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Question Paper Code : 21860

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

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 centrifugal effect on belts?
2. What is chordal action in chain drives?
3. Define module.
4. Differentiate double helical and herringbone gears.
5. What is the difference between an angular gear and a miter gear?
6. What kind of contact occurred between worm and wheel? How does this differ from other gears?
7. Define progression ratio.
8. Write the significance of structural formula.
9. Name the profile of cam that gives no jerk.
10. What is meant by positive clutch?

PART B — (5 × 16 = 80 marks)

11. (a) Select a suitable V-belt and design the drive for a wet grinder. Power is available from a 0.5 kW motor running at 750 rpm. Drum speed is to be about 100 rpm. Drive is to be compact.

Or

- (b) Select a wire rope for a vertical mine hoist to lift a load of 20 kN from a depth of 60 metres. A rope speed of 4 m/sec is to be attained in 10 seconds.

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 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 hour/day for 10 years. The drive transmits 9.37 kW.

Or

- (b) The input to worm gear shaft is 18 kW at 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.

14. (a) A nine speed gear box, used as 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 kinematic arrangement showing number of teeth in all gear.

Or

- (b) A gear box is to give 18 speeds for a spindle of a milling machine. Maximum and minimum speeds of the spindle are to be around 650 and 35 rpm respectively. Find the speed ratios which will give the desired speeds and draw the structural diagram and kinematic arrangement of the drive.

15. (a) Design a cam for operating the exhaust valve of an oil engine. It is required to give equal uniform acceleration and retardation during opening and closing of the valve, each of which corresponding to 60° of cam rotation. The valve should remain in the fully open position for 20° of cam rotation. The lift valve is 50 mm and the least radius of the cam is 50 mm, the follower is provided with a roller of 50 mm diameter and its line of stroke passes through the axis of the cam.

Or

- (b) Explain with a neat sketch the working of a single plate clutch. Derive an expression for the torque to be transmitted by clutch assuming
- (i) Uniform pressure condition and
 - (ii) Uniform wear condition.