Reg. No. :

Question Paper Code: 36701

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

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. State the two important modes of failure in gears.

5. What is a miter gear?

6. Sketch neatly the working drawing of bevel gears in mesh.

7. Name the types of speed reducers.

8. Give the functions of gear box.

9. What is pressure angle in cams?

10. What is a self-energizing brake? When a brake becomes self-locking?

PART - B (5 x 16 = 80 Marks)

11. (a) 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)

Or

(b) Two shafts whose centres are 1 metre apart are connected by a V-belt drive. Thedriving pulley is supplied with 95 kW power and has an effective diameter of 300 mm. It runs at 1000 r.p.m. while the driven pulley runs at 375 r.p.m. The angle of groove on the pulleys is 40°. Permissible tension in 400 mm^{2}cross-sectional area belt is 2.1 MPa. The material of the belt has density of 1100 kg / m^3. The driven pulley is overhung, the distance of the centre from the nearest bearing being 200 mm. The coefficient of friction between belt and pulley rim is 0.28. Estimate: 1. The number of belts required; and 2. Diameter of driven pulley shaft, if permissible shear stress   is 42 MPa. (16)

12. (a) An automotive gear box gives three forward speeds and one reverse with a top gear of unity and bottom and reverse gear ratio of approximately 3.3:1. The centre distance between the shafts is to be 110 mm approximately. Gear teeth of module 3.25 mm are to be employed. Sketch the layout of a typical constant mesh gear box for these conditions giving the number of teeth for the various gear wheels and showing closely how the different ratios are obtained. (16)

Or

(b) 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)

13. (a) Design a pair of CI bevel gears for a special purpose machine tool 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*. (16)

Or

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(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 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)

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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