THEORY OF YARN STRUCTURE

PROF.DIPAYAN DAS
Department of Textile Engineering
IIT Delhi

PRE-REQUISITES : BE/BTech in Textile Technologyl

INTENDED AUDIENCE : Interested students

INDUSTRIES APPLICABLE TO : Trident, Arvind, Welspun

COURSE OUTLINE :
This course deals with a system of theoretically derived inherent laws of structures and properties of yarns. Each module of this course is started with definitions, terminologies and fundamental relations. Then, the theoretical models are presented namely from the initial assumptions through the mathematical derivation to the final relations. Such theoretical results are mostly compared with the experimental ones. The topics in this course include basic characteristics of fibers and yarns; relation among yarn count, twist, and diameter; helical model of fibers in yarns; mass irregularity of yarns; radial fiber migration in yarns; yarn shrinkage due to washing; and tensile mechanics of yarns.

ABOUT INSTRUCTOR :
Prof. Dipayan Das is currently working as Professor at the Department of Textile Technology of Indian Institute of Technology Delhi. He received PhD from Technical University of Liberec, Czech Republic in 2005. This was followed by a position as post-doc research associate in the NC State University, USA. He joined IIT Delhi as Assistant Professor in 2008. He served as Adjunct Assistant Professor at the Department of Textile Engineering,Chemistry & Science of NC State University from 2008 to 2009. At IIT Delhi, he was promoted to Associate Professor and Professor in 2012 and 2018, respectively. He has taught several courses, including Yarn Manufacturing, Textile Structures, Nonwoven Technology, Design of Experiments and Statistical Techniques, at undergraduate and postgraduate levels. His research interest lies in the areas of Textile Structures, Nonwovens, and Product and Process Optimization. He has published four books, two monographs, and over 130 research articles in scientific journals and conference proceedings. He has guided over 30 theses, leading to various degrees, including PhD and MTech. He is a recipient of the BIRAC-SRISTI GYTI Appreciation Award (2018), IIT Delhi Teaching Excellence Award (2017), and Kusuma Trust Outstanding Young Faculty Fellowship (2008-2013).

COURSE PLAN :

Week 1**:** Fiber – The Building block of yarns

Week 2**:** Basic characteristics of yarns

Week 3**:** Relation among yarn count, twist, and diameter

Week 4**:** Helical model of fibers in yarns

Week 5**:** Mass irregularity of yarns

Week 6**:** Radial fibre migration in yarns

Week 7**:** Yarn shrinkage due to washing

Week 8**:** Tensile mechanics of yarns - Part I

Week 9 : Tensile mechanics of yarns - Part II

Week 10 : Tensile mechanics of yarns - Part III

Week 11 : Tensile mechanics of yarns - Part IV

Week 12 : Strength-length relation in yarn