

## Tutorial # 7: Gear 2

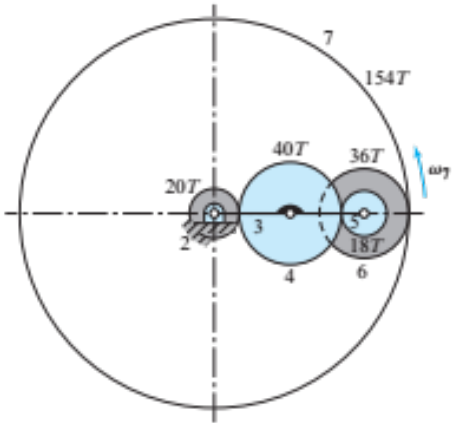


Figure 1

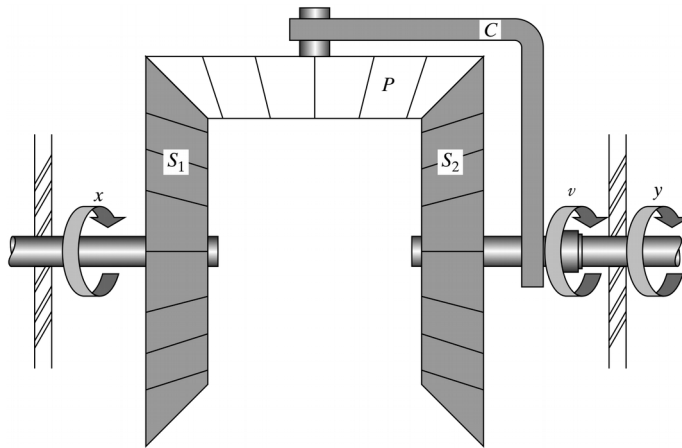


Figure 2

Q1. If the arm in Figure 1 rotates at 300 rev/min ccw, find the speed and direction of rotation of gears 4, 5, 6 and 7.

Q2. Figure 2 shows a bevel-gear automotive differential.  $S_1$ ,  $S_2$  are Sun gears having same number of teeth and connected to the rear wheels,  $C$  is the arm while  $P$  is the planet. Arm  $C$  is supposed to rotate by  $v$  turns while  $S_1$  is given  $w$  rotation w.r.t to the arm  $C$ . Establish the relationship between the absolute rotations  $x$  and  $y$  of  $S_1$  and  $S_2$  with  $v$  and  $w$ . Thus show that  $v$  is average of  $x$  and  $y$ .

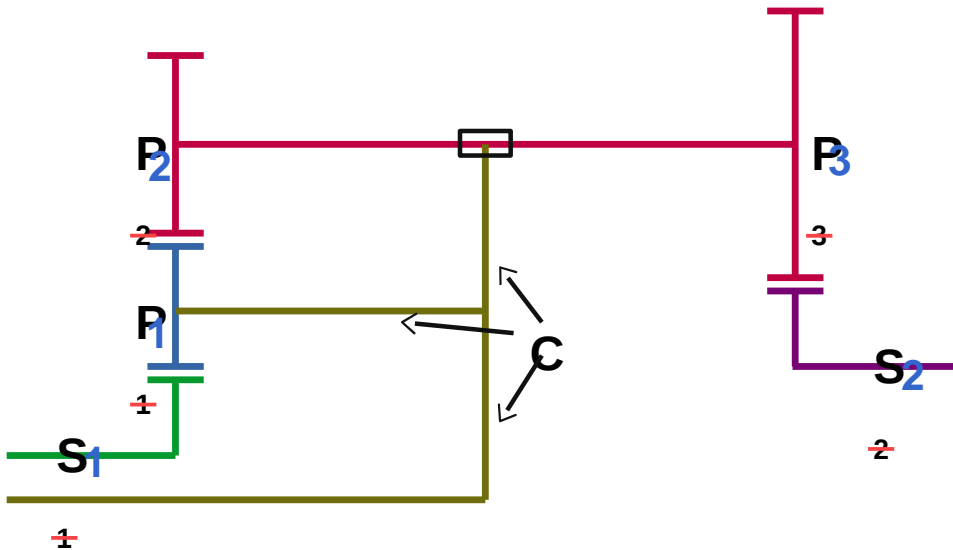


Figure 3

Q3. Figure 3 shows a schematic of an epicyclic gear train.  $S_1$ ,  $S_2$  are the sun gears,  $P_1$ ,  $P_2$ ,  $P_3$  are planet gears having teeth  $N_{S1}$ ,  $N_{S2}$ ,  $N_{P1}$ ,  $N_{P2}$ ,  $N_{P3}$  respectively.  $C$  is the carrier/arm. If  $S_1$  is the input gear having speed  $\omega$  and  $S_2$  is fixed, find out the speed of carrier  $C$  and planets  $P_1$ ,  $P_2$ ,  $P_3$ .