॥ सा विद्या या विमुक्तये ॥

# स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

'ज्ञानतीर्थ', विष्णुपुरी, नांदेड – ४३१ ६०६ (महाराष्ट्र राज्य) भारत

# SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

'Dnyanteerth', Vishnupuri, Nanded - 431 606 (Maharashtra State) INDIA

Established on 17th September, 1994, Recognized By the UGC U/s 2(f) and 12(B), NAAC Re-accredited with'B++' grade

**Phone: (02462)215541** **Academic-1 (BOS) Section** **website: srtmun.ac.in**

**E-mail: bos@srtmun.ac.in**

शैक्षणिक वर्ष २०२४–२५ पासून राष्ट्रीय शैक्षणिक धोरणानुसार लागू केलेल्या विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी प्रथम वर्षाच्या सुधारित (दुरूस्ती) अभ्यासक्रमा बाबत..

..

## प रि प त्र क

संदर्भ:– १. जा.क्र.शै–१/एनईपी/विवत्रंविपदवी/२०२४–२५/११२ दिनांक १२/०६/२०२४

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, संदर्भीय परिपत्रकान्वये दिनांक १५ मे २०२४ रोजी संपन्न झालेल्या मा. विद्यापरिषदेच्या बैठकीतील विषय क्र. १५/५९–२०२४ अन्वये मान्यता दिल्यानुसार विज्ञान व तंत्रज्ञान विद्याशाखे अंतर्गत राष्ट्रीय शैक्षणिक धोरणानुसार पदवी प्रथम वर्षाचे अभ्यासक्रम शैक्षणिक वर्ष २०२४–२५ पासून लागू करण्यात आलेले आहेत. तथापी वरील संदर्भीय परिपत्रका अन्वये प्रकाशित केलेल्या अभ्यासक्रमामध्ये अभ्यासमंडळानी किरकोळ दुरूस्ती करून अभ्यासक्रम सादर केला असून मा. अधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा यांच्या मान्यतेने दुरूस्ती केलेले खालील अभ्यासक्रम लागू करण्यात येत आहेत.

| | |
|---|---|
| 01 | B. Sc. I year Fishery Science |

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी, ही विनंती.

डॉ. सरिता लोसरवार
सहाय्यक.कुलसचिव
शैक्षणिक अभ्यासमंडळ विभाग

'ज्ञानतीर्थ' परिसर,

विष्णुपुरी, नांदेड – ४३१ ६०६.
**जा.क्र.:**शैक्षणिक–१/परिपत्रक/एनईपीयुजीदुरूस्ती/S&T/
२०२४–२५/299
**दिनांक :** १४.१०.२०२४

प्रत माहिती व पुढील कार्यवाहीस्तव.

०१. मा. अधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा, प्रस्तुत विद्यापीठ.
०२. मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
०३. मा. संचालक, सर्व संबधित संकुले, प्रस्तुत विद्यापीठ.
०४. मा. प्राचार्य, सर्व संबधित महाविद्यालये, प्रस्तुत विद्यापीठ.
०५.सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ. यानां देवून कळविण्यात येते की, सदरील परिपत्रक विद्यापीठाच्या संकेतस्थळावर प्रसिध्द करण्यात यावे.

# SWAMI RAM SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED - 431 606


**(Credit Framework and Structure of Four Year UG Program with Multiple Entry and Exit Option as per NEP-2020)**

## UNDERGRADUATE PROGRAMME OF SCIENCE & TECHNOLOGY

# SUB – FISHERY SCIENCE

**Major in DSC and Minor in DSM (Subject)**

## Under the Faculty of Science & Technology

***(Revised as per the Govt. Of Maharashtra circular dt. 13th March 2024)***

***With effect from June 2024***

***Effective from the Academic Year 2024 – 2025***
***(As per NEP-2020)***

स्वामी रामानंद तीर्थ
मराठवाडा विद्यापीठ, नांदेड

# *Details of the Board of Studies Members in the subject Fishery Science under the faculty of Science & Technology of S.R.T.M. University, Nanded*

