

### Syllabus on Vocational Education and Training Course (VTC)

<b>Paper Title</b>	<b>: Mushroom Cultivation -I</b>							
<b>CODE</b>	<b>: VTC: 241.2</b>							
<b>Number of Credits</b>	<b>: 4</b>							
<b>Semester</b>	<b>: III</b>							
<b>No. of Theory Hours Per Week</b>	<b>: One (1 hour)</b>							
<b>No. of Practical Hours per Week</b>	<b>: Three (3 Hours)</b>							
<b>Outline of the Paper:</b>								
<b>Type of Course</b>	<b>Units in the VTC</b>	<b>Hours</b>	<b>Credits</b>	<b>Total Marks</b>	<b>Distribution of Marks (as per OC-8)</b>			
<b>Mushroom Cultivation-I</b>					<b>In-Semester</b>		<b>End-Semester</b>	
					<b>Theory</b>	<b>Practical</b>	<b>Theory</b>	<b>Practical</b>
	<b>Unit-I Theory (25 Marks)</b>	<b>15</b>			<b>25</b>			
	<b>Unit-II to IV Theory (75 Marks)</b>	<b>90</b>	<b>4</b>	<b>100</b>		<b>15</b>		<b>60</b>
<b>Marks Distribution</b>	<b>: Internal Assessment: 40</b> <b>: External Assessment: 60</b>							
<b>Course Objectives</b>	<ol style="list-style-type: none"> <li>1. To enrich the students with basic information of mushrooms,</li> <li>2. To enable them to identify edible and poisonous mushrooms</li> <li>3. To provide exposure on various aspects of mushroom cultivation through field visits.</li> </ol>							
<b>Course Learning Outcome</b>	At the end of the course students will be able to: <ul style="list-style-type: none"> <li>• identify edible and poisonous mushrooms</li> <li>• demonstrate the aspects of production and processing of mushrooms.</li> </ul>							
<b>Unit I: (Theory) 15 Hours</b>	<ul style="list-style-type: none"> <li>• Introduction, history and scope of mushroom cultivation; Common edible mushrooms; Other economically important and medicinal mushrooms;</li> <li>• Different parts of a typical mushroom &amp; variations in mushroom morphology;</li> <li>• Characters of edible and poisonous mushrooms;</li> <li>• Mushroom classification based on occurrence, Natural habitats, Colour of spores, Morphology, Structure and texture of fruit bodies; Nutritional and health benefits of mushrooms.</li> </ul>							
<b>UNIT-II: (Practical) 30 Hours</b>	<ul style="list-style-type: none"> <li>• Identification of edible and poisonous mushrooms (specimen/chart).</li> <li>• Study of nutritional profile of common edible mushrooms.</li> <li>• Study of general morphology, distinguishing</li> </ul>							

