



**ADIKAVI NANNAYA UNIVERSITY**

**Rajamahendravaram**

**National Skill Qualification Framework [NSQF]**

**A UGC Sponsored Scheme for Certificate Course**

*In*

**Mushroom Cultivation and Establishment of  
Training Unit**

*by*

**DEPARTMENT OF BOTANY**

**UNIVERSITY COLLEGE OF SCIENCE AND  
TECHNOLOGY**

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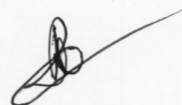


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## PREAMBLE

In recent years UGC took some steps to reorient and reshape its policies regarding higher education. In order to bring down the demand – supply mismatch, a need for developing skills in the students was realized; to create work ready manpower as skills and knowledge are the driving forces of economic growth and social development of the country. In addition to conventional disciplines, there is a need to introduce some career oriented courses where qualified students may learn certain skills and knowledge which will provide them more openings in service, industry and self employment sectors.

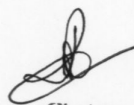
The present certificate course in Mushroom Cultivation and Establishment of Training Unit was introduced in the year 2020-21. Students with 10+2 qualification, age no bar, are eligible to take this course for starting their own business. Others with an inclination towards startup and **Atma Nirbhar Bharath** can also join since this course is conducted **as a part time evening program**. 75% attendance is mandatory for pass certificate.



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## Objectives:

- ✓ Enable the students to identify edible and poisonous mushrooms
- ✓ Provide hands on training for the preparation of bed for mushroom cultivation and spawn production
- ✓ Give the students an industrial exposure to help them in understanding the establishment and functioning of mushroom farms
- ✓ Value addition of the mushroom products
- ✓ Learn marketing strategies – local to cross country
- ✓ Understand the available financial schemes and application processes for establishing a farm
- ✓ Give the learners an experience in research for qualitative and quantitative mushroom production



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## Course Outcome:

On successful completion of the course, students will be able to:

- ✓ Identify edible types of mushroom
- ✓ Gain the knowledge of cultivation of different types of edible mushrooms and spawn production
- ✓ Manage the diseases and pests of mushrooms
- ✓ Develop competency in self-employment and income generation
- ✓ Packaging, Storing and grading of mushroom; post harvest procedures
- ✓ Apply for different Government, Non Government Schemes for establishing a production unit
- ✓ Markets available for commercial production
- ✓ Develop research aptitude



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# DEPARTMENT OF BOTANY

## NSQF – Certificate Course in Mushroom Cultivation and Establishment of Training Unit BoS Committee

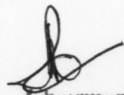
S.No.	Designation	Name of the Member
1.	Chairman	Principal, UCST, Adikavi Nannaya University, Rajamahendravaram
2.	Convener	Dr. Padmavathi, Asst. Prof. Ad hoc, Department of Botany, Adikavi Nannaya University, Rajamahendravaram
3.	Coordinator	Dr. Padmavathi, Asst. Prof. Ad hoc, Department of Botany, Adikavi Nannaya University, Rajamahendravaram
4.	Head	Head, Department of Botany
5.	Experts	1. Dr. Patan Shah Valli Khan, Professor Department of Botany, Yogi Vemana University, Kadapa
		2. Mr. P. Ram Mohan Rao, IFS, Conservator of Forests and Regional Manager, Forest Development Corporation Limited, Rajamahendravaram
		3. Dr. S V Krishna Reddy, Principal Scientist, Division of Crop Production, ICAR – CTRI, Rajamahendravaram
		4. Dr. L. Mutyala Naidu Asst. Prof. Ad hoc, Department of Botany, Adikavi Nannaya University, Rajamahendravaram
		5. Dr. K. Samuel Kumar, Asst. Prof. Ad hoc, Department of Botany, Adikavi Nannaya University, Rajamahendravaram
		6. Ms. M. Prajna, Asst. Prof. Ad hoc, Department of Botany, Adikavi Nannaya University, Rajamahendravaram
		7. Dr. J. Suneetha, Professor and Head, Department of Botany, Government Arts College(A), Rajamahendravaram
		8. Mrs. G. Jyothi, Lecturer and Head, Department of Botany, Dr. K. S. Raju Arts and Science College, Penugonda
		9. Mrs. K. Sri Lakshmi Lakshmi Mushroom , Hukumpeta, Rajamahendravaram
		10. Mrs. Soudhamini. P President, COWE (Confederation of Women Entrepreneurs), India
6.	Student Representatives	11. One PG – Boy 12. One PG - Girl



