

3. POLYMER TESTING AND PROPERTIES

Module I (10 hrs)

Consideration of the importance of Testing-Identification of plastics-Determination of necessary manufacturing conditions-Assessment of properties of finished products in relation to service requirements-Standard and specification-National and International standards-Test specimen preparation-Preconditioning and test atmosphere.

Mechanical Properties: Density and dimensions-Hardness-tensile strength-compressive strength-shear strength-flexural strength-heat strength-impact strength-dynamic stress-strain properties-creep-relaxation and set tests-friction and wear-abrasion test-fatigue-burst strength-and folding endurance.

Module II (14 hrs)

Standard and Specifications-National and International standards-BIS, ASTM, ISO & NABL. Application of national and international standards (BIS-ASTM-ISO) for testing and their significance. Identification of common plastics materials by simple tests e.g., visual inspection, density, effects of heat, combustion and solvents, analysis with common solvents.

Thermal Properties: Specific heat and thermal conductivity thermal dependant properties-thermal endurance-glass transition temperature-thermal yield tests-Heat deflection temperature-Vicat softening temperature-Marten's heat resistance test-low temperature brittle point and flexibility test-coefficient of thermal expansion-shrinkage-Thermal stability-Thermal ageing and flammability.

Permanance Properties: Water absorption-soluble and insoluble matter-chemical resistance environmental stress cracking resistance-ageing-gas permeability-water vapour permeability and weathering.

Module III (12 hrs)

Optical Properties –Refractive index-light transmission-haze-clarity-gloss-colour guard and microscope.

Electrical Properties –Insulation resistance-power factor-permitivity – dielectric strength-tracking resistance-arc resistance and antistatic test. Knowledge and exposure on Sectorial Testing Standards

Preconditioning and Test Atmosphere – Testing of Mechanical, Thermal, Optical, Electrical properties, Permeability Properties and Rheological properties.

Product Testing-Pipe and fittings-film and sheets-container testing and FRP based products. Factors for designing tests for newer products .Factors affecting the quality of materials and products. Analysis of failure and its measurements .

Concepts of non-destructive testing

Text and Reference Books:

1. Plastics Testing Technology Hand book By Shah, Vishu
2. Hand Books of Plastics Test Methods By Brown, R.P
3. Hand Book of Plastics Technology 2 vol. By Allen, W.S & Baker P.N
4. Simple Methods for Identification of Plastics By Brawn, R.B
5. Analysis of Plastics By Crompton, J
6. Plastic Engineering Hand Book & D-5 By Society of Plastics Industry Inc

7. Identification & Analysis of Plastics By Haslam & Others
8. Allen; W.S and Baker; P.N, Hand Book of Plastics Technology, Volume 2, Identification Testing & Recycling of Plastics, CBS Publishers and distributors, New Delhi (2004)
9. Brown; Roger P (Ed.), Hand Book of Polymer Testing, Marcel Dekker, Inc, New York (1999)
10. Brown; Paul F (Ed), Hand Book of Plastics Test Methods, Longman Scientific and Technical, Harlow (1988)
11. Shah, Vishnu, Hand Book of Plastics Testing Technology, John Wiley and Sons, SPE Monograph (1984)
12. Blythe; A. R., Electrical Properties of Polymers, Cambridge University Press, Cambridge (1979).