

**University of Saskatchewan  
College of Engineering  
Dept. of Mech. Engineering  
ME 330.3 Final Examination B  
Dec. 1999**

**Time: 2 Hours**      **Instructors: Chris Zhang**  
**Open Book Exam.**

**Name:** \_\_\_\_\_

**Student Number:** \_\_\_\_\_

This exam consists of **five** parts. Attempt all questions.  
**Do all work on this examination paper.**

Part	Mark
Part I (20)	
Part II (20)	
Part III (15)	
Part IV (20)	
Part V (25)	
Total	

**Part I. (20 marks, 2 marks per question)**

1. Why are alloys of eutectic composition attractive for casting and as filler metals in soldering and brazing?
  
  
  
  
  
  
  
  
  
  
2. Why should people performing hot forming or welding be aware of the effects of heat treatment?

Student name:





10. What is called “drag flow” in plastic extrusion? What is the mechanism to drag fluid to flow towards the die in the extrusion process?

Student name:

**Part II Tolerance Specification (20 marks)**

1. What is the purpose to specify the basic hole and basic shaft concept?
2. What is the purpose of introducing international grade from the standard developer's viewpoint?
3. Write out at least three pieces of information that can be obtained from the tolerance specification shown below:

50 h7 /d8

4. Outline the procedure to specify the tolerance for a shaft and a hole.



Student name:
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**Part III (15 marks total)**

An extruder has a barrel diameter=5.0 in. and length=12 ft. The extruder screw rotates at 50 rev/min; it has channel depth=0.30 in. and flight angle=17.7°. The plastic melt has a shear viscosity= $100 \times 10^{-4}$  lb-sec/in<sup>2</sup>. Find (a) the extruder characteristic and (b) the values of Q and p at the operating point.

**Part III continued**

Student name:





Student name:

**Part V (25 marks total)**

A riser in the shape of a sphere is to be designed for a sand casting mold. The casting is a rectangular plate with length=200 mm, width=100 mm, and thickness=18 mm. Suppose that the total solidification time of the casting itself is known to be 3.5 min, and it will take 25% longer for the riser to solidify.

- (1) Determine the diameter of the riser so that.
- (2) Determine the optimal  $V/A$  ratio if we a cylindrical riser is used, and then calculate the diameter of the cylindrical riser.
- (3) Comment on the volume of the risers for the above two cases based on your calculation.

**Part V continued (if necessary)**

Student name:

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