Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. Deshmukh Shaziya.S.K.A **Department:** Fishery Science

Program: BSc FY **Subject**: Fishery Science **Course Code**: **CCFS I (Section-A) (P-I)**

Paper Title: Paper-I: Icthyotaxonomy & Ecological Adaptation

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Icthyotaxonomy**	1) Scope and importance of fishery science. 2) Classification of fishes (Berg, 1940) up to class level 3) General characters of class Elasmobranchii 4) General characters of class Holocephali 5) General characters of class Dipnoi 6) General characters of class Teleostomi 7) Difference between Elasmobranch and Teleost fishes	Ichthyotaxonomical Importance and classification
II		1) Body forms in fishes. 2) Different types of fins and their functions. 3) Fish identification techniques. i. Study of morphometric characters in fishes. ii. Study of meristic characters in fishes iii. Study of descriptive characters in fishes 4) Locomotion in fishes: Types of locomotion, special mode of locomotion, locomotion due to the movement of appendages. 5) Structure and functions of skin in fishes. 6) Study of different types of scales.	Identification techniques in fishes

III	**Ecological adaptation in fishes**	1) Migration in fishes – general account of migration, types of migration, advantages of migration, factors influencing migration. 2) Colouration in fishes – Source of colour, colour changes in fishes, regulation of colour changes, significance of colour changes. 3) Light producing organs in fishes – occurrence, nature of light producing, location, structure of light producing organs, significance of luminescence in fishes. 4) Electric organs in fishes – Occurrence, location of electric organs, general structure of electric organ, electric organ in torpedo, *Electrophorus electricus* , functions of electric organ. 5) Sound producing organs in fishes 6) Poison glands in fishes – Introduction, difference between poisonous and venomous fishes,division of poisonous fishes	Adjustment of fishes to its different environment.
IV		1) Air bladder, location of air bladder, different types of air bladder, their structure and functions. 2) Weberian ossicle in fishes – structure and functions. 3) Lateral line canal – Structure of lateral line canal 4) Structure and functions of neuromast organs.	To study different scene organs

Specify Course Outcome: Ichthyotaxonomy, techniques, adaptation & scene organs in fishes

Specify Program Outcome: To study the classification & adaptation in different environment.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. S.U Kadam **Department:** Fishery Science

Program: BSc FY **Subject:** Fishery Science **Course Code**: **CCFS I (Section-B) (P-II)**

Paper-II: Type study: *Wallago attu* Fresh Water Shark

Unit Number	Unit Name	Topics	Unit-wise Outcome
I		Introduction and classification 2) External characters 3) Skin – structure and functions. 4) Endoskeleton i. Axial skeleton – typical trunk vertebra, caudal vertebra, ribs ii. Appendicular skeleton – pectoral girdle and fin, pelvic girdle and fin. 5) Air bladder – structure and functions. 6) Weberian ossicles – structure and functions.	To understand the morphology of wallago attu fish
II		1) Coelom and alimentary canal. 2) Associated glands of digestive system. i. Liver ii. Pancreas iii. Gall bladder 3) Physiology of digestion 4) Respiratory system i. Structure of gills ii. Physiology of respiration	To study the physiology of digestion and respiration
III		1) Blood circulatory system i. Structure & working of heart ii. Arterial system iii. Venous system	To study the circulation and nervous system

		iv. Composition of blood 2) Nervous system i. Structure of brain ii. Cranial nerves iii. Spinal nerves	
IV		1) Excretory system 2) Male reproductive system 3) Female reproductive system 4) Spawning habits and structure of eggs. 5) Photoreceptor organs (eye) 6) Internal ear (membranos labyrinth) – Structure and functions. 7) Olfactory organs – Structure and functions.	To study the gonads in fishes.

