Department of Textile Technology

TTL362 Major Test

PART B

28.11.2013

Weightage: 20%

1. For a plain woven grey cotton fabric with partially set yarns, derive the differential equation of the crimp form. (6)
2. A plain woven cotton fabric has the following particulars:

	Warp	Weft
Linear Density (Ne)	13	10
Crimp (%)	25	7.6
Threads/in	55	45

- Find the warpwise and weftwise shrinkage percentage, if the fabric is immersed in water and yarns are allowed to swell till jamming occurs in both directions. (7)

3. 16.3 tex warp yarn and 24 tex weft yarn are used to produce a plain woven fabric with 19 ends per cm and 22 picks per cm. If warp crimp is 4.5% and weft crimp is 9.5% in the grey state of the fabric, find the relaxed state sett of the fabric and dimensional changes in warp and weft directions during relaxation. (7)

h_1 h_2 $P = (L - D\theta)\cos\theta + D\sin\theta$

TTL 362: Theory of Textile Structures

Major Test

Maximum Marks = 40

Date: November 28, 2013, Thursday
Time: 10:30 am – 12:30 pm
Venue: IV LT3

Answer Part A and Part B in separate answer books.

Part A (Maximum Marks = 20)

1) The fibre trajectory in a yarn is determined by the following differential equations

$$\frac{d\varphi}{d\zeta} = 2\pi z(\zeta) \quad \text{and} \quad \frac{dr}{d\zeta} = m(\zeta)$$

where z denotes the twist in fibre element, m refers to a characteristic of radial migration of fibres, r indicates the radius of yarn, ζ represents the axial length of yarn, and φ is the angle between fibre element and yarn axis. State the conditions for the functions $z(\zeta)$ and $m(\zeta)$ that distinguish among the following models.

Models	$z(\zeta)$	$m(\zeta)$
Model of parallel fibre bundle		
Model of helical fibres in yarn		
Model of radial fibre migration in yarn		

1×6

2) Fill in the blanks. 1×4

(a) The diameter of a cotton yarn of 50 tex count and 0.40 packing density is _____ mm.

(b) The limiting value of yarn twist intensity in ideal helical model of fibres in yarn is _____.

(c) The value of mean fibre position as per the model of ideal fibre migration is _____.

(d) The path of fibres as per the model of equidistant fibre migration with very long period follows an equation of a _____.

3) A cotton carded ring-spun yarn of 33 tex count and 700 twist per meter is prepared. Determine packing density, diameter, twist intensity and coefficient k_n of this yarn, assuming that the yarn follows ideal helical model. Determine the ratio of strain of surface fibres to strain of yarn and the numerical value for tensile force utilization coefficient of this yarn, considering the lateral contraction ratio is equal to 0.25. 3+1+1+1+2+2