

GE141 Study Guide III

Spring, 2012

NOTE

The final exam will be cumulative. Approximately 1/3 of the questions will come from study guides I and II. Additionally, some of the terms and concepts from the first two study guides will appear in the questions on new material.

CHAPTER 10; LECTURE 13

Terms

focus; epicenter; seismic waves; P-waves; S-waves; surface waves; seismometer; modified Mercalli intensity scale; Richter scale; moment magnitude scale; liquefaction; tsunami

Important concepts

- a) What is an earthquake and why do they occur?
- b) How do different kinds of seismic waves propagate, and what factors govern the speed of seismic waves?
- c) How do P- and S-waves enable us to pinpoint an earthquake's location?
- d) How do P- and S-waves help us understand the structure and layering of the Earth?
- e) What systems do/have we used to report earthquake magnitude or intensity, and how are these systems different?
- f) What is the energy difference between a magnitude 5.0 and a magnitude 6.0 (or 4 and 6 or 6 and 7, etc.) earthquake on the moment magnitude scale?
- g) What are the effects of earthquakes at the ground surface, and what factors influence how damaging an earthquake of a given magnitude will be?
- h) Where are earthquakes likely to occur, and how can we estimate the average recurrence interval between them?

CHAPTER 15; LECTURE 14

Terms

runoff; stream; stream gradient; stream discharge; dendritic drainage; trellis drainage; superposed drainage; meandering stream; meander; braided stream; flood plane; oxbow lake; stream capacity; point bar; levee; alluvial fan; delta; peak discharge; 100-year flood

Important concepts

- a) How can you recognize valleys carved by streams, and how do these valleys maintain their shape?
- b) Why do different stream drainage patterns form, and what do they tell you about the material the streams are eroding into and the evolution of the landscape? Note, I will probably ask you about specific drainage patterns such as dendritic or radial.
- c) What is a flood plane, and how can you recognize it?
- d) What are braided streams and meandering streams, and what do these channel patterns tell you about sediment load vs. stream capacity?

- e) How do meanders change through time, and what processes operate at the outsides and insides of meander bends?
- f) What is a stream's base level, and how can you recognize areas where a stream has not reached its base level?
- g) Where and why does deposition of sediment occur in and around streams, and what kinds of landforms does this deposition create?
- h) Why is purchasing real estate in New Orleans a bad idea?
- i) What is a 100-year flood, and how do we determine how large one is likely to be?
- j) What are some methods civil engineers use to try to control and mitigate flooding?

CHAPTER 16; LECTURE 15

Terms

Vadose zone a.k.a. unsaturated zone a.k.a. zone of aeration; water table; saturated zone; potentiometric surface; artesian well; cone of depression; contaminant plume

- a) How does ground water flow?
- b) What happens to ground water contaminants once they enter the ground?
- c) How can we monitor and mitigate groundwater contamination?

CHAPTER 17; LECTURE 16

Terms

Bearing land bridge; ice age; glacier; alpine glacier; cirque glacier; valley glacier; continental ice sheet; equilibrium line altitude; cirque; arête a.k.a. knife-edge ridge; glacial striations; roche moutonnée; moraine; glacial erratic; climate change; greenhouse effect; greenhouse gas

Important concepts

- a) When was the last glacial maximum, what was the approximate extent of the ice sheet in North America, and what important and/or notable landforms along the coast of the northeastern U.S.A. are terminal moraines from that ice sheet?
- b) Approximately how long ago did the ice sheet retreat in central Maine?
- c) What is the Bearing land bridge, and why is it particularly significant for Native Americans?
- d) Be able to recognize different glacial landforms and evidence for glaciation in images.
- e) Be able to distinguish valleys formed by glaciers from valleys formed by stream erosion in images.
- f) What kinds of glacial landforms, erosional features, and depositional features are you likely to encounter in Maine, how can you recognize them, and what do they tell you about the glacial history of this area?
- g) What are two different hypotheses for why the most recent ice age began?
- h) What controls the 20–100-thousand-year cycles of global cooling and warming that generally correspond to glacial advance and retreat?
- i) How does the greenhouse effect contribute to global climate, and how might modern humans have exacerbated this effect?

j) How do we test numerical simulations of climate change using observed climate patterns?

CHAPTER 20; LECTURE 16

Terms

fossil fuel; reserve; resource; conventional oil/gas; unconventional oil/gas; fracing (fracking, or fracturing); horizontal drilling; shale oil; tar sand; shale gas; ore; indium; lithium; neodymium

Important concepts

- a) Approximately what is the world's current population, and how is it projected to change in your lifetime?
- b) Where does most of our energy come from?
- c) What are the new, unconventional sources of oil and natural gas that are increasing the global reserves of fossil fuels, and how do we extract them?
- d) What are our alternatives to fossil fuels, and what are their limitations?
- e) We covered 3 metals in class that are critical for manufacturing modern electronics and appliances. What are these, how are they used, and what are the major supply limitations?

EXTRA CREDIT

You may earn up to 60 points of extra credit by memorizing the geologic time scale posted on the website. The last question of *each* of the three exams will ask you to fill in the eras, periods, their beginning and ending dates, and the important geologic events. These are worth 5 points for the eras and periods, 5 points for the dates, and 10 points for the important events.