

STORAGE & PACKAGING TECHNOLOGY (OEC-I)			
Course Code	21AG651	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	(3:0:0:0)	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Objectives:</b> <ul style="list-style-type: none"><li>To impart knowledge to the students on spoilage, storage methods food packaging principles,technology and equipment</li></ul>			
<b>Teaching-Learning Process (General Instructions)</b> <p>These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"><li>Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations.</li><li>Chalk and Talk method for Problem Solving.</li><li>Arrange visits to show the live working models other than laboratory topics.</li><li>Adopt collaborative (Group Learning) Learning in the class.</li><li>Adopt Problem Based Learning (PBL), which fosters students Analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.</li><li>Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills.</li></ol>			
<b>Module-1</b>			
<b>Spoilage and storage:</b> Direct damages, Indirect damages of perishable and durable commodities – control measures - factors affecting storage – types of storage – Losses in storage and estimation of losses.			
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"><li>PowerPoint Presentation</li><li>Chalk and Talk are used for Problem Solving (In-general)</li><li>Video demonstration or Simulations</li><li>Laboratory Demonstrations and Practical Experiments</li></ol>		
<b>Module-2</b>			
<b>Storage methods :</b> Improved storage methods for grain-modern storage structures-infestation-temperature and moisture changes in storage structures-CAP storage-CA storage of grains and perishables- construction operation and maintenance of CA storage facilities			
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"><li>PowerPoint Presentation</li><li>Chalk and Talk are used for Problem Solving (In-general)</li><li>Video demonstration or Simulations</li><li>Laboratory Demonstrations and Practical Experiments</li></ol>		
<b>Module-3</b>			
<b>Functions of packaging materials:</b> Introduction – packaging strategies for various environment – functions of package – packaging materials – bio degradable packaging materials – shrink and stretch packaging materials.			
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"><li>PowerPoint Presentation</li><li>Chalk and Talk are used for Problem Solving (In-general)</li><li>Video demonstration or Simulations</li><li>Laboratory Demonstrations and Practical Experiments</li></ol>		
<b>Module-4</b>			
<b>Food Packaging Materials and Testing:</b> Introduction – paper and paper boards - flexible - plastics - glass containers – cans – aluminium foils - package material testing-tensile, bursting and tear strength.			
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"><li>PowerPoint Presentation</li><li>Chalk and Talk are used for Problem Solving (In-general)</li><li>Video demonstration or Simulations</li><li>Laboratory Demonstrations and Practical Experiments</li></ol>		

Module-5	
<b>Special Packaging Techniques:</b> Vacuum and gas packaging - aseptic packaging - retort pouching – edible film packaging – tetra packaging – shrink and stretch packaging.	
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>1. PowerPoint Presentation</li> <li>2. Chalk and Talk are used for Problem Solving (In-general)</li> <li>3. Video demonstration or Simulations</li> <li>4. Laboratory Demonstrations and Practical Experiments</li> </ol>
<b>Course outcome (Course Skill Set)</b> At the end of the course the student will be able to : <ol style="list-style-type: none"> <li>1. Understand the various packaging methods</li> <li>2. Understand the importance of packaging of food</li> <li>3. Understand the interaction of food, packaging and environment</li> <li>4. Understand the different methods of package development and packaging Select the best type and form of packaging of specific food for specific end users</li> </ol>	
<b>Assessment Details (both CIE and SEE)</b> The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% ( 18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together <b>Continuous Internal Evaluation:</b> Three Unit Tests each of <b>20 Marks (duration 01 hour)</b> <ol style="list-style-type: none"> <li>1. First test at the end of 5<sup>th</sup> week of the semester</li> <li>2. Second test at the end of the 10<sup>th</sup> week of the semester</li> <li>3. Third test at the end of the 15<sup>th</sup> week of the semester</li> </ol> Two assignments each of <b>10 Marks</b> <ol style="list-style-type: none"> <li>4. First assignment at the end of 4<sup>th</sup> week of the semester</li> <li>5. Second assignment at the end of 9<sup>th</sup> week of the semester</li> </ol> Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for <b>20 Marks (duration 01 hours)</b> <ol style="list-style-type: none"> <li>6. At the end of the 13<sup>th</sup> week of the semester</li> </ol> The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be <b>scaled down to 50 marks</b> (to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). <b>CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b> <b>Semester End Examination:</b> Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject ( <b>duration 03 hours</b> ) <ol style="list-style-type: none"> <li>1. The question paper will have ten questions. Each question is set for 20 marks.</li> <li>2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), <b>should have a mix of topics</b> under that module.</li> </ol> The students have to answer 5 full questions, selecting one full question from each module	



**Suggested Learning Resources:****Books**

1. Sahay, K.M. and K.K.Singh. 1996. unit operations of agricultural processing. Vikas publishing house Pvt.Ltd., New Delhi.
2. Food Packaging Technology, Hand book, 2004. NIIR Board, New Delhi.
3. Pandey, P.H.2002. post harvest engineering of horticultural crops through objectives. Saroj Prakasam. Allahabad.
4. Himangshu Barman. 2008, Post Harvest Food grain storage. Agrobios (India), Jodhpur.
5. Chakaraverty, A. 2000. third edition. Post harvest technology of cereals, pulses and oil seeds. Oxford & IBH publishing & Co.Pvt.Ltd. New Delhi.

**Web links and Video Lectures (e-Resources):**

- <http://www.post-gazette.com/>
- <http://www.patentstrom.us/patents/6586036.htm>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Quizzes
- Assignments
- Seminars
- Mini Projects

  
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