water bodies
- 9) Analysis of water quality, Estimation of BOD, chemical pollutant and toxicity test
- 10) Analysis of soil quality
- 11) Biotic communities: Plankton, Benthos, periphyton

#### UNIT -3: Fishing technique and post harvest technology

- 12) Knots, bends and hitches; construction of netting yarn, Waving, Mending and repairing of nets
- 13) Identification of fishing gears and nets
- 14) Fabrication of indigenous bamboo made fishing traps
- 15) Fish quality evaluation, processing of icing and packaging
- 16) Preparation of fishery products and by products



## UNIT-4

### Practical Note Book

### Viva -voice

## Module II (2nd Semester)

### PF / 05: HILL AQUACULTURE AND ITS MANAGEMENT

#### UNIT-1:

Principles of freshwater fish culture: General concept, cultivable fishes, prawn, pearl & oysters  
Composite fish culture: Ponds and river fields integrated farming: methods and practice,  
Aquaculture based fisheries: Lakes and wetlands

#### UNIT-2

Pond and rice fish culture: Site selection, design and construction. Pen and cage culture: Site selection and design. Freshwater pearl culture: Principle and methods, A quaria and ornamental fish keeping: Fabrication & design and methods of fish keeping, Running water recirculation system of aquaculture

#### UNIT-3:

Stocking of fishes in ponds: Sizes, densities, composition, Management of unwanted fishes, predatory animals, Maintenance of water quality, soil nutrients; Use of fertilizers, and manures  
Liming - needs and significance, Feeding: Feed applicators, estimation of feed requirements  
Assessment of natural fish food organisms

#### UNIT-4

Package of practices of freshwater prawn farming, Techniques of freshwater pearl production  
Methods of live fish food production, Artificial Feed formulation and feed ingredients for carp culture, Aquarium plants and their propagation methods

#### UNIT-5

Monitoring of culture fishery: Basic criteria, Fish diseases and the methods of their treatment  
Aqua chemicals, manufacturers, Use of aqua chemicals in culture fishery management

### PF / 06: SEED PRODUCTION AND HATCHERY MANAGEMENT

#### UNIT-1

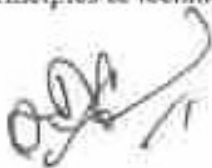
Breeding habits of different cultivable carps species, Brood stock management for Indian and exotic crops, Raising and rearing of brooders of cat fishes and prawns, Food and Feeding schedule of carp brood stock

#### UNIT-2

Factors responsible for gonadal development in carps, cat fishes and prawns, Breeding seasons and suitable environmental features for natural breeding, Mahseers and trouts breeding: Flow through trout hatchery

#### UNIT-3

Induced breeding and its principle, Methods of bund breeding, hapu breeding, Hypophysation, Mechanism of endocrine action on carp spawning, Use of different agents for induction of breeding, LINPE method: principles & technique, Multiple breeding: Principles & method



#### UNIT-4

Hatchery and their importance, Chinese ecobatchery, glass jar hatchery, flow through hatchery; design and construction, Carp milt and their cryo preservation, Mechanism of fertilization and embryo formation in carps

#### UNIT-5

Fish seed industry: Seed production & management, transportation, Breeding techniques of Magur & Singhi, methods of larval rearing, Aquarium breeding of live bearer & egg scatterer fishes

#### PF / 07: SOCIO ECONOMICS AND FISHERIES EXTENSION

##### UNIT-1

Institution for implementation of techniques in fisheries & fish production, Aquaculture leases: Duration, rent, renewal, assignability and transferability, Common property resources in fishery practices, Important provisions of land reforms acts and its impact on aquaculture, Holistic approach in inland fisheries management for socio economic benefit

##### UNIT-2

Economics structures of aquaculture: Resources and potential, Techniques / tool for optimization - Farm planning and budgeting, Farm business analysis: Methods of assets valuation and computing depreciation, Concept of cost, return and efficiency of aquaculture, Functions and problems of aquaculture marketing, Marketing structures and co-operative marketing

##### UNIT-3

Programme planning process: Collection of facts, situation analysis and problem identification Importance of extension programme, characteristics of good programme, Participation of organization and involvement of people in programme planning

##### UNIT-4

Training strategy, Role of farmers/fishers in fisheries, Extension and research linkage, Participatory approach in technology demonstration

##### UNIT-5

Government role and machinery of extension of fishery in Arunachal Pradesh, Communication models of Extension, Audio - visuals and demonstration, Impact of voluntary organization and their role


#### PF / 08: PRACTICALS

##### UNIT - I: HILL AQUACULTURE AND ITS MANAGEMENT

- i) Identification of predatory and used fishes, aquatic insects, aquatic macrophytes
- ii) Feed formulation and preparation of feed
- iii) Examination of pond plankton
- iv) Growth and survival assessment
- v) Live feed culture, Daphnia, Moina, Tubifex, Paramecium, algal culture.
- vi) Collection of mussel species for implantation, graft tissue preparation, surgery, post operative care of mussels.
- vii) Identification of fish diseases and their treatment

##### UNIT - II: SEED PRODUCTION AND HATCHERY MANAGEMENT

- viii) Brood stock identification (1) Carps, Magur, Singhi, Prawn
- ix) Collection of carp pituitary and preparation extract.





