Me423.3 Machine Design II – Midterm Examination

14 February 2001

Time 90 minutes – OPEN BOOK – Notes and Textbook Allowed.
Candidates may use Electronic Calculators and should attempt three (3) of the four (4) questions.
All questions are of equal value.

1. You have been hired as the **Safety Engineer** in a team designing an agricultural machine for Saskatchewan use. Your job is to identify all types of potential saftey hazards with particular emphasis on rotating parts. You are to indicate how you would protect users from the dangers and give examples of the promotional material you would include in the user's manual.
To get full marks you should spend one third of the alloted time on this question.

2. Select a roller chain drive for an application which is to transmit 17.0 horsepower from an small internal combustion engine. The engine rotates at 850 rpm while the load should should rotate between 2130 and 2150 rpm. The center distance shold not exceed 80 inches. Service life is of extreme importance to your client, show all applicable life calculations. $N_s = 1.2$

3. Select a roller chain drive for an application which is to transmit 7.0 horsepower from an small diesel engine. The engine rotates at 150 rpm while the load should should rotate between 213 and 215 rpm. The center distance shold not exceed 70 inches. Assume that wear will not be a factor. Use a 1.3 service factor.

4. Select a V–Belt drive for an application which is to transmit 5.0 horsepower from an electric motor. The motor rotates at 1150 rpm while the load is reciprocating pump which should rotate between 385 and 400 rpm. The center distance shold not exceed 60 inches or be less than 40 inches. Use a 1.3 service factor .