

10. The block brake shown in Fig. 6.50 has two shoes each subtending an angle 80° ; the coefficient of friction of the brake material is 0.3. The brake drum diameter is 800 mm while the rope drum measures 1200 mm in diameter. It is required to stop the load of 20 kN, lowering at a velocity of 5 m/s in a distance of 20 meters. Determine; the effort E required at the end of the lever, the width of the brake shoes given the permissible pressure of 0.7 MPa and the amount of heat generated. **VTU, July 2006**

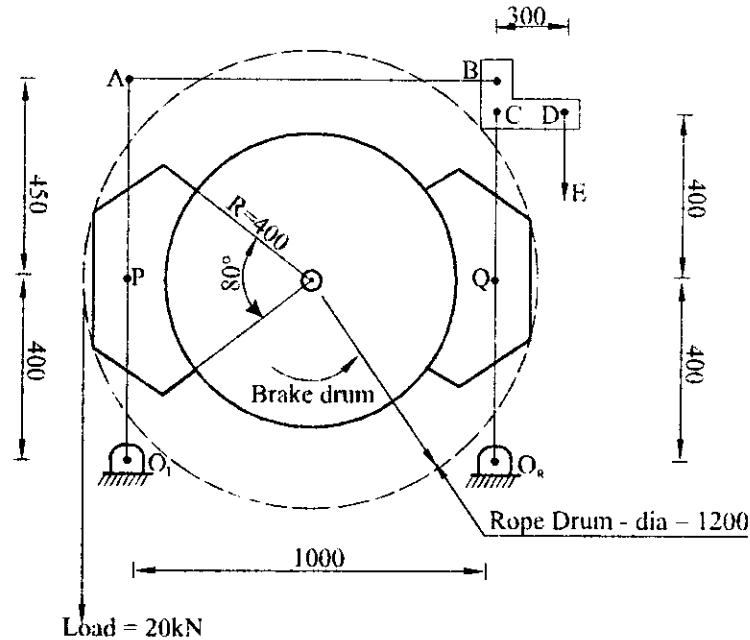


Fig. 6.50

11. a) A multiple plate clutch with steel on bronze is to transmit 8kW at 1440 rpm. The inner diameter of the contact is 80mm and the outer diameter of contact is 140mm. The clutch operates in oil with expected coefficient of friction of 0.1 and allowable pressure of 0.35 MPa. Assume uniform wear theory and determine the number of steel and bronze plates.

Study Note) A differential band brake shown in Fig. 6.51 operates on a drum diameter of 600mm. The band is 3.2mm \times 100mm and coefficient of friction is 0.22. Determine

- Least force required at the end of operating lever when the band is subjected to a stress of 55N/mm^2 .
- Torque applied to the brake drum shaft.
- Is this brake self locking? Prove your answer.

VTU, Dec. 06/Jan. 2007

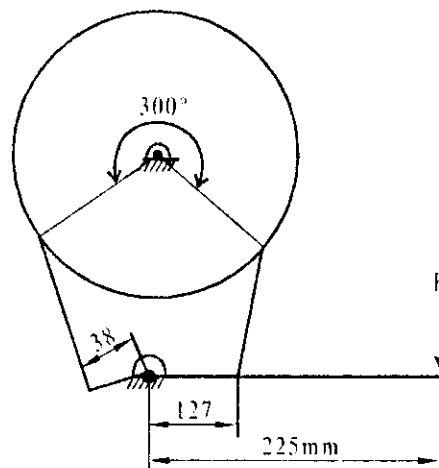
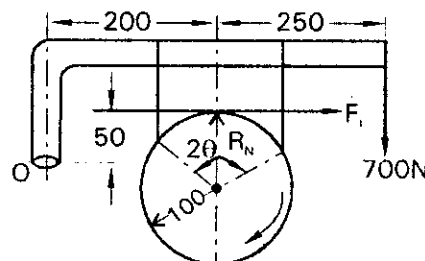


Fig. 6.51

12. a) An engine developing 50 kW at 1000 rpm is fitted with a cone clutch. The cone has a face angle of 12.5° and width of face is one fourth of mean diameter of friction lining. If the normal intensity of pressure between the contact surface is not to exceed 0.1 N/mm^2 , assuming uniform wear criterion and taking $\mu = 0.2$, calculate dimensions of the clutch.

