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Question Paper Code : 53313

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Sixth/Seventh Semester

Mechanical Engineering

ME 6601 — DESIGN OF TRANSMISSION SYSTEMS

(Common to Mechanical Engineering (Sandwich)/
Mechanical and Automation Engineering)

(Regulation 2013)

(Also common to PTME 6601 — Design of Transmission System for B.E. Part Time –
Fifth Semester – Mechanical Engineering – Regulation 2014)

Time : Three hours

Maximum : 100 marks

(Usage of approved design data book is permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Which side of the belt should be on the bottom side of the pulley and why?
2. What are the various stresses induced in wire ropes?
3. State the law of gearing.
4. What is meant by virtual number of teeth?
5. What is crown and miter gear?
6. Define pitch and lead of worm gears.
7. What is a torque converter?
8. Draw the kinematic layout for the 6-speed gearbox.
9. How does the function of a brake differ from that of a clutch?
10. Why are cone clutches better than disc clutches?

PART B — (5 × 13 = 65 marks).

11. (a) A motor driven blower is to run at 650 rpm driven by an electric motor of 7.5 kW at 1800 rpm. Design a suitable V-belt drive.

Or

- (b) Design a chain drive to actuate a compressor from a 10 kW electric motor at 960 rpm. The compressor speed is to be 350 rpm. Minimum center distance should be 0.5m. Motor is mounted on an auxiliary bed. Compressor is to work for 8 hours/day.
12. (a) Design a spur gear drive to transmit 22 kW at 900 rpm, speed reduction is 2.5. Materials for pinion and wheel are C15 steel and Cast-Iron grade 30 respectively. Take pressure angle of 20° and working life of the gears as 10,000 hours.

Or

- (b) A pair of helical gears is to be designed to transmit 30 kW at a pinion speed of 1500 rpm. The velocity ratio is 3. Selecting 15 Ni2Cr1 Mo15 steel as the material, determine the dimensions of the gears.
13. (a) Design a bevel gear drive to transmit 7 kW at 1600 rpm for the following data.

Gear ratio = 3

Material for pinion and gear = C45 steel

Life = 10,000 hours.

Or

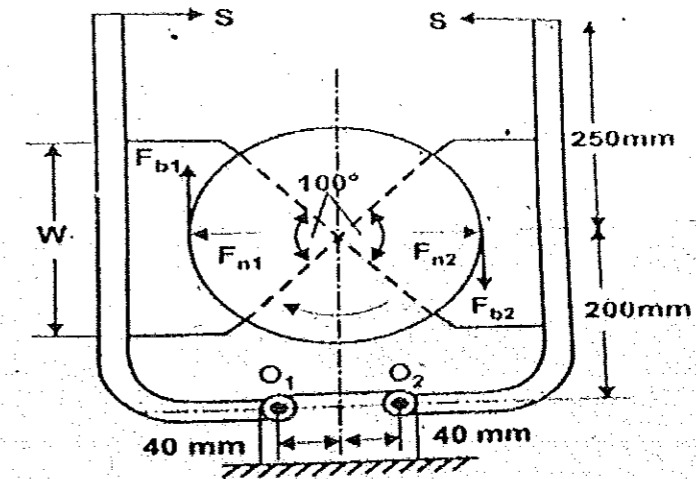
- (b) A hardened steel worm rotates at 1440 rpm and transmits 12 kW to a phosphor bronze gear. The speed of the worm gear should be 60rpm. Design the worm gear drive if an efficiency of atleast 82% is desired by using AGMA method.
14. (a) Design a gearbox with 12 speeds from a source of motor with a speed of 1600 rpm. The required range is from 160 rpm to 2000 rpm.

Or

- (b) Design a gearbox with 9 speed output from a single speed input. The required speed range is from 180 rpm to 1800 rpm.
15. (a) A multiple disc wet clutch is to be designed for a machine tool driven by an electric motor of 12.5 kW running at 1440 rpm. The frequency of clutch engagement is 6/hr and the machine tool is to operate continuously 8hrs/day. Determine the appropriate values for disc inside diameter, outside diameter, total number of discs and clamping force.

Or

- (b) A double shoe brake as shown in the figure is capable of absorbing a torque of 1500 N-m. The diameter of the brake drum is 400 mm and the angle of contact for each shoe is 100° . If the coefficient of friction between the brake drum and lining is 0.4, find (i) the spring force necessary to set the brake and (ii) the width of the brake shoe, if the bearing pressure on the lining material is not to exceed 0.3 N/mm^2 .



PART C — (1 × 15 = 15 marks)

16. (a) Design an 18-speed gearbox from a source of 1000 rpm. Maximum and minimum speeds are to be around 650 rpm and 35 rpm respectively.

Or

- (b) Select a suitable wire rope for a mini hoist carrying a load of 2 tonnes to be lifted from a depth of 100m. A rope speed of 10m/s must be attained in 10 seconds. Assume minimum factor of safety as 10.