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Question Paper Code : 80852

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Sixth Semester

Mechanical Engineering

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

(Common to Mechanical and Automatic Engineering)

(Regulations 2008/2010)

(Common to PTME 2352 – Design of Transmission Systems for B.E. (Part-Time) Fifth Semester – Mechanical Engineering – Regulations 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.

PART A — (10 × 2 = 20 marks)

1. What are the materials used for belt-drive?

2. Why slip is less in the case of V-belts when compared to flat belts?

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

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

5. What is the difference between an angular gear and a miter gear?

6. Why phosphor bronze is widely used for worm gears?

7. Draw the ray diagram for a six speed gear box.

8. In which gear-drive, self-locking is available?

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) Design a V-belt drive to the following specifications

Power to be transmitted	:	75kW
Speed of driving wheel	:	1440 rpm
Speed of driven wheel	:	400 rpm
Diameter of driving wheel	:	300 mm
Centre distance	:	2500mm
Service	:	16 hours/day

Or

(b) Design a chain derive to actuate a compressor from a 10kW electric motor at 960 rpm. The Compressor speed is to be 350 rpm. Minimum center distance should be 0.5 m. Compressor is to work for 8 hours/day.

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 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 atleast 85% is desired. The temperature raise should be restricted to 40°C. Determine the required cooling area.

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) 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.

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