

National Exams December 2017

04-BS-14, Geology

3 hours duration

NOTES:

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. This is a CLOSED BOOK EXAM. Candidates may use one of two calculators, the Casio or Sharp-approved models.
3. Three (3) questions constitute a complete exam paper. YOU MUST ANSWER QUESTIONS 1 TO 3.
4. On Question 3, the first four (4) answers, as they appear in the answer book, will be marked. The only exception will be if the candidate clearly indicates that another question should be substituted for a specified question that was answered previously.
5. The marks assigned to the subdivisions of each question are shown for information.
6. The total number of marks for the exam is 100

Question 1. Multiple Choice / True and False 20 Marks

1. Which of the following is a mafic rock?
 - a. Granite
 - b. Rhyolite
 - c. Basalt
 - d. Andesite

2. The furthest south glaciers have advanced in North America (from evidence of end moraines) was:
 - a. North edge of Texas
 - b. North edge of Mexico
 - c. 49th parallel
 - d. Southern edge of Illinois
 - e. Southern tip of Ontario

3. Following an earthquake a seismograph detects Body Waves and Surface Waves in the order of:
 - a. P-wave→S-wave→L-wave
 - b. S-wave→P-wave→L-wave
 - c. L-wave→P-wave→S-wave
 - d. S-wave→P-wave→L-wave→T-wave

4. The following is an example of a _____ dominated delta.
 - a. Tide
 - b. Stream
 - c. Wave



5. The most widespread metamorphic rocks exposed at the Earth's surface are formed by:
 - a. Regional metamorphism
 - b. Hydrothermal metamorphism
 - c. Contact metamorphism
 - d. Burial metamorphism
 - e. Meteorite impact metamorphism

6. The physical removal of dissolved or disaggregated rock from the site of weathering by wind, water, or ice is termed _____.
- ablation
 - recidivism
 - solifluction
 - erosion
7. _____ is the dissolution or decomposition of minerals and rocks.
- Mechanical weathering
 - Chemical weathering
 - Hydrolysis
 - Rendering
8. In nature, where does the acidity come from to speed up chemical weathering?
- plutonism
 - nuée ardentes from explosive volcanic eruptions
 - Bowen's reaction series
 - organic acids from decayed plants, acid rain, and sulphuric acid from oxidation of pyrite
9. The principal causes of mechanical fragmentation of rocks *in place* are _____.
- erosion and transport by moving wind, water, or ice
 - the relentless actions of Sisyphus
 - always inscrutable because they happened at some time in the past
 - biologic activity, expansion from unloading, frost wedging
10. The three major processes involved in chemical weathering are _____.
- dissolution, hydrolysis, and oxidation
 - precipitation, ion exchange reactions, and degasification
 - carbonation, dissimulation, and salinization
 - recrystallization, pitting, and rinsing

