Question Paper Code : 73855

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

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)

(Also 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 centrifugal effect on belts?

2. What is chordal action in chain drives?

3. Define module.

4. What are the main types of gear tooth failure?

5. State the advantages of herring bone gear.

6. What is a zerol bevel gears?

7. What is step ratio?

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

9. Define pitch point in cam.

10. Differentiate clutch and a brake.

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 the transmitted = 7.5 kW, Speed of driving wheel = 1000 rpm, Speed of driven wheel = 300 r.pm, 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 given 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 required to transmit 45 kW at a pinion speed of 800 rpm. The velocity ratio is 3.5 : 1. The teeth are 20° full depth involute with 18 teeth on the pinion. Both the pinion and gear are made of steel with a maximum safe static stress of 180 N/mm². Assume medium shock conditions.

Or

(b) Design a pair of helical gears to transmit 10 kW at pinion speed of 1000 rpm. The Reduction ratio is 5. Assume suitable materials and stresses.

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 women wheel should be 60 rpm. Design the worm gear drive if an efficiency of at least 82% is desired.

14. (a) Define a 9 speed gear box to give output speed between 280 and 1800 rpm. The input is 5.5 kW at 1400 rpm. Draw the kinematic layout diagram and the speed diagram. Determine the number of teeth on all gear.

Or

(b) Design the layout of a 12 speed gear box for a lathe. The minimum and maximum speed are 100 and 1200 rpm. Power is 5 kW from 1440 rpm, motor. Draw the speed and kinematic diagram. Also calculate the number of teeth on all gears.

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)

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