# SRM VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

## DEPARTMENT OF AGRICULTURAL ENGINEERING

## QUESTION BANK

**VII SEMESTER**

**1902704 - STORAGE AND PACKAGING TECHNOLOGY**

**Regulation – 2019**

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*Prepared by*

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## SUBJECT : STORAGE AND PACKAGING TECHNOLOGY

## SEM / YEAR : VII/ IV

**UNIT I - SPOILAGE AND STORAGE**

Direct damages, Indirect damages of perishable and durable commodities – control measures - factors affecting storage – types of storage – Losses in storage and estimation of losses.

**PART – A**

| Q.No | Questions | BT Level | Competence |
|---|---|---|---|
| 1. | What is food spoilage? | BT-1 | Remembering |
| 2. | List the characteristics of food spoilage. | BT-2 | understanding |
| 3. | What are the reasons for food spoilage? | BT-1 | Remembering |
| 4. | What are the physical changes caused because of food spoilage? | BT-1 | Remembering |
| 5. | What are the effects of food spoilage? | BT-2 | understanding |
| 6. | What are the different signs of food spoilage? | BT-2 | understanding |
| 7. | What are different types of spoilage? | BT-2 | Understanding |
| 8. | Mention the effects of microbial spoilage. | BT-1 | Remembering |
| 9. | Define Putrefaction. | BT-2 | Understanding |
| 10. | Define fermentation. | BT-1 | Remembering |
| 11. | What is rancidity? | BT-1 | Remembering |
| 12. | What are the types of rancidity? | BT-2 | understanding |
| 13. | How food spoilage effects in poultry? | BT-1 | Remembering |
| 14. | What is the effect of spoilage in fishes? | BT-1 | Remembering |
| 15. | What is the effect of pH value on egg? | BT-3 | Applying |
| 16. | What are direct damages caused by storage? | BT-1 | Remembering |
| 17. | List the sources of infestation | BT-1 | Remembering |
| 18. | What are the important storage requirements? | BT-1 | Remembering |
| 19. | When the losses occurs during storage? | BT-1 | Remembering |
| 20. | List the post harvest losses. | BT-2 | understanding |

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| 21. | Compare direct and indirect loss in food storage. | BT-1 | Remembering |
| 22. | Write the formula to calculate loss in Weevil and Germ Eaten Grain Counting Method. | BT-1 | Remembering |
| 23. | Make a keynote on Gravimetric method. | BT-1 | Remembering |
| 24. | List the indirect losses of biochemical changes among the grains | BT-1 | Remembering |
| 25. | List any 4 methods for estimation of storage losses. | BT-2 | understanding |

## PART – B

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|---|---|---|---|
| 1. | Write a brief note on food spoilage. | BT-1 | Remembering |
| 2. | List the Undesirable Changes in Food due to Spoilage. | BT-1 | Remembering |
| 3. | What are the factors affecting food spoilage? | BT-1 | Remembering |
| 4. | What are the effects of bacteria in food spoilage? | BT-2 | understanding |
| 5. | Describe the effect of yeast in foods. | BT-3 | Applying |
| 6. | List with description about the factors affecting growth of microorganisms. | BT-2 | understanding |
| 7. | What is effect of moulds in food spoilage? | BT-3 | Applying |
| 8. | Describe the effects of Spoilage due to Enzymatic Activity. | BT-1 | Remembering |
| 9. | Write the significance of the factors affecting enzymic activity. | BT-3 | Applying |
| 10. | What are the effects of spoilage due to insects, pests and rodents? | BT-3 | Applying |
| 11. | What are the methods of food concentration? | BT-3 | Applying |
| 12. | Write a note on spoilage of dried food products. | BT-1 | Remembering |
| 13. | Write a note on selection criteria of perishable foods. | BT-2 | understanding |
| 14. | What are the different criteria for selection of vegetables? | BT-3 | Applying |
| 15. | List and explain the different methods of food preservation. | BT-3 | Applying |
| 16. | Explain the fermentation process and its effects on pasteurization. | BT-1 | Remembering |
| 17. | What are different temperature employed for different storage systems? | BT-2 | understanding |

## PART – C

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|---|---|---|---|
| 1. | Describe the process of drying with necessary steps. | BT-3 | Applying |
| 2. | Describe the food spoilage due to physical and chemical factors. | BT-2 | understanding |
| 3. | What are effects of spoilage in nutritional quality? | BT-3 | Applying |
| 4. | Explain in detail about food preservation at low and high temperature. | BT-2 | understanding |
| 5. | Explain in detail about estimation of losses. | BT-2 | understanding |

## UNIT II - STORAGE METHODS

Improved storage methods for grain-modern storage structures-infestation-temperatureand moisture changes in storage structures-CAP storage-CA storage of grains andperishables construction operation and maintenance of CA storage facilities.

