

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER M.TECH DEGREE EXAMINATION, DECEMBER 2015

Mechanical Engineering**(Machine Design)****04ME 6507 Design of Power Transmission Elements**

Max. Marks : 60

Duration: 3 Hours

*(Design data books may be permitted)***Part A (8x3=24 marks)**

1. What is meant by 'chordal action of chain'?
2. Derive the expression for Velocity Ratio of a Belt drive?
3. Briefly explain self actuating brakes.
4. Briefly explain various Lubrication considerations taken in metal working.
5. Explain various classifications of brakes
6. Explain the terms a) module b) pitch c) addendum
- 7) Short note on uniform pressure theory?
- 8) What are the advantages of centrifugal clutch?

Part B (6x6=36marks)

9. Derive the expression for length of Belt for a crossed Belt Drive?

OR

10. What are the Advantages and disadvantages of belt drives?

11. Explain the various considerations taken while designing a chain drive.

OR

- 12) Design a chain drive to actuate a compressor from 15kW electric motor running at 1000rpm, the compressor speed being 350rpm. The minimum center distance is 500 mm. The compressor operates 16 hrs per day. The chain tension may be adjusted to shifting the motor on slides.

13. Explain the application of Servo motors and working of the same

OR

14. Explain about the lubrication consideration employed in gear boxes?

15. An internally expanding brake has drum diameter 0.5 m and absorbs 12KW at 1500 rpm. Distance between the effort and the fulcrum is 400mm and distance between the fulcrums is 100 mm. The included angle of the friction lining is 120° . Design the brake. Assume $\mu=0.4$, maximum pressure $P_a=0.18\text{MPa}$, $\theta_1=30^\circ$.

OR

16. A double shoe brake is capable of absorbing a torque of 1400 Nm. The diameter of the brake drum is 350 mm and the angle of contact for each shoe is 100° . If the coefficient of friction between the brake drum and lining is 0.4. Find

1) Spring force necessary to set the brake

2) Width of brake shoe, if the bearing pressure on the lining material is not to exceed 0.3 N/mm^2

17. An engine developing 45 kW at 1000 rpm is fitted with a cone clutch built inside the flywheel. The cone has a face angle of 12.5° and a maximum mean diameter of 500 mm. The coefficient of friction is 0.2. The normal pressure on the clutch face is not to exceed 0.1 N/mm^2 . determine a) face width b) axial spring force.

OR

18. A cone clutch transmits 5 kW power at 240 rpm. The smaller radius of the cone=200 mm and the face width is 50mm. The cone has a face angle of 15° . Find axial force needed to engage the clutch of $\mu=0.25$, also find the maximum pressure on contact surface. Assuming uniform wear?

19. A single block brake having a brake drum of diameter 300 mm. Angle of contact is 90° . Distance of pivot point from the lever end is 550 mm. The drum lies 50 mm above the pivot. The center of the drum is 250 mm away from the pivot. If an operating force of 600 N is applied at the end of the lever, determine torque that may be transmitted by the block brake when the drum rotates clockwise. Take Coefficient of friction = 0.3.

OR

20. Differentiate the working of Differential band brake & Band and Block brakes.