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<b>Adikavi Nannaya University, Rajamahendravaram</b> <b>Certificate Course in Mushroom Cultivation and Establishment of Training Unit</b> <b>Course Structure</b>					
Course	Title of the Paper	Teaching Hours/week	Duration of Exam	Maximum Marks	credits
<b>Theory</b>					
<b>Paper I</b>	Morphology and Characteristics of Mushrooms	4	3	100	4
<b>Paper II</b>	Commercial Cultivation of Mushroom	4	3	100	4
<b>Paper III</b>	Business establishment and marketing strategies	4	3	100	4
<b>Total</b>		<b>12</b>		<b>300</b>	<b>12</b>
<b>Practicals</b>					
<b>Paper IV</b>	Morphology and Characteristics of Mushrooms	4	3	100	4
<b>Paper V</b>	Commercial Cultivation of Mushroom	4	3	150	6
<b>Paper VI</b>	Business establishment and marketing strategies	4	3	100	4
<b>Project work</b>				100	4
<b>Total</b>		<b>12</b>		<b>400</b>	<b>18</b>
<b>Grand Total Marks and Credits for the Course</b>				<b>750</b>	<b>30</b>
<b>Scheme of Examination</b>		<b>At the end of the course</b>			
<b>Theory Pass</b>		<b>Minimum 35% (35 Marks in each Paper)</b>			
<b>Practical Pass</b>		<b>Minimum 50% (50 Marks in Paper IV&amp; VI; 75 in Paper V)</b>			

  
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**Certificate Course in Mushroom Cultivation and Establishment of Training Unit  
Syllabus**

**THEORY**

**Paper I : Morphology and Characteristics of Mushrooms 4 Credits**

**Unit I:** General account of Fungi – beneficial and harmful. Significance of the beneficial fungi – the mushroom; Occurrence – Epigenous, Hypogenous; Morphology and life cycle of mushrooms.

**Unit II:** Natural Habitats- Humicolous, Lignicolous and Coprophilous. Differentiation of edible and poisonous mushroom. Description of Edible Types. Nutritional and antinutritional properties; medicinal values

**Unit III:** Natural growth aspects and climatic requirements for each type of edible mushrooms. Identification of appropriate type of mushroom for commercial cultivation.

**Unit IV:** Present scenario and prospects of mushroom cultivation. Diseases – Fungal diseases and control measures; Bacterial diseases and control measures. Pests and their management strategies

**Paper II : Commercial Cultivation of Mushroom 4 Credits**

**Unit I:** Basic materials required in milky mushroom cultivation. Methods used for commercial cultivation – mushroom substrate selection, substrate soaking, pasteurization etc.

**Unit II:** Role and method of compost preparation, Sterilization procedures; preparation of value added products

**Unit III:** preparation of spawn substrate, process of spawn culture, selection of correct spawn, culture maintenance, mother spawn production and storage of spawn.

**Unit IV:** Harvesting of mushrooms: identifying the right stage for harvesting, methods of harvesting; grading, packaging and storing mushroom

**Paper III: Business establishment and marketing strategies 4 Credits**

**Unit I:** Design and layout of mushroom farm. Equipment and tools and other infrastructure facilities required, safety measures in the farm. Approximate expenditure for establishing the production unit

**Unit II:** Storage of fresh mushrooms and dry mushrooms. Processing of mushrooms – canning, dehydration and packing,

**Unit III:** Market opportunities; market liabilities, exploring local and national markets, scope of exim policy/ foreign trade policy; log books / related documents for audit



**Unit IV:** Banking – Deposits, advances, loan facilities; Government sponsored schemes and subsidies, legal processes in company / industry registration and agricultural finance, and patenting

## **PRACTICALS**

### **Paper IV:**

**4 Credits**

1. Study of external characters of mushroom
2. Study of internal characters
3. Study of different species of mushrooms
4. Identification of edible mushrooms
5. Life cycle of typical mushroom
6. Common diseases and pests in mushroom cultures
7. Nutritional values of mushrooms
8. Medicinal usages of mushrooms