Specify Course Outcome: Morphology, physiology and gonadal organs of bony fish**.**

Specify Program Outcome: To understand the Morphology and physiology of bony fish.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. S.U Kadam **Department:** Fishery Science

Program: BSc FY **Subject:** Fishery Science **Course Code**: **CCFS II (Section-A) (P-III)**

Paper-III: Fresh water fish culture technology

Unit Number	Unit Name	Topics	Unit-wise Outcome
I		1) Importance, objective and scope of aquaculture. 2) Introduction to types of aquaculture. i. Culture based on economic or commercial consideration: Extensive culture, intensive culture & semi-intensive culture ii. Culture based on the types of designs of culture: Pond culture, culture in manmade reservoirs, fish culture in paddy fields, culture in bheries, culture in tanks, raceway culture, cage culture and pen culture. iii. Culture based on number of species: Monoculture and poly culture iv. Culture based on climatic condition: Cold water fish culture, warm water fish culture	Scope of aquaculture
II	**Intensive fish farming**	1) Selection of site - i. Topography ii. Soil type iii. Water supply 2) Construction of fish farm a) Layout, design and construction of different types of pond i. Hatching pits ii. Nursery pond iii. Rearing pond	To study the Commercial and economical fish farming

		iv. Stocking pond b) Physical chemical and biological factors affecting fish culture. 3) Objectives of fish culture 4) Qualities of culturable species of fishes 5) Types of cultivable fishes 6) Culture qualities & breeding habits of Indian major carps	
III	**Fish Pond Management**	1. **Pre-stocking Management** : Drying, ploughing, liming, mannuring, watering, Eradication of aquatic weeds; Eradication of predatory fishes, weed fishes, aquatic insects, predatory animals 2. **Stocking Management** : Seed selection, acclimatization, stocking 3. **Post-stocking Management** : Feeding and Feed management, Water quality management, disease management, harvesting	To manage the fish farm during culture
IV		**1) Composite fish farming** i. Principle of composite fish farming ii. Objectives of composite fish culture iii. Composite fish culture in India iv. Stocking density **2) Integrated fish farming** i. Principle of Integrated fish farming ii. Paddy cum fish farming iii. Poultry cum fish farming iv. Cattle cum fish farming	To understand the techniques of Allied fish farming

Specify Course Outcome: Scope, fish farming, allied fish farming

Specify Program Outcome: To study the culture technology .

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. Deshmukh Shaziya. S.K.A **Department:** Fishery Science

Program: BSc FY **Subject:** Fishery Science **Course Code**: **CCFS II (Section-B) (P-IV)**

Paper- IV: Fish Seed Production & Hatcheries Management

Unit Number	Unit Name	Topics	Unit-wise Outcome
I		1) Natural Seed collection i. Spawn resources investigation technique ii. Selection of spawn collection site iii. Gears used for collection of spawn iv. Methods of collection of spawn 2) Bundh breeding Types of bundhs – i) Wet bundhs ii) Dry bundhs iii) Modern bundhs	Primitive methods of spawn collection
II		1) Artificial fertilization by stripping i) Dry Method ii) Wet Method 2) Induced breeding by hypophysation i. Introduction ii. Identification & selection of brooders iii. Dissection and removal of pituitary gland iv. Preservation and storage of pituitary gland v. Preparation of gland suspension for injection and dosage 3) Hormones responsible for induced breeding	To understand the techniques of induced breeding.

		4) Synthetic hormones used in induced breeding	
III	**Hatcheries and management (Principle, structure and management)**	1) Hatching happa 2) Glass jar hatchery 3) Bin hatchery 4) CIFE D 80 model (Dwivedi – 80) 5) Chinese circular hatchery	To study the different hatcheries
IV		**1) Fish seed transportation** i. Open transportation system ii. Close transportation system iii. Causes of mortality in transportation iv. Use of chemicals in live-fish transportation v. Anesthetic drugs use in transport vi. Antiseptic and antibiotics used in transportation vii. Technique of fish seed release. **2) Fish seed trade** i. Classification of fish seed ii. Identification techniques iii. Different units of fish seed counting iv. Fish seed trade in India	Techniques of fish seed transportation.

Specify Course Outcome: Different techniques of fish seed production.

