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American University of Beirut
Final Examination

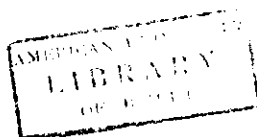
Department of Geology
Physical Geology (201)
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June 17, 1999
Time; 2 hours
Exam rules apply

PART I

Answer all questions in Part I (multiple-choice questions). Select only one answer for each question; note that for each question: correct answer = (+1.5 mark); incorrect answer = (-0.5 mark).

1. Most of the world's convergent plate margins are located in:
A. the Pacific Ocean
B. the Atlantic Ocean
C. the Arctic Ocean
D. the Indian Ocean
E. the Red Sea
2. New oceanic lithosphere forms at:
A. convergent plate boundaries
B. divergent plate boundaries
C. transform plate boundaries
D. collision zones
E. all of these (A,B,C,D)
3. At a transform boundary, plates:
A. slide past one another
B. move toward one another
C. move apart from one another
D. form a subduction zone
E. form a thrust with one another
4. The Red Sea represents a(n):
A. divergent plate boundary
B. ocean-ocean convergent plate boundary
C. ocean-continent convergent plate boundary
D. transform plate boundary
E. a plate tectonic deep trench
5. Which of the following mountain ranges formed as a result of continent-continent conversion:
A. the Andes
B. the Himalayas
C. the Sierra Nevada
D. the Cordillera
E. the Aleutians
6. Partial melting of the mantle takes place at:
A. divergent plate boundaries
B. ocean-ocean convergent plate boundaries
C. ocean-continent convergent plate boundaries
D. all of these (A,B,C)
E. None of these (A,B,C)
7. What is the name of the supercontinent that consisted of all of the present continents?
A. Eurasia
B. Laurasia
C. Pangaea
D. Gondwanaland



8. The asthenosphere occurs within the:
A. the oceanic crust
B. the continental crust
C. the upper mantle
D. the lower mantle
E. the core
9. The thickness of the Earth's mantle is:
A. 900 km
B. 1900 km
C. 2900 km
D. 3900 km
E. 4900 km
10. The main rock component of the Earth's mantle is:
A. rhyolite
B. peridotite
C. granodiorite
D. granite
E. basalt
11. The oceanic crust is made up of:
A. rhyolite
B. peridotite
C. granodiorite
D. granite
E. basalt
12. Which of the following does not form from molten rock?
A. volcanic ash
B. shale
C. basalt
D. granite
E. olivine
13. A volcano that consists of both lava flows and pyroclastic deposits is called a:
A. stratovolcano
B. shield volcano
C. cinder cone volcano
D. volcanic pipe
E. volcanic dome
14. The volcanic rock that is compositionally equivalent to diorite is?
A. andesite
B. rhyolite
C. granodiorite
D. dunite
E. picrite
15. According to Bowen's reaction series, the first feldspar mineral to form (at high temperature) is:
A. K-feldspar
B. Ca-plagioclase
C. Na-Ca-plagioclase
D. Na-plagioclase
E. calcite
16. Amphibole belongs to this mineral group:
A. carbonate
B. oxide
C. silicate
D. sulfide
E. halide
17. Pyroxene is an example of:
A. single chain silicates
B. double chain silicates
C. sheet silicates
D. tectosilicates
E. cyclosilicates