### PART – A

| Q.No | Questions | BT Level | Competence |
|---|---|---|---|
| 1. | List the sources of infestation. | BT-1 | Remembering |
| 2. | What are the storage requirements of agricultural produce? | BT-1 | Remembering |
| 3. | What are factors governing the correct storage technique? | BT-1 | Remembering |
| 4. | List the different types of storages. | BT-1 | Remembering |
| 5. | What are the different traditional storage structures? | BT-2 | Understanding |
| 6. | List the different improved storage structures. | BT-2 | Understanding |
| 7. | What are the effects of relative humidity on crops? | BT-1 | Remembering |
| 8. | Write a note on infested stocks. | BT-1 | Remembering |
| 9. | What is nominal temperature of storage? | BT-1 | Remembering |
| 10. | Define freezing injury. | BT-2 | Understanding |
| 11. | List the symptoms of chilling injury. | BT-3 | Applying |
| 12. | What are the advantages of storage? | BT-1 | Remembering |
| 13. | Define pit storage. | BT-1 | Remembering |
| 14. | List the advantages of pit storage. | BT-2 | Understanding |
| 15. | Define cellar storage. | BT-1 | Remembering |
| 16. | What are pros and cons of cellar storage? | BT-1 | Remembering |
| 17. | What is key feature of air cooled storage? | BT-1 | Remembering |
| 18. | What are the applications of evaporative cooling? | BT-1 | Remembering |
| 19. | Define ventilated storage. | BT-1 | Remembering |
| 20. | Write the significant feature of Improved cool energy chamber. | BT-1 | Remembering |
| 21. | What is the salient feature of refrigerated storage? | BT-1 | Remembering |
| 22. | Write the principle of controlled storage. | BT-1 | Remembering |
| 23. | What are the limitations of CA storage? | BT-1 | Remembering |
| 24. | What are the advantages of CA storage? | BT-1 | Remembering |
| 25. | What are factors affecting gas permeability through the packaging? | BT-2 | Understanding |

| PART – B | | | |
|---|---|---|---|
| 1. | Describe the sources of infestation. | BT-1 | Remembering |
| 2. | Write down the importance parameters of storage requirements | BT-2 | Understanding |
| 3. | List various method to achieve relative humidity. | BT-3 | Applying |
| 4. | What are the factors responsible for proper storage of fruits and vegetables? | BT-1 | Remembering |
| 5. | What are various injury occur to fruit and vegetables during storage? | BT-1 | Remembering |
| 6. | Describe the traditional storage structures with their importance. | BT-3 | Applying |
| 7. | Make a note on temperature in the storage process. | BT-3 | Applying |
| 8. | Explain chilling injury. | BT-3 | Applying |
| a) | Eplain the storage process of food and vegetables. | BT-1 | Remembering |
| 9. | Write briefly about air cooled storage. | BT-2 | Understanding |
| 10. | Write briefly about evaporative cooling | BT-2 | Understanding |
| 11. | What do you understand by evaporative cooling? | BT-2 | Understanding |
| 12. | Explain ventilated storage. | BT-2 | Understanding |
| 13. | Write a brief note on refrigerated storage. | BT-1 | Remembering |
| 14. | Explain CA storage process. | BT-2 | Understanding |
| 15. | Write a note on creating and maintaining modifying atmosphere. | BT-2 | Understanding |
| 16. | Explain CA storage of oil seeds and cerals. | BT-3 | Applying |

