SEAT No. :

[6009]-368

T.E. (Mechanical) (Insem)
DESIGN OF TRANSMISSION SYSTEM
(2019 Pattern) (Semester-II) (302051)

Time : 1 Hour]   *[Max. Marks : 30*

Instructions to the candidates:
1) *Answer Two questions from the following Q.1 or Q.2 and Q.3 or Q.4.*
2) *Draw neat labeled diagrams wherever necessary.*
3) *Figures to the right side indicate full marks.*
4) *Use of non programable electronic calculator is permitted.*
5) *Assume Suitable data if necessary.*

Q1) a) Write the assumptions consider for beam strength of spur gear. Derive an expression for beam strength of spur gear tooth **[5]**

b) It is required to design a pair of spur gear 20° full depth involute teeth. Take Z_p=20 and Z_g=60. The input shaft rotate at 1000 rpm and receives 20 KW. Both gears are made by steel material with σ_b=260MPa. Take Cs=1.25, Ca=1. Take $C_v = \dfrac{3}{3+V}$, $Y = 0484 - \dfrac{2.86}{Z}$, $P_d = \dfrac{21V(cb+_ac_sp_t)}{21V + \sqrt{(cb+c_ac_sp_t)}}$.

    i) Find module for spur gear and Specify Dimensions at v=5m/sec, FOS=2

    ii) Find effective load and correct factor of safety at e=40 microns and C=11400N/mm²

    iii) Find BHN at FOS 1.5 **[10]**

OR

Q2) a) What is virtual number of teeth in helical gears? Derive an expression for formative number of teeth in helical gears? **[5]**

b) With neat sketch, explain the force analysis of Helical gears. **[5]**

c) A pair of helical gear consist of number of teeth on pinion and gear are 18 and 63, normal pressure angle 20° and helix angle 23° take module 3 mm and face width 30 mm. Both gears are made up by steel material with S_{ut}=600 MPa, C_s=1.5, FOS=2. Assume velocity factor is in account

Find power transmitting capactiy. Take $C_v = \dfrac{5.6}{5.6+\sqrt{V}}$, $y = 0.484 - \dfrac{2.87}{Z'}$

[5]

P.T.O.

Q3) a) Compare straight bevel and spiral bevel with sketch. Also explain Hypoid gears. **[5]**

b) Explain beam and Wear strenght for Bevel gear drive **[5]**

c) A pair of bevel gear consists of number of teeth on pinion and gear are 28 and 42, Take pressure angle 20º, module=6 mm, face width=40 mm. Determine PCD of pinion and gear, Cone distance, Pitch angle for pinion and gear, mid-point radius pinion and gear. **[5]**

OR

Q4) a) Write short note on thermal consideration in worm gear. **[4]**

b) A pair of worm gear drive is designated as 2/54/10/5. **[6]**

Calculate

i) Centre Distance;

ii) Speed reduction;

iii) Dimensions of worm and wheel.

c) A pair of worm gear drive is designated as 3/60/10/6. The worm transmits 5 kW at 1440 rpm. Take μ=0.1, α=20º Calculate forces acting on worm and wheel. **[5]**

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