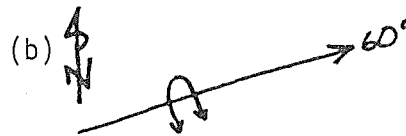
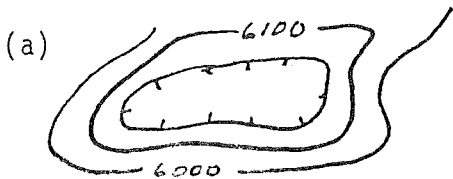




COURSE CTVI	NUMBER 231/4	SECTION V
EXAMINATION FINAL	DATE April 19, 1990	TIME 3 hours
INSTRUCTOR E.L. Procyshyn		# OF PAGES 2
MATERIALS ALLOWED: <input type="checkbox"/> NO	<input type="checkbox"/> YES (PLEASE SPECIFY)	No special materials required.
CALCULATORS ALLOWED: <input type="checkbox"/> NO	<input type="checkbox"/> YES	
SPECIAL INSTRUCTIONS: SEE BELOW		

MARKS

10 1. Explain each of the following symbols or make a simple well labelled sketch that would illustrate the following terms:



- (c) diabasic gabbro
- (e) garnet-sillimanite gneiss
- (g) reverse fault with oblique slip

- (d) cross-bedded graded sandstone
- (f) open overturned syncline
- (h) drumlins, kames and eskers

ANSWER ONLY ONE OF THE FOLLOWING QUESTIONS. i.e. 2 OR 3 OR 4

- 15 2. The compositional variety of igneous rocks can be explained by differentiation from a primary basaltic magma derived by melting either mantle or oceanic crust. Briefly discuss how these two processes would influence the composition of the magma and what mechanisms come into interplay to produce the wide variety of igneous rocks that can now be observed on the earth's surface.
- 15 3. The study of sedimentary rocks provides the necessary data and tools that can be used to reconstruct the earth's history. Elaborate on this statement by bringing into focus your understanding of what these data are and your understanding of geologic time.
- 15 4. Metamorphic rocks contain structures (ie. fabric) and mineral assemblages that can be used to reconstruct the dynamic and environmental conditions (ie. confining pressure and temperature) that were present at the time the rock had crystallized. Choose an example and illustrate how this is accomplished. Use diagrams to illustrate your arguments.

15 **EVERYONE MUST ANSWER QUESTION 5**

5. Discuss the processes, the chemical reactions, and the role of organic matter in the formation of soil. In your answer illustrate the factors which will determine the quality of soil present in a given region, and indicate why areas underlain by glacial deposits presently contain the best agricultural soils in the world. In your answer include a discussion of what the 3 basic soil types are and what their distinguishing features are.

DO QUESTION 6 OR 7 BUT NOT BOTH

- 15 6. River systems develop and evolve in a systematic way. One can thus classify parts of this system by order and major sub-systems. Illustrate in neat well labelled sketches what is meant by these statements and your understanding how such a river system will evolve with time.
- 15 7. Explain the concept of equilibrium in river systems and what constitutes a graded stream. What are the factors that are brought to equilibrium? Cite several examples of how streams adjust to attain equilibrium. Illustrate how a stream in equilibrium will respond to the construction of a dam somewhere along its profile.

DO QUESTIONS 8 OR 9 BUT NOT BOTH

8. Briefly discuss and illustrate in a well labelled sketch the elements that constitute a ground water system. Also include in your answer a discussion on what constitutes and controls the different forms of porosity and permeability. Include in your sketch movement paths of ground water and how an impermeable layer can result in a perched water table. Also indicate in your sketch how uncontrolled pumping can create problems with neighbouring wells.
- 15 9. Briefly explain and illustrate in a well labelled sketch what geologic conditions are necessary for the formation of a spring and an artesian well. Why is the artesian-pressure surface always lower than the hydrostatic head? Explain these terms in your answer.

DO QUESTIONS 10 OR 11 BUT NOT BOTH

- 15 10. Sketch a model of a continental glacial system and explain how it operates. Explain why the ice sheet advances, how the ice moves, and how glaciers erode the surface over which they flow. Make a sketch of North America showing the extent of the ice sheet during Pleistocene time. Briefly describe the major effects, both direct and indirect that have been produced as the result of Pleistocene glaciation.
- 15 11. Parts of Barbados and Bermuda contain limestone caverns that are now submerged below the ocean but which could have formed only if these parts of the island had been elevated above sea-level. Shells in sand deposits at Ottawa and parts of the Northwest Territories now far removed from the sea side indicate that these areas were once submerged by oceans. Today we know that the reasons for this are all related to the great ice-age. With well labelled sketches, explain how sea level changes can be related to advance and retreat of continental glaciers. Briefly describe the parameters that control this process.

EVERYBODY MUST DO QUESTION 12

- 15 12. Building code today must consider earthquake risk. Yet Montreal for an example, should not simply adopt the code prescribed for the California area, nor should the California area adopt the code that should exist for the Chile area. Why not? Briefly explain your answer by stating what earthquakes are, why they occur and where they occur. In your answer, demonstrate how an understanding of Plate Tectonic theory would help you better appreciate and understand earthquake behaviour.