



॥ 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

स्वामी रामानंद तीर्थ  
मराठवाडा विद्यापीठ, नांदेड

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

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विज्ञान व तंत्रज्ञान विद्याशाखेतील बी. व्होक. (व्होकेशनल कोर्सेसचे) पदवी द्वितीय वर्षाचे अभ्यासक्रम शैक्षणिक वर्ष २०२१-२२ पासून लागू करणे बाबत.

### परिपत्रक

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, दिनांक २३ मे २०२२ रोजीच्या विज्ञान व तंत्रज्ञान विद्याशाखेच्या बैठकीतील शिफारशी नुसार व मा. विद्यापरिषदेच्या दिनांक २५ जून २०२२ रोजीच्या बैठकीतील विषय क्रमांक १६/५४-२०२२ च्या ठरावानुसार बी. व्होक. (व्होकेशनल) पदवीच्या खालील अभ्यासक्रमांस शैक्षणिक वर्ष २०२१-२२ पासून लागू करण्यास मान्यता देण्यात आली आहे.

1. B. Voc. Dairy Technology II year
2. B. Voc. Dairy Farming II year
3. B. Voc. Skill Based Zoology II year

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या [www.srtmun.ac.in](http://www.srtmun.ac.in) या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी. ही विनंती.

जा.क्र.:शैक्षणिक-१/परिपत्रक/व्होकेशनल अभ्यासक्रम/N-  
२०२१-२२/४३०

दिनांक : १२.०७.२०२२

प्रत माहिती व पुढील कार्यवाहीस्तव :

- १) मा. मा अधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा, प्रस्तुत विद्यापीठ.
- २) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
- ३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
- ४) अधीक्षक, परीक्षा विभाग विज्ञान विद्याशाखा, प्रस्तुत विद्यापीठ.
- ५) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ याना देवून कळविण्यात येते की, सदरील परिपत्रक व अभ्यासक्रम विद्यापीठ संकेतस्थळावर प्रसिध्द करण्यात यावे.

स्वाक्षरित

सहा.कुलसचिव

शैक्षणिक (१-अभ्यासमंडळ) विभाग

Kingdom Animalia is amongst the five kingdoms of life defined by R. H. Whitaker in his classification system. Amongst several specializations available for students studying zoology, Pearl culture, Apiculture, Sericulture, Vermicomposting are some of those which have potential to become source of employment at their own places without moving to cities in search of it.

The university and UGC have granted the college with B. Voc. Course as a vocational course so that the students withstand the challenging situations of unemployment.

THE SALIENT FEATURES:

Pearl culture, Apiculture, Sericulture, *Azolla* culture and vermicomposting are the compulsory papers in the course. It requires more time for pearl to be formed, cocoon of silk to be formed and honey to be deposited than *Azolla* culture and vermicomposting to happen hence the subjects Pearl culture, Sericulture and Apiculture have been included in first and second years respectively. And *Azolla* culture and Vermicomposting in last third year.

The structure of syllabus duration has been mentioned in the following table:

Kingdom Animalia is amongst the five kingdoms of life defined by R. H. Whitaker in his classification system. Amongst several specializations available for students studying zoology, Pearl culture, Apiculture, Sericulture, Vermicomposting are some of those which have potential to become source of employment at their own places without moving to cities in search of it.

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The structure of syllabus duration has been mentioned in the following table:

Year	Semester	Course Name
B.Voc. Second Year	III	<i>Azolla</i> culture
B. Voc. Second Year	III	Vermicomposting
B. Voc. Second Year	III	Recirculatory aquaculture system (For pearl)

		culture)
B. Voc. Second Year	IV	Utility of <i>Azolla</i>
B. Voc. Second Year	IV	Vermicomposting byproducts
B. Voc. Second Year	IV	Spirulina culture

Utility of the courses (*Azolla* Culture):

Subjects involved in Skill based zoology are equipped to make student earn money out of very less investment and increase their faith in studying traditional subjects. The students can also persuade M. Voc. in future for their post graduate program. Although the topic of *Azolla* culture is related to plants (Botany) it is useful for students to be fed to milking animals like cows, buffalos and goats. Thus the subject will automatic bring back faith of students in animals and thus will add to their source of earning via increased milk production. This can be achieved as adding 100gms of *Azolla* every day to the fodder of these animals can increase milk yield by about 2 liters.