Specify Program Outcome: To study the different techniques of seed production and modern methods of seed production techniques.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. Deshmukh Shaziya .S.K.A **Department:** Fishery Science

Program: BSc FY **Subject:** Fishery Science **Course Code**: **Practical Paper: CCFSP I (P-V)**
(Annual practical Based on CCFS I & II (Section A & B)

Paper-V: Practical Syllabus

Unit Number	Unit Name	Topics	Unit-wise Outcome
		1) Fish identification techniques (any locally available fish) i. Study of any five morphometric characters ii. Study of any five meristic characters 2) Identify, classify and describe following fishes : a) Indian major carps i) *Catla catla* ii) *Labeo rohita* iii) *Cirhinus mrigala* b) Exotic carps i) *Hypothalmyethys molitrix* ii) *Ctinopharyngodon idella* iii) *Cyprinus carpio* c) Adaptation in fishes i) *Tropedo* ii) *Trygon* iii) *Tilapia* iv) *Pterois v) Exocoetus* 3) Identify and describe predatory fishes (any three). 4) Identify and describe predatory insects (any three). 5) Identification of aquatic weeds (any three) 6) Identification of fish feed (any three) 7) Permanent mounting of fish scales (Submission) i) Placoid ii) Cycloid iii) Ctenoid 8) Identification of spawn, fry and fingerlings of Indian major carps. 9) Preparation of pituitary gland extract, injection techniques & dosage. 10) Skeleton study	To identify the different system in fishes To identify the freshwater bony fishes

		i) Trunk vertebra ii) Caudal vertebra iii) Pectoral girdle iv) Pelvic girdle 11) Dissection of *wallago attu* / any locally available teleost. i. Digestive system, ii. Urinogenital system iii. Heart and Ventral aorta, afferent branchial vessels, iv. Brain, v. Air bladder vi. Weberian ossicle 12) Preparation of layout plan of fish farm and their submission. 13) Visit to fish farm/ hatchery / fish market and submission of report.	

Specify Course Outcome: To study the identification techniques of bony fishes.

Specify Program Outcome: To study bony fishes.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. S.U Kadam **Department:** Fishery Science

Program: BSc SY **Subject:** Fishery Science **Course Code**: **CBCS Pattern**

Theory Paper – VI Ecology & Fish Pathology

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Fresh water Ecology**	1) Definition and objectives of ecology. **2)** River ecology a) Physico-chemical characters of river waters b) Biotic factors- Producers, consumers and decomposers c) Zonation of river- Rhithron and potamon zone d) Flora and fauna of river 3) Ecology of Reservoir. a) Introduction to reservoirs b) Classification of reservoirs c) Eutrophication of reservoirs. d) Physico-chemical characters of reservoirs waters. e) Biotic Community: -Flora and fauna of reservoirs.	To know the fresh water environment.
II	**Marine Ecology**	a) Physico-chemical characters of Sea water. b) Horizontal & Vertical Zonation of Sea water. c) Flora & Fauna. d) Food Web & food chain. **Ecology of Estuaries**	To know the marine environment.

		Types of estuaries:- 1) Types of estuaries:- a) Salt wedge estuaries b) Partially mixed estuaries c) Fjords estuaries d) Bar – built estuaries 2) Physico – chemical characteristic of estuaries. 3) Biota of estuaries: - Oligohaline organism, true estuarine organism, Stenohalanine marine Organism & migrants.	
III	**Water pollution & their control.**	1) Introduction and definition. 2) Different types of pollutants. 3) Sewage and domestic refuge. 4) Pollution and treatment of sewage. 5) Pollution control and legislation. 6 6) Effect of pollutants on fishes.	To know the nature of water and the techniques to its control
IV	**Fish Pathology (Disease causing organism, symptoms, preventives measures).**	1) Fungal Diseases:-Gill rot, Branchiomycosis. 2) Bacterial Diseases:- Dropsy and fin rot 3) Protozoan Diseases:-White spot and costiasis. 4) Helminth diseases:-Gyrodactylosis and Dactylogyrosis. 5) Crustacean Diseases :-Learniasis and Argulosis.	To know the fish diseases.

Specify Course Outcome: To study fish environment.

Specify Program Outcome: To study the fish environment and fish disease.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. Deshmukh Shaziya .S.K.A **Department:** Fishery Science

