Mid-semester Exam
TX L222 Yarn Manufacture II

Date: 12.09.2021   Total Marks: **40**

Attempt all the questions. Q. No. 1-12 has 2 marks each and Q. No. 13-16 has 4 marks each. In multiple choice questions, there is only one correct answer (don't select more than one option). Indicate your choice clearly. Give explanations and show calculations where asked.

$12 \times 2 = 24$

1. In a cotton spinning line, the combing process is used for the processing of

   A. Coarse yarns
   B. Fine fibres ✗
   C. Fine yarns ✗
   D. Coarse fibres

Explain the reason (s) for your choice.

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2. The combing operation provides ------------------------ and ------------------------ feel to a cotton fabric by making the yarn -------------------------- and ------------------ ----------- (Fill in the blanks).

3. The use of a shorter feed length per combing cycle leads to
   A. A higher frequency of combing by only cylinder comb
   B. A higher frequency of combing by both cylinder and top comb
   C. A higher frequency of combing by only top comb
   D. A decrease in combing frequency

Explain the reason (s) for your choice.

4. In a rectilinear cotton comber, during passage of a fibre through the combing zone, 20 mm length of the fibre is combed by the cylinder comb, 5 mm length is combed by the top comb and 3 mm length is combed by both types of combs. The feed per nip is 5 mm. The degree of combing and detachment setting are:

      A. 4 & 23
      B. 3 & 25
      C. 4 & 22
      D. 3 & 28

Show step by step calculations.

5. In the staple diagram of a comber lap, the relation between fibre length (l, mm) and number of fibres (n, %) can be expressed by the equation, $l = 40 - 0.3 \times n$. If 10% (by number) short fibres have to be removed by a backward feed comber using a feed length per cycle of 6 mm, the approximate value of detachment setting should be

      A. 10 mm
      B. 15 mm
      C. 20 mm
      D. 12 mm

Show step by step calculations.

6. In a rectilinear cotton comber, the feed length per cycle is 4.5 mm and the detachment setting is 25 mm. The longest fibre going to noil in the forward and backward feed will be ------------------ mm and --------------------, respectively and the shortest fibre going to the combed sliver will be ------------------ mm and -------- -------------- mm, respectively.

Show the calculations.

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7. The removal of long fibres in a rectilinear cotton comber is caused due to

      A. Over parallelization of fibres
      B. Acceleration of long fibres by surrounding fibres
      C. Breakage of long fibres
      D. None of the above

Give reason (s) to justify your choice.

8. A combing machine can be considered as a ------------------------system in which ----- (A) -------------------- do the similar function as the pressure bar. Name the machine element A. Explain why its function is similar to a pressure bar.

9. The forward and backward motion of detaching rollers are obtained by ---------------------a ------------------------- speed generated from --------------------------- shaft and a ------------------------------------ speed generated from the ------------------------- shaft with the help of a ……………………..gearing system.

10. In a bobbin leading roving frame, the bobbin speed needs to be ----------------------- with the increase in bobbin diameter and the bobbin speed needs to be changed:

      A. Exponentially
      B. Asymptotically
      C. Linearly
      D. Following a polynomial curve

Give reason (s) to justify your choice.

11. In a bobbin leading roving frame, what will be the change in the traverse speed of the bobbin rail if the bobbin diameter increases from 3 inches to 6 inches?

      A. 20%
      B. 40%
      C. 50%
      D. 10%

Show step by step calculations.

12. A roving bobbin has full and empty bobbin diameters of 60 mm and 160 mm, respectively. The angle of taper is 90°. If the initial traverse length is 60 cm, calculate the % change in the traverse length from the beginning to the end of bobbin building.
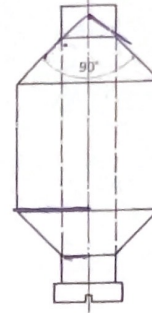
Show step by step calculations.

4×4 = 16

13. A rectilinear cotton comber is processing cotton fibre with 35 mm longest fibre length and triangular fibre length distribution. Calculate the approximate change in productivity(kg/h) when the type of feed is changed from forward feed to backward feed. The technical data related to the comber is given below:

Speed-350 nips/min
Detachment setting-15 mm
Feed per combing cycle-5 mm S
No. of heads -8
Linear density of feed lap- 0.0091 Ne
Tension draft during lap feed-1.05
Running efficiency-95%

Show step by step calculations.

14. Assuming a triangular staple diagram, derive the expression for noil% in a backward feed comber if the detachment setting is E, feed length per cycle is S and maximum fibre length is M. Modify the expression assuming that a fibre with length between E and E+S has 60% chance of going to the combed sliver. Clearly show all the steps. *diagrams*

15. A roving frame was started at a delivery rate of 20 m/min using the flyer leading principle to impart 40 turns per meter of twist in the roving until the bobbin diameter increases by 50%. The machine was then set to operate using the bobbin leading principle starting with the same bobbin speed. If the empty bobbin diameter was 50 mm, calculate the % change in twist from the beginning to the end of bobbin building. Show step by step calculations.

16. A 120 spindle roving frame, producing roving from) 0.12 Ne combed 100% cotton sliver, running at 96% efficiency with empty and full bobbin diameters 50 mm and 150 mm respectively. Calculate the twist (twist per meter) of roving and production of the roving frame (kg/hr). Consider: The initial and final bobbin speeds are 1318 rpm and 1106 rpm respectively, Break draft is 1.11, Main zone draft is 9.0]

------------------------------------- **End of Question Paper** -------------------------------------