TXL212 Major Total marks 25 Time 1 hour

1. (a) What is the meaning of parallel and anti-parallel β-sheet structure?

(b) Define: Storage modulus, loss modulus

(c) Explain basic principle of Ramachandran plot 1+2+2

2. (a) It is very important to maintain moisture-free inert atmosphere during PET production. Explain with chemical reactions.

(b) Polycondensation reaction step for PET manufacturing is reversible. How the reaction is pushed forward for highest yield of polymer? 2+3

3 (a) What is the purpose of xanthation step in viscose preparation? Explain with chemical reaction.

(b) Both viscose and cotton are cellulosic fibres and burn easily. But on burning one shows residue of ash, while the other one does not. Explain.

(c) In a paper distributed in class, hazards related to use of CS_2 was discussed. What other chemicals can be used to replace CS_2 in advanced viscose spinning strategy? 2+1+2

4 (a) Drawing of nylon-6 is usually carried out at room temperature. But as-spun nylon-6 fibres are kept some time for conditioning before taking it to drawing. Why?

(b) In spun-drawn nylon-6 filament, the dye uptake and the diffusion coefficient are increased when heat-setting is carried out by steam. But these two parameters decrease if heat setting is done in dry condition. Explain why.
2+2+1

(c) What are the functions of spin finish?

5 (a) VB Gupta et al, JAPS, mentioned longitudinal cracks in amine-etched PET fibers heat set at temperatures between 100 and 250°C in the free-to-shrink and constant-length conditions. What were the differences observed and why? 3+2

(b) For a molecule to absorb IR, why must the molecule's vibrations cause fluctuations in the dipole moment of the molecule?