| Course code | Course name | L-T-P-Credits | Year of Introduction |
|---|---|---|---|
| AE368 | PLASTIC ENGINEERING | 3-0-0-3 | 2016 |

**Prerequisite: Nil**

**Course objectives**

- To give the concept of plastic engineering and their standards.
- To understand the diverse technological and functional approaches and applications
- To provide an insight of testing, identification and quality control.

**Syllabus**

Engineering Plastics- Concept of testing & identification of plastics- Test methods and standards for bio-degradable plastics - Recycling technologies for bio degradable plastics - Inspection and quality control of moulds - Environmental consideration

**Expected outcome**

On completion of the course, the students will

i. become familiar with testing methods and standards of plastic.
ii. be able to test the quality control of different modules.
iii. be able to identify how to engineer along with the environmental consideration.

**Text Books**

1. Cyril Donaldson, George H.Lecain, V C Goold, Tool Design, TATA McGraw Hill,1998.
2. Fred W. Billmeyer, Jr., Text Book of Polymer Science, John Wiley &Sons, Singapore,1994.
3. G.J.L. Griffin, Chemistry and Technology of Biodegradable Polymers, Blackie Academic Professional, 1994.

**Reference Books:**

1. Abraham J. Domb, Joseph Kost & David M.Wiseman, Handbook of Biodegradable polymers, CRC Press
2. Dominick V. Rosato, DonaldV. Rosato, Injection Molding Hand Book, CBC Publishers&Distributors,1987
3. Gerald Scott & Dan Gilad, Degradable Polymers-Principles & Applications, Chapman & Hall, 1995.
4. Gordon L. Robertson, Food Packaging Principles and Practice, Marcel Dekker, Inc., New York 1993.
5. IrwinI Rubin, Injection Molding Theory and Practice, Wisely Inter science Publication, 1972.
6. Louis T. Manzione, Plastic Packaging of Microelectronic Devices, Van Nostrand Reinhold, New York, 1990.
7. Plastics Engineering Hand Book of the Society of the Plastics Industry Inc.,Van Nostrand Reinhold Company, 1945.
8. Vishu Shah, Hand Book of Plastics Testing Technology, John Wiley & Sons Inc., New York, 1998.

**Course Plan**

| Module | Contents | Hours | Semester Exam Marks |
|---|---|---|---|
| I | **Engineering Plastics :** Sources and Manufacture of raw materials, Methods of Manufacture of Polymer, General Properties and applications of Acrylonitrile Butadiene | 8 | 15% |

| | | | |
|---|---|---|---|
| | Styrene -Polyamides (PA-6,PA-66,PA-6,10,PA-11&12) – Polycarbonates – Poly acetal & Copolymers - Thermoplastic Polyesters (PET&PBT) Poly phenylene oxide – Poly sulfones Fluoropolymers (PVF,PVDF,PTFE,PCTFE) - Thermoplastic Polyurethane. | | |
| **II** | **Concept of testing & identification of plastics** : Basic concepts of testing - Specification and Standards - National and International Standards - Test specimen preparation - Pre-conditioning and test atmosphere. Identification of plastics by simple tests - Visual examination - Density - Melting point - Solubility test - Flame test - Chemical tests. | 8 | 15% |
| **FIRST INTERNAL EXAMINATION** | | | |
| **III** | **Test methods and standards for bio-degradable plastics:** Plastics – criteria used in evaluation of biodegradable plastics – description of current Test methods – Scanning test for ready biodegradability – Test for inherent biodegradability – Test for simulation studies – Other methods for assessing polymer biodegradability | 6 | 15% |
| **IV** | **Recycling technologies for bio degradable plastics**: Conventional recycling – Degradable complicate recycling – reprocessing polyethylene starch/film scrap – Economics in in-plant recycling | 6 | |
| **SECOND INTERNAL EXAMINATION** | | | |
| **V** | **Inspection and quality control of moulds** : Introduction to Tool Room measuring instruments – Vernier– Micrometer – Height Gauge–Slip Gauge–Dial Gauge–Measuring tapers and angles–CMM | 7 | 20% |
| **VI** | **Environmental consideration**: Plastic waste – Classification, Segregation, Sorting and Waste Management viz. source reduction, reuse/repair, recycling related to packaging films and constrainers. Pollutants an outline – Chloro Fluoro Carbon (CFC), Dioxin Life cycle assessment: A case study | 7 | 20% |
| **END SEMESTER EXAMINATION** | | | |

**QUESTION PAPER PATTERN:**

Maximum Marks:100 Exam Duration: 3 Hours

**Part A**

Answer any two out of three questions uniformly covering Modules 1 and 2 together. Each question carries 15 marks and may have not more than four sub divisions.

(15 x 2 = 30 marks)

**Part B**

Answer any two out of three questions uniformly covering Modules 3 and 4 together. Each question carries 15 marks and may have not more than four sub divisions.

(15 x 2 = 30 marks)

**Part C**

Answer any two out of three questions uniformly covering Modules 5 and 6 together. Each question carries 15 marks and may have not more than four sub divisions.

(20 x 2 = 40 marks)