

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. IST Semester–Remedial Examination – July- 2011****Subject code: 712501N****Subject Name: Theory of Textile Structure I****Date: 07/07/2011****Time: 10:30 am – 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) Explain fundamental structural features of yarn. How fibre, yarn and fabric structure and properties are interrelated? **06**

(b) With suitable diagram, explain microscopic method for evaluating yarn diameter. What is Schwarz's constant? **08**

Q.2 (a) Calculate following **07**

1. 150/75/200 Polyester filament yarn has a packing factor of 0.80. The yarn is subjected to a strain up to 16%. Assuming coaxial helical geometry and constant volume deformation, will the yarn be able to sustain the strain if the filament breaking strain is 14.0%?
2. What will be the value of the mean fiber position for perfect migration for a staple yarn if $V_y = 1.20$ and $\tau = 45$

(b) Write in short on various structural features of compact spun yarn. **07**

OR

(b) What are the limitations of Platt's low strain model? Also draw a graph of relative filament strain v/s radial position for different twist angles. **07**

Q.3 Assuming constant value of Poisson Ratio σ_y , derive equation to predict filament strain ϵ_f for large value of ϵ_y . How the same will be modified if the σ_y is incorporated? **14**

OR

Q.3 Derive the expression to predict the tenacity of filament yarn using energy method as treated by Treolar and Riding. **14**

Q.4 (a) With the help of theoretical method derive an equation to find out yarn diameter for filament yarn. **06**

(b) Modify Platt's equation $\frac{\epsilon_y}{\epsilon_f} = \sec^2 \theta$ incorporating σ_y for low strains. **08**

OR

Q.4 State and define various migration parameters along with expressions. Explain fully the migration analysis as carried out by Riding using statistical correlogram approach, and interpret. **14**

Q.5 Write in detail on open and hexagonal close packing of fibres in the yarn. What suggestions are made by Hearle for real yarn? **14**

OR

Q.5 Through traditional and qualitative approaches, discuss extension and breakage behaviour for spun yarns. **14**
