

Ordinary Gear Trains

1. The ordinary gear train considered in Fig. 1 has gears with the same module $m = 24$ mm. Gear 1 has $N_1 = 22$ teeth, gear 2 has $N_2 = 18$ teeth, gear 3 has $N_3 = 20$ teeth, and gear 4 has $N_4 = 54$ teeth. Gears 3 and 3' are fixed on the same shaft. The gear 1 rotates with an input angular speed $n_1 = 290$ rpm. The pressure angle of the gears is 20° . Find the angular velocity of the output gear 4, ω_4 .

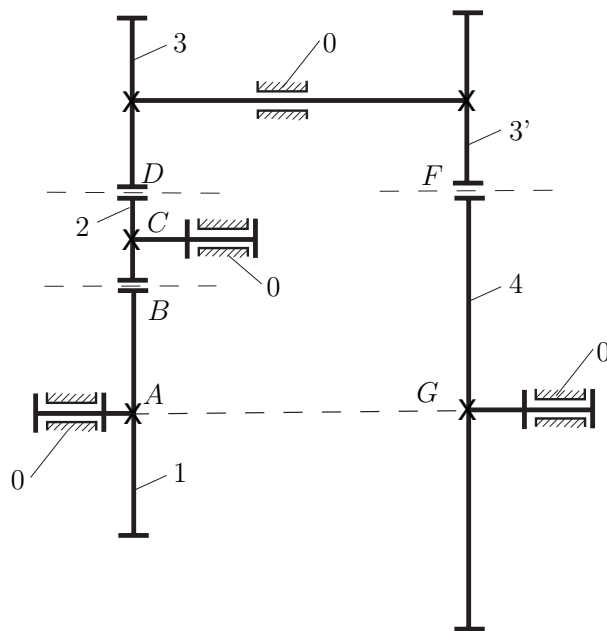


Figure 1: Problem 1

2. An ordinary gear train is shown in Fig. 2. Gear 1 has $N_1 = 11$ teeth, gear 2 has $N_2 = 22$ teeth, gear 2' has $N_{2'} = 17$ teeth, gear 3 has $N_3 = 51$ teeth, gear 3' has $N_{3'} = 12$ teeth, and gear 4 has $N_4 = 32$ teeth. Gears 2 and 2' are fixed on the same shaft and gears 3 and 3' are fixed on the same shaft. The centers of the gears 1 and 3 are located on the same horizontal axis. Gear 1 rotates with an input angular speed of $n_1 = 550$ rpm. The diametral pitch of the gears is 4 and the pressure angle of the gears is 20° . Find the angular velocity of the output gear 4, ω_4 .