TRUE or FALSE

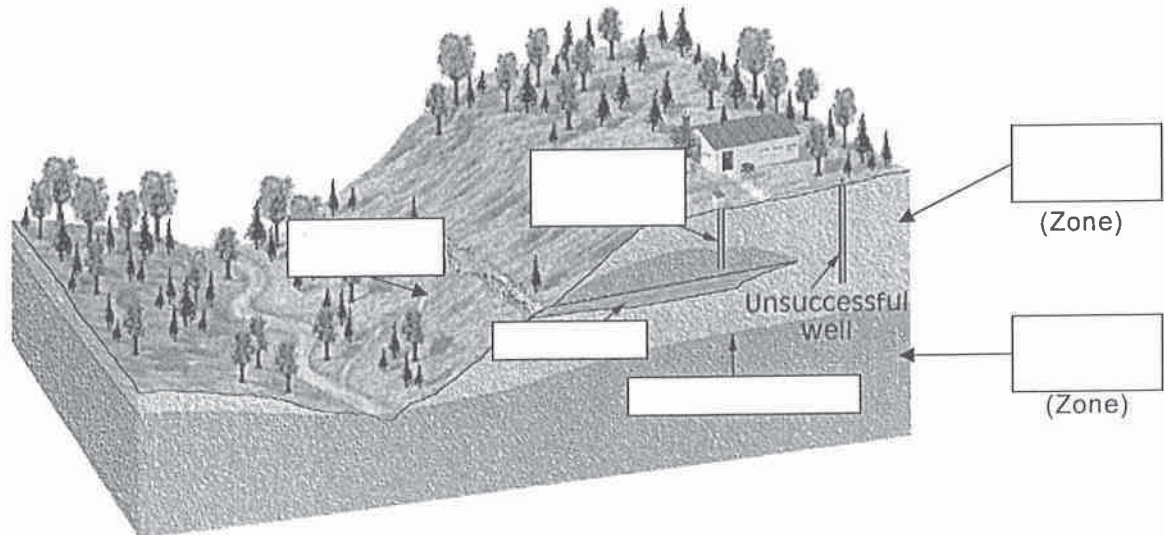
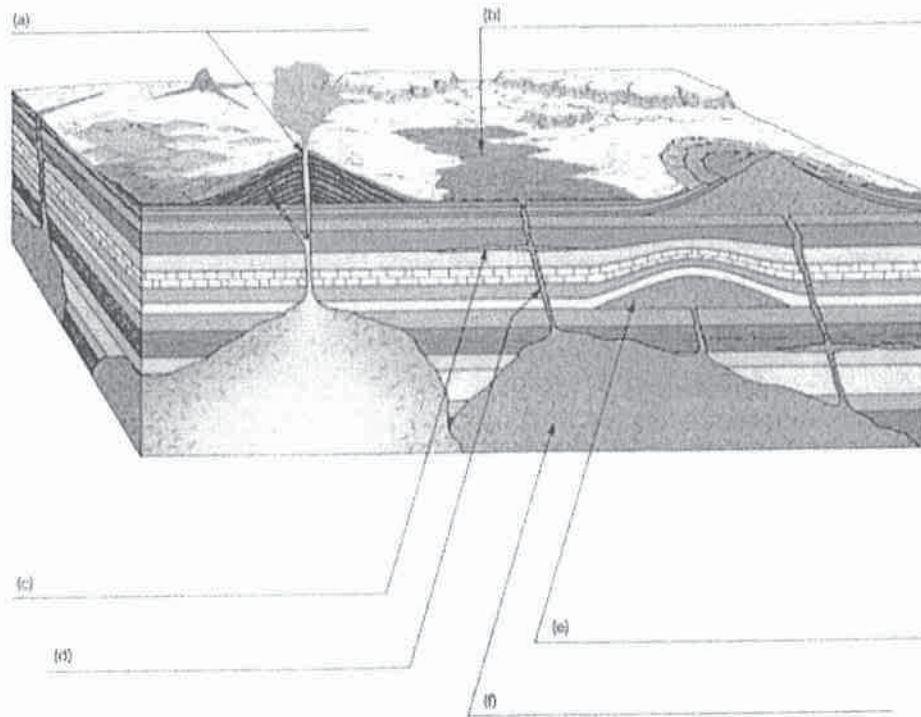
11. Engineering solutions for problems with permafrost include thermosyphons and insulation to aid in melting of permafrost.
12. An aquifer is an impermeable layer which serves as a confining layer above an aquiclude which has the capacity for transmitting groundwater.
13. A spring is a place where the groundwater flows into the ground.
14. Oxbow lakes form when a mature meandering stream cuts off a meander.
15. Drumlins and roche moutonnees have the same overall shape however drumlins are composed of till and roche moutonnees are composed of rock.
16. Normal faults are caused by extensional tectonic forces and reverse faults are caused by compressional tectonic forces.
17. The water velocity required to mobilize a grain of silt is greater than that which will mobilize a grain of sand.
18. Aa flows are generally thinner, faster moving, and have smoother surfaces than pahoehoe flows.
19. Dry granite melts at a higher temperature than dry basalt.
20. Like most other liquids, water decreases in volume when it freezes.

