Math 1435 – Math Fundamentals – Assignment 1 (Due: March 9ᵗʰ @ 10am)

Name:_____ Student Number:_____

Formulas

Rim speed = $\frac{\pi x D}{12}$ x rpm

Pulley Ratio = Drive/ Driven

Motor Rpm (or pulley size) x Pulley ratio = new rpm for arbor (or arbor pulley size)

Rim Speed Problems (2 marks each)

1. What is the rim speed of a 1"dia. router bit at a speed of 25,000 rpm?

2. What is the rim speed of a shaper going at a speed 7,200 rpm with a 5-1/2" dia. Knife?

3. A router with a speed of 20,000 rpm, what are the rim speeds of the following bits:

   a. ¼" dia. Router bit?

   b. 1-1/4" dia. Router bit?

Pulley ratios Problems (3 marks each)

1. Find the arbor speed if the motor has a 6" pulley turning at 3600 rpm driving a 3" pulley on the arbor.

2. Find the arbor speed if the motor has a 2" pulley turning at 3600 rpm driving a 5" pulley on the arbor.

3. What size is the pulley on an arbor if the motor has a 3" pulley turning at 3600 rpm and the arbor is turning at 1800 rpm?

4. A saw blade of 10" with a motor speed of 3600 rpm. What sizes of pulleys should be used to obtain a rim speed of 14,000 lfm?

5. What is the rim speed of a 10" dia., 2,500 rmp motor with a 4" dia. Pulley driving a 1-1/2" pulley?

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Chemical mix Problems (3 marks each)

1. You are mixing a sealer for your project. The mixture calls for 3 parts varnish to 1 parts varsol. How much of each chemical do you need if you require a total of 750ml of sealer?
2. You are making a piece of furniture that will be finished with an oil rubbed finish. You will require 5.1L total of finish to complete the job. <u>How much of each ingredient</u> will you need to end up with the total volume? The recipe calls for 5 parts varnish, 3 parts varsol, and 4 parts mineral oil.

Glue mix Problems - Given the mix ratio below, calculate the following glue requirements. (5 marks each)

3. We are pressing 50 – 3 ply panels that are 74" x 28". What is the total amount of glue by weight needed for this job?
4. The next job at the hot press is for 220 – 7 ply panels that are 38" x 24". What is the total amount of glue by weight needed?
5. We have calculated the total required amount of glue for our next hot press job to be 9750 grams of glue. Calculate the amount of resin, catalyst and water needed for this job.
6. We have calculated the total required amount of glue for our next hot press job to be 10,230 grams of glue. Calculate the amount of resin, catalyst and water needed for this job.

Hot Press Glue details

Mix ratio:

Resin – 20 parts
Catalyst – 4 parts
Water – 1 part
Waste: 10%   Coverage: 20g/sqft

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Tips:

Rim speed problems - use the rim speed formula and fill in the values.

Pulley ratio problems – Use the pulley ratio formula (compare rpm drive/ rpm driven; or drive pulley size/ driven pulley size) to find the factor. Multiply the factor against the motor rpm to get the arbor rpm or the motor pulley size to get the arbor pulley size.

Pulley ratio problems Q4 – Use the rim speed formula to find the arbor rpm, then use the pulley ratio formula to find the factor. Now find two pulley sizes that are work with the factor (i.e. pulley factor of 2 – 2" and (2" x pulley factor of 2) 4").

Pulley ratio problem Q5 – Use the pulley ratio and multiply it by the motor rpm to find the arbor rpm. Now use the rim speed formula to find the rim speed.

Chemical mix problems – Divide the total volume by the <u>total</u> number of parts to find the volume of 1 part, then multiply the volume of 1 part times the amount of parts for each ingredient .

Glue mix problems Q3 & Q4

a) Find the sqft of 1 glue line (be sure to add 1" to width and 1" to length) Also, make sure you have changed the measurements to decimal feet.
b) Multiply the area of 1 glue line by the number of plies in 1 sheet.
c) Multiply that number by the number or sheets in the job. This is your total sqft of glue line value.
d) Multiply the total glue line sqft value by the coverage value.
e) Multiply the above value by the waste to get the total weight of glue with waste.
f) Take the total weight of glue with waste and divide it by the total number of parts to get the weight of 1 part.
g) Now multiply the number of parts for each ingredient by the weight of 1 part to get the total weight needed for each ingredient.

Glue mix Problems Q5 & Q6 – These problems are handled the same way as the chemical mix problem noted above - Divide the total volume by the <u>total</u> number of parts to find the volume of 1 part, then multiply the volume of 1 part times the amount of parts for each ingredient .