### **Paper V:**

**6 Credits**

1. Media preparation for Spawn culture
2. Spawn culture and multiplication
3. Maintenance of pure culture
4. Storage technique of spawn
5. Composition of compost and bed preparation
6. Preparation of different types of compost
7. Pasteurization of compost and sterilization processes
8. Seeding technique of spawn in compost
9. Harvesting stage and methodology
10. Packaging and labeling process
11. Value addition in mushroom products
12. Recipes in mushroom cuisine

### **Paper VI**

**4 Credits**

1. The standard specifications in the designing and construction of mushroom farm
2. Business plan preparation
3. How to apply for different Government schemes and subsidies
4. Safety protocols necessary in the establishment
5. Records and documents to be maintained by the commercial unit for audit
6. Legal procedures for the establishment of unit
7. Business proposal writing Technical, financial, marketing and commercial aspects of business

## References

1. Marimuthu, T. et al. (1991). Oster Mushroom. Department of Plant Pathology. Tamil Nadu Agricultural University, Coimbatore.
2. Nita Bhal. (2000). Handbook on Mushrooms. 2nd ed. Vol. I and II. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Pandey R.K, S. K Ghosh, 1996. A Hand Book on Mushroom Cultivation. Emkey Publications.
4. Pathak, V. N. and Yadav, N. (1998). Mushroom Production and Processing Technology. Agrobios, Jodhpur.
5. Tewari Pankaj Kapoor, S. C. (1988). Mushroom Cultivation. Mittal Publication, New Delhi.
6. Tripathi, D.P. (2005) Mushroom Cultivation, Oxford & IBH Publishing Co. PVT.LTD, New Delhi.
7. V.N. Pathak, Nagendra Yadav and Maneesha Gaur, Mushroom Production and Processing Technology/ Vedams Ebooks Pvt Ltd., New Delhi (2000).
8. National Horticulture Board : Cultivation Technology and Tecchnical Standards of Components of Integrated Button Mushroom Unit; Protected production under NHB Scheme (Technical Standard o. NHB-BM- Type 01-2011
9. Anupam Mishra, SRK Singh and MP Thakur: Training Manual on Cultivation of Tropical Mushroom and its Value addition. Agricultural Technology Application Research Institute – ICAR - Zone VII, JNKVV, Jabalpur
10. Nailoke Pauline Kadhila, Favian SInvula Mubiana, and Keumbo Lorna Halueendo, 2012: Mushroom Cultivation – A Beginners Guide; Published by University of Namibia

### You Tube Videos

<https://www.youtube.com/watch?v=9TSRcTAJYek>

<https://www.youtube.com/watch?v=piY2-R1WgwK>

[https://www.facebook.com/lakshmimushrooms/videos/one\\_year\\_agotraining-program-on-milky-mushroom-cultivation-conducted-by-ctri-kvk/1759570287690349/](https://www.facebook.com/lakshmimushrooms/videos/one_year_agotraining-program-on-milky-mushroom-cultivation-conducted-by-ctri-kvk/1759570287690349/)

  
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## **Model Paper**

### **CERTIFICATE COURSE IN MUSHROOM CULTIVATION AND ESTABLISHMENT OF TRAINING UNIT**

#### **Paper I: Morphology and Characteristics of Mushrooms**

(with effect from 2020-21 admitted batch)

**Time : 3 hrs**

**Max.Marks : 100**

#### **Section A**

**Answer all questions**

**(4X15=60)**

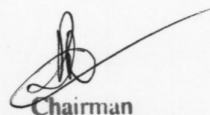
1. a. Write in detail the external and internal characteristics of mushrooms  
or  
b. Give a detailed account of life cycle in mushrooms
2. a. Describe the Natural Habitats of Mushrooms  
or  
b. Give an account of the nutritional and antinutritional properties of mushrooms
3. a. Illustrate the different types of edible mushrooms of India  
or  
b. Identify the appropriate types of mushrooms for commercial cultivation
4. a. Write about the prospects of mushroom cultivation  
or  
b. Detail the healthy mushroom cultivation strategies

#### **Section B**

**Answer any 5 questions**

**(5X8=40)**

5. Poisonous Mushrooms
6. Nutritional properties
7. Structure of milky mushrooms
8. Natural growth parameters
9. Commercial cultivation
10. Climatic requirements
11. Bacterial diseases in mushrooms
12. Pest management
13. Fungal diseases



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## Model Paper

### CERTIFICATE COURSE IN MUSHROOM CULTIVATION AND ESTABLISHMENT OF TRAINING UNIT

#### **Paper II : Commercial Cultivation of Mushroom**

(with effect from 2020-21 admitted batch)