**PART – C**

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|---|---|---|---|
| 1. | Explain the principles of storage process. | BT-3 | Applying |
| 2. | Explain different inmproved storage processes. | BT-3 | Applying |
| 3. | Write a brief note on improved storage methods. | BT-2 | Understanding |
| 4. | Explain CA storage systems | BT-3 | Applying |
| 5 | Explain MA storage systems | BT-1 | Remembering |

| UNIT III - FUNCTIONS OF PACKAGING MATERIALS | | | |
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| Introduction – packaging strategies for various environment – functions of package –packaging materials – cushioning materials – bio degradable packaging materials –shrink and stretch packaging materials. | | | |
| **PART – A** | | | |
| **Q.No** | **Questions** | **BT Level** | **Competence** |
| 1. | Define Packaging. | BT-1 | Remembering |

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| 2. | Mention the key stake holders in strategic development process of packaging. | BT-1 | Remembering |
| 3. | List the characteristic of packaging material. | BT-1 | Remembering |
| 4. | What are the types of packaging? | BT-1 | Remembering |
| 5. | Write short note on primary packaging? | BT-1 | Remembering |
| 6. | What is secondary packaging? Give some exampless. | BT-1 | Remembering |
| 7. | Write the significance of tertiary packaging. | BT-2 | Understanding |
| 8. | What are the functions of packaging cushioning materials? | BT-1 | Remembering |
| 9. | List the types of cushioning materials? | BT-1 | Remembering |
| 10. | Write note on corrugated fibre boards. | BT-1 | Remembering |
| 11. | What are design factors considered in packaging? | BT-1 | Remembering |
| 12. | List any four methods of cushion packaging. | BT-1 | Remembering |
| 13. | What are biopolymers? | BT-1 | Remembering |
| 14. | Compare biobased and biodegradable products. | BT-1 | Remembering |
| 15. | List the biodegradable polymers. | BT-1 | Remembering |
| 16. | List any four bioplastics for the composition of biodegradable materials. | BT-1 | Remembering |
| 17. | List the classification of bioplastics. | BT-2 | Understanding |
| 18. | What are gas barrier properties of biodegradable materials. | BT-1 | Remembering |
| 19. | What is blown films based on biodegradable polyesters? | BT-1 | Remembering |
| 20. | What is shrink wrapping? | BT-2 | Understanding |
| 21. | What different stages are of shrink wrapping? | BT-1 | Remembering |
| 22. | What advantages are of shrink wrapping? | BT-1 | Remembering |
| 23. | What are the uses of shrink packaging system? | BT-2 | Understanding |
| 24. | Define stretched wrap. | BT-1 | Remembering |
| 25. | What are materials used in stretch packaging? | BT-2 | Understanding |
| **PART – B** | | | |
| 1. | What are various packing technologies for different environments? | BT-1 | Remembering |
| 2. | Describe the characteristic of packaging material.. | BT-3 | Applying |
| 3. | List the uses of packaging in detail. | BT-3 | Applying |
| 4. | What are different types of packaging based on purpose? | BT-3 | Applying |

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| 5. | List the various symbols used on packaging and labeling. | BT-3 | Applying |
| 6. | Describe different types cushioning materials. | BT-3 | Applying |
| 7. | List and explain design factors in cushioning materials. | BT-2 | Understanding |
| 8. | Describe the methods of cushioning materials. | BT-3 | Applying |
| 9. | What is the origin and description of biobased polymers in packaging? | BT-2 | Understanding |
| 10. | Classify biodegradable polymers in packaging. | BT-1 | Remembering |
| 11. | Write short note on Starch and polylactic acid. | BT-2 | Understanding |
| 12. | Describe the formation of Poly HydroxyalAnoates. | BT-2 | Understanding |
| 13. | What are the gas bearing properties of packaging in biopolymers? | BT-2 | Understanding |
| 14. | What are different methods and functions of stretch wrapping? | BT-2 | Understanding |
| 15. | What are the advantages and disadvantages of stretch wrap? | BT-1 | Remembering |
| 16. | Write about piller proof and pallet wrapping. | BT-2 | Understanding |
| 17. | Compare shrink and stretch wrapping. | BT-2 | Understanding |
| | **PART – C** | | |
| 1. | What are the key properties of packaging materials? Discuss its significant features. | Applying | Applying |
| 2. | Write a note on cushioning materials its functions, methods and applications. | Understanding | Understanding |
| 3. | What are conventional plastics used in bulk packaging? | Applying | Applying |
| 4. | Describe the manufacturing of biobased food packaging. | Applying | Applying |
| 5. | Write a note on shrink and stretch wrapping. | | |

| **UNIT IV- FOOD PACKAGING MATERIALS AND TESTING** | | | |
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| Introduction – paper and paper boards - flexible - plastics - glass containers – cans - aluminium foils - package material testing-tensile, bursting and tear strength. | | | |
| **PART - A** | | | |
| **Q.No** | **Questions** | **BT Level** | **Competence** |
| 1. | What are different forms of paper boards used in packaging? | BT-1 | Remembering |
| 2. | Write the specification of paper and paperboard as per International organization of standardization? | BT-1 | Remembering |
| 3. | What is temperature range of paperboard packaging? | BT-1 | Remembering |

