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Question Paper Code: 41761

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

Sixth Semester

Mechanical Engineering

14UME601 - DESIGN OF TRANSMISSION SYSTEMS

(Regulation 2014)

(Approved Design Data Book is Permitted)

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) $\mu \left[\dfrac{4\,\mathrm{Sin}\,\theta}{2\theta + \mathrm{Sin}\,2\theta}\right]$ b) $\mu \left[\dfrac{2\,\mathrm{Sin}\,\theta}{2\theta + \mathrm{Sin}\,2\theta}\right]$ c) $\mu \left[\dfrac{4\,\mathrm{Sin}\,2\theta}{2\theta + \mathrm{Sin}\,2\theta}\right]$ d) $\mu \left[\dfrac{4\,\mathrm{Sin}\,\theta}{4\theta + \mathrm{Sin}\,2\theta}\right]$

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11.   A flat belt drive is to design to drive a flour mill. The driving power requirement of the mill is 22.5 Kw at 750rpm with a speed reduction of 3.0.The distance between the shaft is 3m.Diameter of the mill pulley is 1.2m.Design and make a neat sketch of the drive.   (8)

12.   A motor shaft rotating at 1500 *rpm* has to transmit 15 *kW* to a low speed shaft with a speed reduction of 3:1. Assume starting torque to be 25% higher than the running torque. The teeth are 20° involutes with 25 teeth on the pinion. Both the pinion and gear are made of C45 steel. Design a spur gear drive to suit the above conditions and check for compressive and bending stresses and plastic deformations.   (8)

13. A pair of 20° full depth involute teeth bevel gear connects two shafts at right angles having a velocity ratio of 3.2: 1. The gear is made of cast steel with an allowable static stress as 72 N/mm^2, and the pinion is made of steel having a static stress of 100 N/mm^2. The pinion transmits 40 kW and at 840 rpm. Find the module, face width, and pitch diameter from the stand point of the beam strength, and check the design from the stand point of wear. (8)

14. Design the layout of a 12 speed gear box for a lathe. The minimum and maximum speeds are 100 and 1200 rpm. Power is 5 kW from 1440 rpm induction motor. Construct the speed diagram using a standard speed ratio. Calculate the number of teeth in each gear wheel and sketch the arrangement of the gear box. (8)

15. A power of 20 KW is to be transmitted through a cone clutch at 500 rpm. For uniform wear condition, find the main dimensions of clutch and shaft. Also determine the axial force required to engage the clutch. Assume coefficient of friction as 0.25, the maximum normal pressure on the friction surface is not to exceed 0.08 MPa and take the design stress for the shaft material as 40 MPa. (8)

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