## DISCIPLINE SPECIFIC CORE COURSE – 15

### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

| Course title & Code | Credits | Credit distribution of the course | | | Eligibility criteria | Pre-requisite of the course (if any) |
|---|---|---|---|---|---|---|
| | | Lecture | Tutorial | Practical/ Practice | | |
| **POLYMERS IN PACKAGING** | **4** | **2** | **0** | **2** | **Class 12th with Physics, Chemistry, Mathematics** | **-** |

### Learning objectives

- To learn about the Packaging systems and role of Polymer in packaging
- To acquire knowledge of various types of polymers as packaging materials

### Learning outcomes

After studying this paper, students will be able to

- Apprehend the basic concept of packaging and its utilization for desired applications
- Assess the quality of packaging material and packaged product
- Select the packaging material and can design a packaged product

### SYLLABUS OF DSC-15

### THEORY COMPONENT-

### UNIT-1: (10 Hours)

### PACKAGING SYSTEMS

Types of packaging systems: box, bottle, tetrapack, pouch, shrink, vacuum packaging, controlled atmospheric packaging (CAP), modified atmospheric packaging (MAP), aseptic packaging.

### UNIT 2: (10 Hours)

### POLYMERS IN PACKAGING

Importance of polymers in packaging. Property requirements of Polymers for packaging applications: Structure and process requirements for the required Properties and applications. Properties and applications: PE (LLDPE, LDPE, HDPE, HMHDPE), PP, BOPP PVC, nylons, polyester, polycarbonate, PS, EPS, PVA, Ionomers & Fluoro polymers.

**UNIT 3:** **(10 Hours)**

**TESTING OF POLYMER PACKAGING MATERIAL**

Bursting strength, tensile strength, tear strength, puncture test, impact test (drop, falling dart), barrier properties test (water vapour, oxygen), sealing strength., migration & compatibility.

**PRACTICAL COMPONENT** **(60 Hours)**

- Preparation of packaging films (PP/ HDPE/ LDPE/ LLDPE/PVA)
- To prepare polyester film and find its WVTR.
- Identification of packaging materials with the help of FT-IR, DSC, TGA etc.
- Preparation of laminate films by various methods (heat, solvent, adhesives)
- Determination of physico-mechanical properties (density, bursting strength, tensile strength, tear strength, puncture strength, impact strength etc) of packaging materials.
- Determination of water vapor transmission rate of packaging material.
- To determine the seal strength of packaging materials.
- To determine compatibility of packaging film with the packaged material.
- Industrial visit of packaging industry/plant

**ESSENTIAL/RECOMMENDED READINGS**


- Robertson G.L., (2012) Food Packaging – Principles and Practice, CRC Press Taylor and Francis Group.
- Paine F.A., Paine H.Y., (1992) A Handbook of Food Packaging, Blackie Academic and Professional
- Sharma S., Aggarwal M., Sharma D., (2019), Food Frontiers, New Delhi Publisher
- N. C. Saha, M. Garg, S. Dey Sadhu, A. K. Ghosh(2022) Food Packaging-Materials, Techniques and Environmental Issues" by published by Springer.
- Garg, M., Meena, P.L., Sadhu, S.D., Alam, T. (2019). Food Packaging: A Practical Guide : Viba Press Pvt. Ltd.


**SUGGESTIVE READINGS**


- Coles R., McDowell D., Kirwan M.J., (2003) Food Packaging Technology, Blackwell.
- Sukhareva L.A., Yakolev V.S., Legonkova O.A., (2008) Polymers for packaging and containers in the food industry, VSP.


**Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.**