Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME- SEMESTER II– EXAMINATION – SUMMER 2015

Subject Code: 2722508 **Date: 26/05/2015**

Subject Name: Theory of Fabric Structure

Time: 2:30 PM – 5:00 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)**	Derive equations for any three special cases based on the geometrical model of woven fabric as given by Peirce.	**07**
	(b)	Describe methods to measure crimp instrumentally. Also write a short note on crimp interchange and the conditions leading to it.	**07**
Q.2	**(a)**	Derive an equation assuming race-tracked cross-section for the jammed fabric condition.	**07**
	(b)	Write a short note on fabric assistance in woven structures made from different spun yarns.	**07**
		OR	
	(b)	Calculate ratio of major to minor axis of a yarn from following data(Assume race-tracked cross-section) P1 = 208 mills P2 = 170 mills c1 = 7.1 % c2 = 12.5 % Ne = 24.3s	**07**
Q.3	**(a)**	Derive an equation to find force required to bend the yarn in form of elastic at the time of weaving.	**11**
	(b)	Determine the square sett of a fabric having 80% of maximum cover factor if 2 up 2 down 1 up 2 down weave is woven using 2/40s Ne cotton yarn.	**03**
		OR	
Q.3	**(a)**	How fabric properties like shear and bending are measured using KES or FAST systems? Also write note on ñFabricEyeò.	**10**
	(b)	Find extension and contraction % for fabric if PPI = 44, EPI = 60, c1 = 4.5 % and c2 = 12%	**04**
Q.4	**(a)**	Define following terms with reference to tensile properties of fabric: (i) Poisson Ratio (ii) Isotropic (ii) Anisotropic (iv) Orthotropic	**04**
	(b)	Derive an equation for Poisson Ratio for the fabric with reference to geometric changes during the extension of cloth.	**10**
		OR	
Q.4		Critically discuss the model (containing frictional and elastic elements) to illustrate shear behavior of the fabric. Also describe the apparatus used by Trealor for measurement of shear parameters.	**14**
Q.5		What are different cases with reference to load-extension modulus? Derive necessary equation for modulus if the fabric is biaxially stressed and internal energy changes are not considered. (Case I)	**14**
		OR	
Q.5	**(a)**	Draw theoretical buckling curves for fabrics having different values of frictional restraints. Derive an equation for total length of elastica for a buckled fabric, under the action of compressive load at its free ends.	**10**
	(b)	Define the terms porosity and permeability. Deduce the equation for fabric pore area and yarn air space.	**04**