

Reg. No. :

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**Question Paper Code : 71860**

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Sixth Semester

Mechanical Engineering

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

(Common to Mechanical and Automation Engineering)

(Regulation 2008/2010)

(Common to PTME 2352/ 10122 ME 603 — Design of Transmission System for B.E.  
(Part-Time) Fifth/Sixth Semester Mechanical Engineering (Regulation 2009/2010))

Time : Three hours

Maximum : 100 marks

Use of Approved Design Data Books permitted

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. In what ways the timing belts are superior to ordinary V belts.
2. What is meant by 'Chordal action of chain'? Also name a company that produces driving chains.
3. State the law of Gearing.
4. What is pressure angle? What is the effect of increase in pressure angle?
5. State the advantages of herring bone gear.
6. What is a Zerol bevel gears?
7. Draw the ray diagram for a six speed gear box.
8. In which gear-drive, self-locking is available?
9. If a multidisc clutch has 6 discs in driving shaft and 7 discs in driven shaft, then how many number of contact surfaces it will have?
10. Why in automobiles, braking action when traveling in reverse is not as effective as when moving forward?

PART B —(5 × 16 = 80 marks)

11. (a) Design a V-belt drive and calculate the actual belt tensions and average stress for the following data. Power to be transmitted = 7.5 kW, Speed of driving wheel = 1000 rpm, Speed of driven wheel = 300 rpm, Diameter of driven pulley = 500 mm, Diameter of driver pulley = 150 mm and Center distance = 925 mm.

Or

- (b) A 7.5 kW electric motor running at 1400 rpm is used to drive the input shaft of the gearbox of a machine. Design a suitable roller chain to connect the motor shaft to the gear box shaft to give an exact speed ratio of 10:1. The center to center distance of the shaft is to be approximately 600 mm
12. (a) Design a spur gear drive to transmit 8 kW at 720 rpm and the speed ratio is 2. The pinion and wheel are made of the same surface hardened carbon steel with 55 RC and core hardness less than 350 BHN. Ultimate strength is 720 N/mm<sup>2</sup> and yield strength is 360 N/mm<sup>2</sup>.

Or

- (b) Design a helical gear drive to transmit the power of 14.7 kW. Speed ratio 6, pinion speed 1200 rpm, helix angle is 25°. Select suitable materials and design the gear.
13. (a) Design a pair of straight bevel gears for two shafts whose axis are at right angles. The power transmitted is 25 kW. The speed of pinion is 300 rpm and of the gear is 120 rpm.

Or

- (b) Design a worm gear drive to transmit 22.5 kW at a worm speed of 1440 rpm. Velocity ratio is 24:1. An efficiency of at least 85% is desired. The temperature raise should be restricted to 40°C. Determine the required cooling area.
14. (a) Design a nine speed gear box for a machine to provide speeds ranging from 100 rpm to 1500 rpm. The input is from a motor of 5 kW at 1440 rpm. Assume any alloy steel for the gears.

Or

- (b) Design a 12 speed gear box for a lathe. The minimum and maximum speeds are 100 and 1200 rpm. Power is 5 kW from 1440 rpm induction motor.

15. (a) A power of 20 kW is to be transmitted through a cone clutch at 500 rpm. For uniform wear condition, find the main dimensions of clutch and shaft. Also determine the axial force required to engage the clutch. Assume coefficient of friction as 0.25, the maximum normal pressure on the friction surface is not to exceed 0.08 MPa and take the design stress for the shaft materials as 40 MPa.

Or

- (b) Design a differential band brake for a winch lifting a load of 20 kN through a steel wire rope wound around a barrel of 600 mm diameter. The brake drum, keyed to the barrel shaft, is 800 mm diameter and the angle of lap of the band over the drum is about  $240^\circ$ . Operating arms of the brake are 50 mm and 250 mm. The length of operating lever is 1.6 m.