| | | |
|---|---|---|
| **01.** | **Dr. Sunil Deoram Ahirrao**<br>Department of Fishery Science<br>Shri. Shivaji College, Parbhani | **Chairman** |
| **02.** | **Dr. Japrakash Manikrao Gaikwad**<br>Department of Fishery Science<br>Shri. Shivaji College, Parbhani | **Member** |
| **03.** | **Dr. K. S. Shillewar**<br>Department of Fishery Science<br>Science College, Nanded | **Member** |
| **04.** | **Dr. Seema Shesherao Korde,**<br>Department of Fishery Science<br>Azad Mahavidyalaya, Ausa, Dist. Latur. | **Member** |
| **05** | **Dr. Shivaji Prabhakar Chavan**<br>School of Life Sciences,<br>SRTM University Nanded | **Member** |
| **06.** | **Dr. Guiab D. Khedkar**<br>Dr. Babasaheb Ambedkar Marathwada University,<br>Sambhaji Nagar | **Member** |
| **07.** | **Dr. Madhuri Shrikant Pathak**<br>ICAR- Central Institute of Fisheries Education<br>(ICAR-CIFE) Panch Marg. Off Yari Road Mumbai | **Member** |
| **08.** | **Dr. Manoj M. Sharma**<br>F/ 17-18, Raj Green Heights, Behind ICICI bank, Rander Road,<br>Jahangirpura, Surat- 395005 | **Member** |
| **09.** | **Dr. N. G. Popatwar**<br>Department of Fishery Science<br>D.S.M. College, Jintur | **Invitee Member** |
| **10.** | **Dr. S. U. Kadam**<br>Department of Fishery Science<br>D.S.M. College, Parbhani | **Invitee Member** |
| **11.** | **Dr. Dhanaji Waman Patil**<br>Department of Fishery Science,<br>Toshniwal Arts Commerce and Science College, Sengaon, Dist. Hingoli | **Invitee Member** |
| **12.** | **Dr. Sandip Surendra Markad**<br>Department of Fishery Science<br>Toshniwal Arts Commerce and Science College, Sengaon, Dist. Hingoli | **Invitee Member** |
| **13** | **Kaldate Alka Bharat (UG Student)**<br>**C/o** Shri. Shivaji College, Parbhani | **Invitee Member**<br>As per MPUA u/s 40(2) (d)(E) |

# Swami Ramanand Teerth Marathwada University, Nanded

## *Faculty of Science & Technology*

## Subject: Fishery Science

## B.Sc. First Year Semester I (Level 4.5)

## Teaching Scheme Fishery Science

| Subject | Course Code | Course Name | Credits Assigned | | | Teaching Scheme (Hrs/ week) | |
|---|---|---|---|---|---|---|---|
| | | | Theory | Practical | Total | Theory | Practical |
| **Optional** | SFISCT1101 | Fish Posnd Construction and Management | 02 | -- | **02** | 02 | -- |
| | SFISCP1101 | Practical based on SFISCT1101 | -- | 02 | ***02*** | -- | 04 |
| **Generic Electives** *(from other Faculty)* | SFISGE1101 | Culture of Indian Major Carps | 02 | -- | **02** | 02 | -- |
| **Skill Based Course** (related to Major) | SFISSC1101 | Fish identification techniques | -- | 02 | **02** | -- | 04 |
| **Total Credits** | | | **04** | **04** | **08** | **04** | **08** |

# Swami Ramanand Teerth Marathwada University, Nanded

## *Faculty of Science & Technology*

## Subject: Fishery Science

## B.Sc. First Year Semester I (Level 4.5)

## Examination Scheme Fishery Science

[20% Continuous Assessment (*CA*) and 80% End Semester Assessment (*ESA*)]