	characteristics, spore germination and life cycle of common edible mushrooms
<b>UNIT-III: (Practical) 30 Hours</b>	<ul style="list-style-type: none"> <li>• Determination of soil temperature, soil moisture content, soil pH etc</li> <li>• Identification of different parts of mushroom</li> <li>• Classification of mushroom</li> </ul>
<b>UNIT-IV: (Practical) 30 Hours</b>	<ul style="list-style-type: none"> <li>• Visit to mushroom production unit</li> <li>• Visit to mushroom processing unit</li> <li>• Visit to spawn production unit.</li> </ul>
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Biswas, Subrata M. Datta, S. V. Ngchan. (2012) Mushrooms: A manual for Cultivation. PHI Learning Pvt Ltd.</li> <li>2. Gogoi, R. Y. Rathaiah, T.R. Borah. (2006). Mushroom cultivation technology, Scientific Publishers, Jodhpur, India.</li> <li>3. Kannaiyan S. &amp; Ramasamy K. (1980). A hand book of edible mushrooms, Today &amp; Tomorrows printers &amp; publishers, New Delhi.</li> <li>4. Nita, B. (2000). Handbook of Mushrooms. Vol 1 &amp; 2. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.</li> <li>5. Pandey, R.K. and Ghosh, S.K. (1996). A handbook of Mushroom Cultivation. Emkey Publication.</li> <li>6. Som, D. 2021. A Practical Manual on Mushroom Cultivation. P.K. Publisher and Distributor.</li> <li>7. Tripathi, D.P (2005). Mushroom Cultivation. Oxford &amp; IBH Publishing Co. Pvt. Ltd, New Delhi.</li> </ol>
<b>Requirements</b>	<ul style="list-style-type: none"> <li>• Microscopes</li> <li>• Charts and specimens</li> <li>• Tools for studying nutritional profiles</li> <li>• Growing chambers or areas for cultivating mushrooms.</li> <li>• Soil testing kits (for temperature, moisture content, pH).</li> <li>• Equipment for measuring environmental factors (light, humidity).</li> <li>• Specimens of mushrooms for hands-on identification</li> </ul> <p><b>Any other item as and when required</b></p>
<b>Qualified instructors</b>	<ul style="list-style-type: none"> <li>• Qualified instructors with expertise in mushroom cultivation and related fields.</li> <li>• Support staff for maintaining equipment and facilities</li> </ul>

<b>Paper Title</b>	<b>: Mushroom Cultivation -II</b>							
<b>CODE</b>	<b>: VTC: 261.2</b>							
<b>Number of Credits</b>	<b>: 4</b>							
<b>Semester</b>	<b>: IV</b>							
<b>No. of Theory Hours Per Week</b>	<b>: One (1 hour)</b>							
<b>No. of Practical Hours per Week</b>	<b>: Three (3 Hours)</b>							
<b>Outline of the Paper:</b>								
<b>Type of Course</b>	<b>Units in the VTC</b>	<b>Hours</b>	<b>Credits</b>	<b>Total Marks</b>	<b>Distribution of Marks (as per OC-8)</b>			
<b>Mushroom Cultivation-II</b>					<b>In-Semester</b>		<b>End-Semester</b>	
	<b>Theory</b>	<b>Practical</b>	<b>Theory</b>	<b>Practical</b>				
	<b>Unit-I Theory (25 Marks)</b>	<b>15</b>	<b>4</b>	<b>100</b>	<b>25</b>			
<b>Unit-II to IV Theory (75 Marks)</b>	<b>90</b>				<b>15</b>		<b>60</b>	
<b>Marks Distribution</b>	<b>: Internal Assessment: 40</b> <b>: External Assessment: 60</b>							
<b>Course Objectives</b>	<ol style="list-style-type: none"> <li>1. To impart knowledge on the different aspects of cultivation of common edible mushrooms</li> <li>2. To identify problems encountered during cultivation and management strategies.</li> </ol>							
<b>Course Learning Outcome</b>	At the end of the course students are able to: <ol style="list-style-type: none"> <li>1. create a mushroom cultivation unit.</li> <li>2. apply various procedures required for cultivation of common edible mushrooms</li> <li>3. detect diseases and pests effectively.</li> </ol>							
<b>Unit I: (Theory) 15 Hours</b>	<ul style="list-style-type: none"> <li>• Principles of mushroom cultivation: Structure and construction of mushroom house (small village unit and large commercial unit), Sterilization of substrates;</li> <li>• Spawn production: culture media preparation, preparation of mother spawn, production of planting spawn, storage and transportation of spawn, criteria for selection of good quality spawn; Cultivation of Button,</li> <li>• Oyster and Straw Mushrooms: Collection of raw materials, compost &amp; composting, spawn &amp; spawning methods —bed method, Polythene bag method, field cultivation;</li> <li>• Casing &amp; case run: importance of casing mixture, quality parameters of casing soil, different types of casing mixtures and commonly used materials; cropping &amp; crop management, picking &amp; packing.</li> <li>• Problems in cultivation - diseases, pests, nematodes, weed moulds and their management strategies.</li> </ul>							
<b>UNIT-II: (Practical) 30 Hours</b>	<ul style="list-style-type: none"> <li>• Preparation of compost using paddy straw and mushroom bed preparation.</li> </ul>							

