Major: TXL 232

Date: 21.11.2016
Time: 3:30-5:30 pm

Full Marks: 40

Q1 Derive the expression of cover factor (C) of a typical braided structure in terms of braid radius (R), yarn width (w_y), braid angle (α) and number of yarns (N). (5)

Q2 State whether the following statements are true or false and justify your answer. (3x4)

a. Needlepunched fabric has a higher compressional resistance in comparison to vertical lapped web.
b. In a cross-laid web, the fibre orientation distribution is unimodal in nature.
c. In a melt blown process, fibres are laid in the machine direction at a steeper air-angle.
d. Cone-up nozzle geometry can yield better energy transfer in comparison to the cone-down shaped nozzle in a hydroentanglement process.

Q3 Discuss the different types of weft supply packages for shuttleless looms. Why overend withdrawal of yarn from the package is preferred in shuttleless looms? (3+1)

Q4 Discuss in detail how rapiers are classified? Show the movement of yarn and rapiers in terms of displacement, velocity and acceleration profiles. (3+2)

Q5 Polyester weft yarn of 2 m length and 20 tex linear density was moving at 10 m/s velocity when the stopper attached with the weft accumulator of air-jet loom was activated. If all the kinetic energy was used for extending the weft yarn then calculate the tensile strain (%) applied to it. Also calculate the peak force acting on the yarn as a result of energy transformation. Young's modulus: 200 g/den (4+1)

Q6 Prove the following: (5)

$$\alpha = \cos^{-1}\left(\frac{R\cot\xi}{\sqrt{(R+r_s)^2 + R^2\cot^2\theta}}\right)$$

where R is the braid radius, θ is the wrapping angle, ξ is the helix angle, r is the strand radius and α is the braid angle

Q7 Discuss different types of selvedges formed in shuttleless looms. Why the weft yarn has a tendency to untwist in an air-jet loom? (2+2)