*(For illustration we have considered a paper of 02 credits, 50 marks, need to be modified depending on credits assigned to individual paper)*

| Subject | Course Code | Course Name | Theory | | | | Practical | | Total Col (6+7)/ Col (8+9) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Continuous Assessment (CA) | | | ESA | | | |
| | | | Test 1 | Test 2 | Average of T1 & T2 | Total | CA | ESA | |
| ***01*** | ***02*** | ***03*** | **04** | **05** | **06** | **07** | **08** | **09** | **10** |
| **Optional** | SFISCT1101 | Fish Pond Construction and Management | 10 | 10 | 10 | **40** | -- | -- | **50** |
| | SFISCP1101 | Practical based on SFISCT1101 | -- | -- | -- | -- | 20 | 30 | **50** |
| **Generic Electives** *(from other Faculty)* | SFISGE1101 | Culture of Indian Major Carps | 10 | 10 | 10 | **40** | -- | -- | **50** |
| **Skill Based Course** (related to Major) | SFISSC1101 | Fish identification techniques | -- | -- | -- | -- | 20 | 30 | **50** |
| | | | | | | | | | **200** |

# Swami Ramanand Teerth Marathwada University, Nanded

## *Faculty of Science & Technology*

## Subject: Fishery Science

## B.Sc. First Year Semester II (Level 4.5)

## Teaching Scheme Fishery Science

| Subject | Course Code | Course Name | Credits Assigned | | | Teaching Scheme (Hrs/ week) | |
|---|---|---|---|---|---|---|---|
| | | | Theory | Practical | Total | Theory | Practical |
| **Optional** | SFISCT1151 | Freshwater fish culture system | 02 | -- | **02** | 02 | -- |
| | SFISCP1151 | Practical based on SFISCT1151 | -- | 02 | ***02*** | -- | 04 |
| **Generic Electives** *(from other Faculty)* | SFISGE1151 | Freshwater fish breeding techniques | 02 | -- | **02** | 02 | -- |
| **Skill Based Course** (related to Major) | SFISSC1151 | Fish processing and preservation | -- | 02 | **02** | -- | 04 |
| **Total Credits** | | | **04** | **04** | **08** | **04** | **08** |

# Swami Ramanand Teerth Marathwada University, Nanded

## *Faculty of Science & Technology*

## Subject: Fishery Science

## B.Sc. First Year Semester II (Level 4.5)

## Examination Scheme Fishery Science

[20% Continuous Assessment (*CA*) and 80% End Semester Assessment (*ESA*)]

*(For illustration we have considered a paper of 02 credits, 50 marks, need to be modified depending on credits assigned to individual paper)*

| Subject | Course Code | Course Name | Theory | | | | Practical | | Total Col (6+7)/ Col (8+9) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Continuous Assessment (CA) | | | ESA | | | |
| | | | Test 1 | Test 2 | Average of T1 & T2 | Total | CA | ESA | |
| ***01*** | ***02*** | ***03*** | **04** | **05** | **06** | **07** | **08** | **09** | **10** |
| **Optional** | SFISCT1151 | Freshwater fish culture system | 10 | 10 | 10 | **40** | -- | -- | **50** |
| | SFISCP1151 | Practical based on SFISCT1151 | -- | -- | -- | -- | 20 | 30 | **50** |
| **Generic Electives** *(from other Faculty)* | SFISGE1151 | Freshwater fish breeding techniques | 10 | 10 | 10 | **40** | -- | -- | **50** |
| **Skill Based Course** (related to Major) | SFISSC1151 | Fish processing and preservation | -- | -- | -- | -- | 20 | 30 | **50** |
| | | | | | | | | | **200** |

# Swami Ramanand Teerth Marathwada University, Nanded

## Faculty of Science and Technology

## UNDERGRADUATE PROGRAMME

### Subject: Fishery Science

---

**Course pre-requisite:**

1. Students should have a 10+2 (HSC) Examination passed.

2. Students should have Science subjects at HSC level examination

**Course objectives:**

1.To get the knowledge of induced breeding technique and fish seed production.

2.To get the knowledge fish farm construction and management.

3.To get the knowledge of hatcheries management.

4.To acquire the techniques regarding the fish culture methods.

