Theory of Yarn Structure
Prof. Dipayan Das
Department of Textile Technology
Indian Institute of Technology - Delhi

Lecture – 05
Basic Characteristics of Yarns (contd.,)

Welcome to you all, we will continue with module 2, basic characteristics of yarn, in the last class we established the important characteristics of yarn and we have solved one numerical problem now, we would like to solve a few more numerical problems on module 2.

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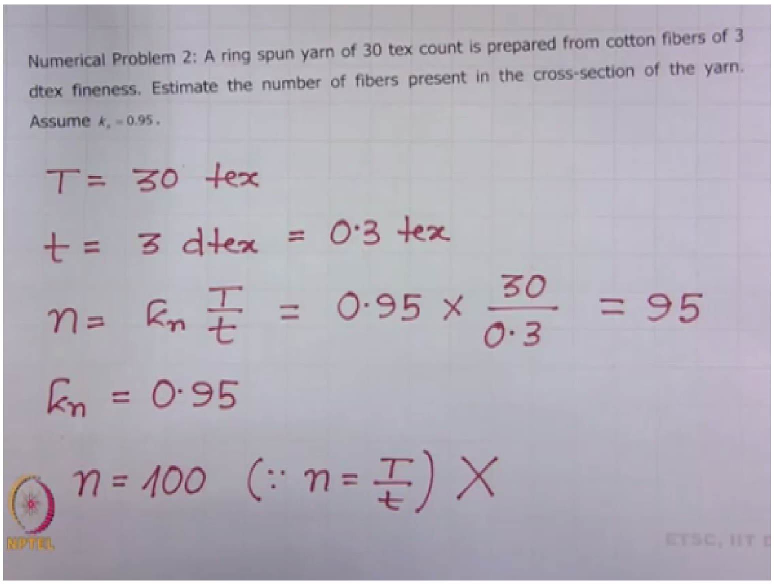

So, numerical problem number 2 is in front of you; a ring spun yarn of 30 tex count is prepared from cotton fibers of 3 deci tex fineness, so what information is given to you; capital T is given, 30 Tex right and also fiber fineness, small t also given to you, 3 deci Tex, estimate the number of fibers present in the cross section of the yarn, so you need to find out n, what is given more, assume kn, coefficient kn is 0.95.

So, this is basically the problem, you need to find out n, these 3 values are given right, so how will you find out this, we know n = kn times capital T/ small t, we have already derived, so now kn is given 0.90; 0.95 and what is capital T; 30 Tex, small t, 0.3, so it will be the value, 95, so this is the correct answer 95 to give you a small note, if you calculate many people do, n = 100 since you know n is capital T / small t which will be wrong.

Because this formula is valid for parallel fiber assembly not for yarn because yarn is a twisted fibrous assembly for yarn, you have to multiply kn; kn has a value != 1, 0.95, this we have already spoken all right, okay.

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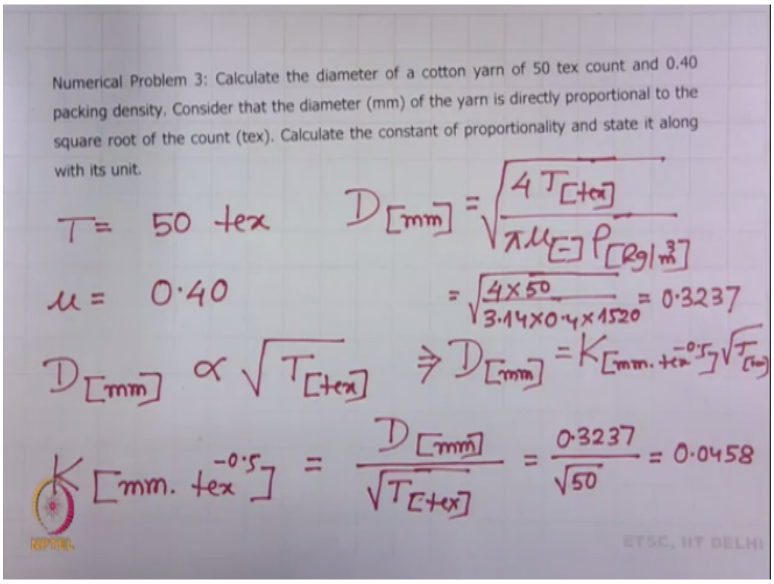

So, then we proceed to numerical problem 3; calculate the diameter of a cotton yarn of 50 Tex count and 0.40 packing density, so what is given; capital T is 50 Tex, Mu is 0.4, consider that the diameter of the yarn is directly proportional to the square root of the count that means, Koechlin formula, we have to use so, diameter of the yarn in millimeter is directly proportional to square root in tex, this is given.

That means, D millimeter K * root T; T is in Tex, so you need to basically find out K, so K in this unit millimeter tex to the power 0.5 D, let us rewrite it by root T tex, right, so what is D? D is not given, D you need to calculate, T is given; 50, okay no problem, let us calculate D, (()) (06:42) it, so 4 capital T; 50 divided by pi * Mu 0.4 * density of cotton fiber, we can take 1520 kg per meter cube, so what will this value?

