# GUJARATTECHNOLOGICALUNIVERSITY

**Program Name: Engineering**

**Level: PG**

**Branch: Plastic Engineering**

**Course/Subject Code: ME01084031**

**Course/Subject Name: Plastic Additives, Blends & Alloys**

| | |
|---|---|
| w.e.f. Academic Year: | 2024-25 |
| Semester: | 1st Semester |
| Category of the Course: | PEC |

**Course Outcome:**

After Completion of the Course Student will able to:

| No | Course Outcomes |
|---|---|
| 01 | Classify and explain the characteristics of various additives for Plastics. |
| 02 | Explain construction and working of compounding equipment. |
| 03 | Describe the methods & steps of polymer blend preparation and its properties & applications |
| 04 | Explain the characterization techniques for alloys/blends. |

**Teaching and Examination Scheme:**

| Teaching Scheme (in Hours) | | | Total Credits L+T+(PR/2) | Assessment Pattern and Marks | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|
| | | | | Theory | | Tutorial/ Practical | | |
| L | T | PR | C | ESE (E) | PA/ CA (M) | PA/CA(I) | ESE (V) | |
| 3 | 0 | 2 | 4 | 70 | 30 | 20 | 30 | 150 |

**Course Content:**

| Unit No. | Content | No.of Hours | %of Weightage |
|---|---|---|---|
| 1. | Introduction to Additives: Introduction - Technological Requirements - Classification - Selection Criteria - General effect on Properties - Evaluation and functions of additives. | 3 | 5 |
| 2. | Additives: Antioxidants - Stabilizers (Heat & UV) - Plasticizers - Fillers and reinforcements - Impact Modifiers - Lubricants - Slip and Anti-block | 10 | 25 |

| | | | |
|---|---|---|---|
| | agents - Processing aids - Blowing agents - Flame Retardants - Anti-static additives - Nucleating agents - Colorants | | |
| 3. | Compounding of Plastics : Construction and working of High speed mixer - Two roll mill - Banbury Mixer - Ribbon blender - Twin Screw extruder | 7 | 15 |
| 4. | Polymer blends & alloys – Definitions and nomenclature – reasons for making polymer blend – how to select blend components – Methods of blending-how to select blend components, steps in blending, Polymer-polymer miscibility, Compatibilizers, Compatibilization, Methods of Compatibilization. | 10 | 25 |
| 5. | Properties and applications of commercial polymer alloys and blends:<br>PVC/ABS, PVC/SAN, PVC/NBR,<br>PC/PET, PC/PBT, PC/ABS;<br>PPO/HIPS | 7 | 15 |
| 6. | Characterization of Blends:<br>Differential scanning Calorimetry (DSC),<br>TGA,<br>FTIR,<br>Scanning electron micrographs (SEM) ,<br>TEM | 8 | 15 |
| | **Total** | **45** | **100** |

**Suggested Specification Table with Marks (Theory):**

| Distribution of Theory Marks | | | | | |
|---|---|---|---|---|---|
| **R Level** | **U Level** | **A Level** | **N Level** | **E Level** | **C Level** |
| 15 | 15 | 20 | 10 | 5 | 5 |

*WhereR:Remember;U:Understanding;A:Application,N:AnalyzeandE:EvaluateC:Create(asper Revised Bloom's Taxonomy)*

**References/Suggested Learning Resources:**

**Books:**

1. Plastics Materials: J. A. Brydson
2.The Additives for Plastics Handbook : John Murphy
3.Mixing and compounding of polymers Theory and Practice: Manas-Zloczower, Ica
4. Polymer Alloys and Blends: L.A.Uttracki
5. Polymer Blends and Alloys by M.J Folkes
6.Polymer Blends and Alloys by R.P Singh and C.K Das

**(b)Open source software and website:**

1) https://nptel.ac.in/

2) https://pslc.ws/

**Suggested Course Practical List: : As per the above syllabus topics**