GUJARAT TECHNOLOGICAL UNIVERSITY ME - SEMESTER– I (New course)• REMEDIAL EXAMINATION – SUMMER 2015 Subject Code: 2712508 Date:13/05/2015 Subject Name: Theory of Yarn Structure			
Time: 10:30 am to 1:00 pm Total Max		70	
Ins		Attempt all questions. Make suitable assumptions wherever necessary.	
Q.1	(a) (b)	Write on any one modern method of measuring yarn diameter. Write a short note on different ways in which fiber packing occurs in yarns.	07 07
Q.2	<b>(a)</b>	Discuss in detail material and process related factors influencing yarn surface	07
	(b)	profile. What is migration? Derive expressions for migration parameters like Mean fiber position(Y bar), Root mean square deviation (amplitude)(D) and Rate (intensity) of migration (I).	07
	(b)	<b>OR</b> For ideal and perfect migration, prove that RMS deviation (D) is 0.3.	07
Q.3	(a)	Prove theoretically that the number of filaments crossing corresponding to any given increment of length is constant. Also derive equation to find out contraction	12
	(b)	in filament. Calculate diameter of individual filament of polyacrylonitrile yarn having 76/34/0 specification.	02
0.2	(-)	OR	07
Q.3	(a) (b)	Write short note on qualitative view of spun yarn mechanics. Explain the basic structural features of open end yarn.	07 07
Q.4		Derive theoretical prediction equation of yarn tenacity for $\epsilon_f < 10 \%$ OR	14
Q.4		Derive an equation to predict filament strain $\epsilon_f$ for large value of $\epsilon_y$	14
Q.5		Derive an equation of triangular wave form of first cycle of migration pattern assuming linear approximation.	14
0.5		OR	14
Q.5		<ul> <li>Calculate Following: <ul> <li>(i) 176/70/200 Polyester filament yarn has a packing factor of 0.80. The yarn is subjected to a strain up to 15%. Assuming coaxial helical geometry and constant volume, will the yarn be able to sustain the strain if the filament breaking strain is 14.0%?</li> <li>(ii) The breaking load of a PFY, with denier 155/74/0, is 400 g. What will be the tenacity in gpd?</li> <li>(iii) Hamilton yarn geometer gave the following values: Yarn major dia = 280 microns Yarn minor dia = 170 microns If the yarn count is 18<sup>s</sup> Ne and fiber specific volume is 0.657 cm<sup>3</sup>/g, estimate packing factor.</li> </ul> </li> </ul>	14
		(iv) What will be the value of the mean fiber position for perfect migration for a staple yarn if $V_y = 1.25$ and $\tau = 45$	

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