Learning objectives:

- Introduction to Pteridophytes
- Principals of *Azolla* culture
- Demonstration of making of *Azolla* bed
- Identification of different species of *Azolla*
- Visits to sites of usage of *Azolla* as fodder (KVKT)
- Management of *Azolla* bed in all the seasons

Practical:

- To improve skills of students in *Azolla* culture.
- To visit sites where the success in the field has been achieved.
- To equip students with the necessary skills in maintaining *Azolla* bed in every season.
- To Acquaint students with marketing of *Azolla* culture

Prerequisites:

The study of subjects being offered under the Skill Based Zoology requires basic knowledge of biology as elaborated below.

Basic knowledge about occurrence of Pteridophytes in nature.

Knowledge about sell of harvested *Azolla* and its usage.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Skill Based Zoology

B. Voc. Second year

Skill Based Zoology

Semester V

Title of Paper: *Azolla* culture

Periods: 45

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Semester I

**Unit I:** Taxonomy: Classification of Pteridophytes 11

Classification of Pteridophytes with special emphasis on various species belonging to genus *Azolla*.

Understanding ecosystem of *Azolla*.

**Unit II:** Principles of *Azolla* culture: Introduction to different shape and sizes of *Azolla* 12  
culture ponds.

Standardization of water quality parameters.

**Unit III:** Field visits 10

Visits to different *Azolla* culture sites (Krishi Vigyan Kendra, Tondapur).

Collection of *Azolla* cultures by visits to different KVKs.

**Unit IV:** Factors affecting *Azolla* growth and its use as fodder: 12

Introduction to different chemical (Single Super Phosphate) and biological factors (Cow dung and Cow urine) that affect *Azolla* growth.

Use of *Azolla* as milking animal's fodder and installation of the units at farms related to students.

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Skill Based Zoology

B. Voc. Second year

Skill Based Zoology

Semester V

Title of Paper: Practicals based on *Azolla* culture.

Periods: 45

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- |  |    |
|--|----|
| 1. To improve skills of students in <i>Azolla</i> culture.                                       | 9  |
| 2. To visit sites where the success in the field has been achieved.                              | 9  |
| 3. To equip students with the necessary skills in maintaining <i>Azolla</i> bed in every season. | 12 |
| 4. To understand factors affecting <i>Azolla</i> culture (Cow dung and Single super phosohate).  | 9  |
| 5. To Acquaint students with marketing of <i>Azolla</i> culture                                  | 6  |

#### Utility of the courses (Vermicomposting):

Subjects involved in Skill based zoology are equipped to make student earn money out of very less investment and increase their faith in studying traditional subjects. The students can also persuade M. Voc. in future for their post graduate program. Vermicomposting finds its application in agriculture and horticulture practices. The subject will promote students to be volunteers in praising organic farming over traditional farming techniques. This can be achieved as teaching about various research papers published in the subject.

#### Learning objectives:

- Introduction to Annelids
- Principles of Vermicomposting
- Demonstration of making Vermicomposting bed
- Identification of different species of earthworms
- Management of Vermicomposting bed in all the seasons

#### Practical:

- To improve skills of students in Vermicomposting.
- To visit sites where the success in the field has been achieved.
- To equip students with the necessary skills in maintaining Vermicomposting bed in every season.
- To Acquaint students with marketing of Vermicompost, Vermiwash and Earthworms

#### Prerequisites:

The study of subjects being offered under the Skill Based Zoology requires basic knowledge of biology as elaborated below.

Basic knowledge about occurrence of Earthworms in nature.

