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**Q 2411**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

Sixth Semester

Mechanical Engineering

ME 342 — DESIGN OF TRANSMISSION SYSTEM

Time : Three hours

Maximum : 100 marks

(Approved Design Data Book is permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Under what conditions, chain drives are preferred over V-belt drives.
2. What are the advantages and disadvantages of V-belt drive over flat belt drive?
3. Sketch the profile of spur gear and mark terminology used to specify the gear.
4. What is beam strength of spur gear? What is the effect of module on beam strength of a tooth in a spur gear?
5. What is the advantage of helical gear over spur gear?
6. Differentiate between external bevel, internal bevel and crown gears.
7. Calculate intermediate speeds for a gear box with minimum speed 30 rpm maximum speed 600 rpm having 12 steps.
8. Why only roller contact bearings are used gear box?
9. What is the advantage of conical clutch over plate clutch? Give its limitations.
10. What are the required properties of brake lining?

PART B — (5 × 16 = 80 marks)

11. (a) Design a flat belt drive to transmit 25 kW at 720 rpm to an aluminium rolling machine the speed reduction being 3.0. The distance between the shaft is 3 m. Diameter of rolling machine pulley is 1.2 m.

Or

- (b) Design a chain drive to transmit 5.5 kW at 900 rpm of the sprocket pinion. A speed reduction of 2.5 : 1 is desired. The driving motor is mounted on an adjustable base. Assume that the load is steady, the drive is horizontal and the service is 16 hrs a day.

12. (a) Design a spur gear drive to transmit 30 kW at 1440 rpm, speed reduction is 2.5.

Or

- (b) Design a cast iron spur gear drive for a crane hoist to transmit 3.75 kW at 1440 rpm. Maximum gear ratio in the gear box is 4. Each gear is expected to work 2 hours/day for 10 years. Determine the minimum centre distance, required face width and module of the gear.

13. (a) A pair of helical gears subjected to heavy shock loading is to transmit 37.5 kW at 1750 rpm of the pinion. The speed reduction ratio is 4.25 and the helix angle is 15°. The service is continuous and the teeth are 20° full depth in the normal plane. Select suitable material and design the gears. Calculate the major dimensions and draw the arrangement.

Or

- (b) Design a worm gear drive to transmit 3 kW at 600 rpm. Speed of worm wheel is 40 rpm. Tabulate the results neatly.

14. (a) Explain the following with reference to gear box design

- (i) Components of speed reducers. (5)
- (ii) Multispeed gear box. (4)
- (iii) Progression ratio. (3)
- (iv) Kinematic arrangement of gears. (4)

Or

- (b) Design a nine speed gear box for a minimum speed of 35 rpm and a maximum speed of 1000 rpm. Draw the speed diagram and kinematic chart.

15. (a) A multiple disc clutch consisting of steel and bronze plates is to transmit 10 kW at 1000 rpm, the inner and outer diameter of discs being 90 and 160 mm respectively. The engagement factor may be taken as 1.25. The coefficient of friction between the contracting plates is 0.18 and maximum intensity of pressure  $0.3 \text{ N/mm}^2$ . Find the required number of steel and bronze plates, using uniform wear condition.

Or

- (b) A double block brake is used to lower a load of 10 kN at a speed of 4 m/s. Assuming friction coefficient for wood on C.I as 0.33, determine the necessary effort 'P' and the tension in spring if the bell crank leverage is 50–450 mm the diameter of brake is 750 mm and the diameter of hoist drum is 450 mm. Take leverage for spring as 2.