**Time : 3 hrs**

**Max.Marks : 100**

#### **Section A**

**Answer all questions**

**(4X15=60)**

1. a. List out the material required for milky mushroom cultivation  
or  
b. Describe the different methods used for commercial mushroom cultivation
2. a. Write about the different methods used in compost preparation  
or  
b. Give an account of the sterilization protocols in mushroom cultivation
3. a. Explain the spawn culture preparation  
or  
b. Detail the process of mother spawn production
4. a. What are the different strategies used in mushroom harvesting  
or  
b. Illustrate the grading, packaging and storing of mushrooms

#### **Section B**

**Answer any 5 questions**

**(5X8=40)**

5. Bulk Chamber
6. Substrate selection
7. Design of farm
8. Spawn selection
9. Incubation
10. Pasteurization
11. Grading
12. Mushroom packaging
13. Storage strategies



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## **Model Paper**

### **CERTIFICATE COURSE IN MUSHROOM CULTIVATION AND ESTABLISHMENT OF TRAINING UNIT**

#### **Paper III: Business establishment and marketing strategies**

(with effect from 2020-21 admitted batch)

**Time : 3 hrs**

**Max.Marks : 100**

#### **Section A**

**Answer all questions**

**(4X15=60)**

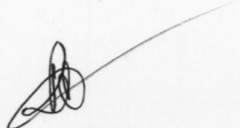
1. a. What are the basic requirements in the construction of mushroom farm  
or  
b. List out the infrastructure required in establishment of a mushroom farm
2. a. Write about the storage process in dry mushrooms  
or  
b. Describe the strategies in mushroom processing
3. Give an account of marketing strategies mushroom culture  
or  
b. Detail the possible market liabilities in mushroom production
4. a. What are the different Government schemes available for commercial growth of mushrooms  
or  
b. Write about the procedures in commercial establishment of mushroom farm

#### **Section B**

**Answer any 5 questions**

**(5X8=40)**

5. Designing a farm
6. Tools required
7. Safety measures
8. Mushroom culture- business
9. Audit books
10. Local marketing
11. Patenting
12. Loan processing
13. Proposal writing

  
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### **Model Paper**

#### **CERTIFICATE COURSE IN MUSHROOM CULTIVATION AND ESTABLISHMENT OF TRAINING UNIT**

#### **Paper IV: Morphology and Characteristics of Mushrooms**

(with effect from 2020-21 admitted batch)

**Time : 3 hrs**

**Max.Marks : 100**

1. Identification, classification and comment on given mushroom variety with suitable diagrams [15]
2. Preparation of temporary mount of internal structure of mushroom with reference to pileus, gills and basidiospores [20]
3. Identify different edible mushrooms from among the group displayed [15]
4. Identify the diseases in the given material [15]
5. List out the nutritional and medicinal value of mushrooms [15]
6. Viva-voce [10]
7. Practical record [10]



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## **Model Paper**


### **CERTIFICATE COURSE IN MUSHROOM CULTIVATION AND ESTABLISHMENT OF TRAINING UNIT**

#### **Paper V: Commercial Cultivation of Mushroom** (with effect from 2020-21 admitted batch)

**Time : 3 hrs**

**Max.Marks : 150**

1. Write the procedures in composition, preparation and types of compost in mushroom cultivation [40]
2. List out the different Sterilization and Pasteurization techniques learnt by you [30]
3. Demonstrate the substrate preparation [20]
4. Write the procedures in spawn culture and multiplication [20]
5. Write an account on the harvesting techniques [20]
6. Record [10]
7. Viva Voce [10]

  
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## **Model Paper**

### **CERTIFICATE COURSE IN MUSHROOM CULTIVATION AND ESTABLISHMENT OF TRAINING UNIT**

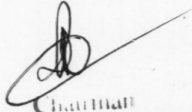
#### **Paper VI: Business establishment and Marketing Strategies**

(with effect from 2020-21 admitted batch)

**Time : 3 hrs**

**Max.Marks : 100**

1. Give in detail the designing of a production unit for mushroom culture[20]
2. Write about the different safety protocols required in the mushroom farm establishment [10]
3. Write a business plan with financial implications for establishment of a production unit [20]
4. How does one apply for the Government Schemes and Subsidies available for business establishment [20]
5. Write a business proposal for commercial unit set up [10]
6. Record [10]
7. Viva Voce [10]

  
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