

Reg. No. :

**Question Paper Code : 11533**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2012.

Sixth Semester

Mechanical Engineering

ME 2352/ME 61/ME 1352/10122 ME 603 – DESIGN OF TRANSMISSION SYSTEMS

(Regulation 2008)

(Common to PTME 2352 – Design of Transmission Systems for B.E. (Part-Time)  
Fifth Semester Mechanical Engineering Regulation 2009)

Time : Three hours

Maximum : 100 marks

Note : Approved Design Data Book is permitted to use in the examination.  
Any missing data can be suitably assumed.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Give an expression for ratio of tensions in a flat belt drive.
2. How is a V-belt specified?
3. State the law of gearing.
4. State an advantage and a disadvantage with helical gear.
5. When is bevel gear preferred?
6. Calculate angle between the shafts of a crossed helical gears made of two left handed helical gears of  $10^\circ$  helix angle each.
7. Calculate standard step ratio for six speed gear box with speed ranging between 100 and 560 rpm.
8. Select 3 pairs of gears with total teeth for each pair 60 and speed ratios 1, 1.41, and 2.
9. Name different types of clutch.
10. How does the function of a brake differ from that of a clutch?



PART B — (5 × 16 = 80 marks)

11. (a) A motor of power 2 kW running at a speed of 1400 rpm transmits power to an air blower running at 560 rpm. The motor pulley diameter is 200 mm. The centre distance may be 1000 mm. Design a suitable V-belt drive.

Or

- (b) Design a suitable chain drive to actuate a compressor from a 10 kW electric motor. Speed of the motor shaft is 1050 rpm and the compressor speed is 350 rpm. Minimum centre distance is to be 600 mm. compressor service required is 12 hours per day.
12. (a) Design a pair of straight spur gears to transmit 12kW at 1500 rpm. Speed reduction required is 4. Check for compressive and bending stresses. Also check for plastic deformation of teeth. Make a schematic diagram and show the results neatly.

Or

- (b) Design a pair of full depth involute teeth helical gears to transmit 5 kW at 1440 rpm. Use C 45 steel for the gears. Number of teeth on pinion may be 24 and that in on gear 56. Check for compressive and bending stresses. Make a simple sketch and label the important dimensions of the drive.
13. (a) Design a bevel gear drive to transmit 7.5 kW. Speed ratio is 4. Driving shaft speed 400 rpm.

Or

- (b) Design a worm gear drive to transmit 12 kW at 1440 rpm with a speed ratio of 20. Use steel worm and cast iron wheel.
14. (a) For a load lifting arrangement transmitting 10 kW with electric motor running at 1400 rpm, constant mesh type speed reducer is required with reduction ratio 12. Design a suitable arrangement and make a neat sketch.

Or

- (b) Select speeds for a 12 speed gear box for a minimum speed of 16 rpm and maximum speed of 900 rpm. Drive speed is 900 rpm. Draw speed diagram and draw kinematic arrangement of the gear box showing the number of teeth in all the gears.

15. (a) A radial cam rotating at 200 rpm is driving a 10 mm diameter translating roller follower to produce the following motions, rise of 20 mm with SHM in  $150^\circ$  of cam rotation, dwell for  $60^\circ$  and fall of 20 mm with SHM in  $120^\circ$  of cam rotation and dwell for remaining  $30^\circ$ . Draw the profile of the cam. Check whether under cutting will occur.

Or

- (b) A single plate clutch, effective on both sides, is required to transmit 22.5 kW at 2400 rpm. Determine the outer and inner diameter of frictional surfaces if the coefficient of friction is 0.2, ratio of diameter is 1.2 and the maximum pressure is not to exceed  $0.1 \text{ N/mm}^2$ . Determine (i) the face width required and (ii) the axial spring force necessary to engage the clutch.