- x) Hypophysation (Field practical) and induced breeding of carps / cat fishes using ova prim
- xi) Stripping of exotic carps and fertilization of eggs with sperm
- xii) Observations on developmental stages of fertilized eggs
- xiii) Assessment of brooding success and fertilization rate
- xiv) Packing and transportation of spawn
- xv) Preparation of fish chromosome from the hatchlings

#### UNIT - III: SOCIO ECONOMICS AND FISHERIES EXTENSION

- xvi) Survey for identification of technology gaps
- xvii) Skill demonstration
- xviii) Interaction with the trainee farmers

#### UNIT-IV

Practical Note Book

Viva- voce

#### LIST OF TOOLS AND EQUIPMENTS

##### Equipments

- 1) Microscope 2) Centrifuge 3) Sechi disc 4) Balance 5) Calorimeter 6) PH meter 7) Thermometer 8) Dissection Box

##### Non - consumables (Glass ware)

- 1) Benkers 2) Conical flasks 3) Pipettes 4) Burettes 5) Funnels 6) Watch glasses 7) Slides 8) Cover slips 9) Measuring jars 10) Reagent bottles

##### Consumables (Chemicals make: Glaxo/ E-merck/ Sarabhai/ BD/ Sd-fine)

1. Formaldehyde 40 lit
2. Potassium Dichromate 500 gm.
3. Absolute Alcohol 5 lit
4. Borax Caramine 200 ml
5. DPX 200 ml
6. Acetic Acid 500 ml
7. Sodium Nitrate 500 gm
8. Phenol 5 lit
9. EDTA 500 gm
10. Murexide powder 50 gm
11. Erichrome Black 50 g
12. Sodium thio Sulphate 50 g
13. Manganese Sulphate 500g
14. Potassium Iodide 500g
15. Potassium Hydroxide 500 g.
16. Starch powder-500 g.
17. Sulphuric Acid 2lit.
18. Hydrochloric Acid 2lit
19. pH papers (Assorted) 5 Pkt
20. pH Indicator 500 g
21. Silver Nitrate 10g
22. Sodium Hydroxide 1000 g
23. Sodium Carbonate 500g
24. Mettler orange 100ml

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25. Phenolphthalein Indicator 100ml
26. Copper Sulphate 250 g
27. Cotton 2 bundles
28. Ovaprim 2 bottles
29. Glycerol 500ml
30. Ethanol(100ml)
31. Filter papers ( Assorted)
32. Malachite Green 500g
33. C IFAX 500 ml.
34. Cobalt Chloride 100 g
35. Buffer tablets 100nos
36. Chloram Phenicol 200 g
37. Boric acid 500 g
38. Xylene 500 ml

### REFERENCE BOOKS

1. Fish and Fisheries - V.G. Jhingran, Hindustan Publishing Corporation.
2. Inland Fishes - Vol. 1 and 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- F. Day.
8. Fisheries and Aquaculture - Ravi Shankar Piska, Lahari Publications, Hyderabad.
9. Concepts of Aquaculture - Ravi Shankar Piska, Lahari Publications, Hyderabad
10. Fresh Water Aquaculture - RK. Rath, Scientific Publications.
11. Fish Biology and Indian Fisheries - RP. Parihar, Central Publishing House.
12. Fish & fisheries of Arunachal Pradesh- Nath & Dey, Narendra Publishing House, New Delhi
13. Fisheries - Open University, Hyderabad.
14. An Introduction to Fisheries - S.S. Khanna, Central Book Depot, Allahabad.
15. Ecology and Environment - P.D. Sharma, Rastogi Publications, Meerut.
16. Fish Breeding- NCRT Publications, New Delhi.
17. Fish Culture - NCRT Publications, New Delhi.

### c. Guidelines on launching programme(s) design:

- d. Advertisement for admission of the candidate will be made in national/local dailies by the institute/university websites.
- e. In addition, media campaign using AIR, Door-Darshan etc. will be taken up by the institute from time to time.
- f. 10 + 2 level science students with biology
- g. Contact program of the students will there, total 30 days contact program for theoretical activities & 30 days contact program for practical activities.
- h. Besides, there will be assessment on the background of the project under the whole curricula.
- i. For the project and contact program, mark will be assigned as per syllabus.







- j. Contact program will be held either in the fishery unit of Zoology Department particularly for practical (component) or in nearby Govt. fish farm time to time.
- k. Side by side theoretical classes of contact program will be conducted in the IDE as per date schedule notify by institute.

  
**(Mrs Moyir Riba)**

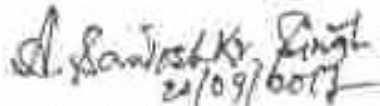
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