Question Paper Code: 36701

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Sixth Semester

Mechanical Engineering

01UME601 - DESIGN OF TRANSMISSION SYSTEMS

(Regulation 2013)

Duration: 1.15 hrs   Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. The power transmitted by belt drive depends on

    (a) belt velocity   (b) initial belt tension   (c) arc of contact   (d) all of the above

2. In order to have smooth operation, the minimum number of teeth on the smaller sprocket, for moderate speeds should be

    (a) 15   (b) 17   (c) 21   (d) 25

3. The backlash for spur gears depends upon

    (a) module   (b) pitch line velocity
    (c) tooth profile   (d) both (a) and (b)

4. In helical gears, the distance between similar faces of adjacent teeth along a helix on the pitch cylinders normal to the teeth, is called

    (a) normal pitch   (b) axial pitch
    (c) diametric pitch   (d) module

5. When bevel gears having equal teeth and equal pitch angles connect two shafts whose axes intersect at right angle, then they are known as

    (a) angular bevel gears   (b) crown bevel gears

    (c) miter gears   (d) internal bevel gears

6. The number of starts on the worm for a velocity ratio of 40 should be

    (a) single   (b) double

    (c) triple   (d) quadruple

7. Which of the following is not a type of gearbox?

    (a) Linear mesh gearbox   (b) Sliding mesh gearbox

    (c) Constant mesh gearbox   (d) Synchromesh gearbox

8. The contact ratio for gears is

    (a) zero   (b) less than one

    (c) greater than one   (d) none of these

9. In case of a multiple disc clutch, if n_1 are the number of discs on the driving shaft and n_2 are the number of the discs on the drive shaft, then the number of pairs of contact surfaces will be

    (a) $n_1 + n_2$ (b) $n_1 + n_2 - 1$

    (c) $n_1 + n_2 + 1$ (d) none of these

10. For a block brake with long shoe, the equivalent coefficient of friction is

    (a) $\mu \left[\dfrac{4 \sin \theta}{2\theta + \sin 2\theta}\right]$ b) $\mu \left[\dfrac{2 \sin \theta}{2\theta + \sin 2\theta}\right]$ c) $\mu \left[\dfrac{4 \sin 2\theta}{2\theta + \sin 2\theta}\right]$ d) $\mu \left[\dfrac{4 \sin \theta}{4\theta + \sin 2\theta}\right]$

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11.   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*.   (8)

12.   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

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for these conditions giving the number of teeth for the various gear wheels and showing closely how the different ratios are obtained. (8)

13. 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. (8)

14. The following particulars of a single reduction spur gear are given :
Gear ratio =10 : 1; Distance between centres =660 mm approximately; Pinion transmits 500kW at 1800 r.p.m.; Involute teeth of standard proportions (addendum =m) with pressure angle of 22.5°; Permissible normal pressure between teeth =175 N per mm of width. Find :
    The nearest standard module if no interference is to occur;
    The number of teeth on each wheel;
    The necessary width of the pinion; and
    The load on the bearings of the wheels due to power transmitted. (8)

15. A single cylinder double acting steam engine develops 150 kW at a mean speed of 80 r.p.m. The coefficient of fluctuation of energy is 0.1 and the fluctuation of speed is ± 2% of mean speed. If the mean diameter of the flywheel rim is 2 metres and the hub and spokes provide 5 percent of the rotational inertia of the wheel, find the mass of the flywheel and cross-sectional area of the rim. Assume the density of the flywheel material (which is cast iron) as 7200 kg / m^3. (8)

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