If you calculate you will get this value as 0.3237, this value if you substitute here, square root of 50 will give you a value, 0.0458, so these all numbers are practical numbers that means, this constants of proportionality, the coefficient of yarn diameter, for this yarn is this value right, okay. So, now we will proceed to the last problem, numerical problem 4.

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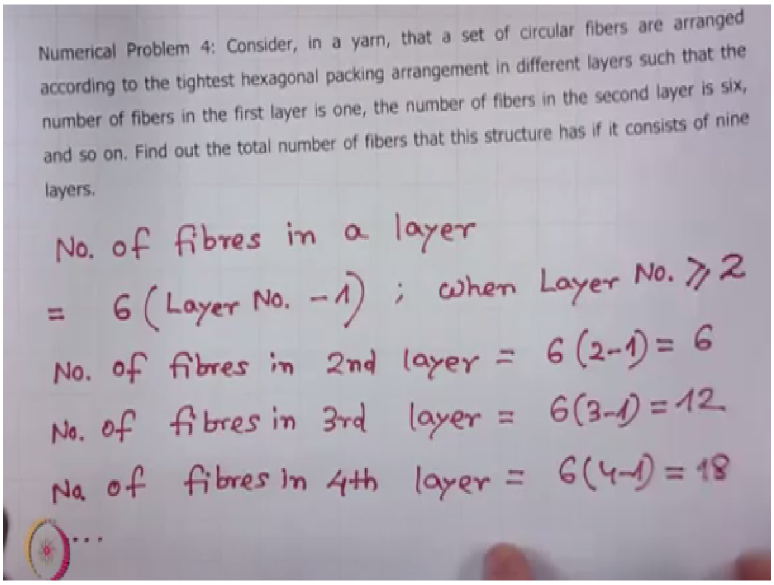

Consider in a yarn that a set of circular fibers are arranged according to the tightest hexagonal packing arrangement in different layers such that the number of fibers in the first layer is 1, the number of fibers in the second layer is 6 and so on, find out the total number of fiber that the structure has if it consists of 9 layers, so it is a problem on hexagonal packing arrangement tightest structure.

You can find out if you study the structure a little more, you can find out that number of fibers in a layer = 1, you can derive this formula, number of fibers in a layer = 6 * layer number - 1 except when layer number is > = 2, so number of fibers in a layer = 6 times layer number – 1, this formula is true when layer number > = 2, so that means for the first layer it is not true valid, for second layer onwards, this formula is valid, you can find it out, you can derive it.

Now, so number of fibers in second layer = 6 * 2 - 1 that = 6, already given, number of fibers in a second layer is 6 similarly, number of fibers in third layer; 6 * 3 - 1 that is 12, number of fibers in fourth layer; 6 * 4 – 1, 18 and so on so, what will be total number of fibers?

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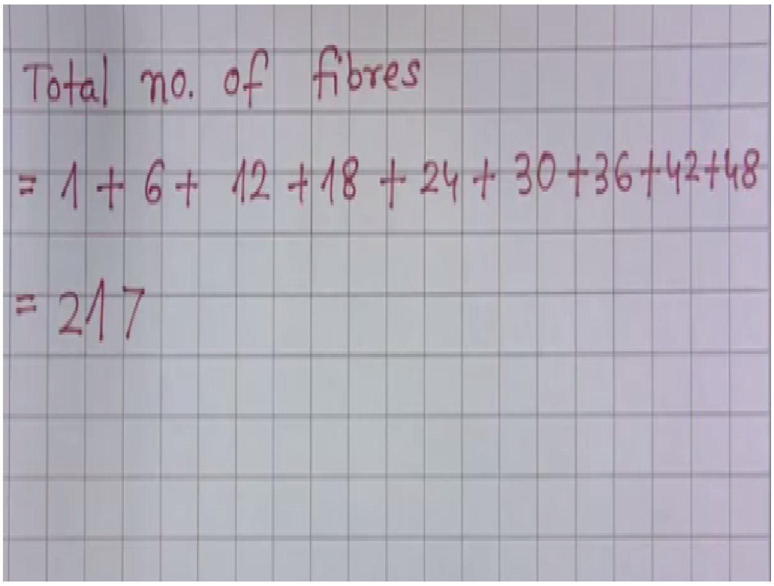

Total number of fibers will be; first layer it is 1, second layer it is 6, third layer 12, fourth layer 18, fifth layer 24, sixth layer 30, seventh layer 36, eighth layer 42, ninth layer 48, till ninth layer, so what will the value? 217 that means, total number of fibers of the structure; if it has 9 layers, this will be the distribution of number of fibers in each layer, the total number will be 217.

So, this is the answer to this problem number 4, so this was our last numerical problem on module 2, so we have completed module 2, we will now proceed to module 3, thank you, thank you for your attention.