	<ul style="list-style-type: none"> <li>• Spawning using different methods, spawn running and harvesting.</li> <li>• Preparation of casing mixture, casing and case run.</li> <li>• Sterilization and sanitation of mushroom house, instruments and substrates.</li> </ul>
<b>UNIT-III: (Practical) 30 Hours</b>	<ul style="list-style-type: none"> <li>• Introduction to microbiology laboratory, Laminar air flow, Autoclave etc.</li> <li>• Preparation of mother culture, media, inoculation, incubation and spawn production.</li> <li>• Study of common diseases, pests, nematodes and their management strategies during mushroom cultivation.</li> </ul>
<b>UNIT-IV: (Practical) 30 Hours</b>	<ul style="list-style-type: none"> <li>• Cultivation of Paddy straw mushroom.</li> <li>• Cultivation of Oyster mushroom using paddy straw.</li> <li>• Cultivation of Button mushroom.</li> </ul>
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Ahlawat, O.P. R.P. Tewari (2007). Cultivation technology of Paddy straw Mushroom. National Research Centre for Mushroom (ICAR), Chambaghat, Solan, India.</li> <li>2. Biswas, Subrata M. Datta, S. V. Ngchan. (2012) Mushrooms: A manual for Cultivation. PHI Learning Pvt Ltd.</li> <li>3. Gogoi, R. Y. Rathaiah, T.R. Borah. (2006). Mushroom cultivation technology, Scientific Publishers, Jodhpur, India.</li> <li>4. Gupta P. K. Elements of Biotechnology. Rastogi Publications.</li> <li>5. Som, D. 2021. A Practical Manual on Mushroom Cultivation. P.K. Publisher and Distributor.</li> <li>6. Tripathi, D.P (2005). Mushroom Cultivation. Oxford &amp; IBH Publishing Co. Pvt. Ltd, New Delhi.</li> </ol>
<b>Requirements</b>	<ol style="list-style-type: none"> <li>1. Mushroom Cultivation Area:</li> <li>2. Sterilization Facilities:</li> <li>3. Microbiology Laboratory:</li> <li>4. Disease Management:</li> </ol> <p><b>Any other item as required</b></p>
<b>Qualified instructors:</b>	<ul style="list-style-type: none"> <li>• Qualified instructors with expertise in mushroom cultivation and related fields.</li> <li>• Support staff for maintaining equipment and facilities</li> </ul>