Question 2. Short Answer

40 marks

21. Within the blanks provided, write the name of the feature that is denoted with arrows.

12 marks

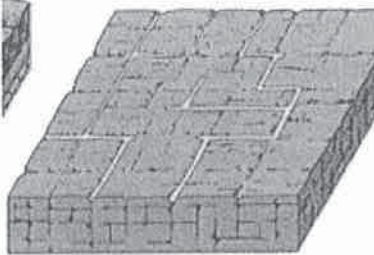


22. Label the drainage pattern:

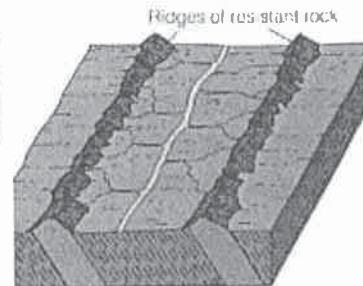
5 marks



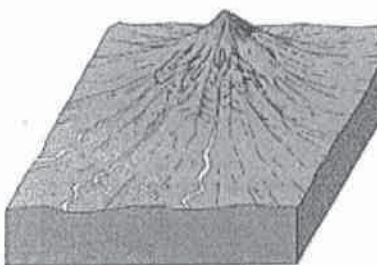
a. _____ drainage



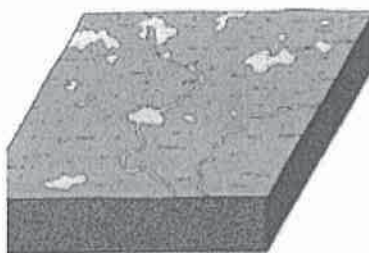
b. _____ drainage



c. _____ drainage



d. _____ drainage

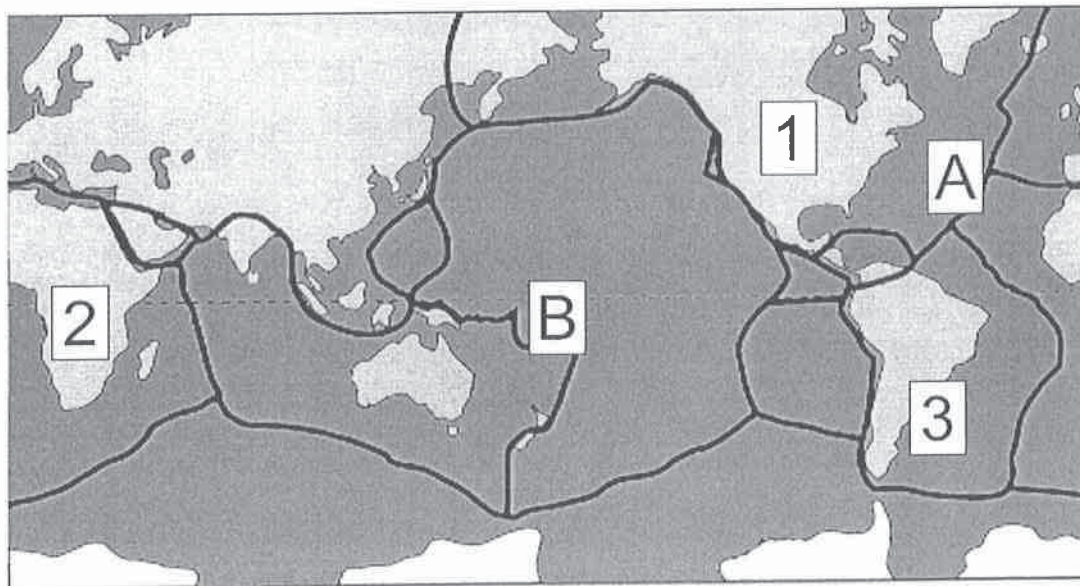


e. _____ drainage

23. In the following map of the Earth the continents and oceans are shown. The tectonic plates and boundaries are also indicated with the thick black lines. Do Not Mark Anything on the map and do not hand it in with your exam booklet. Clearly write the answers in your exam booklet

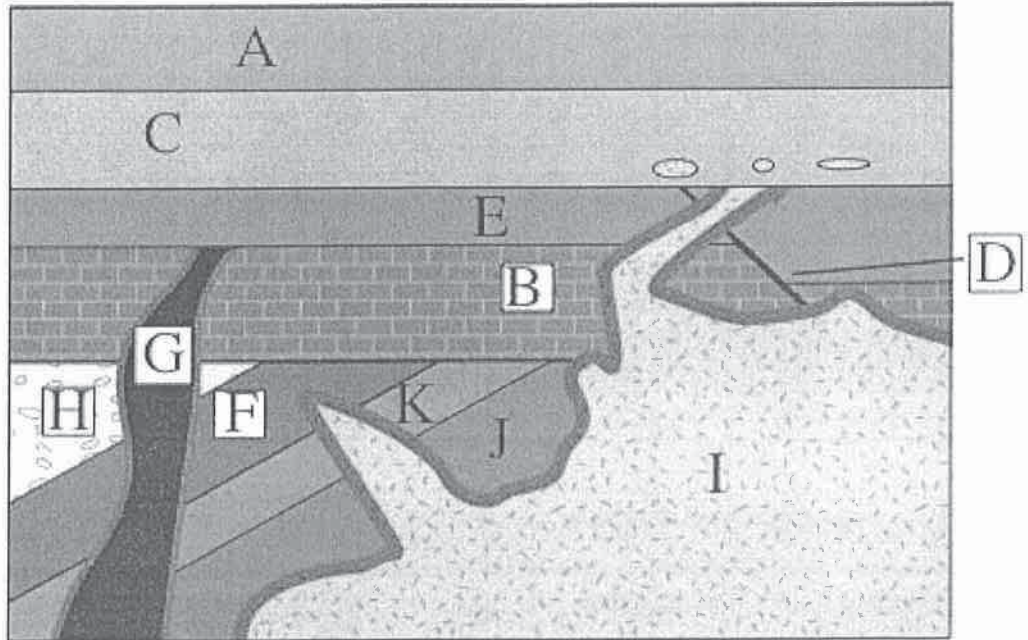
- a. Name the 3 tectonic plates (1, 2 and 3)
- b. Name each type of tectonic boundary indicated in capital letters (A, B)

6 marks



24. For the cross-section shown below, list the geologic events that caused the current configuration in chronological time.

17 marks



Question 3. Answer four (4) of the following questions: 40 marks

25. List and describe four (4) factors that influence mass wasting.
26. Sketch and describe the hydrologic cycle.
27. Name three (3) types of glaciers and give key characteristics of each.
28. List and describe three (3) erosional features and three (3) depositional features associated with glaciers.
29. Describe Bowen's Reaction Series.
30. Describe tectonic theory.
31. List and describe four (4) types of volcanoes.
32. Draw a typical permafrost profile, label, and describe the layers. Beside the profile (i.e. correlating it to depth), sketch a graph of temperature versus depth for summer and winter.
33. Sketch a stress-strain graph, label the axes and draw 2 characteristic behaviour curves: One for a brittle sample and a second for ductile sample.