- Knowledge about sell of harvested Vermicompost, Vermiwash and Earthworms

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Skill Based Zoology

B. Voc. Second year

Skill Based Zoology

Semester V

Title of Paper: Vermicomposting

Periods: 45

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Semester I

**Unit I:** Taxonomy: Classification of Annelids

Classification of Annelids with special emphasis on various species belonging to genus *Eisenia*

Understanding importance of Vermicomposting in Agricultureecosystem. 12

**Unit II:** Principals of Vermicomposting. Introduction to different shape and sizes of containers for Vermicomposting (Cement and Plastic).

Cooling of content to be put for Vermicomposting 12

**Unit III:** Field visits

Visits to different Vermicomposting sites (Krishi Vigyan Kendra, Tondapur).

Collection of worms from different sites. 9

**Unit IV:** Factors affecting capacity of earthworms to convert organic mass in to vermicompost

Use of Vermicompost in making soil fertile and installation of the units at the farms of agriculture related students. 12

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Skill Based Zoology

B. Voc. Second Year

Skill Based Zoology

Semester V

Title of Paper: Practicals based on Vermicomposting

Periods: 45

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|---|----|
| 1. To improve skills of students in Vermicomposting culture.                                      | 9  |
| 2. To visit sites where the success in the field has been achieved.                               | 9  |
| 3. To equip students with the necessary skills in maintaining Vermicomposting bed in every season | 12 |
| 4. To understand factors affecting Vermicomposting  | 9  |
| 5. To Acquaint students with marketing of Vermiwash and Vermicompost                              | 6  |



Utility of the courses (Recirculatory Aquaculture System: RAS):

Recirculatory Aquaculture System is a technology by which water is recycled and reused after mechanical and biological filtration and removal of suspended matter and metabolites. The method is used for high-density culture of various species of fish using minimum land area and water.

Learning objectives:

- Learning how to extend durability of tanks and equipments.
- Reduced dependency on antibiotics and therapeutants hence getting high quality aquaculture products.
- Principles of working of RAS
- Demonstration of making Recirculatory Aquaculture System.
- Focusing on long life survival of bivalves in RAS in all seasons.

Practical:

- To improve skills of students in Making RAS.
- To visit sites where the success in the field has been achieved.
- To equip students with the necessary skills in maintaining RAS in every season.
- To Acquaint students with marketing of RAS to the bivalve rearing farmers

Prerequisites:

The study of subjects being offered under the Skill Based Zoology requires basic knowledge of biology as elaborated below.

To gain basic knowledge about occurrence need of RAS in bivalve culture.

- Knowledge about sell RAS to bivalve rearing farmers.

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Skill Based Zoology

B. Voc. Second Year

Skill Based Zoology

Semester V

Title of Paper: RAS

Periods: 45

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Semester I

**Unit I:** Understanding mechanism of working of RAS.

Understanding working of mechanical filter.

Understanding working of biological filter and removal of ammonia.

**Unit II:**

Understanding working of ozone and UV treatment plant.

To understand working of aerator and CO<sub>2</sub> removal from the plant.

**Unit III:** Field visits

To understand advantages and disadvantages of working of RAS.

To understand biology of suitable animals for RAS.

**Unit IV:** Factors affecting reproductive capacity of bivalves

Making of high protein containing food for bivalves

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Skill Based Zoology

B. Voc. Second Year

Skill Based Zoology

Semester V

Title of Paper: Practicals based on RAS.

Periods: 45

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1. Making of homemade mechanical filters.	9
2. Making of homemade biological filters.	9
3. Maintenance of aeration and oxygenation	12
4. Making of food for bivalves	9
5. Factors affecting bivalve growth and reproduction	6

#### Utility of *Azolla*:

Subjects involved in Skill based zoology are equipped to make student earn money out of very less investment and increase their faith in studying traditional subjects. The students can also persuade M. Voc. in future for their post graduate program. Although the topic of *Azolla* culture is related to plants (Botany) it is useful for students to be fed to milking animals like cows, buffalos and goats. *Azolla* can even be used as fish feed in farms. The symbiotic association of *Azolla* with *Anabaena* is to be notified. Culture of *Azolla* does not require nutrients like nitrogen however supplementation of phosphorus is needed by the culture pond. It can also be cultivated with crop of paddy being a good source of nitrogen. The capacity to double in weight within 4-10 days makes it more commercially important.

