B.TECH. DEGREE EXAMINATIONS: NOVEMBER 2009

Fifth Semester

TEXTILE TECHNOLOGY

U07TT505: Textile Mechanics

Time: Three hours   **Maximum Marks: 100**

Answer ALL the Questions:-

PART A (10 x 1 = 10 Marks)

1. If the driver wheel of diameter d_1 rotates at n_1 rpm and driven wheel of diameter d_2 at n_2 rpm, the speed relation of this system considering the effect of slip (S %) and belt thickness (t) would be

    (A) $n_2 = n_1 (d_1+t / d_2+t).(1+S/100)$ (B) $n_2 = n_1 (d_1+t / d_2+t).(1-S/100)$

    (C) $n_1 d_1 = n_2 d_2$ (D) $n_1(d_1+t) = n_2 (d_2 + t).S$

2. Which of the following expression is WRONG?

    (A) $p = z/d$ (B) $m = d/z$ (C) $\rho P = \pi$ (D) $m = z/d$

    Where P = Diametral pitch or Teeth per inch; d = pitch circle diameter

    Z = No. of teeth; ρ = circular pitch (mm)

3. The radial distance between the addendum and dedendum of a gear is __

    (A) Tooth thickness   (B) Working depth   (C) Total depth   (D) Clearance

4. Flyer lead principle is used in

    (A) Dobson & Barlow frame   (B) T & S the frame

    (C) Platts fly frame   (D) Brook & Shah Fly frame

5. If the values of r & l are 3 cm & 12 cm respectively, then the sley eccentricity in units by graphical method equals.

    (A) 3.38   (B) 2.62   (C) 0.76   (D) 0.84

6. A phenomenon which produces, or tends to produce, motion or change of motion in a body is defined as ____.

    (A) Mass   (B) Momentum   (C) Force   (D) Work done

7. Potential energy is expressed by the formula

    (A) mgh   (B) $0.5 \, mv^2$ (C) ma   (D) GmM / R^2

8. A ring frame traveler moving in a circle of 5 cm diameter at 9000 rpm offers a resistance to movement of 0.15 N. If the frame has 240 spindles, the power expended in moving the travelers is _____

    (A) 3.53 J   (B) 847.2 W   (C) 353 W   (D)   926 W

9. Amonton's law is given by the expression

(A) $T_s = T_t e^{u\theta}$ (B) $T_t = T_s e^{u\theta}$ (C) $F = uN$ (D) $F =$

10. In a negative let-off motion, a weaver's beam is provided with weights of 2(each end. If the leverage of the system (x/y ratio) is 4, the tight side tension

(A) 200 N   (B) 195 N   (C) 605 N   (D) 800 N

PART B (10 x 2 = 20 Marks)

11. Compare belt drives with gear drives.

12. What is an epicyclic gear train?

13. State the differences between bobbin lead and flyer lead systems.

14. State the purpose of cam. List any two applications of cam in textile industry

15. State the equations of motion.

16. Define Force.

17. Give the condition for a body to be in equilibrium based on 'principle of mon

18. Define coefficient of friction.

19. What is a block brake?

20. What is sley eccentricity? List down the factors that influence sley eccentricit

PART C (5 x 14 = 70 Marks)

21. (a) Derive the relationship between tight side and slack side tension in a Flat bel Also deduce the condition for maximum power transmission.

(OR)

(b) Explain Fallow's differential with a neat sketch indicating all the necessary Also prove that the above differential is a bobbin lead system with data given Input Revolutions of Main shaft: 365 rpm, Front roll delivery of roving frame cm/min, Empty bobbin diameter: 3.35 cm . Assume any other relevant data.

22. (a) Construct the profile of a shedding tappet for weaving 2/2 twill weave with the following particulars:

(i) Lift of Tappet - 3 inches

(ii) Dwell - 120^0 or $1/3^{rd}$ of pick.

(iii) Diameter of Bowl – 1.5 inches

(iv) Distance from centre of counter shaft to nearest point of contact with anti-friction bowl: 2 inches. Assume any other data suitably.

(OR)

...d **draw** the profile of cone drums for a simplex machine which is having a
...bbin diameter of 1.25" and maximum package diameter of 7.5". When the
...age is $2/3^{rd}$ full, diameter of driving and driven cones are 7"and
...0"respectively. The belt shift is 36 ". Locate and also verify theoretically the
diameter of two cones when package is 20% full and 50% full respectively. Assume
any other data suitably.

... (a) (i) **Derive** the expression to calculate the power required for picking.   (7+7)

(ii) A jacquard loom produces a fabric with 20 picks/cm at a rate of 2.4 m/hr. If the
pattern repeat in the fabric occurs at 36 cm intervals and the width of a card is 8
cm, calculate the length of the pattern chain and the angular speed of its motion.

(OR)

(b)   A shuttle 1m above floor level and moving at 10 m/s flies out of a loom at an
angle of 0.15 rad above the horizontal. How high will it rise, how far
horizontally from its starting position is the place where it lands, and what is its
velocity is as it strikes the floor.

24. (a) (i) A rod AB of length 30 cm, pivoted 10 cm from A, is used for suspending
glassware. One piece of apparatus, with a mass of 500 g, is hung from A, a
second piece, of mass 100g is hung from B and a third piece, of mass 400 g, is
hung 7.5 cm from the pivot on the side nearest B. Show that the system remains
in equilibrium.

(7)

(ii) Draw and explain the forces acting in a heald reversing system and propose
equations when the heald shaft is UP and DOWN.

(7)

(OR)

(b)   A sphere of mass 20 kg, moving at 8 m/s, overtakes and collides with a second
one of mass 40 kg, traveling at 5 m/s along the same straight line. Find the
velocities of the two after impact and the kinetic-energy loss in each case:

i) if collision is perfectly inelastic

(5)

ii) if collision is perfectly elastic;

(5)

iii) if the coefficient of restitution is 0.5.

(4)

25. (a)   Derive the expression for tension acting in warp sheet in a negative let-off motion.

(OR)

(b) Draw a diagram of crank and connecting rod system, where the crank ha: of 10 cm (crank arm 5 cm) and the connecting rod is 18 cm long. diagram to measure the number of degrees of crankshaft rotation f movement of the far end of the connecting rod.

i) from the inner dead centre

ii) from the outer dead centre

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