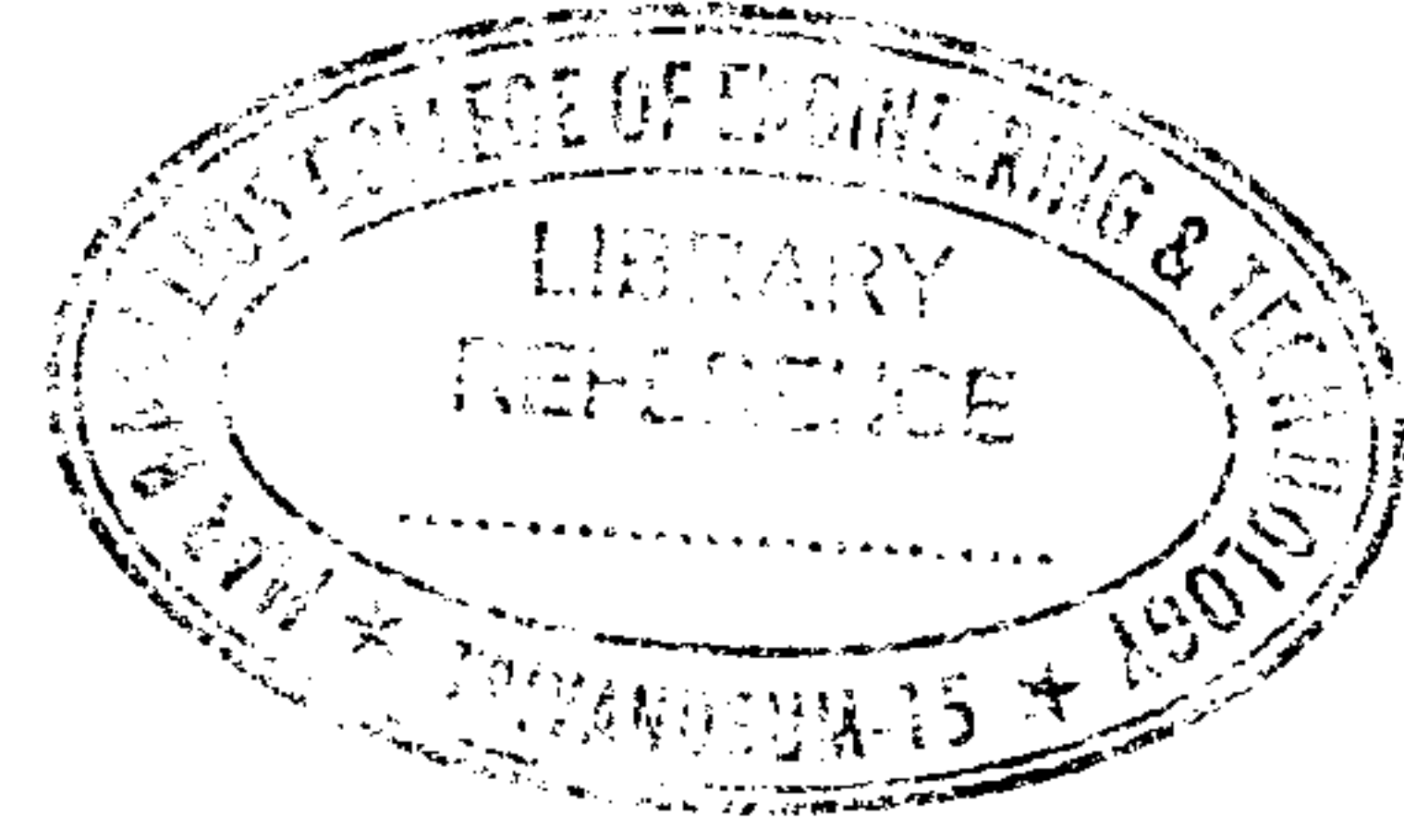




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B – 2872

Reg. No. :

Name :

Second Semester M.Tech. Degree Examination, December 2016
Branch : Machine Design
MDC – 2002 : DESIGN OF POWER TRANSMISSION ELEMENTS

Time : 3 Hours

Max. Marks : 60

Instructions : Use of data book is **permitted**. Answer **any two** questions from **each** Module. **All** questions carry **equal** marks. **Any** data **not** given may be suitably **assumed**.

Module – I

1. Design a double stranded chain drive to transmit 15 kW power from electric motor (1400 rpm) to a shaft running at 350 rpm under moderate shock conditions. Centre to centre distance is approximately 40 times the pitch.
2. A V-belt drive is required transmission of 20 kW, 1440 rpm from electric motor to a compressor running at 480 rpm for 20 hrs per day. Space available for centre distance of 1m approximately. Design the drive. Also find the tensions on the belt.
3. A 30 second work cycle consists of two equal halves. For the first half, radial load is 45 kN and axial load is 10 kN. For the second half, radial load is 15 kN and 5 kN. The respective speeds are 600 and 1200 rpm. The static and dynamic load capacities of the bearing selected are 52 and 87.1 kN respectively. Calculate life of bearing in hours at 90% reliability.

Module – II

4. Design a suitable friction drive to transmit a power of 30 kW with motor speed 600 rpm. The driven wheel rotates at 300 rpm. The expected life is 5000 hrs with permissible speed variation of 5%.
5. An uncrowned straight bevel pinion has 20 teeth, module 4 mm and quality number 6. Both pinion and gear are made of hardened steel with Brinell hardness of 300 BHN. Driven gear has 60 teeth. Pinion life expectancy is 10^9 revolutions with reliability of 0.999. Shaft angle is 90° , pinion speed is 900 rpm, face width is 32 mm and normal pressure angle is 20° . Pinion is mounted outboard of its bearings and gear straddle mounted. With factor of safety = 1 and based on the AGMA bending strength, find the power rating of the gear set.

