

# Me413.3 Machine Design I Midterm Examination 2003

## NOTE THIS IS AN OPEN BOOK EXAMINATION

Attempt THREE of the FOUR Questions.

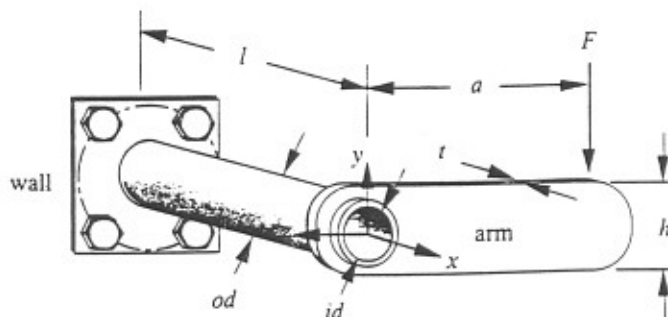
All questions are of equal value.

Show all of the calculations used in sizing the drives.

Time allowed 1.5 hours

1. Select a roller chain drive to transmit 12 horsepower between 2 parallel shafts with a spacing of 43 inches. The input speed is 1800 rpm with the desired output speed being 1200 rpm. Specify the number of teeth on each sprocket and the length of the chain in pitches. Check the life of the chain for initial lubrication only and for flood lubrication.

2. Find all of the loads on each bolt of the bolted connection described below. Assume that the effects of friction are to be neglected.  $F = 1000 \text{ N}$ .,  $l = 25 \text{ cm}$ ,  $a = 30 \text{ cm}$ ,  $od = 4 \text{ cm}$ , the bolt circle diameter is 11 cm, and  $h = 3 \text{ cm}$ .



3. Select a "V" belt drive for the drive problem given in question 1. Comment on the relative advantages and disadvantages of chain drives versus "V" belt drives.

4. Find all of the loads on each of the bolts for the bracket given below, neglect the effects of friction.

4. Find all of the loads on each of the bolts for the bracket given below, neglect the effects of friction.  $F = 10000\text{lbs}$ ,  $w = 5\text{ in}$ .  $y_f = 10\text{ in}$ ,  $y_1 = 7\text{ in}$ .  $y_3 = 2\text{ in}$ . The load is applied at the same  $x$  coordinate as bolts 2 and 4.