Program: BSc SY **Subject:** Fishery Science **Course Code**: CBCS Pattern

Theory Paper - VII, Fish Biology

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Developmental biology**	a) Types of eggs. b) Cleavage and formation of blastula. c) Fate map of blastula. d) Gastrulation. e) Hatching and post embryonic development. f) Oviparity, viviparity & ovo – viviparity.	To study the embryology of fish
II	**Reproductive biology**	a) Sexual dimorphism in Fishes. b) Seasonal changes in Testes (Morphological and Histological). c) Seasonal change in ovary (Morphological and Histological). d) Study of oogenesis and spermatogenesis in fishes. e) Assessment of fecundity in fishes i) Volumetric method ii) Gravimetric method iii) Von Bayrs methods f) Study of Gonado Somatic Index (GSI).	To study the embryology of fish
III	**Growth studies**	a) Introduction to growth b) Linear growth characteristic c) Estimation of length (Linear growth)	To study the age and growth in fishes

		d) Length- weight relationship e) Ponderal index f) Age and growth studies in fishes Different methods of age and growth determination:- Tagging method, Marking method, Scale method, otolith method, radio carbon uptake method, RNA– DNA ratio method.	
IV	**Nutritional value and Economical importance of Fish.**	a) Bio-chemical composition of raw fish. b) Medicinal value of fishes. c) Calorific value in fishes. d) Economic importance of fishes. e) By products.	To study the nutritional value of fish

Specify Course Outcome: Reproductive and development biology, growth and nutritional value of fish.

Specify Program Outcome: To study the fish biology.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. Deshmukh Shaziya .S.K.A **Department:** Fishery Science

Program: BSc SY **Subject:** Fishery Science **Course Code**: CBCS Pattern

Theory Paper – VIII, Fish Anatomy, Physiology & Fish microbiology

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Comparative study of –**	i) Teeth: - Types and function. ii) Gill Rakers: -structure, types and function. iii) Food: - Types of food, Feeding habits in fishes. iv) Alimentary canal:- alimentary canal of herbivorous and carnivorous fish	To study the different organs in fishes.
II		i) Structure and working of heart in elasmobranches and teleost. ii) Excretory System: - Kidney – structure types & functions. iii) Structure & function of air bladder in fishes. iv) Osmoregulation in fishes:- Osmoregulation in fresh water and marine fishes.	To study the different organs in fishes.
III	**Endocrine Gland : (Structure & Functions)**	i) Pituitary gland ii) Thyroid gland iii) Adrenal gland iv)Gonads	To study Different endocrine glands in fishes

		v) Thymus gland	
IV	**Fish Microbiology**	i) General account of harmful and useful micro-organisms in fresh water and marine water. ii) Fish spoilage Causes of fish spoilage – Bacterial, enzymatic and chemical spoilage. iii) Changes during fish spoilage – Rigor mortis. iv) Chemical test for freshness. v) Organoleptic test for freshness. vii) Sources of contamination of fish.	To study the microorganisms in fishes

Specify Course Outcome: To study the comparative organs, endocrine glands and microorganisms.

Specify Program Outcome: To study different organs, endocrine glands and microorganisms in fishes

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. S.U Kadam **Department:** Fishery Science

Program: BSc SY **Subject:** Fishery Science **Course Code**: **CBCS Pattern**

Theory Paper –IX, Fish Technology & Processing

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Methods of Fishing and Fishing gear**	i) History of fishing ii) Methods of fishing a) Traditional methods- Catching by hands, fishing by hunting (wounding) fishing by plant poisons b) Conventional methods iii) Nets- mode of netting a) Active netting Dip net, Cast net, Purse net, Drag net, Gill net, Rampani net, Bag net, Trawls, Hooks and Lines, Fishing Baited springs, Fish screens. b) Passive netting Gill net, Drift net, Trammel net, Fixed bag net, Fixed trap net, iv) Material used in manufacture of nets:- a) Natural b)Synthetic v) Preservation of the gear.	Study of different nets.
II	**Unconventional fishing and Fishing crafts**	a) Unconventional fishing i) Electric fishing-mode of site of electric fishing ii) Light fishing	To study electric, light, eco sounder fishing

		iii) Fish finder- Hydro-acoustic devices, Fishing operations by eco-sounders b) Fishing crafts i) Inland fishing crafts ii) Sea fishing crafts iii) Mechanized crafts iv) Material used in Boat/Craft constructions	
III	**Fish Preservation**	Introduction i) Principles of preservation: -Washing, Gutting, Cleaning, lowering the temperature, rising the temperature, dehydration, use of salt, use of preservatives. ii) Methods of Preservation:- a) Chilling with ice & salt. b) Freezing & refrigeration. c) Storing in cold storage. d) Deep freezing & freeze drying. e) Canning f) Sun drying g) Mechanical drying h) Dry salting i) Brining j) Smoking k) Pickling	To study different methods of fish preservation.
IV	**Special Problems in fish preservation**.	a) Denaturation due to freezing of fish. b) Food poisoning and allergies from fish food. c) Food poisoning from consumption of poisonous fish. d) Food poisoning of bacterial origin.	To study the difficulties in fish preservation.

