## Semester VI

## Food Equipment and Food Packaging

**OBJECTIVES:**

**The course enables the students to:**

- **Acquire knowledge and understanding of basic engineering principles in the fields ofFood Processing.**

| Subject | TC | Th | Pr | Int | Ext | Total |
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| **Food Equipment and Food Packaging** | **4** | **4** | **-** | **25** | **75** | **100** |

| Module No. | Objectives | Topic and Details | Assessment |
|---|---|---|---|
| **1** | **The course enables the students to:**<br>- learn basic engineering concepts and<br>- gain knowledge about machines used for transportation of matter<br>- learn the working principles and applications of different separation techniques in food industry | **Mechanical power transmission, Transportation of solid, liquid, gases and Mechanical Separation**<br><br>• Mechanical power transmission- Introduction of drives, gears, bearing, friction, speed regulation and control definitions<br>• Transportation of solid, liquid, gases<br>Solids- Conveyor<br>Fluids- Flow of fluids, pumps<br>Gases- Blowers, chimneys, compressors<br>• Mechanical Separation<br>Grading, Filtration, Centrifugation, Solvent extraction,Osmosis, Floating and sedimentation<br>Principles involved and Applications of all above methods in food industries | **25 Marks**<br>Quiz and Assignments |

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| **2** | **The course enables the students to:**<br>- Learn different equipments used for mixing and blending<br>- Understand the working principles and applications of various size reduction equipments<br>- Gain knowledge about basic concepts of psychrometry | **Mixing and Blending, Size reduction, Psychrometry**<br><br>• Mixing and Blending<br>Different types of mixers: for liquid, for dry powders<br>Kneaders<br>• Size reduction:<br>Size reduction equipment-<br>Grinders(wet and dry grinding), Hammer mills, Cryogenic mill, Ball mills, pulpers, mixers, pulverizer<br>• Introduction to psychrometry:<br>Definition and principle involved, humidity,<br>Definition of dry bulb temperature and wet bulb temperature,<br>Applications | **25 Marks**<br><br>Presentations<br>Assignments |
| **3** | **The course enables the students to:**<br>- Understand different modes of heat transfer and the principles involved in heat exchangers<br>- Learn refrigeration cycle and its application in food industry<br>- Know different methods of freezing<br>- Understand the working principles of concentrators, dehydrators, evaporators<br>- Apply the principles of heat transfer and exchange in food industry | **Heat transfer and Heat Exchangers, Refrigeration, Freezing, Concentration and Dehydration, Evaporation**<br><br>• Heat transfer and Heat Exchangers:<br>Conduction, convection, radiation – Principle, Different types of heat exchangers, definition, principles of working and application<br>• Refrigeration:<br>Principle,<br>Properties of common refrigerants their comparison and the basis of selection.<br>• Freezing:<br>Principle, Various requirements and methods used for freezing<br>• Concentration and Dehydration, Evaporation:<br>Moisture calculation: Dry and wet basis<br>Equipments for concentration and dehydration- Dehydrator, Evaporators: different types, Dryers: different types<br>Osmotic Drying, Vacuum drying | **25 Marks**<br>Presentations<br>Assignment |

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| **4** | - Understand the functions, types, properties of packaging and packaging materials<br>- Gain knowledge about different packaging forms and methods<br>- Learn about the food labeling, packaging laws.<br>- To gain knowledge about latest packaging materials and techniques | **Food Packaging and Labeling**<br><br>• Function of packaging<br>• Types of packaging materials<br>• Packaging forms and methods<br>• Food packaging/ food interactions<br>• Importance of labeling, Rules, Laws, Govt. Regulations and Barcoding<br>• Latest packaging materials and techniques | **25 Marks**<br><br>Assignment<br>Presentations |

**REFERENCES:**


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2. Petter, Norman N, Herchkiss, Joseph H,(1996), Food Science, 5th ed., Chapman and Hall, New Delhi CBS.

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4. Le Magves and Jalen.P., (Editor), Food Engineering and process application, Vol. 2 Unit operation.

5. Patel R.C. , Karamchandani C.J. , (1989), Elements of Heat Engines, Vol. III,14th ed., Acharya Book Depot, Vadodara.

6. Diamond P.S., Denmann R.F., (1973), Laboratory Techniques in Chemistry and Biochemistry, 2nd ed., London, Butterworths.