



B.TECH DEGREE EXAMINATIONS: DEC 2022

(Regulation 2018)

Fifth Semester

TEXTILE TECHNOLOGY

U18TXT5001: Mechanics of Textile Machinery

COURSE OUTCOMES

- CO1:** Define the importance of gear and belt drives and to express the relationship between tensions in belt drives and also the condition for maximum power transmission.
- CO2:** Design the profiles of cone drums used in speed frames as well as scutcher, plain and twill tappets and ring frame builder motion cams.
- CO3:** Calculate the picking force, shuttle velocity and acceleration in weaving machines and to use the equations of motions in textile applications.
- CO4:** Justify the use of kinetic energy, potential energy and principle of moments in textile industry.
- CO5:** Explain the importance of friction in textile applications and to point out the applications of brakes and clutches in textile industry and to derive the expressions for the torque transmitting capacity of various types of clutches.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

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| 1. Recall the condition for centrifugal tension and velocity during maximum power transmission. | CO1 | [K ₁] |
| 2. Outline the principle of electromagnetic drive. | CO1 | [K ₂] |
| 3. What is the application of cone drums used in blow room and speed frame? | CO2 | [K ₁] |
| 4. Identify the function of builder cam in the ring frame builder motion. | CO2 | [K ₃] |
| 5. List the equations of angular motion. | CO3 | [K ₁] |
| 6. Calculate the time taken for the 80° crank revolution, with the crank shaft speed of 220 rpm. | CO3 | [K ₃] |
| 7. Interpret the expression for kinetic energy. | CO4 | [K ₂] |
| 8. The two springs for reversing the motion of heald frame each have to be stretched 25cm to put them in down position with the heald shaft down, if the stiffness of each spring is 1.8N/Cm, and then find the work done in putting these springs in position. | CO4 | [K ₃] |
| 9. Compare the terms static, dynamic and coil friction. | CO5 | [K ₂] |
| 10. Relate the eccentricity of sley with crank radius and connecting arm length. | CO5 | [K ₂] |

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11. a) A motor shaft is running at 200 rpm is required to drive a machine shaft by means of belt. The pulley on the motor shaft is of 30 cm diameter and that of the machine shaft is 75 cm diameter. If the belt thickness is 5 mm find the speed of the machine shaft when i) there is no slip and ii) there is a slip of 2%. 10 CO1 [K₃]
- b) The tensions in the two sides of the belt is 800 N and 600 N respectively. If the speed of the belt is 50 m/s, find the power transmitted by the belt. 6 CO1 [K₃]
12. a) Design the profile of the 2/2 shedding tappet with the following data. 12 CO2 [K₅]
Nearest point of contact between bowl surface and tappet centre = 4 cm
Lift of the tappet = 3 inches, Diameter of the anti friction bowl = 3 cm
Dwell period = 1/3rd of the pick, Shaft movement = simple harmonic
- b) Calculate the upper and lower dwell angle for 2/2 twill cam if the dwell period the cam is 1/3rd of the pick. 4 CO2 [K₃]
13. a) A card cylinder rotates at 165 rpm. After the drive has been disengaged, the cylinder comes to rest after 140 revolutions. If the retardation is uniform, calculate the angular retardation of card cylinder and how long does it take to stop? 10 CO3 [K₃]
- b) A loom sley with a mass equivalent to 60 kg and moving at 1.3 metre/ second is stopped by the fast reed mechanism in 1.2 metre. Calculate the force acted on the sley. 6 CO3 [K₃]
14. a) A carding engine cylinder revolving at 220 rpm has 30000 joules of kinetic energy stored in it, when the belt is thrown off the machine comes to rest in 120 revolutions. Assuming that the K.E. is the total for all the moving parts in the machine, find the power required to run it at its operating speed of 220 rpm and also time requirement to stop the machine. 10 CO4 [K₃]
- b) Calculate the kinetic energy of a 50 kgs bale falling from rest at a height of 5 m from the ground and time taken for the bale to reach the ground is 2 seconds. 6 CO4 [K₃]

15. a) With neat sketch, identify the application of clutches in textile machineries and explain the working of those clutches used in textile machineries. 12 CO5 [K₃]
- b) A leather brake bar presses against the rim of the pulley with a normal force of 90 N. if the co-efficient of friction is 0.12, calculate the power dissipated in stopping the machine in 12 seconds if the diameter of the pulley is 20 cm and it completes 14 revolutions during the stoppage time. 4 CO5 [K₃]
16. a) A ring frame traveler is moving in a ring of 38 mm diameter at 16000 rpm, offers a resistance to the movement of a value of 0.5 N. Calculate the HP spent in running the traveler and find the power spent to run the machine with 1008 spindles. 8 CO3 [K₃]
- b) A simple weight lever system at each end of the loom beam is provided with a weight of 500N, the distance from fulcrum to chain on the lever and the dead weight is 15 cm and 90 cm respectively. Full beam radius = 60 cm, ruffle radius = 20 cm, no. of laps = one and half, $\mu = 0.15$, find the tension at the point of slippage. 8 CO5 [K₃]