**Course outcomes**:

1.Students will understand details about fish identification techniques

2. Students will get knowledge of Pond construction and management.

3. Students will get knowledge of Aquaculture and fish breeding Technology.

4. Students can start own fish farm and Ornamental fish production center.

**Swami Ramanand Teerth Marathwada University, Nanded**
**Faculty of Science and Technology,**

**Four Year UG Program, Fishery Science (w.e.f. 2024)**
**B.Sc. FY Semester-I**
***SYLLABUS***

**Periods: 30** **No. of Credits: 02** **Marks: 50**

## Major course (Optional) (Theory)

## SFISCT 1101: Fish Pond Construction and Management

| Module | Unit | Title of topic | hrs |
|---|---|---|---|
| | | **Survey for fish farm construction site** | |
| | 1.1 | Selection of site | |
| 1 | 1.2 | Topography | |
| | 1.3 | Soil type | 8 |
| | 1.4 | Water quality and supply | |
| | 1.5 | Physico chemical and biological factors affecting fish production | |
| | | **Layout and design of different types of pond** | |
| | 2.1 | Breeding pond | |
| 2 | 2.2 | Hatching pond | 7 |
| | 2.3 | Nursery pond | |
| | 2.4 | Rearing pond | |
| | 2.5 | Stocking pond | |
| | | **Pre stocking Management** | |
| | 3.1 | i.Drying, ii. Ploughing, iii. Liming, iv. Manuring, v. Fertilization | |
| 3 | 3.2 | Eradication of aquatic weeds | |
| | 3.3 | Eradication of predatory and weed fishes | 7 |
| | 3.4 | Eradication of predatory insects and animals | |
| | | **Stocking and Post stocking Management** | |
| | 4.1 | Seed selection | |
| | 4.2 | Acclimatization | |
| | 4.3 | Conditioning | |
| | 4.4 | Stocking fish seed | |
| 4 | 4.5 | Post-stocking Management: | 8 |
| | 4.6 | Food and feeding management | |
| | 4.7 | Water quality management | |
| | 4.8 | Disease management | |
| | 4.9 | Harvesting | |

**Swami Ramanand Teerth Marathwada University, Nanded**
**Faculty of Science and Technology,**

**Four Year UG Program, Fishery Science (w.e.f. 2024)**
**B.Sc. FY Semester-I**
***SYLLABUS***

| **Periods: 60** | **No. of Credits: 02** | **Marks: 50** |
|---|---|---|

## Major course (Optional) (Practical)

## SFISCP1101 Practical based on SFISCT1101 (Fish Pond Construction and Management)

| **Module** | **Unit** | **Title of Practical** | **hrs** |
|---|---|---|---|
| 1 | 1 | Estimation Dissolved Oxygen from pond water | 60 |
| | 2 | Estimation Dissolved carbon dioxide from pond water | |
| | 3 | Estimation Dissolved salinity from pond water | |
| | 4 | Estimation alkalinity from pond water | |
| | 5 | Study of phytoplankton and zooplanktons | |
| | 6 | Identification of predatory and Weed fishes (Any three) | |
| | 7 | Identification predatory insects (Any three) | |
| | 8 | Identification of aquatic weeds (Any three) | |
| | 9 | Identification of fish feed ingredient (Any three) | |
| | 10 | Dissection of any locally available teleost: Digestive System | |
| | 11 | Visit to fish farm and submission of report | |
| | 12 | Preparation and submission of layout plan of fish farm | |

