

**INSTRUCTIONS:**

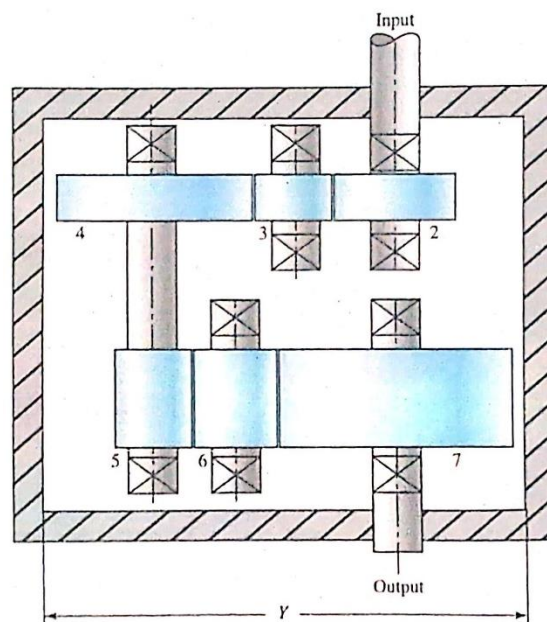
This quiz is open-book and open-note, and you may work with your classmates. Please answer all questions and show all of your work.

**GIVEN:**

In the gearbox shown, gears 4 and 5 are compounded to the same shaft. The gearbox receives an input power of 2.98 kW at a speed of 300 rpm.

The gears have a module of 0.24 mm, a  $20^\circ$  pressure angle, and the following numbers of teeth:

$N_7 = 80$  teeth,  $N_5 = N_3 = 20$  teeth,  $N_4 = 60$  teeth, and  $N_2 = 30$  teeth.



Assume all shafts lie in the same plane. Assume the gearbox is reasonably efficient, so losses can be neglected for this analysis.

**FIND:**

- The number of teeth on gear 6 to make the input and output shafts be in-line.
- The gear train ratio.
- The output speed, in rpm.
- The pitch line velocity for gear 2,  $V$ , in units of mm/min.
- The transmitted load between gears 2 and 3,  $W^t$ , in N.
- The radial load supported by the input shaft, in N.
- The input and output torques, in N-mm.
- The output power, in kW.