Specify Course Outcome: Different methods of fishing, methods of fish preservation.

Specify Program Outcome: Different technologies of fish catching methods and fish preservation.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. S.U Kadam **Department:** Fishery Science

Program: BSc SY **Subject:** Fishery Science **Course Code**: **CCFSPR-II**

Practical Paper based on Theory Paper VI & VIII (Paper- X)

Unit Number	Unit Name	Topics	Unit-wise Outcome
		[1] Water analysis – a) Dissolved oxygen b) Dissolved CO_2 c) Chlorides d) Carbonates e) Ph- by Ph - meter [2] Collection, identification and submission of prepared slides of Fresh water phytoplankton & Zooplankton. 3] Collection, identification and submission of prepared slides of Marine Phytoplankton & Zooplankton. 4] Identification, classification & diagnostic characters of a) Marine Water Fishes with adaptive characters (any 08) b) Fresh Water Fishes (any 08) c)Estuarine Fishes (any 05) 5] Identification & sexual dimorphisms in fishes. (Any five) 6] Study of maturity stages in teleost locally available fish (Morphological & Histological). 7] Assessment of fecundity of locally available fish.(any two)	To study the chemical properties of water, plaktons. To analyse the protein, fat, carbohydrates from fish body. To study the fish diseases.

		8] Identification, classification of fresh water aquatic insects (any three) 9] Identification, classification of marine water aquatic insects (any three) 10] Assessment of spawning periodicity by ova diameters measurement in any locally available fish. 11] Length weigh relationship study of locally available fish.(any two) 12] Quantitative estimation of Protein/fat/carbohydrate from fish tissue (dry or wet). 13] Determination of fish age by scale method. 14] Identification of Fish Parasite a) Argulus b) Dactylogyrus c) Gyrodactylus d) Icthyoptheris multiphlis. 15] Excursion tour, visit to coastal / fish farm/ fish market and submission of excursion report.	

Specify Course Outcome: To study the nature of water, plankton, fish diseases

Specify Program Outcome: To study the fish and its environment.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. S.U Kadam **Department:** Fishery Science

Program: BSc SY **Subject:** Fishery Science **Course Code**: **CCFSPR-III**

Practical Paper based on Theory Paper VII & IX Paper- XI

Unit Number	Unit Name	Topics	Unit-wise Outcome
	[1] **Dissection :(any locally available fish)** 2) **Micro Technique**	a) Digestive System. b) Urinogenital System. c) Ventral aorta. d) Afferent and efferent branchial arteries. e) Brain. Block Preparation section cutting and staining of tissue: a) Pituitary b) Ovary c) Testes d) Intestine e)Stomach f)Liver 3)Isolation of micro-organism (Bacteria & fungi) from fish (Streak plate method). 4) Staining – monochrome staining and Grams staining. 5) Identification of fresh fishes and spoiled fishes. 6) Study of fishing lines. (Any two). 7) Study of Fishing gears (Any five). 8) Study of fishing craft (Any five). 9) Identification, Classification and Characters of fresh water aquatic weeds.(any five)	To identify the different system in fishes. To study the fishing gears and fish preservation.

		10) Study of Organic and Inorganic fertilizers.(each two) 11) Fabrication of fishing boat model & submission (Any one). 12) Preservation of locally available fishes by Ratnagiri method. 13) Preparation of fish Preservation (Washing, gutting, cleaning, and other stages & processing). 14) Preservation of locally available fishes by mechanical drying method. 13 15) Excursion tour: - Visit to fish processing industries and submission of report.	

Specify Course Outcome: To study the different fishes and its catching methods.

Specify Program Outcome: To study the different gears and fish preservation techniques.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. S.U Kadam **Department:** Fishery Science

Program: BSc SY **Subject:** Fishery Science **Course Code**: **CBCS Pattern**

Paper- SEC I –B Fresh water fish production technology.