**Swami Ramanand Teerth Marathwada University, Nanded**
**Faculty of Science and Technology,**

**Four Year UG Program, Fishery Science (w.e.f. 2024)**
**B.Sc. FY Semester-I**
***SYLLABUS***

**Periods: 30** **No. of Credits: 02** **Marks: 50**

## Generic Elective (Theory)

## SFISGE 1101 (2 Credit) Culture of Indian Major Carps

| Module | Unit | Title of topics | hrs |
|---|---|---|---|
| | | **History of Pisciculture** | |
| | 1.1 | Aims, Objective, scope and importance of pisciculture | |
| 1 | 1.2 | Water quality for fish culture | |
| | 1.3 | Types of cultivable fishes | 7 |
| | 1.4 | Qualities of cultivable fishes | |
| | | **Introduction to culture practices** | |
| | 2.1 | Culture based on commercial consideration | |
| | 2.2 | Extensive culture | |
| 2 | 2.3 | Intensive culture | 8 |
| | 2.4 | Semi-intensive culture | |
| | 2.5 | Cold and warm water fish culture. | |
| | | **Fish culture systems** | |
| | 3.1 | Pond culture | |
| 3 | 3.2 | Reservoir fish culture | 8 |
| | 3.3 | Paddy fish culture. | |
| | 3.4 | Pen culture | |
| | | **Introduction to modern fish culture methods** | |
| | 4.1 | Raceway culture | |
| 4 | 4.2 | Cage culture | 7 |
| | 4.3 | Biofloc fish culture | |
| | 4.4 | Aquaponics fish culture | |

**Swami Ramanand Teerth Marathwada University, Nanded**
**Faculty of Science and Technology,**

**Four Year UG Program, Fishery Science (w.e.f. 2024)**
**B.Sc. FY Semester-I**
***SYLLABUS***

| **Periods: 30** | **No. of Credits: 02** | **Marks: 50** |
|---|---|---|

## Skill Based Course (Practical)

### SFISSC 1101: Fish identification techniques

| Module | Unit | Title of topic | hrs |
|---|---|---|---|
| 1 | 1 | Introduction to fish classification | 60 |
| | 2 | Methods of fish preservation for museum study | |
| | 3 | Fish and its general characters | |
| | 4 | Fin and its types | |
| | 5 | Body forms in fishes | |
| | 6 | Types of scales in fishes | |
| | 7 | Fish identification technique –Definitions and measurements | |
| | 8 | Fish identification based on morphometric characters (any 4) | |
| | 9 | Fish identification based on meristic characters (any 4) | |
| | 10 | Collection of different types of fishes and their submission | |
| | 11 | Visit to fish market and submission of report. | |

**Swami Ramanand Teerth Marathwada University, Nanded**
**Faculty of Science and Technology,**

**Four Year UG Program, Fishery Science (w.e.f. 2024)**
**B.Sc. FY Semester-II**
***SYLLABUS***

| **Periods: 30** | **No. of Credits: 02** | **Marks: 50** |
|---|---|---|

## Major course (Optional) (Theory)

## SFISCT1151- Freshwater Fish Culture

| Module | Unit | Title of topics | Hrs |
|---|---|---|---|
| 1 | | **Introduction to aquaculture.** | 7 |
| | 1.1 | Objective scope and importance of aquaculture | |
| | 1.2 | Water quality for fish culture | |
| | 1.3 | Types of cultivable fishes | |
| | 1.4 | Qualities of cultivable fishes | |
| 2 | | **Induced breeding by hypophysation** | 7 |
| | 2.1 | History of induced breeding | |
| | 2.2 | Identification & selection of brooders | |
| | 2.3 | Dissection and removal of pituitary gland | |
| | 2.4 | Preservation and storage of pituitary gland | |
| | 2.5 | Preparation of gland suspension for injection and dosage | |
| | 2.6 | Hormones responsible for induced breeding | |
| | 2.7 | Synthetic hormones used in induced breeding | |
| 3 | | **Types of fish culture** | 8 |
| | 3.1 | Fish culture in pond | |
| | 3.2 | Fish culture in paddy fields | |
| | 3.3 | Fish culture in pens | |
| 4 | | **Introduction to modern fish culture methods** | 8 |
| | 4.1 | Extensive culture | |
| | 4.2 | Intensive culture | |
| | 4.3 | Semi intensive culture | |
| | 4.4 | Raceway culture | |
| | 4.5 | Cage Culture | |
| | 4.6 | Recirculatory Aquaculture System(RAS) | |
| | 4.7 | Biofloc culture | |