<b>Paper Title</b>	<b>: Mushroom Cultivation -III</b>							
<b>CODE</b>	<b>: VTC: 361.2</b>							
<b>Number of Credits</b>	<b>: 4</b>							
<b>Semester</b>	<b>:VI</b>							
<b>No. of Theory Hours Per Week</b>	<b>: One (1 hour)</b>							
<b>No. of Practical Hours per Week</b>	<b>: Three (3 Hours)</b>							
<b>Outline of the Paper:</b>								
<b>Type of Course</b>	<b>Units in the VTC</b>	<b>Hours</b>	<b>Credits</b>	<b>Total Marks</b>	<b>Distribution of Marks (as per OC-8)</b>			
<b>Mushroom Cultivation-III</b>					<b>In-Semester</b>		<b>End-Semester</b>	
					<b>Theory</b>	<b>Practical</b>	<b>Theory</b>	<b>Practical</b>
	<b>Unit-I Theory (25 Marks)</b>	<b>15</b>			<b>25</b>			
	<b>Unit-II to IV Theory (75 Marks)</b>	<b>90</b>	<b>4</b>	<b>100</b>		<b>15</b>		<b>60</b>
<b>Marks Distribution</b>	<b>: Internal Assessment: 40</b> <b>: External Assessment: 60</b>							
<b>Course Objectives</b>	<ol style="list-style-type: none"> <li>To explain on preparation of various value-added products from mushroom and funding opportunities in Mushroom Cultivation.</li> </ol>							
<b>Course Learning Outcome</b>	<p>At the end of the course students are able to:</p> <ol style="list-style-type: none"> <li>prepare and present proposals on mushroom and spawn production</li> <li>prepare value added products from mushroom.</li> <li>identify the economics of mushroom cultivation.</li> <li>demonstrate the economics of value-added products from mushroom.</li> </ol>							
<b>Unit I: (Theory) 15 Hours</b>	<ul style="list-style-type: none"> <li>Post-harvest management and processing of mushrooms: Blanching, Steeping, sun drying, canning, pickling, freeze drying; packaging; Storage- short term and long term; Marketing</li> <li>Economics of mushroom cultivation; Economics of processed products of mushrooms.</li> <li>Application of Artificial Intelligence in mushroom cultivation.</li> </ul>							
<b>UNIT-II: (Practical) 30 Hours</b>	<ul style="list-style-type: none"> <li>Sterilization of glasswares, equipments etc.</li> <li>Blanching, Steeping, sun drying of mushrooms.</li> <li>Freeze drying of mushrooms.</li> <li>Packaging of mushrooms.</li> </ul>							
<b>UNIT-III: (Practical) 30 Hours</b>	<ul style="list-style-type: none"> <li>Pickling of mushrooms.</li> <li>Study of storage life of processed mushrooms.</li> <li>Economics of processed products of mushroom.</li> </ul>							
<b>UNIT-IV: (Practical)</b>	<ul style="list-style-type: none"> <li>Economics of Mushroom cultivation and spawn production.</li> <li>Visit to various financial funding agencies.</li> </ul>							

<b>30 Hours</b>	<ul style="list-style-type: none"> <li>• Preparation of project proposal for mushroom cultivation and spawn production.</li> </ul>
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Biswas, Subrata M. Datta, S. V. Ngchan. (2012) Mushrooms: A manual for Cultivation. PHI Learning Pvt Ltd.</li> <li>2. Gogoi, R. Y. Rathaiah, T.R. Borah. (2006). Mushroom cultivation technology, Scientific Publishers, Jodhpur, India.</li> <li>3. Hand Book of Mushroom Cultivation, Processing and Packaging, Eiri Staff, Engineers India Research Institute (2007)</li> <li>4. Pathak, V.N. Nagendra Yadav and Maneesha Gaur (2010). Mushroom Production and Processing Technology. Published by Agrobios (India).</li> <li>5. Rai R.D. and T. Arumuganathan (2008). Post-Harvest Technology of Mushrooms, Technical Bulletin 2008, NRCM, ICAR, Chambaghat, Solan1731213, (H.P.).</li> <li>6. Revathy, N. A. Vijayasamundeeswari, V.M. Indumathi, V. Gomathi Mushroom Cultivation (Paperback,), Shanlax Publications, ISBN: 9789390082735, Edition: 1, 2020</li> <li>7. Som, D. 2021. A Practical Manual on Mushroom Cultivation. P.K. Publisher and Distributor.</li> <li>8. Tripathi, D.P. (2005). Mushroom Cultivation. Oxford &amp; IBH Publishing Co. Pvt. Ltd, New Delhi.</li> </ol>
<b>Requirements</b>	<ul style="list-style-type: none"> <li>• Microscopes</li> <li>• Charts and specimens</li> <li>• Tools for studying nutritional profiles</li> <li>• Growing chambers or areas for cultivating mushrooms.</li> <li>• Soil testing kits (for temperature, moisture content, pH).</li> <li>• Equipment for measuring environmental factors (light, humidity).</li> <li>• Specimens of mushrooms for hands-on identification</li> <li>• <b>Any other item as and when required</b></li> </ul>
<b>Qualified instructors</b>	<ul style="list-style-type: none"> <li>• Qualified Instructors with expertise in mushroom cultivation and related fields.</li> <li>• Support staff for maintaining equipment and facilities</li> </ul>