

Geology 3063

Exam 3

Dec. 7, 1998

Instructions.

1. Place all books and notes on the floor.
2. Read each question carefully, then read it again.
3. **ThinkThinkThinkThinkThink.**
4. Organize your thoughts and outline your answer mentally before writing. If you are not certain, put your ideas down on the back of the page before proceeding.
5. Answer the questions in the space provided. You may use the backs of the pages to outline and doodle.
6. You have 60 minutes. All exams must be turned in by 10:00am. You are responsible for pacing yourself.
7. Proceed when ready.

This too shall pass

25 points 1. Assume that you have a rock volume that is composed of 0.5 to 1.0 meter thick layers of limestone that are interbedded with layers of dolomite that are 1.0 meter thick, and dolomite layers occur every 10 meters. Describe how this rock volume would behave, what deformation mechanisms would be active, and the resultant structures and rock fabrics that would develop under the following conditions.

- a) The rock volume is subjected to an imposed strain rate of 1×10^{-4} at a temperature of 25°C and at a depth of 1.5km.
- b) The rock volume is subjected to an imposed strain rate of 1×10^{-8} at a temperature of 300°C and at a depth of 10km.

Water is present, and the rock experiences pure shear deformation in both cases.

- 25 points* 2. Compare and contrast the rock fabrics that should form under pure vs. simple shear deformation of a granitoid subjected to a strain rate of 1×10^{-6} at a temperature of 750°C and at a depth of 10km.

- 25 points* 3. Explain, from the crystalline viewpoint, what is happening within a material that experiences the following $\sigma - \epsilon$ curve. You may want to label and describe important “points” and “regions” along the curve, and include a description of their significance in your answer.

- 25 points* 4. Describe the processes that contribute to the formation of the crack tip process zone as a fracture propagates in a mixed Mode I/II in a ductile brittle system. Could you determine the orientation of fractures that would form under these circumstances? ... Explain.