#### Learning objectives:

- Study of use of *Azolla* as fish feed
- Study of use of *Azolla* as a good source of ammonia in farms
- Study of use of *Azolla* as a good weed controller in paddy fields.
- Management of *Azolla* bed in all the seasons

#### Practical:

- To improve skills of students in *Azolla* culture.
- To visit sites where the success in the field has been achieved.
- To equip students with the necessary skills in maintaining *Azolla* bed in every season.
- To acquaint students with marketing of *Azolla* culture

#### Prerequisites:

The study of subjects being offered under the Skill Based Zoology requires basic knowledge of biology as elaborated below.

Basic knowledge about culture of fish *Tilapia mossambica*.

Knowledge symbiotic association of *Anabaena* and *Azolla*.

Knowledge about use of *Azolla* as a manure for Kharif and Rabi season.

Biology of paddy crop and *Azolla* together.

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Skill Based Zoology  
B. Voc. Second Year  
Skill Based Zoology

Semester V

Title of Paper: Utility of *Azolla*

Periods: 45

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Semester I

**Unit I:**Culture of fish *Tilapia mossambica*.

The origin, classification and biology of the fish.

Captive breeding of the fish and use of *Azolla* as its fodder.

6

**Unit II:***Azolla* as a good source of nitrogen fixation.

Understanding the classification and biology of nitrogen fixing blue green algae *Anabaena*

Understanding symbiotic association between *Azolla* and *Anabaena* at microscopic level

Analysis of water to ensure fixed nitrogen in the soil by *Anabaena*.

**Unit III:**Use of *Azolla* as manure.

Use of *Azolla* as a manure in both Kharif and Rabi seasons.

Visits to farms of paddy production and provoke farmers to grow *Azolla* in their farms

To study knowledge about use of *Azolla* as a weed controller in paddy fields.

**Unit IV:** Factors affecting *Azolla* growth and its use as fodder:

Introduction to different chemical (Single Super Phosphate) and biological factors (Cow dung and Cow urine) that affect *Azolla* growth.

Study growth of *Azolla* in fields of good phosphorus content

12

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Skill Based Zoology

B. Voc. Second Year

Skill Based Zoology

Semester IV

Title of Paper: Practicals based on Utility of *Azolla*

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Periods: 45

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1. To study use of *Azolla* as a source of food for fish *Tilapia mossambica* 12
2. To study symbiotic association between *Anabaena* and *Azolla* at microscopic level 12
3. To study use of *Azolla* as a manure for Kharif and Rabi seasons of crop cultivation 12
4. To study and visits of growth of paddy and *Azolla* together 9

#### Utility of the courses (Vermicomposting byproducts):

Subjects involved in Skill based zoology are equipped to make student earn money out of very less investment and increase their faith in studying traditional subjects. The students can also persuade M. Voc. in future for their post graduate program. Vermicomposting byproducts find their application in agriculture and horticulture practices. The subject will promote students to be volunteers in praising organic farming over traditional farming techniques. This can be achieved as teaching about various research papers published in the subject.

#### Learning objectives:

- To understand uses of vermicomposting over burning and land filling of wastes and intensive use of agrochemicals in conventional cropping systems.
- Introduction to worm casting, vermicast tea and worm meal.
- Use of vermicompost products as biological control agents providing suppression on many plant diseases.
- Packing and sell of vermicomposting by products like vermicast and vermiwash.

#### Practical:

- To fetch attention of students towards sustainable and pollution free agriculture.
- To get fine quality worm casting and vermiwash for its uses as manure.
- To demonstrate students use of vermicompost as biological control agent of diseases.
- To Acquaint students packing of Vermicompost and Vermiwash.

#### Prerequisites:

The study of subjects being offered under the Skill Based Zoology requires basic knowledge of biology as elaborated below.

