(49)

ROLL NO

B.E/B.TECH (Full-time) Arrear End Semester Degree Examination, Nov/Dec 2013

Sixth semester

Mechanical Engineering

ME 9353 – DESIGN OF TRANSMISSION SYSTEMS

(Regulation 2008)

Time: 3 Hours Answer All Questions Max. Marks: 100

PART-A (10 x 2 = 20 Marks)

1. What is meant by crowning of pulley? Why it is provided?
2. Differentiate between Regular, Lang and Composite lay ropes.
3. Why a pressure angle of 20° is preferred than a 14½° spur gear system?
4. What is the drawback of using a single helical than a double helical gear system?
5. What are zerol bevel gears?
6. List the merits of using worm gears.
7. What is meant by step ratio?
8. What are the principles to be considered during the design of a gear box?
9. Define the terms with respect to cams: Stroke; Point of Inflection
10. Brief about the qualities does a brake lining material should possess.

Part-B (5 x 16 = 80 Marks)

11. Draw the kinematic arrangement and ray diagram of a 16 speed gear box having output speeds ranging from 100 – 560 rpm. Also determine the number of teeth on all the gears.

12(a) Design a chain drive to actuate a compressor from a 10 kW electric motor at 960 rpm. The compressor runs at a speed of 350 rpm. The minimum centre distance is to be taken as 0.5 m. The motor is mounted on an auxiliary bed The compressor should be designed in such a way that it works for 8 hours per day.

[OR]

12 (b) A leather belt drive should be designed to transmit 15 kW power. The driver and the driven pulleys run at 1440 rpm and 480 rpm respectively. The centre distance between the pulleys is twice the diameter of the bigger pulley. The belt should operate at a velocity of 20 m/s approximately and the stresses in the belt should not exceed 2.25 N/mm^2. The density of the leather is 0.95 g/cc and the coefficient of friction is 0.35. The thickness of the belt is 5 mm. Calculate the diameters of the pulleys, length & width of the belt and the belt tensions.

13(a) Design a pair of spur gears for the requirement: Power of 15000 kW, pinion speed of 450 rpm, wheel speed of 80 rpm, centre distance of less than 1.5 m and assuming a life of 10,000 hours.

[OR]

13(b) A pair of helical gears subjected to moderate shock loading is to transmit 37.5 kW at 1750 rpm of the pinion. The speed reduction ratio is 4.25 and the helix angle is 15°. The service is continuous and the teeth are 20° FD in normal plane. Design the gears assuming a life of 10,000 hours.

14(a) Design a bevel gear drive to transmit 10 kW at 1440 rpm for the following data. Gear ratio = 3. Material for pinion and gear is C45 surface hardened. Assume a life of 25,000 hours.

[OR]

14(b) Design a worm gear drive to transmit 20 HP from a worm at 1440 rpm to worm-wheel. The speed of the worm-wheel should be 40 $\pm$ 2% rpm. An efficiency of at least 85% is desired. The temperature rise should be restricted to 40°C.

15(a) A centrifugal clutch transmitting 18.5 kW at 720 rpm, consists of 4 shoes. The clutch is to be engaged at 75 % of the running speed. The inner radius of the drum is 165 mm, while the radius of the centre of gravity of each shoe during engaged position is 140 mm. The coefficient of friction is 0.25, while the permissible pressure on the friction lining is 0.1 N/mm^2. Calculate the mass of each shoe and the dimensions of the friction lining.

[OR]

15(b) A single block brake with torque capacity of 250 N-m is shown in Fig. 15b. The brake drum rotates at 100 rpm and the coefficient of friction is 0.35. Calculate the

a. Actuating force and hinge-pin reaction for clockwise rotation of the drum
b. Actuating force and hinge-pin reaction for anticlockwise rotation of the drum
c. Rate of heat generated during braking action
d. Dimensions of the block, if the intensity of pressure between the block and the brake drum is 1 N/mm^2. The length of the block is twice its width. State whether the brake is self-locking.

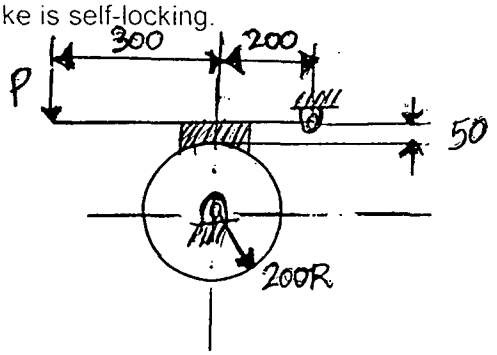

FIG. 15b