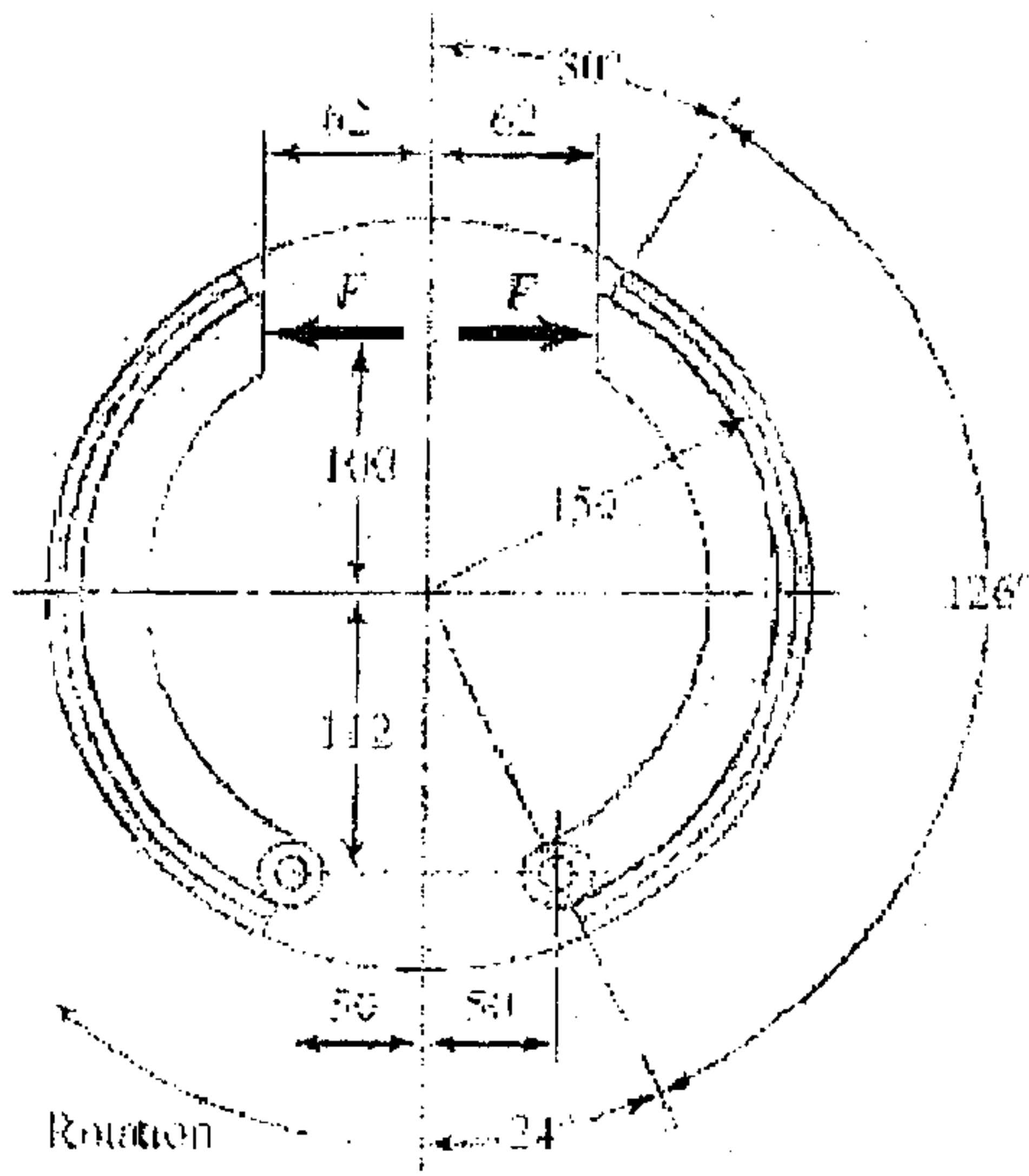
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6. Design a six speed gear box for an engine lathe with speeds ranging in geometric progression from 118 to 1180 rpm. The speed of input shaft is 750 rpm. Make a sketch of the gear box arrangement and indicate the number of teeth on each gear and actual output speeds. Minimum number of teeth of any gear to be 20. If all gears are having module 3.5 mm, find the centre to centre distance between shafts.

Module – III

7. Internal expanding rim type brake having an inside rim diameter of 300 mm is shown in figure. The shoes have a face width of 40 mm. The lining material is having a coefficient of friction 0.3 and maximum permitted pressure of 1200 kPa. Estimate the actuating force, F and the total braking capacity.



8. A cone clutch is used to transmit 30 kW at 750 rpm. Semi-cone angle is 12.5° , coefficient of friction is 0.25. Mean diameter of friction surface is $6b$ where b is the width of friction surface in mm. Load factor is 1.75. Find the radii of friction surfaces and face width. Design a suitable spring for the clutch using disengagement factor is 1.2 and spring index is 6. Assume safe shear stress for spring material is 400 MPa and deflection is limited to 5 mm during disengagement.
9. Write short notes on :
- Overrunning clutch.
 - Link and sliding anchor brakes.

