



**114**

**Textile Engineering**

TIME : 3 HOURS

MAXIMUM MARKS : 300



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**INSTRUCTIONS :**

1. *All questions are compulsory.*
  2. *Question Paper may be divided into 4 (four) Sections from Section-A to Section-D and carry marks as under :*
    - a. *Section - A - Total 3 Questions having two parts, i.e. (a) and (b) each questions carries 12 marks × 3 Questions = Total 36 Marks.*
    - b. *Section - B - Total 3 Questions having two parts, i.e. (a) and (b) each questions carries 20 marks × 3 Questions = Total 60 Marks.*
    - c. *Section - C - Total 3 Questions having two parts, i.e. (a) and (b) each questions carries 28 marks × 3 Questions = Total 84 Marks.*
    - d. *Section - D - Total 3 Questions having two parts, i.e. (a) and (b) each questions carries 40 marks × 3 Questions = Total 120 Marks.*
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**SECTION - A**

(Each question is of 12 marks and each sub part (a) and (b) are of 6 marks each)

- 1 (a) Why polyester is a thermoplastic fibre and cotton is a thermo-set fibre ?  
(b) What is the relationship between the orientation and tensile properties of a textile fibre ?
- 2 (a) What is the typical cleaning efficiency of a modern blowroom ? What are the factors which influence the cleaning efficiency of a blowroom line ?  
(b) What are the differences between the qualities of carded and combed yarn ? Explain the reasons.

- 3 (a) What are CRE and CRL principles of tensile testing ?  
(b) What are work of rupture and specific work of rupture?

### SECTION - B

(Each question is of 20 marks and each sub part (a) and (b) are of 10 marks each)

- 4 (a) How the tenacity of the following textile fibres would change with the moisture regain ? Explain briefly.
- \* Cotton
  - \* Vicoose
  - \* Polyprpylene
- (b) How the polyester fibre is manufactured in direct esterification method ? Describe with relevant chemical reaction.
- 5 (a) Why the end breaks in ring spinning are more when the winding takes place at the tip of the cop ?  
(b) What are the objectives of bleaching ? Explain the mechanism of bleaching with hydrogen peroxide.
- 6 (a) What is bumping in weaving ? How is it influenced by picks per inch value of woven fabric ?  
(b) Why is it not possible to weave regular satin on 6×6 repeat size?

### SECTION - C

(Each question is of 28 marks and each sub part (a) and (b) are of 14 marks each)

- 7 (a) Cleaning efficiency of four machines of a modern blowroom is 10, 15, 20 and 25%. If the trash present in cotton bale is 5%, then determine the trash % in lap ?  
(b) Explain the polar drafting system of drawframe. What are the advantages of this system ?

- 8 (a) What is negative left off motion ? Why the dead weight has to be shifted periodically in case of this system ? Explain with mathematical expression.
- (b) What is early shedding and late shedding ? Which type of shedding should be preferred when weaving a cotton cloth of very high areal density.
- 9 (a) A 5 gram sample of 3 denier polyester fibre of  $1.39 \text{ gm/cm}^3$  density is packed in a chamber of 2.5 cm diameter to make a compressed fibre plug. If the 3 denier fibre is replaced with 2 denier fibre and the same pressure drop is maintained then calculate the % change in flow rate.
- (b) Prove the relationship among warp cover factor, weft cover factor and cloth cover factor.

#### SECTION - D

(Each question is of 40 marks and each sub part (a) and (b) are of 20 marks each)

- 10 (a) State the sequence of major operations in forward and backward feed combers. For forward and backward feed combers, show the fringe length at the following stages if detachment setting and feed per nip are D and F, respectively.
- \* Fringe length after detachment
  - \* Fringe length during combing
  - \* Fringe length after combing but before detachment
- (b) What is roller nip movement ? Show that the forward roller nip movement create a thin place in the drafted material.
- 11 (a) What is thin boiling starch ? How the sizing diagram helps to understand the relationship among concentration, viscosity, add-on and wet-pick up for normal and thin boiling starch ? What is the advantage of thin boiling starch over normal starch ?

- (b) What is sley eccentricity ? Why is it required in a shuttle loom? If the angular position of the crank, crank radius, length of connection rod and sley eccentricity are  $\theta$ ,  $r$ ,  $l$  and  $e$  respectively, then show that for maximum sley velocity.

$$\theta = \cos^{-1} \frac{\sqrt{1 + 8e^2} - 1}{4e}$$

- 12 (a) How is mercerization of cotton related with the swelling that takes place during the process ?
- (b) Acrylic fibres can vary a lot in chemical composition (presence of different types of co-monomers and their relative concentrations) across different fibre manufactures. How can a dyer tackle the differences in dyeing characteristics of acrylic fibres of different origins? How can the problem of unlevelness be addressed in acrylic dyeing ?