1. A motor running at 50 RPM is attached as depicted below. All gears are involute profile spur gears or helix gears with a diametrical pitch of 6 teeth/inch. (Gears 5 & 6 are on the same shaft.)

What is the speed and direction (CW, CCW as shown) of gear 7 (20 pts.)
2. The motor speed is 200 RPM, delivering 25 H.P, with helical gears as shown, with a diametral pitch of 5 teeth/inch, pressure angle of 20° and a helix angle of 15°.
Determine the forces on the pinion (Draw sketch of pinion shown rotational speed direction and forces).
Determine the speed of the output shaft.
Determine the center distances between the shafts. (30 pts.)
3. Design the smallest inside coil diameter compression spring to fit over a 0.5" diameter rod (use spring ID>0.510"). The spring must have a 5 lb preload and will experience a maximum load of 10 lb at a 0.5 inch deflection from the preloaded position. Preloaded length will be 2.5 inches. Use standard music wire, a spring index of 9, and plain ground ends. (FIND: k, D, d, free length, N_t) (25 pts.)

Also determine the static loading factor of safety of your design. (5 pts.)
4. What is the minimum chain length would you specify for two sprockets that both have 19 teeth, ANSI #60 steel roller chain sprockets that are 24.5 inches on center? (10 pts)

5. What is the rated horsepower at 200 RPM for ANSI #60 steel roller chain? (5 pts.)