CONCORDIA UNIVERSITY
Faculty of Engineering and Computer Science
Department of Mechanical and Industrial Engineering

MECH 343/2 X: Theory of Machines 1, Winter 2011-12

Assignment 7:

Question 1:

The number of teeth on pinion 2 and wheel 3 of a spur-gear drive are 20 and 60 respectively. The diametral pitch and pressure angle are 6 teeth/in and 22.5˚ respectively. The pinion and wheel have the standard addendum of 1 module.

(a) Determine,
  (i) the module and the circular pitch
  (ii) the pitch circle diameters of pinion and wheel
  (iii) the center distance

(b) Check for interference and determine,
  (i) the path of contact
  (j) the arc of contact
  (k) the contact ratio

Question 2:

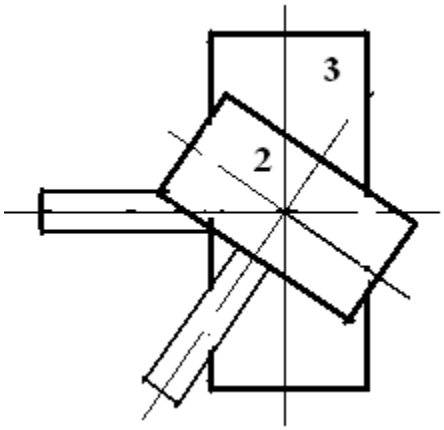
The pitch circle diameters of pinion 2 and wheel 3 of a spur-gear drive are 100 mm and 180 mm respectively. The pressure angle for the drive is 22.5˚. The pinion and wheel have equal addendum of 1 module. Determine,

(a) the maximum allowable addendum for no interference
(b) the corresponding minimum number of teeth on pinion and wheel
(c) the corrected maximum allowable addendum
(d) the contact ratio

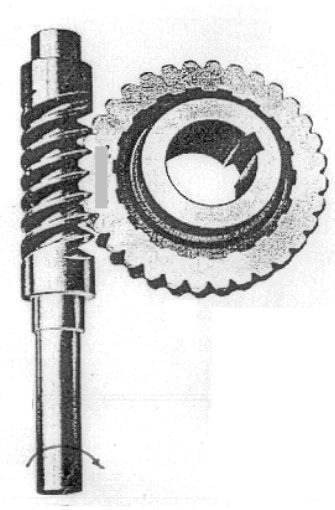
Question 3

The helical angles of pinion 2 and wheel 3 of a crossed-axis helical gear drive, shown in Figure, are 20˚(LH) and 30˚(LH) respectively. The number of teeth on pinion and wheel are 30 and 60 respectively. The normal diametral pitch for the drive is 5 teeth/in. Wheel 3 has to rotate at 250 RPM in the clock-wise sense, when viewed from left. Determine,

(a) the pitch diameters of the pinion and wheel
(b) the center distance
(c) the speed and sense of rotation of the pinion
(d) the velocity of slip



Question 4



The worm (2) of the worm and wheel drive shown has 3 right-handed teeth of lead angle 30˚. The axial pitch of the worm is 0.5 inch. The speed reduction ratio is 15 to 1 and the worm rotates at 1500 RPM in CW sense when viewed upwards. The angle between the shafts is 90˚ Determine,

(a) the helical angle of the worm and the wheel
(b) the pitch circle diameters of the pinion and the wheel
(c) the speed of the wheel and the sense of rotation.

Question 5

A pair of bevel gears is used to reduce the speed between shafts that are inclined at 120˚. The pinion and gear have 15 and 33 teeth respectively. Determine,

(a) the pitch angles of the pinion and gear
(b) the pitch circle diameters if the circular pitch is 15 mm.

Question 6

The gear train shown the number of teeth in the bevel gears, worm and wheel and spur gears. The leftmost bevel pinion rotates at 1050 RPM in the clockwise sense, when viewed upwards. Determine,

(a) the speeds of all other gears
(b) the sense of rotations of all gears
(c) the overall gear ratio, if (2) is the input and (7) is the output