Reg. No. | | | | | | | | | | | | |

Question Paper Code : 57574

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Sixth Semester

Mechanical Engineering

ME 6601 – DESIGN OF TRANSMISSION SYSTEMS

(Common to Mechanical and Automation Engineering)

(Regulations 2013)

Time : Three Hours **Maximum : 100 Marks**

(Use of PSG Design Data Book is permitted Answer all Questions)
Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Name the few materials for belt drives.
2. Under what circumstances chain drives are preferred over V belt drives ?
3. What are the profiles of a spur gear ?
4. What is herring bone gear ?
5. How bevel gears are manufactured ?
6. What is helical angle of worm ?
7. What is multispeed gear box ?
8. What is R20 series ?
9. What is the function of clutch in a transmission system ?
10. What is the significance of pressure angle in cam design ?

PART – B (5 × 16 = 80 Marks)

11. (a) Design a flat belt drive to transmit 110 kW for a system consisting of two pulleys of diameters 0.9 m and 1.2 m respectively, for a center distance of 3.6 m, belt speed of 20 m/s and coefficient of friction = 0.3. There is a slip of 1.2% at each pulley and 5% friction loss at each shaft with 20% over load.

OR

(b) A 7.5 kW electric motor running at 1400 rpm is used to drive the input shaft of the gear box of a special purpose machine. Design a suitable roller chain to connect the motor shaft to the gear box shaft to give an exact speed ratio of 10 to 1. Assume the minimum centre distance between driver and driven shaft as 600 rpm.

12. (a) A speed reducing unit using spur gear is to be designed. Power to be transmitted is 60 hp and is continuous with moderate shaft loads. The speeds of the shafts are 720 rpm and 144 rpm, respectively. The center distance is kept as small as possible. Select a suitable material and design the gears. Give the details of the gears.

OR

(b) A pair of helical gears subjected to moderate shock loading is to transmit 30 kW at 1500 rpm of the pinion. The speed reduction ratio is 4 and the helix angle is 20°. The service is continuous and the teeth are 20° FD in the normal plane. For gear life of 10,000 hours, design the gear drive.

13. (a) Design a bevel gear drive to transmit 3.5 kW. Speed ratio = 4. Driving shaft speed = 200 rpm. The drive is non-reversible. Pinion is of steel and wheel of C.I. Assume a life of 25,000 hrs.

OR

(b) Design a worm gear drive to transmit 20 kW at 1440 rpm speed of worm wheel is 60 rpm.

14. (a) A six speed gear box is required to provide output speeds of is required to provide output speeds in the range of 125 to 400 rpm, with a step ratio of 1.25 and transmit a power 5 kW at 710 rpm. Draw the speed diagram and kinematic diagram. Determine the number of teeth module and face width of all gears, assuming materials for gears. Determine the length of the gear box along the axis of the gear shaft.

OR

(b) Draw the kinematic diagram and speed diagram of the head stock gear box of a turret lathe having arrangement for 9 spindle speeds, Ranging from 31.5 rpm to 1050 rpm. Calculate the number of teeth on each gear. Minimum number of teeth on a gear is 25. Also calculate the percentage deviation of the obtainable speeds from the calculated ones.

15. (a) A multiplate clutch with both sides effective transmits 30 kW at 360 rpm. Inner and outer radii of the clutch discs are 100 mm and 200 mm respectively. The effective coefficient of friction is 0.25. An axial load of 600 N is applied. Assuming uniform wear conditions, find the number of discs required and the maximum intensity of pressure developed.

OR

(b) A 50 kg wheel, 0.5 m in diameter turning at 150 rpm in stationary bearings is brought to rest by pressing a brake shoe radially against the rim with a force of 100 N. If the radius of gyration of wheel is 0.2 m, how many revolutions will the wheel make before coming to rest ? Assume that the coefficient of friction between shoe and rim has the steady value of 0.25.
