B.E (Full Time) DEGREE End Semester Examination APR/MAY 2011
Sixth Semester Mechanical Engineering (Regulation R2008)

ME 9353 Design of Transmission Systems for flexible elements

Answer all Questions
Approved Design Data Book is Permitted

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

PART-A **(10x2=20)**

1 State the merits and demerits of flat belt over Chain drive
2 Explain the chordal action in Chain drive, how to reduce it?
3 Illustrate the normal module, transverse module and axial module in the case of helical gear tooth.
4 What is meant by Gear correction, why is this done on gears?
5 Show that the axial load on bevel pinion is equal to radial load on bevel wheel.
6 Why is worm-gear drive made of heterogeneous materials?
7 List any two advantages of Geometric progression.
8 What are the limitations of step ratio during over drive and under drive in the design of machine tool gear-box.
9 What is the condition for self-locking in the case of single shoe-brake?
10 State any four important properties of clutch material.

PART-B **(5x16=80)**

11 A pair of helical gears with 20° full depth teeth is used to transmit 15kW at 1500 rpm. The speed reduction is 2:1. The helix angle being 15°. The pinion is made of C60 material and gear is made of C45 material. The number of teeth on the pinion is not less than 18. Tabulate all relevant dimensions and the minimum hardness of the material.

12 a) Design and sketch any one of the sprocket of a chain drive to actuate a compressor from an Electrical motor of 10kW running at 960 rpm. The compressor rpm is 320. Minimum Center distance may be adjusted by shifting the motor on rails. The compressor is to Work for 8 hrs/day.

(OR)

12 b) A 7.5kW, 1440 rpm motor is to drive a compressor by means of "V" belts. The diameters of the pulleys are 140 mm and 280 mm. The probable center distance between the compressor and the motor is 500mm. Design a suitable "V" belt drive and sketch the arrangements.

13.a) A pair of bevel gear is required to transmit 2.kW at 1440 rpm of the pinion. The speed of the gear is 480 rpm. Minimum number of teeth for pinion should be 20. C 45 steel is to be used for both wheels. Design a suitable bevel gear drive and draw the arrangement.

(OR)

13.b) Design a worm gear speed reducer to transmit 25 kW at a worm speed of 1440 rpm. The desired velocity ratio is 40:1 and an efficiency of at least 80% is desired. Assume that the worm is made of hardened steel and select suitable material of the gear state the reasons.

14.a) Design the headstock (gear box) of a milling machine having twelve spindle speeds ranging from 30 to1400 rpm. The power of the machine may be from a 5 kW 1440 rpm motor. Minimum number of teeth on the gear is to be 25. i) Draw the speed diagram ii) sketch the layout of the gear box iii) Calculate the diameter of the shafts iv)Calculate the number of teeth on all gears.

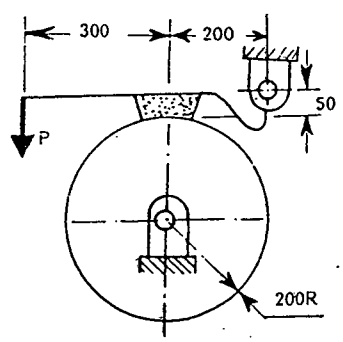
(OR)

14.b) Design a gear box for an all geared headstock of a lathe. The minimum and maximum speeds are to be 450 and 1400 rpm respectively. Number of steps is six and drive is from an electric motor giving 3 kW at 1440 rpm, Calculate the module of the smallest pinion.

15.a) A single block brake with a torque capacity of 500 N-m is shown in Fig. 15 a). The brake drum rotates at 100 rpm and the co-efficient of friction is 0.35. Calculate:
i) the actuating force and the hinge-pin reaction for clockwise rotation of the drum;
ii) the actuating force and hinge-pin reaction for anticlockwise rotation of the drum;
iii) the rate of heat generated during the braking action; and
iv) the dimensions of the block if the intensity of pressure between the block and brake drum is 1 N/mm^2. The length of the block is twice its width.

(OR)

15.b) Determine a suitable size, required applied force for an axial disk clutch. The clutch should transmit 5kW at1500 rpm with a service factor of 2.5. Assume a single dry friction surface disk with asbestos molded lining. the design includes disk dimensions number of levers and its dimensions and shaft diameter.



(A)

Fig. 15a.