B.E. END SEMESTER EXAMINATIONS APRIL/MAY 2012
(REGULATIONS R 2008)
ME 9353 DESIGN OF TRANSMISION YSTEMS
VI Semester Mechanical Engineering

(60)

Instruction to candidates

1. **Approved design data book is permitted**
2. **Assume any missing dimensions suitably and reason stated**

Answer ALL Questions

Time: 3 Hours **Max. Marks: 100**

PART-A (10 x 2 = 20 Marks)

1 List any four reasons for the need of transmission systems.
2. List any two merits and demerits of "V" belt drive over chain drive.
3. Explain abrasion and pitting failures in gear tooth and remedy for the same.
4. Illustrate normal module and axial module in the case of helical gear tooth.
5. Distinguish between external and internal bevel gear drives.
6. The power transmission between worm gear tooth is different from spur gear tooth, state any two reasons.
7. List any four advantages of geometric progression.
8. What is the maximum step ratio used for over drive and under drive, if the maximum ratio is violated, what are the defects occurs in the gear box.
9. List any four important properties of clutch materials.
10. What is the conditions for occurance of self-locking in band brake?

PART-B (5 x16 = 80 Marks)

11. A 21-tooth pinion rotating at 1500rpm meshes with a 33-tooth gear in spur gear reducer. Both pinion and gear are manufactured to a quality level of 9. A reliability of 0.9 has been specified, and the transmitted torque is 120 N-m at pinion speed. It is proposed that standard 25° full depth teeth be used with both pinion and wheel. Use C45 and hardened steel for the pinion and wheel. Calculate the module, dimensions of the gears, bending and compressive stresses induced in the pinion.

12.a) Design a "V' belt drive to transmit 10.0 kW, power at 1500rpm from an electric motor to a reciprocating compressor rotating at 500rpm. The probable centre distance is 1.0m and the compressor has to work 8hrs/day and sketch the smallest pulley.

(OR)

12.b) Select a roller chain to transmit 7.5kW power at 1000rpm from an electric motor to pulvarizer pulley rotating at 500rpm in the first stage of reduction. The chain selected must have to withstand dust environment and also at the working temperature of 50°C. The approximate centre distance is 0.5m. The pulvarizer has to work 10hrs/day.

13.a) Design a bevel gear pair to transmit 2kW power at 1500rpm to the pillar drilling machine spindle rotates at 500rpm. The pinion and the wheel are made of cast iron grade 35. Calculate the dimensions and check for stresses induced.

(OR)

13.b) A worm gear drive has a center distance of 200mm and module equal to 6. The worm is double start and the wheel has 48 teeth. Find the pitch diameter of the worm and wheel. If the worm rotates at 1000rpm. Find the torque capacity heat generated and heat dissipated.

14.a) Draw the Ray diagram and kinematic layout of a 12 speeds gear box. The minimum and maximum speeds are 112 and 1400rpm. The gear box should have standard step ratio and strand speeds. The gear box should also have minimum number of gears. The smallest pinion in the gearbox has 18 tooth full depth of 20° pressure angle.

(OR)

14.b) A milling machine has a 6 speeds gear box. The minimum and maximum spindle speeds of the cutter are 450rpm and 1400rpm. The power of the milling machine is 5kN. Design the sliding mesh gear box such that it has minimum number gears and standard step ratio. Estimate the module of the gear if it is made of C60 material of 20° pressure angle.

15.a) Determine a suitable size and required force for an axial plate clutch. The clutch must pass 5kW at 1000rpm with a service factor of 2. Assume a pair of dry uniform friction surfaces with molded lining.

(OR)

15.b) The brake shown in Fig.15.b has a coefficient of friction of 0.30 and is to operate using a maximum force F of 400N. If the band with is 50mm. Find the band tensions and the braking torque.

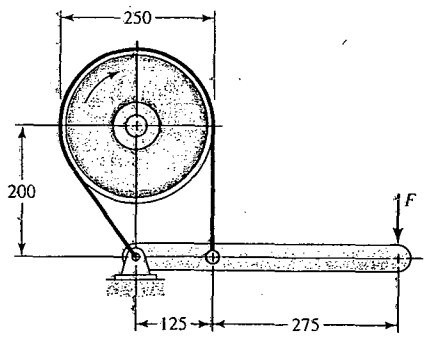

FIG. 15.b