- Basic knowledge about sustainable agriculture.
- Basic knowledge about action of urea and other manures in agriculture
- Biological control plant diseases by vermicomposting by products.
- Knowledge about packaging of Vermicompost and Vermiwash

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Skill Based Zoology

B. Voc. Second Year

Skill Based Zoology

Semester V

Title of Paper: Vermicomposting byproducts

Periods: 45

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Semester I

**Unit I:**Introduction to sustainable agriculture

Problems with traditional agriculture practices

Need of sustainable agriculture practice and role of vermicomposting in it 12

**Unit II:**Introduction to byproducts of vermicomposting

Introduction to and chemical composition of

Worm casting,  
vermicast tea and  
worm meal.

11

**Unit III:** Introduction to plant diseases and their biological control

Introduction to plant parasitic nematodes

Chemical and biological control of plant parasitic nematodes 11

**Unit IV:**Packaging and selling of vermicomposting by products

Grading and sell of byproducts like vermicast and Vermiwash 11



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Skill Based Zoology

B. Voc. Second Year

Skill Based Zoology

Semester IV

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Title of Paper: Practicals based on Vermicomposting byproducts

Periods: 45

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|---|----|
| 1. To demonstrate importance of organic farming   | 9  |
| 2. To introduce students with worm casting, vermicast and worm meal   | 9  |
| 3. To introduce students with plant parasite nematodes  | 12 |
| 4. To demonstrate action of Vermicomposting byproducts as biological control agents of plant parasitic diseases | 9  |
| 5. To Acquaint students with grading of vermicomposting byproducts  | 6  |

Utility of the course ( Spirulina culture):

Spirulina is a biomass of Cyanobacteria belonging to genus *Arthrospira*. There are their species of spirulina found which include are *Arthrospira platensis*, *A. fusiformis*, and *A. maxima*. Spirulina does not come in contact with land during its growth. Spirulina can be grown in shady pools or containers of small size. This makes Spirulina culture a useful and cost effective source of income.

Learning objectives:

- Learning how to manage growing facility and water quality needed by Spirulina.
- Learning how to manage micronutrients and fertilizers needed by the plant.
- Learning use of pH meter, litmus paper and filtration devices of various mesh size.
- Learning of lux meter and importance of agitation devise.

Practical:

- To improve skills of students in analysis of water quality
- To teach students regarding management of fertilizers and micronutrients
- To equip students with skills to manage pH of container
- To teach students with importance of agitation of tank

Prerequisites:

The study of subjects being offered under the Skill Based Zoology requires basic knowledge of biology as elaborated below.

To gain basic knowledge about occurrence need of Spirulina.

Classification of algae.

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Skill Based Zoology

B. Voc. Second Year

Skill Based Zoology

Semester V

Title of Paper: Spirulina culture

Periods: 45

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Semester I

**Unit :** Introduction to classification of algae

Introduction to algae

Management of growing facility and growing facility by the students.

**Unit II:**

On field pH measurement capacity using pH meter, litmus paper and digital pH meter

Measurement of light intensity and its importance in Spirulina culture.

Understanding effect of sodium bicarbonate, potassium nitrate and sodium chloride on Spirulina growth.

**Unit III:** Factors affecting Spirulina growth

Understanding effect of potassium dihydrogen phosphate, iron sulphate, magnesium sulphate on Spirulina growth.

Understanding theory behind preparation of pools of various sizes

**Unit IV:** Spirulina farming cycles

**Understanding cycles of Spirulina growth and timings of farming.**

Harvesting and drying of Spirulina.

Understanding medicinal importance of spirulina.

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Skill Based Zoology

B. Voc. Second Year

Skill Based Zoology

Semester V

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Title of Paper: Practicals based on Spirulina culture.

Periods: 45

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|--|----|
| 1. Define and construction of cement tanks for Spirulina culture.        | 9  |
| 2. Museum study of specimen of algae belonging to various orders         | 9  |
| 3. Working and functions of pH meter                                     | 9  |
| 4. Role of various salts on Spirulina growth                             | 12 |
| 5. Reasons and agitation devices used in Spirulina culture               | 3  |
| 6. Study of life cycle of Spirulina and ideal timings for it cultivation | 3  |