Unit Number	**Unit Name**	**Topics**	**Unit-wise Outcome**
		1) Introduction of aquaculture 2) Topography 3) Analysis and maintenance of water quality 4) Analysis and maintenance of soil quality 5) Lay out plan of fish farm 6) Construction of different types of ponds 7) Management of fertilizers 8) Induced breeding technique 9) Fish seed identification technique 10) Fish seed packing and transport 11)Disease management	To study The fish farming methods

Specify Course Outcome: To study fish farming methods.

Specify Program Outcome: Techniques of fish farming and its management.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. S.U Kadam **Department:** Fishery Science

Program: BSc SY **Subject:** Fishery Science **Course Code**: **CBCS Pattern**

Paper - SEC II A) Fish Preservation and Processing Technology.

Unit Number	Unit Name	Topics	Unit-wise Outcome
		1) Study of fish spoilage- Bacterial, Enzymatic and Chemical. 2) Study of Rigor-mortis a) Causes of Rigor-mortis, b) Factors responsible for prolongation of Rigor-mortis, c) Identification of fresh and spoiled fish 3) Principles of Preservations a) Cleaning and gutting, b) Lowering temperature, High temperature and dehydration, c) Use of salts and Preservatives, d) Use of Natural Preservatives 4) Methods of Fish Preservations a) Refrigeration, b) Deep Freezing, c) Freeze Drying, d) Salting: Dry salting, Wet salting, Brine salting, Cold salting, e) Smoking, f) Drying – Natural drying, Artificial Drying, g) Canning,h) Demerits' of Fish Preservation	Study of fish microorganisms and methods of fish preservation techniques.

Specify Course Outcome: Study of fish microorganisms and methods of fish preservation techniques.

Specify Program Outcome: Techniques to increase the lag phase in fishes.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. S.U Kadam **Department:** Fishery Science

Program: BSc TY **Subject:** Fishery Science **Course Code**: **CBCS Pattern**

Theory Paper - XII Indian Fisheries and Mericulture (A)

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Study of marine fisheries (classification, external feature, distribution, food & feeding, reproduction)**	1) Sardine fishery. 2) Bombay duck fishery. 3) Mackerel fishery. 4) Sole fishery	To study marine water commercial fishes of India.
II		1) Hilsa fishery. 2) Pomfret fishery. 3) Mollusk fishery, (Cephalopod, Chanks). 4) Prawn fishery.	To study marine water commercial fishes of India.
III	**Mericulture:-**	1) Prawn Culture. 2) Mussel Culture (Edible oyster) 3) Pearl oyster culture. 4) Seaweed culture.	To study marine water culture.
IV	**Important lakes and Estuarine fisheries of India**	1) Hooghly-Matla estuary 2) Chilka lake 3) Pulicat lake 4) Kolleru lake .	To study estuarine fisheries of India.

Specify Course Outcome: Marine and estuarine water commercial fishes of India.

Specify Program Outcome: Important marine water commercial fishes of India.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. S.U Kadam **Department:** Fishery Science

Program: BSc TY **Subject:** Fishery Science **Course Code**: **CBCS Pattern**

Theory Paper – XIII Aquaculture Technique and Fish nutrition (Elective B I)

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Fish culture:**	1. Culture of Indian major carps. 2. Culture of air breathing fishes. 3. Culture of milk fish – Chanos chanos. 4. Culture of sea bass. 5. Culture of crabs.	Culture of different fishes.
II	**Marine water prawn culture:**	1. Study of general characteristics. 2. Food and feeding. 3. Selection of site. 4. Collection of broods. 5. Mating and spawning. 6. Development. 7. Water quality for culture. 8. Prawn rearing. 9. Larval food supply. 10. Methods of fishing.	Culture methods of Prawn
III	**Fish Nutrition:**	1) Ingredients for fish feed. i) Mill - by – Products. ii) Oil extractives. iii) Animal by- products. iv) Miscellaneous. **2) Fish feed formulation.** i) Balancing crude protein level.	To study the different fish feed of fishes.

		ii) Steps in feed formulation. iii) Best-bye techniques. iv) Storage and distribution.	
UNIT IV	**Aquaculture and Probiotics**	1) Introduction and Definition. 2) History of probiotics. 3) Selection criteria for probiotics 4) Composition and dosages. 5) Potential of probiotics i) Pathogen inhibition ii) Growth promoters iii) Water quality maintenance 6) Overall significance of probiotics in aquaculture.	Use of probiotics in aquculture.

