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

Question Paper Code: 56701

B.E./B.Tech. DEGREE EXAMINATION, MAY 2022

Sixth Semester

Mechanical Engineering

15UME601-DESIGN OF TRANSMISSION SYSTEMS

(Regulation 2015)

(Design data book permitted)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART – A (10 x 1 = 10 Marks)

1. Which one of the following is a positive drive? CO1-R

(a) Crossed flat belt drive (b) Rope drive (c) V-belt drive (d) Chain drive

2. The wire rope make contact at CO1-R

(a) Bottom of the grooved pulley (b) Side of the grooved pulley

(c) Side and bottom of the grooved pulley (d) Anywhere in the grooved pulley

3. The size of gear is usually specified by CO2-R

(a) Pressure angle (b) Pitch circle diameter

(c) Circular pitch (d) diametrical pitch

4. A helical gear has normal module of 6 mm. What is the transverse module if helix angle is 25^{o}? CO2-R

(a) 4.95 mm (b) 500 mm (c) 5.43 mm (d) 6.62 mm

5. When bevel gears having equal teeth and equal pitch angles connect two shafts whose axes intersect at right angles the they are known as CO3-R

(a) Angular bevel gear (b) Crown bevel gear

(c) Internal bevel gear (d) Mitre gear

6. What is the shortest distance between worm gear and axes of the worm for a worm gear pair designated as 2/40/10/8? CO3-R

(a) 50 mm (b) 200 mm (c) 320 mm (d) 360 mm

7. In the two stage gear box how may shaft will be there CO4-R

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

8. Name the series in which speeds of multispeed gear box are arranged CO4-R

(a) Arithmetic progression (b) Geometric progression

(c) Logarithmic progression (d) Harmonic progression

9. In case of multiple disc clutch if n_1 are the number of discs on the driving shaft and n_2 are the number of discs on the driven shaft, then the number of pairs of contacting surfaces will be CO5-R

(a) $n_1 + n_2$ (b) $n_1 + n_2 - 1$ (c) $n_1 + n_2 + 1$ (d) None of these

10. The cam follower extensively used in air-craft engines is CO5-R

(a) Knife edge follower (b) Flat faced follower

(c) Spherical faced follower (d) Roller follower

PART – B (5 x 2 = 10 Marks)

11. State the reason for keeping the tight-side of the belt at the bottom side of the pulley CO1-U

12. What is the virtual number of teeth in helical gears CO2-U

13. What are the various forces acting on a bevel gear? CO3-U

14. What is Ray diagram? CO4-U

15. Mention a few applications of cam.. CO5-U

PART – C (5 x 16 = 80 Marks)

16. (a) A compressor receives power from a motor rated at 30 kW at 22 rpm by means of V belts. The pulley diameters are 300 mm and 750 mm. Centre distance is 1.4 m. Design the belt drive. CO1-App (16)

Or

	(b)	The transporter of a heat treatment furnace is driven by a 4.5 kW, 1440 rpm induction motor through a chain drive with a speed reduction ratio of 2.4. The transmission is horizontal with bath type of lubrication. Rating is continuous with 3 shifts per day. Design the complete chain drive.	CO1-App	(16)
17.	(a)	Design spur gear to transmit 1.5 kW at 1440 rpm from an electric motor to an air compressor running at 720 rpm. Assume both the gear and pinion is made with Cast iron grade 25 material. The expected life of the gears are 10000Hours	CO2-App	(16)
		Or		
	(b)	A pair of helical gears is to transmit 38 kW at 1500 rpm of the pinion. The speed reduction is 5 and the helix angle is 15 degrees. Assume C45 material for both pinion and gear drive	CO2-App	(16)
18.	(a)	Design a bevel gear drive to transmit 10 kW at 1440 rpm. Take Gear ratio as 3, material for pinion and gear – C45 steel and expected life as 10,000 hrs	CO3-C	(16)
		Or		
	(b)	Design a worm gear drive to transmit a power of 22KW. The worm speed is 1440rpm and the speed ratio of 24. The drive should have a minimum efficiency of 85% and above. Select suitable material for the worm and wheel and decide upon the dimensions of the drive.	CO4-C	(16)
19.	(a)	Design the layout of a gear box for a milling machine to provide twelve output speeds ranging from 160 rpm to 2000 rpm. Input speed 1440 rpm Choose standard speed ratio and construct the structural diagram and kinematic arrangement. Show the number of teeth for all the gears in the kinematic arrangement.	CO4-C	(16)
		Or		

(b) A 12 speed gear box is to provide a minimum speed of 31.5rpm with a step ratio of 1.12. Using standard step ratios, find the number of teeth on all gears. CO4-C (16)

20. (a) An automotive single plate clutch consists of two pairs of contacting surfaces. The inner and outer radii of friction plate are 120mm and 250mm respectively. The coefficient of friction is 0.25 and the total axial force is 15kN. Calculate the power transmitting capacity of the clutch plate at 500rpm using (i) uniform pressure theory (ii) uniform wear theory. CO5-App (16)

Or

(b) An automotive type internal expanding shoe is shown in the diagram. The face width of the friction lining is 60mm and the coefficient of the friction is 0.35. The maximum intensity of pressure is limited to 1.2 N/mm^2. Assume angle θ, can be zero calculate (i) The actuating force P and (ii) The torque capacity of the brake. CO5-App (16)