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| 4. | What is sheet forming in paperboard packaging? | BT-1 | Remembering |
| 5. | List the different forms of paperboards available in market. | BT-1 | Remembering |
| 6. | Define the plastics in food packaging. | BT-1 | Remembering |
| 7. | How the evolutions of plastic take place in foreign countries? | BT-1 | Remembering |
| 8. | What is the temperature range of plastic in packaging? | BT-1 | Remembering |
| 9. | Define permeation. | BT-3 | Applying |
| 10. | What are the factors for rate of permeation? | BT-1 | Remembering |
| 11. | What are main types of glass packaging? | BT-2 | Understanding |
| 12. | Write the chemical composition of glass. | BT-2 | Understanding |
| 13. | List the attributes of food packaged in glass containers. | BT-3 | Applying |
| 14. | What are different types of closures available in glass? | BT-1 | Remembering |
| 15. | List the specific test carried on glass packaging. | BT-1 | Remembering |
| 16. | Define depalletization. | BT-1 | Remembering |
| 17. | List the raw materials of can making. | BT-1 | Remembering |
| 18. | Brief the recycling of packaging metal. | BT-1 | Remembering |
| 19. | List the seam parameters in metal packaging. | BT-1 | Remembering |
| 20. | What is post processing in can cooling, drying and labelling? | BT-1 | Remembering |
| 21. | What are various types of drying aide? | BT-1 | Remembering |
| 22. | What is pallet system? | BT-1 | Remembering |
| 23. | List the main factors that affect shelf life of canned foods. | BT-1 | Remembering |
| 24. | What is Interactions between the can and its contents? | BT-1 | Remembering |
| 25. | What is role of tin in metal cans? | BT-1 | Remembering |
| **PART – B** | | | |
| 1. | What are uses of packaging in main categories of food? | BT-2 | Understanding |
| 2. | Explain pulping of paperboards from fibre source and separation. | BT-3 | Applying |
| 3. | Describe the procedure of manufacturing of paperboard packaging. | BT-2 | Understanding |
| 4. | List and explain the properties of paper and paperboard in packaging. | BT-2 | Understanding |
| 5. | Identify the purpose of plastics in food packaging. | BT-2 | Understanding |

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| 6. | List the uses of plastics in packaging. | BT-2 | Understanding |
| 7. | What are different types of plastic used in packaging? | BT-3 | Applying |
| 8. | Write briefly about Coating of plastic films – types and properties. | BT-2 | Understanding |
| 9. | What are different combinations for colour bottles? | BT-3 | Applying |
| 10. | What are different attributes of food packaging in glass containers? | BT-3 | Applying |
| 11. | Write the glass pack integrity and product integrity. | BT-3 | Applying |
| 12. | Describe the cold form technique in glass formation. | BT-3 | Applying |
| 13. | What are different types of cluosures available in glass? Explain | BT-2 | Understanding |
| 14. | Explain thermal processing of glass packaged foods. | BT-2 | Understanding |
| 15. | What are the inputs required for glass packaging design? | BT-2 | Understanding |
| 16. | What are the performance requirements of metal containers? | BT-2 | Understanding |
| 17. | Summarize of quality assurance checks on in-coming containers at food packers. | BT-3 | Applying |
| | **PART – C** | | |
| 1. | Explain with neat sketch the principle features in manufacturing of paperboard packaging. | BT-2 | Understanding |
| 2. | What are key features in paper and paperboard packaging? | BT-3 | Applying |
| 3. | Describe the manufacturing of plastic packaging. | BT-2 | Understanding |
| 4. | Write a detailed procedure for glass and glass container manufacturing. | BT-3 | Applying |
| 5. | Explain the metal can making process with sketches. | BT-3 | Applying |

**UNIT V- SPECIAL PACKAGING TECHNIQUES**

Vacuum and gas packaging - aseptic packaging - retort pouching – edible film packaging – tetra packaging – antimicrobial packaging – shrinks and stretches packaging.