Specify Course Outcome: To study culture methods, fish feed and use of probiotics

Specify Program Outcome: To study the culture methods, fish feed and use of Probiotics.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. Deshmukh Shaziya.S.K.A **Department:** Fishery Science

Program: BSc TY **Subject:** Fishery Science **Course Code**: **CBCS Pattern**

SECFS III (A) Fish Feed Production Technology

Unit Number	**Unit Name**	**Topics**	**Unit-wise Outcome**
		1. Introduction 2. Importance of feed 3. Factors affecting feed design, production and feeding 4. Nutritional requirement of fishes 5. Formulated fish feed a. Ingredients for fish feed (Animal origin & plant origin) b. Feed Additives (Binders, antioxidents, antimicrobial agents, chemo attractants, feeding stimulants, Pigments, anabolic agents, miscellaneous) c. Fish Feed Formulation d. Feed types (Wet feed, Moist, Dry, Larval) e. Selection of ingredients f. Formulation of feed g. Feed processing (Premix processing, grinding, mixing, pelleting, extrusion cooking, cooling, drying, crumbling, fat spraying, bagging, storage, quality control) h. Storage i. Quality control	Different techniques have used for production of fish feed

Specify Course Outcome: To know the different techniques of fish feed production.

Specify Program Outcome: To know the different techniques of fish feed production.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. Deshmukh Shaziya .S.K.A **Department:** Fishery Science

Program: BSc TY **Subject:** Fishery Science **Course Code**: **CBCS Pattern**

Theory Paper – XIV Aquarium Keeping and Rearing Of Ornamental Fishes(A)

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Fish Aquarium**	1) Introduction 2) Types of aquarium. 3) Importance of aquarium. 4) Accessories of aquarium. 5) Aquarium fabrication. 6) Setting of aquarium.	Classification of aquarium
II		1) Care and maintenance of aquarium. 2) Aquarium water quality and management. 3) Aquarium plants. 4) Food for Aquarium fishes.	Management of aquarium
III		**1. Study of ornamental fishes** (Taxonomy general characters, food and feeding and breeding habits) A. Egg Layers i) Gold fish ii) Zebra iii) Koi carp vi) Angle v) Gourami B. Live Bearers i) Guppy ii) Mollies iii)Sword tail iv) Platies **2.Breeding and rearing of ornamental fishes:** i) Identification of brooders ii) Breeding behaviour iii) Induced breeding	Classification of aquarium fishes

		iv) Management of water quality In breeding and rearing of fishes. v) Transportation of ornamental fishes.	
IV	**Disease management of ornamental fishes**	(Symptoms, life cycle, and control measures) i. protozon disease ii. Bacterial disease iii. Crustecian disease iv. Fungal disease v. Helminth disesase	Diseases of ornamental fishes

Specify Course Outcome: Classification, management and disease of ornamental fishes.

Specify Program Outcome: Aquarium and its managements.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. S.U Kadam **Department:** Fishery Science

Program: BSc TY **Subject:** Fishery Science **Course Code**: **CBCS Pattern**

Theory Paper – XV Fish Economics, Marketing, Cooperative and Extension
(Elective B I)

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Fish economics:**	i) Definitions and principals of fisheries economics. ii) Terms in economics. iii) Demand. iv) Supply. v) Cost.	Understanding the fish economics
II	**Fish Marketing:**	i) Introduction and definition. ii) Characteristics of fish marketing. iii) Types of marketing : a) Traditional fish market. b) Modern fish market. iv) Types of distribution channel: a) Direct distribution channel. b) Indirect distribution channel. v) Marketing functions: a) Functions of exchange. b) Functions of physical supply. c) Facilitating functions. vi) Price structure and problems in fish marketing.	Define the marketing terms

