

Government Institute of Printing Technology, Mumbai.

Sample Paper

Course: Flexible Packaging
Duration: 03Hours

Code: M509
Marks: 80

Instructions to candidates:

1. Attempt all questions and illustrate your answers with neat sketches wherever necessary.
 2. Figures to the right indicate full marks.
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- Q1 Answer any five questions. 20**
- a. Define flexible packaging. List two flexible materials.
 - b. Define polymer and polymerisation. Explain with suitable example.
 - c. List two advantages & two limitations of blister packaging.
 - d. Explain heat sealing method with diagram.
 - e. List four advantages of aseptic packaging.
 - f. Explain how dairy products are preserved.
 - g. Explain edible packaging.
- Q2 Answer any two questions. 12**
- a. Write three properties of 1) LDPE 2) PP
 - b. Explain blister packaging with neat diagram write its two applications.
 - c. Explain shrink wrapping with neat diagram write its two application.
- Q3 Answer any two questions. 12**
- a. Explain wet lamination with neat diagram.
 - b. Explain Aseptic packaging with all stages.
 - c. Write two packages requirements for
1) Carbonated drinks 2) Meat products 3) Dairy products.
- Q4 Answer any two questions. 12**
- a. List & explain any three additives of plastic
 - b. Explain any two types of closure. Also write function of liner.
 - c. With neat diagram, explain structure of lamitubes. List its three applications.
- Q5 Answer any two questions. 12**
- a. Compare between Thermoset and Thermoplastic up to six points.
 - b. List two physical and two chemical properties of packaging material. List four advantages of plastic.
 - c. Explain intelligent and active packaging with example.
- Q6 Answer any two questions. 12**
- a. Explain bottle manufacturing with neat diagram.
 - b. List and explain any three requirements of package for food packaging.
 - c. Explain controlled Atmosphere packaging technology. Write its two advantages and limitations.

Teaching and Examination Scheme

| Teaching Scheme hours/week | | Examination Scheme | | | | | | |
|-------------------------------|-----------|--------------------|-----------------------------|-----------------|-----------------------|-------------|-------------|-------------|
| Theory | Practical | Credits | Paper Duration in Hrs | Theory Marks | Unit Test Marks | PR Marks | OR Marks | TW Marks |
| 04 | 04 | 08 | 03 | 80 | 20 | #30 | #20 | \$20 |

= External, \$= Internal Assessment

Rationale:

Packaging is becoming one of the large segments of printing and related industry. This course intends to deal with additional knowledge of packaging requirements such as variety of substrates, finishing operations, conversion, etc.

| Chapter | Name of the Topic. | Hours | Marks |
|------------|---|-----------|-----------|
| 1.0 | Introduction | 12 | 16 |
| 1.1 | Introduction to Flexible packaging , Area of Applications | | |
| 1.2 | Introduction to polymer, classification, type of polymerisation - Addition, Condensation; Thermoset/ Thermoplastic | | |
| 1.3 | Additive in plastics antislip, antistatic, colorants, fillers, plasticizers | | |
| 1.4 | General Properties, Applications of following polymers related to Packaging - Polyethylene (PE), Polypropylene (PP), Polyvinyl Chloride (PVC), Polycarbonate (PC), Polyamide (PA), Polystyrene (PS), Polycarbonate (PC), Polyurethane | | |
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| 2.0 | Plastic converting Technology | 18 | 20 |
| 2.1 | Plastic extrusion technology – Blown film extrusion – single layer and multi-layer film manufacturing process, die blow mouldings – split die, sheet extrusion process control | | |
| 2.2 | Injection moulding – Meaning, bottle manufacturing | | |
| 2.3 | Lamination Technology – Dry Lamination, Wet Lamination, Sealing technology – heat sealing methods, Types of sealers – wire, rod, band, conductive etc. | | |
| 2.4 | Blister Pack Technology – use of materials, manufacturing process, backing material for Blister | | |
| 2.5 | Label application – label pasting; Closures, liners of closures | | |

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| 3.0 | Special packaging | 12 | 16 |
| 3.1 | Lamitubes - Structure of lamitube, Layers in laminate, plastic properties, manufacturing process, printing on lamitubes | | |
| 3.2 | Aseptic packaging – concept, process, and sterilization processes, requirements of films | | |
| 3.3 | Tetra pack – lamination processes, sterilization processes, pack forming on HFF and VFF machines. | | |
| 3.4 | Bag in Box – process, Retort packaging, Packaging Requirements | | |
| 3.5 | Pouch forming machines, filling machine, stand up pouches – materials used for pouches | | |
| 3.6 | Shrink wrapping and Stretch wrapping machines, films for shrink /stretch wrapping, Applications | | |
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| 4.0 | Food Packaging | 12 | 16 |
| 4.1 | A) Requirements of package for food packaging. Sterilization process for containers, B) Preservation technologies and Package Requirements for food packaging- Dairy products, Carbonated soft drinks, Beverages, Bakery products, Alcoholic drinks, Meat products | | |
| 4.2 | Physical, chemical properties of materials used for package, barrier properties of packaging material | | |
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| 5.0 | Tools in Food Packaging | 10 | 12 |
| 5.1 | Controlled Atmosphere Packaging Technology (CAP), Modified Atmosphere Packaging Technology (MAP) – Concept, Process, Advantages and disadvantages | | |
| 5.2 | Intelligent and Active Packaging – Reacting material for CO ₂ , Oxygen, Methane, Ethylene etc. | | |
| 5.3 | Different types of Indicators and labels to asses' Shelf life of Package | | |
| 5.4 | Concept of Sustainable packaging – environmental aspects related to packaging, edible packaging. | | |
| | Total | 64 | 80 |

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| No | Practical |
| 01 | Sample collection of various food packages and writing technical report |
| 02 | Study of extrusion, injection moulding |
| 03 | Demonstration of FFS machine |
| 04 | Demonstration of Layer Separation of multi layer product |
| 05 | Thickness of Films |
| 06 | Observing Printing on products and writing technical report |
| 07 | Demonstration of Drop test |
| 08 | Demonstration of Stack test |
| 09 | Demonstration of Water Vapour Transmission Test |
| 10 | Demonstration of Printability test |

References Book:

| No. | Title of Book | Author | Publisher's Name |
|-----|--|------------------------|---------------------------|
| 01 | Plastics in Flexible Packaging | A. S. Athalye | Multi-Tech Publishing Co. |
| 05 | Modern Packaging Films | S.H. Pinner | London Butter Worths |
| 08 | A Handbook for Printing And Packaging Technology | Bishwanath Chakravarty | Galgotia |