

MECH 325

Homework Assignment #2

Due Oct. 18

(Submit to Mech. Office by 4:00pm)

Problem 1 (Question 17-4)

A flat-belt drive is to consist of two 4-ft-diameter cast-iron pulleys spaced 16 ft apart. Select a belt type to transmit 60 hp at a pulley speed of 380 rev/min. Use a service factor of 1.1 and a design factor of 1.0.

Problem 2 (Question 17-17)

A single Gates Rubber V belt is to be selected to deliver engine power to the wheel-drive transmission of a riding tractor. A 5-hp single-cylinder engine is used. The mechanical efficiency of the gearbox is 60% so that only 3 hp is transmitted to the belt. The driving sheave has a diameter of 6.2 in, the driven, 12.0 in. The belt selected should be as close to a 92-in pitch length as possible. The engine speed is governor-controlled to a maximum of 3100 rev/min. Select a satisfactory belt and assess the factor of safety and the belt life in passes.

Problem 3 (Question 17-27 modified)

A 700 rev/min 25-hp squirrel-cage induction motor is to drive a two-cylinder reciprocating pump, out-of-doors under a shed. A service factor K_s of 1.5 and a design factor of 1.1 are appropriate. The pump speed is 140 rev/min. Select a suitable number of strands of Number 80 chain and sprocket sizes.

Problem 4 (Question 17-31)

A 2000-ft mine hoist operates with a 72-in drum using 6×19 monitor-steel wire rope. The cage and load weigh 8000 lbf, and the cage is subjected to an acceleration of 2 ft/s^2 when starting.

- (a) For a single-strand hoist how does the factor of safety $n_f = F_f/F_t$, neglecting bending, vary with the choice of rope diameter?
- (b) For four supporting strands of wire rope attached to the cage, how does the factor of safety vary with the choice of rope diameter?