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American University of Beirut
Final Examination

Department of Geology
Physical Geology (201)
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Time; 2.5 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. Quartz belongs to this mineral group:
A. carbonate
B. oxide
C. silicate
D. sulfide
E. halide
2. The most abundant element in the earth's crust is:
A. Mg
B. Na
C. O
D. Si
E. K
3. Plagioclase feldspar is an example of:
A. single chain silicates
B. double chain silicates
C. sheet silicates
D. tectosilicates
E. cyclosilicates
4. Chemical substances that have exactly the same chemical formula, but different crystal structures are called:
A. ions
B. polymorphs
C. isotopes
D. pseudomorphs
E. anions
5. What type of chemical bonding holds the Li and F (also Na and Cl) atoms together in a crystalline solid:
A. ionic bonds
B. covalent bonds
C. metallic bonds
D. nuclear bonds
E. Van Der Walls bonds
6. Which of the following minerals is not found in ultramafic rocks:
A. quartz
B. olivine
C. pyroxene
D. garnet
7. The oceanic crust is made up of:
A. rhyolite
B. peridotite
C. granodiorite
D. granite
E. basalt
8. The main rock component of the Earth's mantle is:
A. rhyolite
B. peridotite
C. granodiorite
D. granite
E. basalt



9. The asthenosphere occurs within the:
- A. the oceanic crust
 - B. the continental crust
 - C. the upper mantle
 - D. the lower mantle
 - E. the core
10. The thickness of the Earth's mantle is:
- A. 1400 km
 - B. 1900 km
 - C. 2900 km
 - D. 3400 km
 - E. 3900 km
11. According to Bowen's reaction series, the first feldspar mineral to form (at high temperature) is:
- A. K-feldspar
 - B. Na-plagioclase
 - C. Na-Ca-plagioclase
 - D. Ca-plagioclase
 - E. Na-amphibole
12. 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
13. Which of these rocks form from a melt characterized by low viscosity and high density:
- A. slate
 - B. marble
 - C. andesite
 - D. basalt
 - E. rhyolite
14. 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
15. Which of these rocks is the product of thermal metamorphism:
- A. phyllite
 - B. slate
 - C. quartzite
 - D. gneiss
 - E. migmatite
16. With increasing grade of metamorphism, a characteristic sequence of the rocks produced is:
- A. shale - slate - schist - phyllite - gneiss
 - B. shale - schist - phyllite - gneiss - slate
 - C. shale - gneiss - schist - slate - phyllite
 - D. shale - slate - phyllite - schist - gneiss
 - E. shale - phyllite - schist - slate - gneiss
17. The volcanic rock that is compositionally equivalent to diorite is?
- A. andesite
 - B. rhyolite
 - C. granodiorite
 - D. dunite
 - E. picrite
18. 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
19. The age of the boundary between the the Mesozoic and the Paleozoic eras is?
 A. 65 Ma
 B. 245 Ma
 C. 325 Ma
 D. 570 Ma
 E. 850 Ma
20. The Eocene epoch belongs to this geologic era:
 A. Cenozoic
 B. Mesozoic
 C. Paleozoic
 D. Proterozoic
 E. Archean
21. Exfoliation is an example of:
 A. chemical weathering
 B. mechanical weathering
 C. extrusion of magma
 D. oxidation processes
 E. metamorphism
22. The most common acid responsible for chemical weathering in nature is:
 A. nitric acid
 B. hydrochloric acid
 C. hydrofluoric acid
 D. sulfuric acid
 E. carbonic acid
23. The least stable mineral (or most affected by chemical weathering) at the earths surface is:
 A. kaolinite (clay)
 B. calcite
 C. quartz
 D. olivine
 E. Na-plagioclase
24. What is the name for soils that are rich in Ca?
 A. bauxites
 B. laterites
 C. evaporites
 D. pedalfers
 E. pedocalcs
25. What is the soil horizon that consists primarily of slightly altered and weathered bedrock?
 A. the A-horizon
 B. the B-horizon
 C. the C-horizon
 D. the D-horizon
 E. none of the above
26. Which of the following is an example of a fault where the motion is primarily horizontal?
 A. a wrench fault
 B. a thrust fault
 C. a reverse fault
 D. a normal fault
 E. a horst
27. Which type of fault that shows the hanging-wall displaced downward with respect to the footwall?
 A. reverse fault
 B. thrust fault

- C. both reverse and thrust
E. wrench fault
- D. normal fault
28. Downfolds, or troughs, of layered rocks are called:
A. unconformities
C. synclines
- B. anticlines
D. grabens
29. The line formed by the intersection of an inclined sedimentary layer and a horizontal plane is called the:
A. dip
C. bed
E. hinge
- B. strike
D. axial plane
30. An accumulation of a mixture of boulders, sand, and clay materials deposited directly by a glacier is called:
A. moraine
C. kame
E. loess
- B. esker
D. outwash deposits
31. Streamlined asymmetrical hills composed of till and deposited by a glacier is a description of:
A. moraines
C. kames
E. none of the above
- B. eskers
D. outwash deposits
32. The percentage of a rock's total volume taken up by pore space is called:
A. recharge
C. texture
E. porosity
- B. permeability
D. aquifer
33. Which of the following combinations make for the best groundwater reservoir?
A. low permeability and low porosity
B. low permeability and high porosity
C. high permeability and low porosity
D. high permeability and high porosity
34. The groundwater table lies at:
A. the top of the unsaturated zone
B. the top of the saturated zone
C. the base of the saturated zone
D. the sea level
E. none of the above
35. What is the term for a relatively impermeable geologic unit?
A. artesian
C. aquifer
E. karst
- B. nonartesian
D. aquiclude
36. Large cone-shaped deposits of sediments at a mountain front are called:
A. deltas
C. natural levees
E. all of the above
- B. alluvial fans
D. desert pavement

37. Particles that roll and slide along the river bottom are called:
 A. bed load B. suspended load
 C. drift load D. natural levees
 E. delta deposits
38. Which of the following is not a divergent plate boundary?
 A. the great rift valley of east Africa (the Red Sea)
 B. the East Pacific Rise
 C. the San Andreas fault
 D. the Mid-Atlantic Ridge
 E. none of the above
39. What is the name of the Mesozoic supercontinent that consisted of all of the present continents?
 A. Eurasia B. Laurasia
 C. Pangaea D. Gondwanaland
40. The remaining large bedrock knobs representing remnants of old-age desert landscape are called:
 A. Bajadas B. inselbergs
 C. pediments D. playas
 E. loess

PART II

Answer only three of the following four questions in Part II

(Marks)

- (15) 1. (a) Describe the various types of folds (use diagrams, along with text to illustrate your answer), and describe each type in about two lines.
 (b) Use two fully labelled diagrams to show the various components and characteristics of:
 i) a reverse fault and ii) a dextral wrench fault.
- (15) 2. 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 (four lines each).
- (15) 3. (a) List the characteristics of the metamorphic rocks.
 (b) 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.
- (15) 4. Describe in detail the various types of "Convergence" along plate margins, indicating the geological features associated with each type, and give examples (use fully labelled diagrams, along with text to illustrate your answer).
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HAVE A GOOD SUMMER