



AMITY UNIVERSITY
 ———— UTTAR PRADESH ————

Course Title: Conductive Polymers

Course Code: SAE901

Credit Units:

| L | T | S | SW/ FW | P | TOTAL CREDIT UNITS |
|---|---|---|-----------|---|--------------------------|
| 2 | - | - | 4 | - | 4 |

Course Objectives: This course covers the basic fundamentals of conducting polymers. Course provides an in-depth knowledge on different types of conducting polymers, their properties, characterization techniques and applications.

Pre-requisites: Basic information of organic chemistry and polymers

Course Contents/Syllabus:

| | Weightage (%) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Module -I Introduction to conductive polymer/conducting polymer | 20 |
| <ul style="list-style-type: none"> • Introduction • Need of conducting polymer, • Types of conducting polymer • Methods of synthesis of CPs • Structural characteristics and Doping Concept. | |
| Module –II: Conduction Process in conductive Polymers | 20 |
| <ul style="list-style-type: none"> • Conduction mechanism in conductive polymers e.g. Polyaniline (PANI) and Polypyrrole (PPY) • Concept of Polarons and solitons. | |
| Module -III: Techniques of Polymerization | 20 |
| <ul style="list-style-type: none"> • Bulk polymerization • Solution polymerization | |

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <ul style="list-style-type: none"> • Suspension polymerization • Emulsion polymerization • Advantages and disadvantages of these techniques • Comparison of the above. | |
| Module-IV: Analytical Techniques for Characterization of CPs | 20 |
| <ul style="list-style-type: none"> • Fourier Transform Infra-red spectroscopy • Scanning electron microscopy • Transmission electron microscopy • X-Ray Diffract meter (XRD) • Thermo gravimetric Analysis (TGA) • Ultraviolet and visible spectrophotometer | |
| Module-V: Physical Properties and Associated Applications of Conducting Polymers | 20 |
| <ul style="list-style-type: none"> • Polymer solar cells • Dye sensitized solar cells • Light Emitting Diodes | |

Student Learning Outcomes:

- To characterize the conducting polymer using various characterization tools.
- To demonstrate knowledge of conducting polymers used to fabricate plastic solar cells and light emitting diodes.
- To describe the physics of the polymer solar cells and light emitting diode.

Pedagogy for Course Delivery:

The class will be taught using theory and case based method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques

(a) Lecture Plan/Session Plan :

Assessment/ Examination Scheme:

| Theory L/T (%) | Lab/Practical/Studio (%) |
|----------------|--------------------------|
| 100 | NA |

Theory Assessment (L&T):

| Continuous Assessment/Internal Assessment | | | | | End Term Examination |
|-------------------------------------------|---------------|------------|------|------------|----------------------|
| Components (Drop down) | Mid Term Exam | Assignment | Viva | Attendance | |
| Weightage (%) | 15% | 5% | 5% | 5% | 70% |

Text & References:

1. Principles of Polymerization –G.Odian
2. Polymer Science and Technology –Joel R. Fried
3. Hand book of Conducting Polymers-Terje A. Skoyheim (Vol.I).
4. Conducting Polymers with Micro or Nanometer structure- Meixiang Wan
5. Polymer Science and Technology-Premamoy Ghosh