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Question Paper Code : 60860

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Sixth Semester

Mechanical Engineering

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

(Common to Mechanical and Automation Engineering)

(Regulations 2008/2010)

(Common to PTME 2352/10122 ME 603 – Design of Transmission System for B.E. (Part-Time) Fifth/Sixth Semester Mechanical Engineering – Regulations 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. What is the condition to transmit maximum power in a flat belt drive?

2. How the wire ropes are designated?

3. Backlash of Spur gear depends on which of two factors?

4. What are the common profiles used for gear tooth?

5. Define back cone radius for a bevel gear.

6. What are the two types of failure in worm gear drives?

7. What is step ratio?

8. What are the possible arrangements to achieve 12 speeds from a gear box?

9. Define Jerk.

10. Give examples for axial and radial friction clutches.

PART B — (5 × 16 = 80 marks)

11. (a) A compressor is driven by a 15 kW motor, running at 960 rpm, through an open belt drive. The speed of the compressor pulley is 480 rpm. The centre distance of the drive is 2.5m. Select a flat belt drive. Neglect the effect of slip.

Or

(b) Design a wire rope for a vertical nine hoist to lift a load of 50 kN, from a depth of 250 m. Rope speed of 8 m/s is to be attained in 10 seconds. Take factor of safety as 6.

12. (a) In a spur gear drive for a stone crusher, the gears are made of C40 steel. The pinion is transmitting 30 kW at 1200 rpm. The gear ratio is 3. Gear is to work 8 hours per day six days a week and for 3 years. Design the drive.

Or

(b) A pair of Helical gears subjected to moderate shock loading is to transmit 37.5 kW at 1750 rpm of 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 the normal plane. Design the gears, assuming a life of 10,000 hours.

13. (a) Design a bevel gear drive to transmit 3.5 kW. Speed ratio = 4. Driving shaft speed = 200 rpm. Pinion is of steel and wheel of CI. Assume a life of 25000 hrs.

Or

(b) A hardened steel worm rotates at 1400 rpm and transmits 12 kW to a phosphor bronze gear. The speed of the worm wheel should be 60 rpm. Design the worm gear drive if an efficiency of at least 82% is desired.

14. (a) Design a gear box for a drilling machine, to give speed variation between 100 and 560 rpm in six steps. The input shaft speed is 560 rpm. The inter mediate shaft is to have three speeds.

Or

(b) A gear box is to be designed to provide 12 output speed ranging from 160 to 2000 rpm. The input speed of motor is 1600 rpm. Choosing a standard speed ratio, construct the speed diagram and the kinematic arrangement.

15. (a) A multiple – disc clutch transmits 50 kW of power at 1400 rpm. Axial intensity of pressure is not to exceed 0.15 N/mm^2 and the coefficient of friction for the friction surfaces is 0.12. The inner radius of the discs is 80 mm, and is 0.7 times. The outer radius. Determine the number of discs required to transmit the given power. Assume uniform wear condition.

Or

(b) A radial cam rotates at 1200 rpm with translating flat – face follower rising 20 mm with simple harmonic motion in 150° of cam rotation. The base circle radius is 38 mm. Check whether undercutting will occur.