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: Fish Diseases Management

Unit Number	Unit Name	Topics	Unit-wise Outcome
I		1. Cause and development of fish diseases 2. General etiology of fish diseases 3. Extrinsic factors affecting fish health a. Water-associated:(safe levels of water quality) Dissolved oxygen, CO_2, Hardness, Ammonia, pH, Temperature b. Nutrition-associated; Deficiency of vitamin, protein, lipoid, minerals and starvation. 4. Common symptoms of stress 5. Effect of stress on a fish health	To know the water and nutrition associated diseases and its symptoms on fish health
II	**Types of fish diseases Infectious Fish Diseases: (Disease causing organism, symptoms and preventives measures)**	1. Bacterial Diseases: Dropsy and fin rot 2. Viral Diseases: Papillomatosis, Lymphocystosis and Infectious pancreatic necrosis (IPN) 3. Fungal Diseases:-Gill rot, Branchiomycosis (Dermal Mycosis, Branchial mycosis, Systemic mycosis) 4. Epizootic Ulcerative Syndrome (EUS) in fishes.	Different infectious fish disease Causing organisms symptoms and preventive measures
III	**Parasitic diseases of Fish**	{Disease causing organism, symptoms and preventives measures (Prophylaxis)} 1. Protozoan Diseases:-White spot (Ichthyophthiriasis) and costiasis. 2. Metazoan Diseases:	To know the Protozoan and metazoan and Crustacean parasitic disease in fishes

		a. Monogenic trematode parasites (Dactylogyrus, Gyrodactylus), b. Digenic trematodes (trematode larval and Neodiplostomum), c. Cestode parasites (Ligula and *Dibothriocephalus latus*), d. Nematodes and fish leeches. 3. Crustaceans diseases: Argulus and Learnia	
IV		1. Nutrition deficiency diseases: Avitaminosis, Mineral deficiency, Starvation. 2. Environmental induced diseases of fish. a) Gas bubble disease b) Oxygen deficiency, c) Thermal stress d) Stress due to pH variations; 3. Management practices to control fish diseases.	To know the environmental induce diseases in fishes and its managements.

Specify Course Outcome: To study fish disease and its management

Specify Program Outcome: To study the management practices to control the fish disease.

Signature of Teacher

Dnyanopasak Shikshan Mandal's
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Pro-forma for program and course outcomes (2.6.1)

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

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

Theory Paper - VII: Fish Developmental Biology

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Developmental biology**	1. Types of fishes based on reproduction: Oviparity, viviparity & ovo-viviparity 2. Gametogenesis in fishes: Oogenesis and spermatogenesis 3. Types of eggs 4. Fertilization of egg 5. Cleavage	To know fish gonads
II	**Developmental biology**	1. Morula 2. Blastula 3. Fate map of Blastula 4. Gastrulation 5. Hatching and post embryonic development.	To know the fish embryology
III	**Reproductive biology**	1. Sexual dimorphism in Fishes. 2. Parental care in fish 3. Maturity stages in male and female fish (Teleost) 4. Assessment of fecundity: i) Volumetric method ii) Gravimetric method iii) Von Bayer's methods 5. Study of Gonado Somatic Index (GSI).	To know the different reproductive assessment in fishes
IV	**Growth studies**	1. Introduction to growth 2. Factors affecting growth in fish 3. Ponderal index 4. Length- weight relationship 5. Methods for age and growth determination in fishes: a) Direct method b) Tagging method c) Marking method d) Counting rings on	To know the different methods of growth in fish

		hard body parts (Scale & otolith) e) Radio carbon uptake method f) RNA– DNA ratio method	

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

Specify Program Outcome: To study the fish developmental biology.

Signature of Teacher

Dnyanopasak Shikshan Mandal's
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Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. Deshmukh S .S. **Department:** Fishery Science
Program: BSc SY **Subject:** Fishery Science **Course Code**: CBCS Pattern

Theory Paper – VIII: Fish Preservation & Fish by Product Technology

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Fish spoilage**	1. Introduction 2. Biochemical composition of fish 3. Causes of fish spoilage: Chemical, Bacterial, Enzymatic 4. Post mortem changes in fish: Rigor Mortis 5. Test for freshness of fish: Chemical, organoleptic 6. Sources of contamination of fish.	To know the causes of fish spoilage
II	**Fish Preservation**	1. Introduction 2. Principles of preservation: - Washing, gutting, lowering the temperature, rising the temperature, dehydration, use of salt, use of preservatives. 3. Methods of Preservation:- a) Drying: Sun drying, Mechanical drying, Freeze drying b) Salting: Dry salting, Wet salting/ Brining, Kench salting, Mona salting, Pit salting c) Freezing: Plate freezing, Blast freezing, deep freezing, Quick freezing d) Chilling e) Storing in cold storage. f) Canning g) Smoking h) Pickling	To know the principle of fish preservation
III	**Fish Byproducts Technique:**	1. Different types of fish by-products: a) Fish oil: Body oil, liver oil b) Fish meal c) Fish Guanos d) Fish flour	To study Different fish byproducts

		e) Fish manure f) Prawn manure g) Fish glue h) Isinglass i) Fish Silage j) Fish skin	
IV	**Problems in fish preservation**	1. Denaturation due to freezing 2. Food poisoning and allergies from fish food. 3. Food poisoning from consumption poisonous fish. 4. Food poisoning of bacterial origin.	To know food poisoning and allergy from fish

Specify Course Outcome: To study the course of fish spoilage and its preservation.