**Swami Ramanand Teerth Marathwada University, Nanded**
**Faculty of Science and Technology,**

**Four Year UG Program, Fishery Science (w.e.f. 2024)**
**B.Sc. FY Semester-II**
***SYLLABUS***

| **Periods: 30** | **No. of Credits: 02** | **Marks: 50** |
|---|---|---|

## Major course (Optional) (Practical)

## SFISCP1151 Practical based on SFISCT1151 (Freshwater Fish Culture)

| Module | Unit | Topic of practicals | hrs |
|---|---|---|---|
| 1 | 1 | Identification of seeds-spawn, fry and fingerlings | 60 |
| | 2 | Study and definitions of various morphometric and meristic dimensions of fish. | |
| | 3 | Morphometric study of bony fishes ( any 4 ) | |
| | 4 | Meristic study of bony fishes (any 4) | |
| | 5 | Taxonomical study of Indian Major Carps:<br>Catla catla<br>Labeo rohita<br>Cirrhinus mrigala | |
| | 6 | Taxonomical study of Exotic Carps:<br>Hypophthalmichthys molitrix<br>Ctenopharyngodon idella<br>Cyprinus carpio | |
| | 7 | Study of weed fishes(any 3) | |
| | 8 | Permanent mounting Cycloid and Ctenoid scales (Submission) | |
| | 9 | Permanent mounting Placoid scales (Submission) | |
| | 10 | Preparation of pituitary gland extract and doses of injection. | |
| | 11 | Visit to fish market and submission of report. | |

**Swami Ramanand Teerth Marathwada University, Nanded**
**Faculty of Science and Technology,**

**Four Year UG Program, Fishery Science (w.e.f. 2024)**
**B.Sc. FY Semester-II**
***SYLLABUS***

**Periods: 60** **No. of Credits: 02** **Marks: 50**

## Generic Elective (Theory)

## SFISGE1151- Freshwater fish breeding techniques

| Module | Unit | Title of topics | Hrs |
|---|---|---|---|
| 1 | | **Breeding techniques** | 6 |
| | 1.1 | Introduction to Bundh breeding . | |
| | 1.2 | Types of bundhs – | |
| | | i) Wet bundh ii) Dry bundh iii) Modern bundh | |
| | 1.3 | Artificial fertilization by stripping | |
| | | i)Dry Method ii) Wet Method | |
| 2 | | **Induced breeding by hypophysation** | 8 |
| | 2.1 | History of induced breeding | |
| | 2.2 | Identification & selection of brooders | |
| | 2.3 | Dissection and removal of pituitary gland | |
| | 2.4 | Preservation and storage of pituitary gland | |
| | 2.5 | Preparation of gland suspension for injection and dosage | |
| | 2.6 | Hormones responsible for induced breeding | |
| | 2.7 | Synthetic hormones used in induced breeding | |
| 3 | | **Hatcheries and management (Principle, structure and management)** | 7 |
| | 3.1 | Hatching happa | |
| | 3.2 | Glass jar hatchery | |
| | 3.3 | CIFE D 80 model (Dwivedi – 80) | |
| | 3.4 | Chinese circular hatchery | |
| 4 | | **Fish seed transportation** | 8 |
| | 4.1 | Open transportation system | |
| | 4.2 | Close transportation system | |
| | 4.3 | Causes of mortality in transportation | |
| | 4.4 | Use of chemicals in live-fish transportation | |
| | 4.5 | Aesthetic drugs use in transport | |
| | 4.6 | Antiseptic and antibiotics used in transportation. | |

