A **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code: U6701

B.E. / B.Tech. DEGREE EXAMINATION, APRIL / MAY 2025

Sixth Semester

Mechanical Engineering

21UME601 – DESIGN OF TRANSMISSION SYSTEMS

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. …… is a mechanical drive made up of flexible material used to transmit power from one shaft to another shaft which are parallel to each other and run at same or different speeds? CO1- U

   (a) Belt drive (b) V-Belt drive (c) Chain Drive (d) All the above.

2. …….. drive design is more complicated and cannot be used for larger centre distance. CO1- U

   (a)Flat belt (b) V-belt (c) Wire rope (d) Chain drive

3. Which of the following type of drives transmit power by friction? CO1- U

   (a) spur gear drive (b) chain drive (c) worm gear drive (d) belt drive

4. Compared with spur gears, helical gears CO1- U

   (a) run more smoothly (b) run with noise and vibrations

   (c) consume less power (d) run exactly alike

5. In a concrete mixer, the bevel gears for rotating the drum are generally CO1- U

   (a) Casting (b) forging (c)hobbing (d) shaping

6. The worm helix angle is the _____ of the worm lead angle. CO1- U

   (a) Complement (b) Half (c) Double (d) Supplement

7. When the spindle speeds are arranged in GP, then the ratio between the two adjacent speeds is known as — CO1- U

(a) Harmonic progression (b) logarithmic progression

(c) Arithmetic progression (d) step ratio

8. In the two stage gear box how many shaft will be there — CO1- U

(a) 3 (b) 2 (c) 1 (d) 4

9. The friction material of the clutch should have — CO1- U

(a) high coefficient of friction (b) low coefficient of friction

(c) high surface hardness (d) high endurance limit strength

10. In case of multi-disk clutches, oil is used — CO1- U

(a) to reduce the friction (b) to carry away the heat

(c) to lubricate the contacting surfaces (d) for all above functions

PART – B (5 x 2= 10 Marks)

11. Explain the Law of Belting. — CO1- U

12. Explain working depth of a gear-tooth. — CO1- U

13. Explain the Herringbone gear. State its application. — CO1 -U

14. Define progression ratio. — CO1 -U

15. Explain the function of a clutch. — CO1 -U

PART – C (5 x 16= 80Marks)

16. (a) Design and analyze a fabric belt to transmit 10 kw at 450 rpm from an engine to a line shaft as 1200 rpm. The diameter of the engine pulley is 600 mm and the distance of the shaft from the engine is 2 m. — CO5- Ana (16)

Or

(b) A 600 rpm blower is to be driven by a 10 kW, 1440 rpm motor approximately 750 mm away. Design and analyze a suitable chain drive. — CO5- Ana (16)

17. (a) In a spur gear for rock crusher, the gears are made of case hardened steel.The pinion is transmitting 18 kW at 1200rpm, with a gear ratio of 3.5; The Gear is to work for 8 hours per day for 3 Years. Design and Compare both design and induced stresses for rock crusher. — CO4- Ana (16)

Or

	(b)	Design a Helical gear to transmit 15 kW at 1400 rpm to the following specification: Speed reduction is 3; Pressure angle is 20^0; Helix angle is 15^0; The material of both the gears is C45 steel. Allowable static stress 180 N/mm^2 ; Surface endurance limit is 800 N/mm^2 ; Young's modulus of material = $2x10^5$ N/mm^2	CO4- Ana	(16)
18.	(a)	Design a worm gear drive to transmit 25 kW from a worm at 1400 rpm to the worm wheel the speed of the worm wheel should 40± 2% rpm	CO3- App	(16)
		Or		
	(b)	Design a cast iron bevel gear drive for a pillar drilling machine to transmit 1875 W at 800 rpm to a spindle at 400 rpm. The gear is to work for 40 hours per week for 3 years. Pressure angle is 20^0	CO3- App	(16)
19.	(a)	A gear box is to give 18 speeds for a spindle of a milling machine. The drive is from an electric motor of 3.75 kW at 1440 rpm. Maximum and minimum speeds of the spindle are to be around 650rpm and 35 rpm respectively. Construct the kinematic arrangement and the ray diagram of the gear box.	CO2- App	(16)
		Or		
	(b)	Design and analyze a 16 speed gear box is to furnish speeds in the range of 100 rpm to 560 rpm. Sketch the kinematic arrangement and the ray diagram.	CO2- App	(16)
20.	(a)	A single plate clutch, effective on both sides, is required to transmit 30 kW at 1400 rpm. Determine the inner and outer diameter of friction surfaces if the co-efficent of friction is 0.25, ratio of diameter is1.5 and the maximum pressure is not to exceed 0.2 N/mm^2. Also determine the axial thrust to be provided by springs. Assume the theory of uniform wear.	CO2- App	(16)
		Or		

(b) The block brake shown in fig. is set by a spring that produces force S on each arch equal to 3500N. The wheel diameter is 350mm and the angle of contact for each block is 120deg. Take coefficient of friction as 0.35, Compare the (i) the maximum torque that the brake is capable of absorbing, and (ii) the width of the brake shoes, if the bearing pressure on the lining material is not to exceed 0.3N/mm^2. CO2- App (16)