**PART – A**

| Q.No | Questions | BT Level | Competence |
|---|---|---|---|
| 1. | What is vacuum packaging? | BT-1 | Remembering |
| 2. | What is effect of vacuum packaging on quality of products? | BT-1 | Remembering |
| 3. | Write the effect of removal of oxygen in raw meats. | BT-1 | Remembering |

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| 4. | Mention the nano composite role in vacuum packaging. | BT-1 | Remembering |
| 5. | What do you mean by gas packaging? | BT-1 | Remembering |
| 6. | What are different ways to achieve gas packaging? | BT-1 | Remembering |
| 7. | Write a short note on gas flushing. | BT-1 | Remembering |
| 8. | List the two stages in compensated vacuum. | BT-3 | Applying |
| 9. | Write the evolution of aseptic packaging. | BT-1 | Remembering |
| 10. | What are basic operations in aseptic packaging? | BT-1 | Remembering |
| 11. | What are main characteristic of aspetic packaging? | BT-1 | Remembering |
| 12. | What are materials used in aspetic packaging? | BT-1 | Remembering |
| 13. | Define retort pouch. | BT-1 | Remembering |
| 14. | What are the aim of retort pouching? | BT-1 | Remembering |
| 15. | List the advantages of retort pouch than other packaging methods. | BT-1 | Remembering |
| 16. | List the types of retort puches. | BT-1 | Remembering |
| 17. | What are the steps in processing of food in retort poches? | BT-2 | understanding |
| 18. | What are the shipping advantages of retort food? | BT-1 | Remembering |
| 19. | What is difference between foil and non-foil retort structure? | BT-1 | Remembering |
| 20. | What is edible packaging? | BT-1 | Remembering |
| 21. | What is edible coating? | BT-1 | Remembering |
| 22. | What are the methods of coating applications? | BT-1 | Remembering |
| 23. | What is antimicrobial packaging? | BT-1 | Remembering |
| 24. | What is principle of antimicrobial packaging? | BT-2 | understanding |
| 25. | What are methods of incorporating antimicrobial agents into films? | BT-1 | Remembering |
| **PART – B** | | | |
| 1. | What are the significance of Vacuum and gas packaging? | BT-4 | Analysis |
| 2. | Write down the importance of aseptic packaging. | BT-4 | Analysis |
| 3. | How the development of retort pack had developed? | BT-2 | understanding |
| 4. | Explain the design of antimicrobial packaging system. | BT-4 | Analysis |
| 5. | Describe the engineering properties on antimicrobial packaging technique. | BT-2 | understanding |

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| 6. | Describe the structure of retort pack. | BT-1 | Remembering |
| 7. | What are characteristics essential for retort packs? | BT-4 | Analysis |
| 8. | Expain the process of food in retort packs. | BT-3 | Applying |
| 9. | Discus the advantages and limitations of retort packs. | BT-3 | Applying |
| 10. | What is edible film? List its advantages. | BT-3 | Applying |
| 11. | What are different components of edible coating? | BT-3 | Applying |
| 12. | Describe the functional properties of ediblefilm coating. | BT-3 | Applying |
| 13. | What are the use of edible films and coatings? | BT-3 | Applying |
| 14. | Describe any four methods of coating applications. | BT-1 | Remembering |
| 15. | What are drawbacks on edible film packaging | BT-3 | Applying |
| 16. | What are different methods and functions of stretch wrapping? | BT-4 | Analysis |
| 17. | What are the advantages and disadvantages of stretch wrap? | BT-4 | Analysis |



**PART – C**

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|---|---|---|---|
| 1. | Explain about Vacuum and gas packaging. | BT-4 | Analysis |
| 2. | Describe the general conditions and process of aseptic packaging. | BT-4 | Analysis |
| 3. | What are the salient features of retort pouching? Describe its applications | BT-4 | Analysis |
| 4. | Explain about edible film packaging. | BT-2 | understanding |
| 5. | Explain the design of antimicrobial packaging system. | BT-2 | understanding |