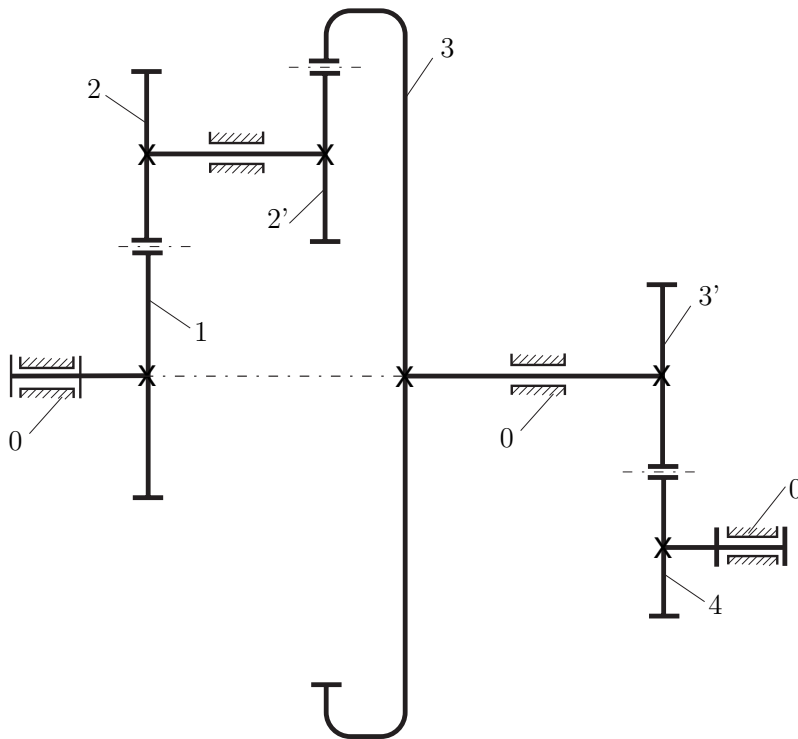


Figure 2: Problem 2

3. A gear train is shown in Fig. 3. The ring gear 1 has $N_1 = 60$ teeth, gear 2 has $N_2 = 25$ teeth, and gear 2' has $N_{2'} = 15$ teeth. Gears 2 and 2' are fixed on the same shaft. Gear 3 has $N_3 = 20$ teeth and gears 3 and 3' are fixed on the same shaft. The ring gear 4 has $N_4 = 90$ teeth. Gear 1 rotates with the input angular speed $n_1 = 100$ rpm. The diametral pitch of the gears is 5 and the pressure angle of the gears is 14.5° . Find the angular velocity of the output gear 4, ω_4 .

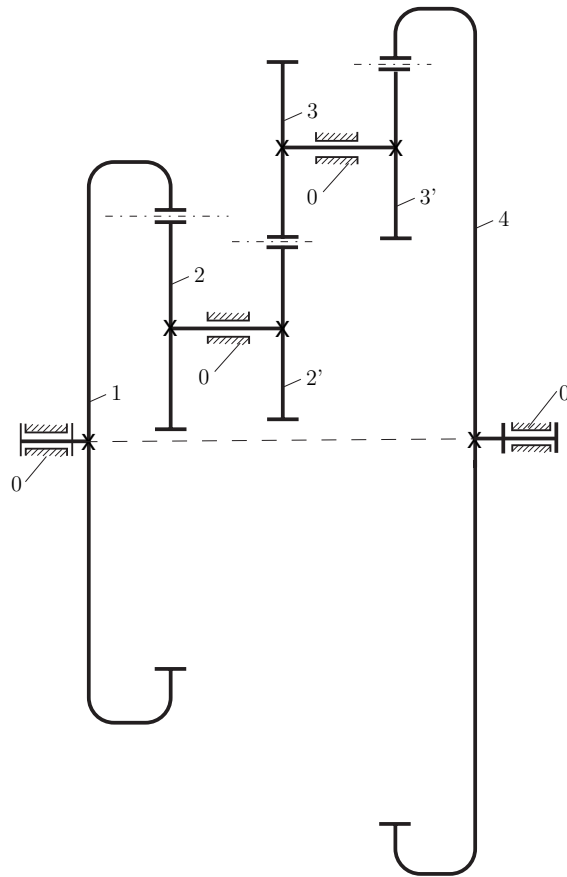


Figure 3: Problem 3

4. A gear train is shown in Fig. 4. Gear 1 has $N_1 = 11$ teeth, gear 2 has $N_2 = 19$ teeth, ring gear 4 has $N_4 = 40$ teeth, gear 5 has $N_5 = 29$ teeth, and gear 6 has $N_6 = 24$ teeth. Gear 1 rotates with a constant input angular speed $n_1 = 200$ rpm. The centers of the gears 1, 4, 5, and 7 are located on the same horizontal axis. The diametral pitch of the gears is 4 and the pressure angle of the gears is 20° . Find the angular velocity of the output gear 7, ω_7 .