III	**Fish Co-operatives:**	i) Definitions and principals of co-operative societies. ii) History of co-operatives movements in India. iii) Organs of co-operatives i) President ii) vice-presidents iii) Directors iv) Members v) Treasurer vi) Auditors vii) Types of meetings iv) Structure of fisheries co-operative society. i) Primary co-operative ii) Regional federation iii) State level federation iv) National federation v) Function of fishermen co-operative society vi) Problems of fishermen co-operative society and their remedial measures.	Functions of fish co- operatives
UNIT IV	**Fisheries Extension:**	i) Governments policies ii) Plans and programmes iii) Funding, Training and mass media iv) Socioeconomics condition of fishermen v) Role of FFDA vi) Role of remote sensing i) Direct methods ii) indirect methods vii) Exclusive economic zone (EEZ) viii) Fisheries institutions of India i) Central marine fisheries Research institute – CMFRI ii) Central institute of fisheries Technology – CIFT iii) Central institute of fisheries Education – CIFE iv) Central institute of freshwater Aquaculture – CIFA v) Fisheries survey of India - FSI vi) National institute for oceanography - NIO	To understand the fisheries extension

Specify Course Outcome: To illustrate meaning of economics, marketing, co-operative and extension

Specify Program Outcome: Different terms in economics, marketing and extension.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. Deshmukh Shaziya .S.K.A **Department:** Fishery Science

Program: BSc TY **Subject:** Fishery Science **Course Code**: **CBCS Pattern**

SEC IV (Theory) Fabrication of Aquarium (A)

Unit Number	Unit Name	Topics	Unit-wise Outcome
		1. Introduction 2. Types of aquarium 3. Different shape & sizes of aquarium 4. Accessories for aquarium fabrication 5. Fabrication of aquarium 6. Aquarium tank accessories 7. Setting of aquarium	To design the fish aquarium

Specify Course Outcome: Aquarium setting

Specify Program Outcome: To demonstrate the fish aquarium

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. Deshmukh Shaziya .S.K.A **Department:** Fishery Science

Program: BSc TY **Subject:** Fishery Science **Course Code**: **CBCS Pattern**

Paper Title: Practical Paper – XVI(Based on XII+XIV)

Unit Number	Unit Name	Topics	Unit-wise Outcome
		1) Identification, classification and commercial importance of following fishes. 1) Sardine 2) Mackeral 3) Bombay duck 4) Sole fish 5) Pomfreet 6) Ribbon fish 7) Hilsa 8) Mugil 2) Identification, classification and commercial importance of following Non fish organisms 1) Peanius indices 2) Peanius Monodon 3) Edible oyster 4) Pearl oyster 5) Sepia 6) Loligo 7) Chanks. 8) Mytilus 3) Study of fishing crafts and gears (Five each) 4) Identification penaeid and non penaeid prawns with sex. 5) Identify and describe the aquarium accessories with their use and maintains. (any five).	Classify the marine water fishes To demonstrate the fish aquarium

		6) Preparation of an aquarium tank of suitable size. 7) Setting of aquarium. 8) Maintenance of an aquarium. 9) Study of aquarium fishes (any five). 10] Study of aquarium plants (any five). 11] Study of fish pathogens	

Specify Course Outcome: Classify and demonstrate fish and aquarium**.**

Specify Program Outcome: To explain and demonstrated fish and aquarium.

Signature of Teacher

Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. S.U Kadam **Department:** Fishery Science

Program: BSc TY **Subject:** Fishery Science **Course Code**: **CBCS Pattern**

Paper Title: Practical Paper – XVII (B I) (Based on XIII+XV)

Unit Number	Unit Name	Topics	Unit-wise Outcome
		1) Study of cultivable fishes: Labeo ,Catla, Cirrhina, Chanos chanos, Sea bass, Clarius, Anabus, Channa, Heteropneustes fossilis 2) Non fish organisms - P. indicus , P.monodon, Crab 3) Study of phytoplankton and zooplanktons (Any 5) 4) Study of locally available feed ingredients (Any 5) 5) Formulation of fish feed 6) Estimation of crude protein from feed ingredients and feed. 7) Estimation of lipid from feed ingredients and feed. 8) Estimation of carbohydrate from feed ingredients and feed. 9) Estimation of vitamin from feed ingredients and feed.	Classify the bony fishes Analysied protein fat and carbohydrates

		10 Collection and submission of locally available feed ingredients. 11) Submission of prepared fish feed. 12) Calculate per hector income of fish production from given data. 13) Visit to fisheries co-operative society/ Fish market	

Specify Course Outcome: Classify and analysed fish and fish feed

Specify Program Outcome: Explain The cultivable fishes and fish feed.

Signature of Teacher