- b) The diameter of the drum of a single block shown in Fig.6.52 is 200 mm and the angle of contact is 90° . If an operating force of 700 N is applied at the end of a lever and the coefficient of friction between the drum and the lining is 0.35, determine the torque that may be transmitted by the block brake. **VTU, July 2007**



All dimensions in mm

Fig. 6.52

13. a) A cone clutch with face angle 12.5° is to transmit 7.5 kW at 900rpm. The width of face is half the mean radius and the normal pressure between the contact faces is not to exceed 0.09 MN/m^2 . Assuming uniform wear and the coefficient of friction between contact faces as 0.2, determine the main dimensions of the clutch and the axial force required to engage the clutch.

- b) A band brake shown in Fig. 6.53 uses a V-belt. The pitch diameter of the V-grooved pulley is 400 mm. The groove angle is 45° and the coefficient of friction is 0.3. Determine the power rating.

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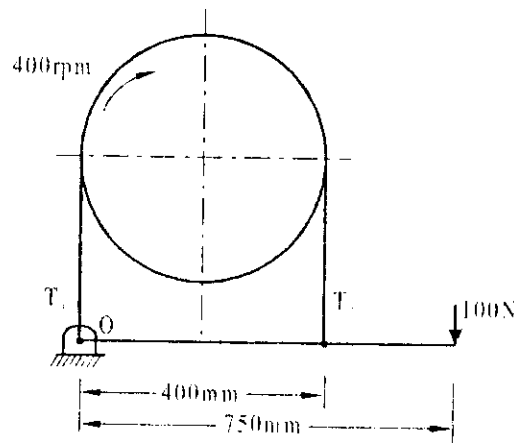


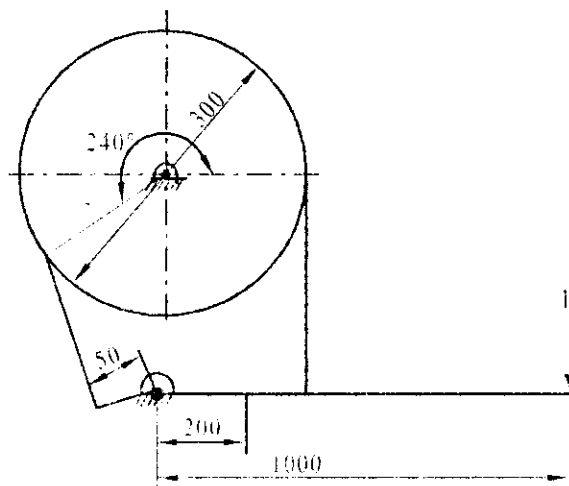
Fig. 6.53

- 14 A single plate clutch both sides effective is required to transmit 25 kW at 1600rpm. The outer diameter of the plate is limited 0.3m and the intensity of pressure is not to exceed 0.07 MPa. Assuming uniform wear and the coefficient of friction 0.3, determine the inner diameter of the plate and the axial force necessary to engage the clutch.

VTU, Jun/July 2008

15. a) With the help of a neat sketch derive an equation for torque transmitting capacity of single plate clutch, considering uniform wear.
- b) A cone clutch is to be designed to transmit 40 Nm of torque. The semi-cone angle is 12.5° . The mean radius of clutch is twice the face width, coefficient of friction $\mu = 0.18$, normal intensity of pressure between contacting surfaces should not exceed 0.1 N/mm^2 . Considering uniform wear calculate.
- The inner and outer diameter of friction layer,
 - Face width of friction layer and
 - Force required to engage the clutch.
- c) A band brake shown in Fig. 6.54, the width and thickness of the band are 100mm and coefficient of friction between band and drum = 0.2. Calculate.
- Tensions in band,
 - Actuating force,
 - Torque capacity of the brake.
- Also check for self locking.

VTU, Dec. 08/Jan. 2009

**Fig. 6.54**