Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E –IIst SEMESTER–EXAMINATION – JULY- 2012

Subject code: 1722505 **Date: XX/07/2012**

Subject Name: Advanced Fibre Properties

Time: 10:30 am – 13:00 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)**	Schematically represent fibre structure in terms of three major variables.(As given by Hearle)	**07**
	(b)	Explain various terms related with thermal characterization of fibres like DTA, DSC, TG, TMA, DMA, DMTA etc. Draw typical DTA or DSC trace showing points of Tg, Tc and Tm.	**07**
Q.2	**(a)**	Derive different heat of sorption equations from the absorption isotherms based on Clausius-Clapeyron water vapour equation.	**07**
	(b)	For a homogeneous cylinder of length L and radius r, derive equation for time (τ) for a change in the equilibrium concentration in cylinder from C_1 to C_0.	**07**
		OR	
	(b)	Write a note on: (i) Dynamic testing method(any two) (ii) Water retention theory based on centrifuging of wet fiber.	**07**
Q.3	**(a)**	Elaborately discuss the transverse swelling after water absorption.	**07**
	(b)	With neat sketch explain (i) Change in fibre mass condition after air blow (ii) Ideal transmission of change by forced draught.	**07**
		OR	
Q.3	**(a)**	Define and describe following: (i) Thermodynamic equilibrium (ii) Diffusion coefficient	**06**
	(b)	Write on molecular forms and packing in wool. Also write on structural mechanics of wool fibre as given by Chapman.	**08**
Q.4	**(a)**	What is flexural rigidity? Derive equations with reference to bending of fibres.	**05**
	(b)	Describe following test procedures in short for measurement of bending of fibres: (i) Use of Tensile tester for coarse fibres (ii) By a loop method	**09**
		OR	
Q.4	**(a)**	What is torsional rigidity of fibres? Derive equations with reference to torsional rigidity, shear modulus etc. for fibres.	**06**
	(b)	Describe experimental methods used by Morton for measuring torque-twist relationship in fibres.	**08**
Q.5	**(a)**	Write in detail on empirical results with reference to effect of various parameters on fibre friction.	**05**
	(b)	Write essential features of following apparatus for measurement of fibre friction. (i) Bowden and Leben's apparatus (ii) Guthrie and Oliver's apparatus (iii) Pascoe and Tabor's modifications for low loads.	**09**
		OR	
Q.5	**(a)**	What is DFE with reference to wool fibre? Which are different combinations that can occur with reference to scales of the wool?	**05**
	(b)	With reference to theories of time dependence how ideal spring and dashpot in series and in parallel help to elucidate viscoelastic behaviour of fibres? Also write on Eyring's three element model with reference to reaction-rate theory.	**09**

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