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

Question Paper Code: 56701

B.E./B.Tech. DEGREE EXAMINATION, NOV 2018

Sixth Semester

Mechanical Engineering

15UME601-DESIGN OF TRANSMISSION SYSTEMS

(Regulation 2015)

(Design data book permitted)

Duration: Three hours Maximum: 100 Marks

PART A - (10 x 1 = 10 Marks)

Answer All Questions

1. A V-belt pulley has belt velocity 20 m/s and mass 0.7 kg per meter. If allowable tension in the belt is 600 N then what will be the power transmitting capacity of belt? CO1- R

   (a) 3.75 kW (b) 3.2 kW (c) 4.5 kW (d) 5.23 kW

2. 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

3. Spur gear design normally begins with selecting this: CO2- R

   (a) Rack size (b) Tooth size (c) Gear size (d) Pitch diameter

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. The face angle of a bevel gear is equal to CO3 -R

   (a) pitch angle + addendum angle (b) pitch angle – addendum angle

   (c) axial pitch (d) diametral pitch

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. A gear box that converts a high speed input into single output, it is called as _____ CO4 -R

(a) Multi stage gear box (b) Single stage gear box

(c) Constant mesh gear box (d) None of the above

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

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

9. Movement of follower away from cam centre CO5 -R

(a) The Rise (b) The Dwell (c) The Return (d) None of the above

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= 10Marks)

11. What are the materials used for belt drive? CO1- R

12. Why is dedendum value more than addendum value? CO2- R

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

14. What is Ray diagram? CO4- R

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

PART – C (5 x 16= 80Marks)

16. (a) Design a V-belt drive to the following specifications. Power to be transmitted 7.5 kW, speed of driving wheel 1440 rpm, speed of driven wheel 400 rpm, diameter of driving wheel 300 mm, center distance 1000 mm, service 16 hours/day. CO1- App (16)

Or

(b) Write the design procedure for a chain drive. CO1- App (16)

17. (a) Design a straight spur gear drive to transmit 8 kW. The pinion speed is 720 rpm and the speed ratio is 2. Both the gears are made of the same surface hardened carbon steel with 55RC and core hardness less than 350 BHN. Ultimate strength is 720 N/mm2and yield strength is 360 N/ mm^2. CO2- Ana (16)

Or

	(b)	A pair of helical gears are to transmit 15 kW. The teeth are 20° stub in diametral plane and have a helix angle of 45°. The pinion runs at 1000 r.p.m. and has 80 mm pitch diameter. The gear has 320 mm pitch diameter. If the gears are made of cast steel having allowable static strength of 100 MPa; determine a suitable module and face width from static strength considerations and check the gears for wear, given σ_{es} = 618 MPa.	CO2- Ana	(16)
18.	(a)	Design a pair of bevel gears for two shafts whose axes are at right angles to transmit 20KW @ 1000 rpm. The speed of gear is 250rpm.	CO3 -Ana	(16)
		Or		
	(b)	Design a pair of CI bevel gears for a special purpose machine tool to transmit 3.5 kW from a shaft at 500 rpm to another at 800 rpm. The gears overhang in their shafts. Life required is 8000 hours	CO3 -Ana	(16)
19.	(a)	The minimum and maximum speed of a six speed gear box are to be 160 and 500 rpm. Construct the kinematic arrangement and the ray diagaram of the gear box Design the six speed gear box is to provide the speeds in the range of 160 to 500 rpm and transmit a power of 5 kW at 710 rpm. Draw the speed diagram and kinematics diagram. Determine the number of teeth module and ace width of all gears, assuming suitable materials for the gears.	CO4 -U	(16)
		Or		
	(b)	Design a 12 speed gear box or a lathe. The min and max speeds are 100 and 1200 rpm. Power is 5 kW from 1440 rpm induction motor.	CO4 -Ana	(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- U	(16)
		Or		

(b)	Describe with the help of a neat sketch the principle of operation of an internal expanding shoe brake. Derive the expression for the braking torque.	CO5- U	(16)