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**Question Paper Code : 31573**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Sixth Semester

Mechanical Engineering

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

(Regulation 2008 / 2010)

(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

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. What is meant by the ply of belt?
2. Write any four wire rope applications.
3. Differentiate between circular pitch and diametral pitch.
4. Where do we use spiral gears?
5. What is the difference between an angular gear and a miter gear?
6. Why phosphor bronze is widely used for worm gears?
7. What is step ratio?
8. State any three basic rules to be followed while designing a gear box.
9. Define pitch point in cam.
10. Differentiate between clutch and a brake.

PART B — (5 × 16 = 80 marks)

11. (a) A centrifugal pump running at 340 rpm is to be driven by a 100 kW motor running at 1440 rpm. The drive is to work for at least 20 hours every day. The centre distance between the motor shaft and the pump shaft is 2000 mm, suggest a suitable multiple V-belt drive for this application. Also calculate the actual belt tensions and stress induced. (16)

Or

- (b) The transporter of a heat treatment furnace is driven by a 4.5 kW, 1440 rpm induction motor through a chain drive with a speed reduction ratio of 2.4. The transmission is horizontal with bath type of lubrication. Rating is continuous with 3 shifts per day. Design the complete chain drive. (16)
12. (a) Design a spur gear drive to transmit 22.5 kW at 900 rpm. Speed reduction is 2.5. Materials for pinion and wheel are C15 steel and cast iron grade 30 respectively. Take pressure angle of  $20^\circ$  and working life of the gears 10,000 hours. (16)

Or

- (b) Design a helical gear to transmit 15 kW at 1440 rpm to the following specifications : Speed reduction is 3 ; pressure angle is  $20^\circ$  ; helix angle is  $15^\circ$  ; the material of both the gears is C45 steel. Allowable static stress 180 GPa ; surface endurance limit is 800 GPa. Young's modulus of material = 200 GPa. (16)
13. (a) Design a straight bevel gear drive between two shafts at right angles to each other. Speed of the pinion shaft is 360 rpm and the speed of the gear wheel shaft is 120 rpm. Pinion is of steel and wheel of cast iron. Each gear is expected to work 2 hours/day for 10 years. The drive transmits 9.37 kW. (16)

Or

- (b) The input to worm gear shaft is 18 kW and 600 rpm. Speed ratio is 20. The worm is to be of hardened steel and the wheel is made of chilled phosphor bronze. Considering wear and strength, design worm and worm wheel. (16)

14. (a) An 18 speed gear box is required to give output speeds ranging from 35 rpm to 650 rpm. The input power is 3.75 kW at 1440 rpm. Draw the structural diagram and the kinematic arrangement of gears. (16)

Or

- (b) A nine speed gear box, used as a head stock gear box of a turret lathe, is to provide a speed range of 180 rpm to 1800 rpm. Using standard step ratio, draw the speed diagram and the kinematic layout. Also find and fix the number of teeth on all gears. (16)
15. (a) A single plate clutch transmits 25 kW at 900 rpm. The maximum pressure intensity between the plates is 85 kPa. The ratio of radii is 1.25. Both the sides of the plate are effective and the coefficient of friction is 0.25. Determine (i) the inner diameter of the plate, and (ii) the axial force to engage the clutch. Assume theory of uniform wear. (16)

Or

- (b) Describe with the help of a neat sketch the principles of an internal expanding shoe. Also deduce the expression for the braking torque. (16)