

**B. Tech Degree V Semester Examination in Polymer Science and Rubber Technology, November 2009**

**PTF 1502 POLYMER PHYSICS**

Time : 3 Hours

Maximum Marks : 100

**PART A**

(Answer **ANY FIVE** questions)  
(All questions carry **EQUAL** marks)

(5 x 5 = 25)

- I. (a) Define degree of crystallinity. How is the crystallinity in polymers different from that in low molecular weight organic compounds?
- (b) Discuss the various factors that influence the polymer chain flexibility.
- (c) Define solubility parameter. Comment on its applications.
- (d) Describe in detail the effect of molecular weight, extent of branching and cross – linking on the mechanical properties of polymers.
- (e) Define dielectric strength and dielectric constant. Describe their dependency on polymer structure.
- (f) Define intrinsic viscosity. How is it determined?
- (g) Give a typical stress – strain curve of a thermoset polymer and indicate the various parameters obtained from it.

**PART B**

(Answer **ANY FIVE** questions)  
(All questions carry **EQUAL** marks)

(5 x 15 = 75)

- II. Discuss the principle of X - ray diffraction experiment. How is it used to determine the degree of crystallinity?
- III. Write short notes on :
- (i) Thermal diffusivity
- (ii) Stress relaxation
- (iii) Folded chain lamellae and fringed micelle model of polymer crystals
- IV. Discuss two theories of glass transition.
- V. Discuss the principle of dynamic mechanical analysis. Comment on its applications.
- VI. Discuss the Flory – Huggins theory of polymer solutions.
- VII. (a) Name three conducting polymers. Discuss the mechanism of conduction, taking one example.
- (b) Give an account of the various bonding forces that hold the polymer chains together.
- VIII. Discuss the effect of strain rate, temperature and steric factors on the strength of a polymer sample.