Specify Program Outcome: To study different methods of preservation and byproduct techniques.

Signature of Teacher

Dnyanopasak Shikshan Mandal's
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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, Fishing Gear and Craft Technology

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Fishing Gears**	1. Introduction and classification of fishing gears 2. Fabrication of fishing gear 3. Material used in manufacture of fishing gear 4. Fishing gear accessories 5. Care, maintenance and preservation of fishing gear	To know different fishing gears.
II	**Fishing craft**	1. Introduction and classification of fishing craft 2. Material used for manufacture of fishing craft 3. Fishing craft accessories/deck equipments 4. Care and maintenance of fishing crafts 5. Different fishing crafts: i) Inland fishing crafts ii) Sea fishing crafts;	To know different fishing crafts
III	**Fishing Methods**	1. History/Evolution of Fishing 2. Methods of Fishing a. Traditional methods: Catching by hand, fishing by hunting, fishing by plant poisons, Hooks and lines fishing, Trolling b. Conventional Methods: i. Active netting: Cast net, Dip Net, Bag net, Drag net, Purse seine net, Trawl net, Rampani net	To know different fishing methods

		ii. Passive netting: Gill net, Drift net, Trammel net, Fixed bag net, Fixed traps	
IV	**Unconventional fishing methods and equipment's**	1. Unconventional fishing methods: a. Light Fishing b. Electro fishing c. Jigging 2. Equipments: a. Fish Finder/Ecosounder b. SONAR c. RADAR d. GPS e. Radio	To know the unconventional methods and its equipment's.

Specify Course Outcome: Study of different fishing gears and its methods.
Specify Program Outcome: Study of fishing gears and crafts.

Signature of Teacher

Dnyanopasak Shikshan Mandal's
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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. Isolation of microorganism's (bacteria & fungi) from fish (Streak plate method). 3. Preparation and identification of fish fungal parasites 4. Staining: Monochrome stating and Gram staining 5. Identification of spoiled and fresh fishes 6. Identification of fish parasites : a) Ichthyopthirius b) Pseudomonas bacteria c) Saprolagnia d) Branchiomyces e) Dactylogyrus f) Gyrodactylus g) Dibothryocephalus h) Ligula i) fish leech j) Argulus k) Larnaea 7. Fish processing: washing, gutting, cleaning of locally available fish 8. Preservation of locally available fish by mechanical drying method 9. Preservation of local available fish by Ratnagiri method 10. Estimation of fats 11. Estimation of proteins 12. Estimation of carbohydrates 13. Preparation of fish fry/fish curry/ fish pickles 14. Preparation of byproducts 15. Visit to fish market/fish processing unit	To study the chemical properties of water, planktons. . To study the fish diseases. To analyse the protein, fat, carbohydrates from fish body

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

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Pro-forma for program and course outcomes (2.6.1)

Name of Teacher: Dr. Deshmukh S.S **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. Study of embryonic development stages 2. Study of sexual dimorphism 3. Study of parental care in fishes 4. Study of gonads 5. Estimation of fish fecundity 6. Study of length weight relationship 7. Identification of spawn fry and fingerlings 8. Study of fishing gears (any four) 9. Study of fishing hooks & lines 10. Study of fishing crafts (any four) 11. Study of fishing gear accessories 12. Fabrication of fishing nets 13. Study of fishing crafts materials 14. Submission of prepare models of fishing crafts and gears 15. Visit to fish landing centers/ fish markets 16. Micro techniques: Block preparation, section cutting, staining of Ovary and Testes	To identify the different embryonic development in fishes. To know the different fishing crafts and gears and Micro techniques.

Specify Course Outcome: To study the embryonic development fishes and it's catching methods.

Specify Program Outcome: To study the different fishing crafts and gears and Micro techniques..

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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 –A: Manufacturing of fish by-products

Unit Number	Unit Name	Topics	Unit-wise Outcome
		1. Sorting and grading of fish catch 2. Fish Spoilage: causes of fish spoilage 3. Nutritional value of fish. 4. Biochemical composition of raw fish 5. Calorific value of fish. 6. Preparation of Fish manure, Fish meal, Fish body oil, Fish liver oil, Fish Maws & Isinglass, Fish Silage / Ensilage Fish Glue, Fish Gelatin, Pearl Essence 7. Preparation of prawn pickles, Fish pickle, clam pickle, 8. Preparation of Fermented Fish sauce. 9. Preparation of Dried prawn.	To study the different methods of manufacturing fish byproduct

Specify Course Outcome: To study manufacturing fish byproduct.

Specify Program Outcome: To study the different methods of manufacturing fish byproduct.

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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 c. Increasing the temperature d. Dehydration, e. Use of salts and Preservatives, f. 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