Register Number.....

M.TECH. DEGREE EXAMINATIONS: DECEMBER 2008

First Semester

TEXTILE TECHNOLOGY

P07TX103 Fabric Formation Mechanics and Structure

Time: Three Hours **Maximum Marks: 100**

Answer ALL Questions:-

PART A (20 x 1 = 20 Marks)

1. The spacing of ends or picks or both in a woven cloth is referred to as _____

   A. Sett B. Areal Density C. Crimp % D. Take-Up%

2. A cotton typewriter ribbon cloth is analysed, and from a tested strip of 20 cm, the mean warp thread length is 21.2 cm. The crimp% in the cloth is _____

   A. 5.66% B. 6% C. 4.2% D. 7.4%

3. The condition for jamming of threads in warp direction according to Peirce's plain cloth geometry is _____

   A. $l/D = \pi/2$ B. $\theta = l/D$ C. $h = D$ D. $h = 4/3\ p\sqrt{c}$

4. Which of the following conforms to a balanced cloth?

   A. Square sett, similar warp and weft counts
   B. Square sett, different warp and weft counts, different warp and weft cover factor.
   C. Similar warp and weft counts, different epi and ppi
   D. Different warp and weft counts, different epi and ppi

5. The initial region of a tensile stress-strain curve of woven fabrics usually demonstrates a lower slope due to _____.

   A. Decrimping B. Fabric extension C. Yarn extension D. Induced fibre extension

6. Bending properties of a fabric are determined by _____

   A. yarn bending behaviour B. Weave of fabric C. finishing treatments applied D. All of the above

7. The force required to accelerate a shuttle from rest to a speed of 12.5m/s over a distance of 2 m is _____

   A. 32.5 N B. 65 N C. 195 N D. 120 N

8. Which of the following statement is FALSE with regard to the use of weft accumulator?

   A. Reduction in average tension during weft insertion B. Increased weft wastage
   C. Fewer weft breakages D. Increase in efficiency of weaving machine

9. The torsion bar of a projectile weaving machine is 72 cm long and 1.5 cm in diameter and angular displacement at the commencement of picking is 28 °. Calculate the torsion applied if the modulus of rigidity of material of torsion bar is 0.8454×10^{10} kg/m^2

   A. 28.76 kgm B. 7.05 kgm C. 12.5 kgm D. 20.2 kgm

10. According to elastic theory of shuttle picking, the alacrity of picking system is given by the relation

A. $\sqrt{\lambda/M}$ B. $\sqrt{M/\lambda}$ C. $\sqrt{\lambda M}$ D. $\lambda\sqrt{M}$ where

λ = rigidity of mechanism comprising of a mass in series with spring
M = Mass of the block kept in series with spring

11. Which of the following element is not associated with braking of carrier?

A. Swell B. checkstrap C. hydraulic checking device D. shuttle eye cutter

12. The force acting on the moving thread in airjet weaving machine is given by the expression _____

A. $\rho\mu DL(Va - Vt)$ B. $\rho\mu L(Va - Vt)$ C. $\rho DL(Va - Vt)$ D. $\mu DL(Va - Vt)$

13. Which of the following statement is FALSE about water quality in water jet weaving machine.

A. Mechanical impurities removed by a fine fabric filter
B. Should not contain sediment forming additives
C. Water not de-aerated when machine is at rest for long time
D. Operating temperature of water approximately lies between 16-24c.

14. If consumption of water in a water-jet loom is proportionate to loom width, then the amount of w consumed in litres/hour on a loom 165 cm wide running at 500 ppm given that a 125 cm loom runnin the same speed consumes 0.5 ml of water per pick.

A. 12.5 litres/hour B. 9.8 litres/hour C.19.8 litres/hour D. 21.2 litres/hour

15. Which of the following factors doesn't influence the motion of sley?

A. radius of arc along which axis of the sword pin reciprocates
B. relative heights of sword pin and crank shaft
C. length of crank in relation to that of crank arm
D. speed of loom

16. Which of the following value of sley eccentricity 'e' gives higher beat-up force and allows more time passage of shuttle?

A. e = 0 B. e = 0.2 C. e = 0.3 D. e = 0.5

17. 'Kinematics' is a branch of science dealing with system that are solely governed by the physical attribu namely _____

A. length and time B. mass and time C. length and mass D. mass, length and time

18. Which of the following type of clutch engages positively and can transmit large torque with no slip?

A. Two plate friction clutch
B. Multi-plate friction clutch
C. Jaw clutch
D. Conical Clutch

19. Which of the following type of brake exhibits a tendency of the drum-shaft to bend under the action of normal force?

A. Internal expanding brake B. Band brake C. differential band brake D. Block brake with short shoe

20. The torque absorbed by the band brake is given by the relation ___

A. $(T_t - T_s)\, r$ B. $T_t / T_s = e^{\mu\theta}$ C. $T_t / T_s = r$ D. $(T_t + T_s)\, r$

PART B (5 x 16 = 80 Marks)

21. (a) (i) Derive the conversion factor which relates Peirce's fractional cover and Grosberg's fractional cover.

(ii) Explain the process of crimp interchange in woven fabrics. (8+8)

(OR)

21. (b) Using Peirce's plain cloth geometry, derive the relationship connecting thread displacement, crimp and pick spacing.

22. (a) (i) Discuss on the buckling phenomenon in woven fabrics.

(ii) Detail the various steps involved in finite element method for modelling the fabric tenacity. (8+8)

(OR)

22. (b) (i) In a loom running at 220 rpm, the shuttle begins to move at 100 ° past beat-up and comes to rest at 225 ° past beat-up. How long is the shuttle moving? If the distance moved by the shuttle is 130 cm, calculate its mean velocity.

(ii) Explain in detail the elastic theory of shuttle picking. Derive expressions for displacement, velocity and acceleration assuming straight line movement to shuttle. (8+8)

23. (a) Discuss in detail the dynamics of weft yarn insertion in airjet looms.

(OR)

23. (b) Discuss in detail the performance of yarns in airjet insertion with regard to yarn structure, yarn count and twist/ply.

24. (a) Discuss in detail the kinematics of 4 bar link beat-up mechanism and prove that the beat-up force is maximum at front centre.

(OR)

24. (b) (i) Explain the mechanics of beat-up. Also state the differences between link and cam beat-up mechanism citing examples.

(ii) What is rotary beat-up. (12+4)

25. (a) (i) Explain the mechanics of conical clutch by deriving relations for axial force applied and torque transmitting ability.

(ii) State the differences between clutch and brake. (12+4)

(OR)

25. (b) (i) Discuss the mechanism of differential band brake by deriving relations for frictional force and torque absorbing capacity.

(ii) Draw a typical retardation curve when a shuttle moving at 15 m/s contacts a hinged swell inside a shuttle box 20 cm long before it strikes a picker at the end. (12+4)

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