**Swami Ramanand Teerth Marathwada University, Nanded**
**Faculty of Science and Technology,**

**Four Year UG Program, Fishery Science (w.e.f. 2024)**
**B.Sc. FY Semester-II**
***SYLLABUS***

**Periods: 60** **No. of Credits: 02** **Marks: 50**

## Skill Based Course (Practical)

## SFISSC1151 Fish Processing and Preservation

| Module | Unit | Topic | Hrs |
|---|---|---|---|
| | 1 | Fish Processing: | |
| | | Washing, | |
| | | Gutting, | |
| | 2 | Lowering the temperature, | |
| | 3 | Rising the temperature, | |
| | 4 | Dehydration, | |
| | | Salting, | |
| | | Drying, | |
| | 5 | Use of preservatives, | 60 |
| | 6 | Methods of Preservation:- | |
| | 7 | Drying: Sun drying, Mechanical drying. | |
| | 8 | Salting: Dry salting, Wet salting | |
| | 9 | Cold storage. | |
| | 10 | Canning | |
| | 11 | Smoking | |
| | 12 | Pickling | |

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED**
**B. Sc. First Year (NEP 2020)**
**Effective from June 2024**
**Semester- I**
**Subject: - Fishery Science**
**SFISCP 1101 based on SFISCT 1101**
**Fish Pond Construction and Managements**

**Time: 4 hrs.** **Marks: 30**
**Batch No:** **Date:**

---

Q.1) Dissect given fish so as to expose …….System (any locally available fish) **8**

Q.2) Analyze given water sample for estimation of Dissolved Oxygen/Free Carbon Dioxide/Salinity/Alkalinity 6

Q.3) Identify and comment on predatory insects and aquatic weeds (Any two) **6**

Q.4) Identify and comment on fish feed ingredient (Any two) **4**

Q.5) Identify and comments on planktons (Any two) **6**

.

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED**

**B. Sc. First Year (NEP 2020)**

**Effective from June 2024**

**Semester- II**

**Subject: - Fishery Science**

**SFISCP1151 based on SFISCT 1151 Freshwater Fish Culture**

**Time: 4 hrs.** **Marks: 30**

**Batch No:** **Date:**

---

| | | |
|---|---|---|
| Q.1) | Dissect given fish to expose …… system. | **09** |
| Q.2) | Permanent Mounting and identification of scales | **06** |
| Q.3) | Define and measure morphometric and meristic characters from the given fish (Five each) | **05** |
| Q.4) | Identify, Classify and describe given fish specimen (Any Two) | **06** |
| Q.5) | Identify and comment on fish seed (Any two) | **04** |

## References


1. Jagtap H.S.,Mukherjee S.N. and V.K.Garad.A Text Book of Pisciculture &Aquarium keeping,Daya Publishing House,New Delhi.
2. Jagtap H.S, Mukherjee, S.N. and Nanaware S.S. , Practical manual of Pisciculture &Aquarium keeping, Daya Publishing House,New Delhi.
3. Ninawe,.A.S. and Khedkar G.D.(2010) Nutrition in aquaculture.Narendra Publishing House,New Delhi.
4. Balkhande Jayvardhan v.(2016) A Text Book of Applied Zoology, Aruna Prakashan,Latur
5. Mohekar A.D. Kamble S.M.Bhawagan H.K.and Chinte D.N. (2013) Manual of Fishery Science, Geeta Prakashan,Ramkote ,Hyderabad.
6. Chinte D.N. Text Book of Fish Pathology and Parasitology, Geeta Prakashan,Ramkote ,Hyderabad.
7. Ahirrao S.D. Fish and Fisheries of Marathwada region, Int. Society of Science and Technology, Mumbai
8. Edward A. Laws (2018). Aquatic Pollution: An Introductory Text, John Wiley & Sons, Ltd, UK: 740p.
9. Gowhar Hamid Dar, Khalid Rehman Hakeem, Mohammad Aneesul Mehmood and
10. F.W.Owa (2014). Water pollution: sources, effects, control and management, International Letters of Natural Sciences, 3: 1-6
11. Handbook of Fisheries and Aquaculture. 2006. Published by Indian Councilof Agricultural Research, New Delhi, KAB-I, Pusa, New Delhi.
12. Gopakumar, K. 2006. Trade and Export of Fishery Products. In: Handbookof Fisheries and Aquaculture. ICAR pp. 633
13. Korde S.S. Practical Manual of Fishery Science, Knowledge Factory Publication,Latur.14. Ahirrao
14. S.D. Text Book of Water Analysis, International Society of Science and Technology, Mumbai
15. Ahirrao S.D. Fish Feed Production Technology, International Society of Science and Technology, Mumbai