18. What type of chemical bonding holds the Na and Cl atoms together in a crystalline solid:
A. ionic bonds
B. covalent bonds
C. metallic bonds
D. nuclear bonds
E. Van Der Waals bonds
19. Which of these rocks form from a melt characterized by high viscosity and low density?
A. slate
B. marble
C. andesite
D. basalt
E. rhyolite
20. Which of the following affect the rate of weathering?
A. the soil
B. the rock type
C. the climate
D. none of these (A,B,C)
E. all of these (A,B,C)
21. What is the difference between breccias and conglomerates?
A. breccias are sediments; conglomerates are sedimentary rocks
B. breccias are sedimentary rocks; conglomerates are sediments
C. breccias have rounded rock fragments; conglomerates have angular rock fragments
D. breccias have angular rock fragments; conglomerates have rounded rock fragments
E. breccias are sedimentary rocks; conglomerates are igneous rocks
22. Which of these rocks is the product of regional metamorphism:
A. quartzite
B. shale
C. syenite
D. slate
E. marble
23. The Eocene epoch belongs to this geologic era:
A. Cenozoic
B. Mesozoic
C. Paleozoic
D. Proterozoic
E. Archean
24. The age of the boundary between the Mesozoic and the Paleozoic eras is?
A. 65 Ma
B. 245 Ma
C. 325 Ma
D. 570 Ma
E. 850 Ma
25. Which of the following is an example of a fault where the hanging-wall is displaced downwards with respect to the footwall?
A. a wrench fault
B. a thrust fault
C. a reverse fault
D. a normal fault
E. a horst
26. Downfolds, or troughs, of layered rocks are called:
A. synclines
B. anticlines
C. horsts
D. grabens
E. fold limbs

27. The line formed by the intersection of an inclined sedimentary layer and a horizontal plane is called the:
- A. dip
 - B. strike
 - C. limb
 - D. axial plane
 - E. hinge
28. Streamlined asymmetrical hills composed of till and deposited by a glacier is a description of:
- A. arete deposits
 - B. kame deposits
 - C. outwash deposits
 - D. esker deposits
 - E. drumlin deposits
29. Deposits forming planes of sorted silt and sand deposited by glacial meltwater are called:
- A. arete deposits
 - B. kame deposits
 - C. outwash deposits
 - D. esker deposits
 - E. drumlin deposits
30. The percentage of a rock's total volume taken up by pore space is called:
- A. recharge
 - B. permeability
 - C. texture
 - D. aquifer
 - E. porosity
31. Large cone-shaped deposits of sediments at a mountain front are called:
- A. deltas
 - B. Ox-bow lake deposits
 - C. natural levees
 - D. desert pavement
 - E. alluvial fans
32. What type of drainage network would you expect to find within a region containing volcanoes?
- A. dendritic drainage
 - B. radial drainage
 - C. rectangular drainage
 - D. annular drainage
 - E. trellis drainage
33. A drainage pattern which develop in regions characterised by jointed and faulted crystalline bedrock is called:
- A. dendritic drainage
 - B. radial drainage
 - C. rectangular drainage
 - D. annular drainage
 - E. trellis drainage
34. Which of the following sequences is written correctly from oldest to youngest?
- A. Proterozoic, Paleozoic, Mesozoic, Cenozoic
 - B. Cenozoic, Paleozoic, Proterozoic, Mesozoic
 - C. Paleozoic, Cenozoic, Mesozoic, Proterozoic
 - D. Mesozoic, Cenozoic, Paleozoic, Proterozoic
35. The Jurassic is a geologic:
- A. eon
 - B. epoch
 - C. era
 - D. period

PART II

Answer only two out of three questions in Part II

(Marks)

(20) 1.(a) Illustrate, by means of a diagram, all the various "Erosional" and associated topographic features of glaciers (label all). Describe, and comment on the origin or formation of each one of the various types of these features (two lines each).

(b) Divergent plate margins: Describe in detail, indicating the geological features associated with it, and give examples (use fully labelled diagrams, along with text to illustrate your answer).

(Marks) Answer only two out of three questions in Part II

- (20) 2. (a) Construct a table showing the typical transition in mineralogy and texture with progressive metamorphism of shale from low grade through medium-, to high grade, indicating the temperature ranges. In the same table (at the bottom) give the names of the various rock types, as well as the characteristic textures, that form during each stage of metamorphism.
- (b) List five evidences in favour of the plate tectonic theory.

(Marks) Answer only two out of three questions in Part II

(20) 3. (a) Describe in detail the various types of folds (use diagrams, along with text to illustrate your answer), and describe each type in about two lines.

(b) Physical (or Mechanical) weathering: Define, and describe the various mechanisms that lead to this type of weathering.