04 JAN 2023 – FN

(COE)

Reg. No.												

Question Paper Code	11557

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022

Sixth Semester

Mechanical Engineering

ME8651 - DESIGN OF TRANSMISSION SYSTEMS

(Regulations 2017)

(Use of Approved Design Data Book is permitted)

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	How will you designate V-belt?	*2,K2,CO1*
2.	What are the parts of roller chain?	*2,K1,CO1*
3.	What are the factors that influence backlash?	*2,K1,CO2*
4.	In what ways helical gears are differed from spur gears?	*2,K2,CO2*
5.	In which gear-drive, self-locking is available?	*2,K1,CO3*
6.	What are zero bevel gears?	*2,K1,CO3*
7.	What is preferred number?	*2,K1,CO4*
8.	What is step ratio?	*2,K1,CO4*
9.	Classify clutches based on the coupling methods.	*2,K1,CO5*
10.	What factors should be considered when designing friction clutches?	*2,K1,CO5*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	Design a Flat Belt Drive to transmit 10 kW at 1500 rpm to a line shaft to run at 500 rpm. Approximate centre distance is 2m. The diameter of larger pulley is 750 mm.	*13,K3,CO1*
		OR	
	b)	If a motor driven blower is to run at 600 rpm, is driven by an electric motor of 10 kw running at 1800 rpm, suggest a suitable V – Belt for the above application.	*13,K3,CO1*
12.	a)	A Spur Gear drive is required to transmit 20kW power at 450rpm with a speed reduction ratio of 3. Design the drive.	*13,K3,CO2*
		OR	
	b)	A pair of Helical Gears subjected to moderate shock loading is to transmit 30 kW power at 1500 rpm of the pinion. Speed Reduction	*13,K3,CO2*

Ratio is 4 and Helix angle is 15°. Service is continuous and the teeth are 20° Full Depth. Design the drive for a Life of 10,000hours by assuming suitable materials.

13. a) Design a Bevel Gear Drive to transmit 9 kW at 20 rps of the pinion. Gear ratio is 3. Material for Pinion & Wheel C 20 steel. Life = 10,000 hours. *13,K3,CO3*

OR

b) Design a worm gear drive to transmit a power of 22.5 KW. The worm speed is 1440 rpm and the speed of the wheel is 60 rpm. The drive should have a minimum efficiency of 80% and above. Select suitable materials for the worm and the wheel. *13,K3,CO3*

14. a) The maximum and minimum speed of a Six Speed Gear Box is 1600 rpm & 500 rpm respectively. Draw the speed diagram and kinematic arrangement. *13,K3,CO4*

OR

b) A 9 Speed Gear Box is to give output speeds ranging from 100 rpm to 630 rpm. Draw the Structural Diagram & Kinematic Layout. *13,K3,CO4*

15. a) A single plate clutch, effective on both sides, is required to transmit 25 KW at 3000 rpm. Determine the outer and inner diameter of frictional surfaces if the coefficient of friction is 0.25, ratio of diameter is 1.25 and the maximum pressure is not to exceed 0.1 N/mm^2. Determine (i) the face width required and (ii) the axial spring force necessary to engage the clutch. *13,K3,CO5*

OR

b) A multi disk clutch consists of five steel plates and four bronze plates. The inner and outer diameters of friction disks are 75mm and 150mm respectively. The coefficient of friction is 0.1 and the intensity of pressure is limited to 0.3. N/mm^2. Assuming the uniform wear theory, calculate (i) the required operating force, and (ii) power transmitting capacity at 750 rpm. *13,K3,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) A Simple Band Brake is shown in Figure 1. and assume the following data: b = 250mm; l=750mm; r = 250mm; θ =225°. The width of the friction lining is 60mm and the coefficient of friction is 0.4. The maximum intensity of pressure is 0.25N/mm^2. Calculate (i) the band tension; (ii) actuating force; (iii) the torque capacity of the brake. *15,K3,CO6*

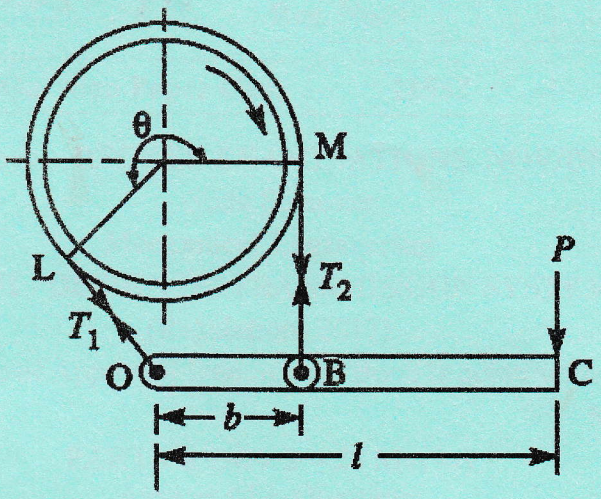

Figure 1

OR

b) A Differential Band Brakeis shown in Figure 2. The width and the thickness of the steel band are 100 mm and 3 mm respectively and the maximum tensile stress in the band is 50 N/mm^2. The coefficient of friction between the friction lining and the brake drum is 0.25. Calculate: (i) the tensions in the band; (ii) the actuating force; (iii) the torque capacity of the brake. *15,K3,CO6*

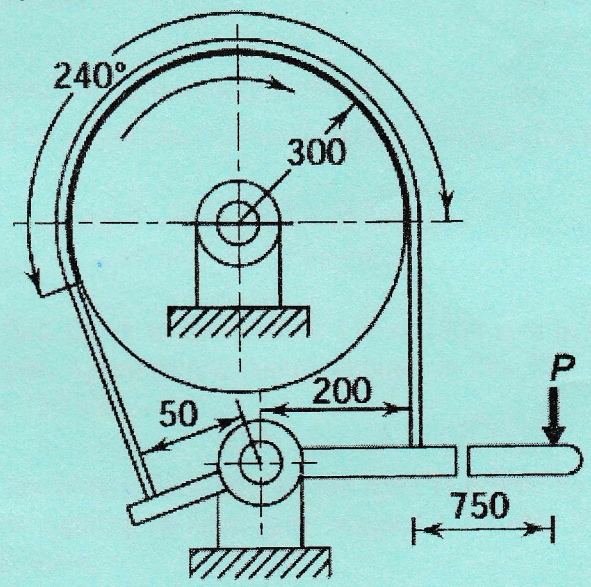

Figure 2