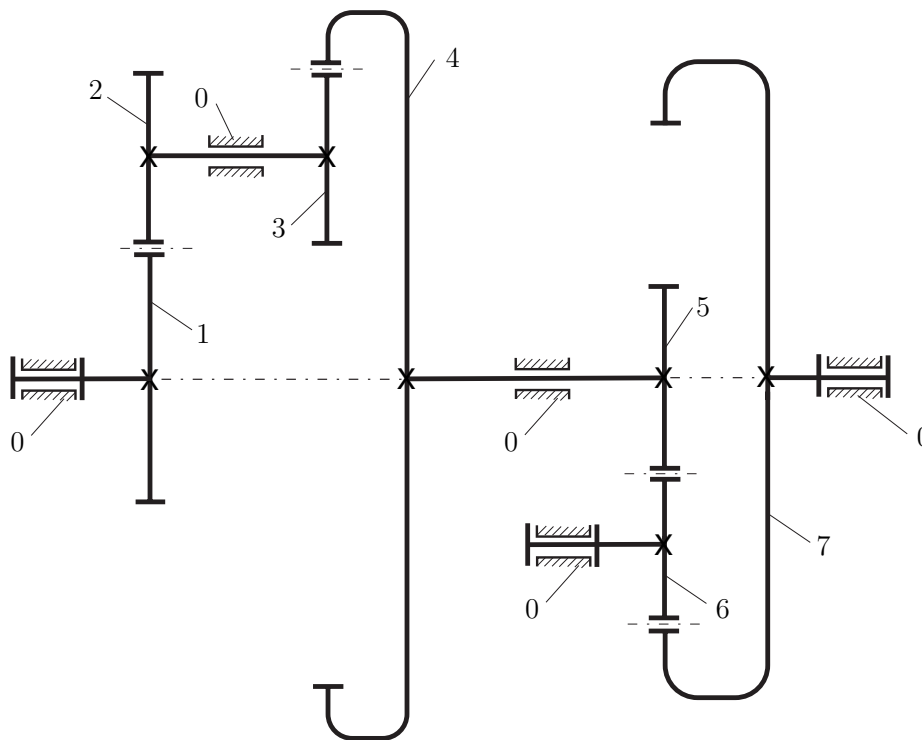


Figure 4: Problem 4

5. A gear train is shown in Fig. 5. Gear 1 has $N_1 = 28$ teeth, Gear 2 has $N_2 = 21$ teeth, and gear 4 has $N_4 = 16$ teeth. Gears 2 and 4 are fixed on the same shaft. The centers of the gears 1 and 5 are located on the same horizontal axis. Gear 1 rotates with the input angular speed $n_1 = 370$ rpm. The diametral pitch of the gears is 5 and the pressure angle of the gears is 20° . Find the angular velocity of the output gear 5, ω_5 .

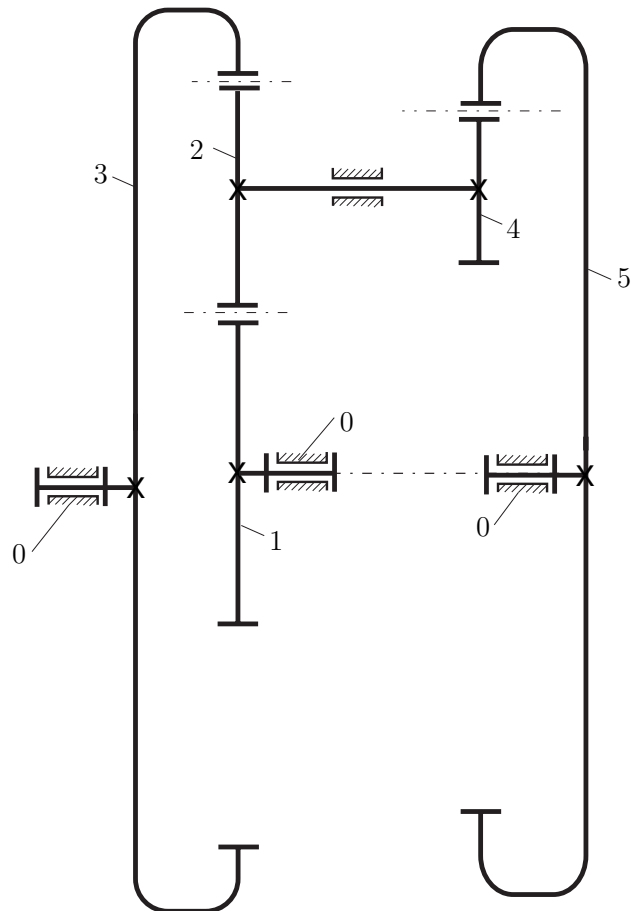


Figure 5: Problem 5