

MODEL QUESTION PAPER WITH ANSWER KEY

ETS-I (Mid-Term Tests)

TT/TE/TC

Q.1. Length of a surface fibre per turn of twist if TPI = 14, Yarn diameter = 0.2mm, is _____

$$h = \frac{1}{T} = \frac{1}{14} = 0.714 \text{ inch} = 1.81 \text{ mm}$$

$$R = \frac{d}{2} = \frac{0.1}{2}$$

$$l = \sqrt{h^2 + (2\pi R)^2} = 1.9 \text{ mm}$$

Q.2. Find the yarn diameter if the surface fibre helix angle = 30° and Yarn twist = 5 tpcm.

$$\tan \alpha = 2\pi RT \Rightarrow d = 2R = \frac{\tan \alpha}{\pi T}$$

$$\Rightarrow d = \frac{\tan 30^\circ}{\pi \times 5} = 0.036 \text{ cm or } 0.36 \text{ mm}$$

Q.3. Find the Relationship between twist factor in English cotton system (tpi/Ne^{1/2}) and tex system(tpcm.tex^{1/2}).

$$\tau_{tex} = tpcm \sqrt{tex}$$

$$\tau_{tex} = \frac{tpi}{2.54} \sqrt{\frac{590.5}{Ne}}$$

$$\tau_{tex} = 9.56 \tau_{Ne}$$

Q.4. What should be the geometrical properties of a yarn if it is an ideal yarn?

1. The yarn should be circular in cross section and uniform along its length.
2. The yarn should be made-up of a series of superimposed concentric layer of different radii in each of which the fibre follows a uniform helical path so that its distance from the centre remains same.
3. A filament at the centre would follow the straight line of the yarn axis, but going out from the centre the helix angle gradually increases, since the twist per unit length in all the layers remains constant.
4. The axis of the circular cylinders should coincide with the yarn axis.
5. The number of fibres/ filaments of yarn crossing the unit area should be constant, i.e. the density of packing of fibres/filament in the yarn should remain constant throughout the model.
6. The structure should be made up of a large number of filaments; this would avoid any complications arising because of any discrepancies in packing of fibres/filaments.

Q.5. Geometrically compare the structure of ring yarn and rotor yarn.

	Ring spun yarn		Rotor spun
	Classic	Compact	
Fibre disposition			
In the core	Parallel, helical	Parallel, helical	less Parallel, helical
In the sheath	Parallel, helical	Parallel, helical	More random, less twisted
Fibre orientation			
Parallelism	Good	Very good	Medium
Compactness	Compact	Very compact, round	Open
Hairiness	Noticeable	Low	Very low