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

Question Paper Code: 36071

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Sixth Semester

Mechanical Engineering

01UME601 - DESIGN OF TRANSMISSION SYSTEMS

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. In an open belt drive, which side of the belt is tight? Why?
2. What are the advantages of a wire rope over fibre rope?
3. State the law of gearing.
4. What is virtual number of teeth in helical gears?
5. What is a miter gear?
6. Sketch neatly the working drawing of bevel gears in mesh.
7. In worm gearing heat removal is an important design requirement. Why?
8. Distinguish between structural diagram and speed diagram.
9. What is pressure angle in cams?
10. What is self-energizing brake?

PART - B (5 x 16 = 80 Marks)

11. (a) Design a V-Belt drive for the following data: P = 22.5 kW; Speed ratio = 3; Driver speed = 740 rpm. (16)

Or

(b) Design a chain drive to transmit 6 *kW* at 900 *rpm* of a sprocket pinion. Speed reduction is 2.5:1. Driving motor is mounted on an adjustable base. Assume that load is steady, drive is horizontal and service is 16 *hours/day*. (16)

12. (a) Design a set of helical gears to transmit 60 *kW* to effect a speed reduction of 2.5:1 with pinion connected to motor rotating at 1440 *rpm*. The teeth of gears are of full depth 20° pressure angle to the normal plane. Peripheral pitch line velocity may be limited to 600 meters per minute. Assume gear and pinion are to be made of forged steel having ultimate tensile strength of 600 N/mm^2. The pinion is properly heat treated to obtain hardness of 240 *BHN*. Assume service factor of 2 and number of teeth in pinion = 16. (16)

Or

(b) A pair of straight teeth spur gear is to transmit 22.5 *kW* when the pinion rotates at 300 *rpm*. The velocity ratio is 1:3. The allowable static stresses for the pinion and gear materials are 120 and 100 N/mm^2 respectively. The pinion has 15 teeth and face width is 14 times the module. Determine (i) the module (ii) face width and (iii) pitch circle diameters of both the pinion and the gear. (16)

13. (a) The input to worm gear shaft is 18 *kW* and 600 *rpm*. Speed ratio is 20. The worm is to be of hardened steel and the wheel is made of chilled phosphor bronze. Considering wear and strength, design worm and worm wheel. (16)

Or

(b) A triple threaded worm has teeth of 6 mm module and pitch circle diameter of 50 mm. If the worm gear has 30 teeth of 14½° and the coefficient of friction of the worm gearing is 0.05, find 1. the lead angle of the worm, 2. Velocity ratio, 3. centre distance, and 4. Efficiency of the worm gearing. (16)

14. (a) Design a 12 speed gear box for an all geared headstock of a lathe by drawing speed diagram. Show the details in a kinematic lay out. The maximum and minimum speeds are to be 1400 *rpm* and 112 *rpm* respectively. Take the input drive speed to be the 1400 *rpm*. (16)

Or

(b) Design a nine speed gear box for a minimum speed of 35 *rpm* and a maximum speed of 560 *rpm*. Draw the speed diagram and kinematic arrangement showing number of teeth in all gears. Check whether all the speeds obtained through the selected gears are within ± 3 % . (16)

15. (a) Calculate the average bearing pressure and initial and average breaking power for a single block shoe brake. The diameter of the drum is 400 *mm* and it rotates at 200 *rpm*. Coefficient of friction is 0.2 and drum width is 75 *mm*. The distance between center of the drum to the pivot point is 200 *mm* and the distance between the center of the drum to the loading point is 240 *mm*. the load applied is 4.5*kN*. Assume that the frictional force is in line with the pivot point. (16)

Or

(b) A single cylinder double acting steam engine delivers 185 kW at 100 r.p.m. The maximum fluctuation of energy per revolution is 15 per cent of the energy developed per revolution. The speed variation is limited to 1 per cent either way from the mean. The mean diameter of the rim is 2.4 m. Design and draw two views of the flywheel. (16)

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