16. Kiran Shillewar, D.V. Totawar, 2015.A Hand Book of Fishery Science, Creative Publication, Nanded.Maharashtra
17. Kiran Shillewar, D.V. Totawar, A Hand Book of Fishery Science, 2016, Research India Publication, Rohini Sector-16, Delhi
18. Ramachandra T V, 2009. Municipal Solid Waste Management, TERI Press, NewDelhi
19. McDougall, F. R., White, P. R., Franke, M., and Hindle, P. 2001. Integrated SolidWaste Management: A Life Cycle Inventory, Blackwell Science, UK.
20. Balachandran K.K. (2012). Post harvest technology of Fish and fish products, Daya Publishing house, New Delhi. 440
21. Venugopal,V. F. Shahidi & Dr. Tung-Ching Lee (1995) Value added products from underutilized fish species
22. YadavB. M: Fish and Fisheries, Daya Publishing House, New Delhi
23. Korde S.S. A text book of Pisciculture, Knowledge Factory Publication,Latur.
24. Korde S.S. A text book of Genetics, Shaurya Publication,Latur.
25. A.S. Ninawe and K. Rathnakumar (2008). Fish Processing Technology And Product Development, Narendra Publishing House: 562.
26. Jhingran, V. G. (1975). Fish & Fisheries of India. Hindustan Publishing Corporation(India).
27. Kiran shillewar,D.V. Totawar A Text Book of Fish Seed Production, 2018, Lambert Academic Publishing , Beau Bassin, Mauritius, Germany
28. Kiran Shillewar, D.V. Totawar, A Hand Book of Aquarium Fishes,2019, Research India Publication, Rohini Sector-16, Delhi
29. Methodology for water analysis – Indian Association of Aquatic biology
30. Reday K.R. & Babre M.G. (2010). General topies in Fishery Science.
31. Reday K.R. & Babre M.G. Manual in fishery science
32. C.V. Kurian and V.O. Sebastian. Prawns and prawn Fisheries of India:
33. C W. EMMENS (1993): Keeping and Breeding Aquarium Fishes, academic press inc., publishers, New York.
34. Fundamentals Of Fish Taxonomy - By K.C. Jayaram

35. Korde S.S.Wallago attu- Fresh water Shark, Lulu Publication,USA
36. Kiran Shillewar, D.V. Totawar, Fabrication of Aquarium, 2018, Research India Publication, Rohini Sector, Delhi
37. C.J.Hiware and S.R.Sonawane. Hand Book of fish aquarium.
38. S.P.Chavan,M.S.Kadam, and S.D.Niture. Aquaculture and aquarium keeping.
39. Fish catching methods of the world / edited by O.Gabriel, K. Lange, E. Dahm & T.Wendt. – 4th ed
40. Kiran Shillewar, D.V. Totawar, A Hand Book of Fishery Science (III rd Edition) 2021, BlueRose Publication, New Delhi
41. Kiran Shillewar, D.V. Totawar,Manual of Fishery Science, 2023, Lambert Academic Publishing, Mauritius, Germany
42. Archana Sinha and Pramod Kumar Pandey (2021). Breeding and Culture of Freshwater Ornamental Fish, New India Publishing Agency, New Delhi
43. An introduction to fishes-S.S. Khanna,central book depot.Allahabad
44. A textbook of fish and,fisheries and technology-K.P. Biswas,Narendra publishing house,N.Delhi.
45. A textbook of fishery science and Indian fisheries-C.B.L. Shrivastava
46. Applied fishery science-vol.I,II,S.M.Shafi.Atlantic publishers and distributors, N. Delhi General and applied ichthyology-S.K. Gupta S.Chand publishing company, N. Delhi
47. Fish and Fisheries-Pandey Shukla, Rastogi publication,Meerut