

GUJARAT TECHNOLOGICAL UNIVERSITY**BE – SEMESTER- VII EXAMINATION-SUMMER 2023****Subject Code: 3172904****Date: 26/06/2023****Subject Name: Yarn Structure and Fabric Geometry****Time: 10:30 AM TO 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.
4. Simple and non-programmable scientific calculators are allowed.

		Marks
Q.1	(a) Which are the disturbing factors that operate in determining real yarn structures.	03
	(b) Hamilton yarn geometer gave following values for a yarn with 150 denier. Major Dia = 400 micron Minor dia = 190 micron Estimate packing factor if specific volume of fibre is 1.11 cm ³ /g	04
	(c) Work out equations for fractional cover, warp and weft cover factors and total cover factor for cotton fabrics.	07
Q.2	(a) Find diameter of individual filament and yarn for polypropylene yarn having count as 85/40/300	03
	(b) What will be the TPI of a 50 ^s cotton yarn if surface twist angle is 28 deg and the packing factor is 0.6?	04
	(c) Enlist three basic structural features of yarn and discuss volumetric density in detail.	07
	OR	
	(c) Calculate fractional warp, fractional weft and total fabric cover for following two cases: 1. EPI - 132, PPI – 92, Count 2/120 x 2/100 Ne Cotton shirting 2. EPI - 40, PPI – 36 , Count 9 x 9 Ne Cotton denim	07
Q.3	(a) Draw a detailed graph of strength-twist relationship for spun yarns and interpret relationships.	03
	(b) Draw graphs for filament strain(radial position v/s relative filament strain) taking surface twist angles of 10, 20, 30 and 40 deg.	04
	(c) Prove that the number of filaments corresponding to any given increment of length of yarn is constant.	07
	OR	
Q.3	(a) Define ideal and preferential migration.	03
	(b) With reference to migration, write equations for Mean fibre position, root mean square deviation and rate of migration.	04
	(c) Derive equations for retraction and contraction due to twist in filament yarn	07
Q.4	(a) In order to use cheaper, coarser yarn and produce fabric faster, calculate the count to be used if the PPI are to be reduced from 82 to 72 using 40s Ne yarn.	03
	(b) With reference to packing of fibres in yarn, write on disturbing factors.	04
	(c) Derive most basic equation to predict filament strain of a yarn subjected to tensile strain.	07

OR

- Q.4** (a) What are the limitations of Peirce model of fabric geometry? **03**
(b) What is crimp interchange? Derive equations for the same. **04**
(c) Derive an equation to determine maximum cover factor and crimp for a 2 up 1 down weave. **07**

- Q.5** (a) Find the crimp in weft yarn for a fabric having following details: **03**
EPI – 54, PPI – 60, Count of warp and weft - 40sNe, C_1 – 6%
(b) Based on Peirce theory derive equation for p_2 when the weft yarn is straight. **04**
(c) With the help of Peirce fabric geometry, derive an equation to determine h_1 **07**

OR

- Q.5** (a) With reference to tensile properties of fabric explain following terms: **03**
(i) Anisotropic (ii) Isotropic (iii) Orthotropic
(b) Define fabric porosity and permeability. Relate the same with fabric cover factor. **04**
(c) Derive an equation for cloth geometry assuming jammed conditions and assuming race tracked cross section. **07**
