


<b>Geology Department</b> <b>Faculty of Sciences</b> <b>Assiut University</b> <b>Fourth level</b>		<b>Second Term Examination</b> <b>Ore forming processes (438 G)</b> <b>June, 2024</b> <b>Two Hours</b>
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### Ore Forming Processes (438g)

**A. Sign the true statement by (✓) and the false one by (X)**

1. Chalcophile elements are typically found associated with felsic and alkaline rocks
2. Cu-Ni ores are deposited via magmatic immiscibility process
3. The heat of hydrothermal solutions may come from magma, metamorphism or just an increase in temperature with depth.
4. S-saturation is reached by the fractionation of Fe-bearing minerals such as olivine and pyroxene.
5. Chromite deposits are associated with basic and ultrabasic rocks
6. Hypothermal is a hydrothermal ore deposits formed at substantial depths (greater than 4500 meters) and elevated temperatures (400–600 °C).
7. Supergene refers to the mineralization caused by descending hydrothermal solutions.
8. Metallogeny is the study of the genesis of mineral deposits.
9. The process of ore deposition from hot aqueous solutions of various sources is known as magmatic segregation.
10. Ore deposits formed due to replacement of wall rocks adjacent to an intrusive is called pyrometasomatic (skarn) type deposits.
11. Magmatic immiscibility is settling out from magmas of sulfide, sulfide-oxide or oxide melts which accumulate beneath the silicates or are injected into country rocks or extruded on the surface.
12. Metallogenic epoch is a region characterized by a particular assemblage of mineral deposit types.
13. Evaporites deposits are resulted by mechanical weathering
14. Leaching of soluble elements leaving concentrations of insoluble elements is known as residual process.
15. hydrothermal ore deposits formed at intermediate depths (1500–4500 meters) and temperatures (200–400 °C) called epithermal deposits
16. Specific gravity of minerals are the factor controlling placer deposits type.
17. Hydrothermal ore deposits formed at shallow depths (less than 1500 meters) and fairly low temperatures (50–200 °C) are mesothermal deposits
18. Ore is any unnaturally occurring material from which a mineral or aggregate of value can be extracted at a profit.
19. Ore forming processes mean understanding the nature and origin of mineral occurrences and how they fit into the Earth system.
20. Concentration of heavy minerals into placer due to mechanical accumulation is called residual type deposits
21. Diamond deposits are genetically associated with kimberlite rocks.

22. Supergene Enrichment means leaching of certain elements from the upper part of a mineral deposit and their re-precipitation at depth to produce higher concentrations.
23. Sn and W deposits are genetically associated with S-type granite
24. Volcanic Exhalative is the process of exhalation sulfide-rich magmas at the surface, usually under marine conditions.
25. VMS (volcanogenic massive sulfide) deposits consists of over 90% iron sulfide.
26. Magma, groundwater, sea water and chemical reactions during metamorphism are the main sources of water of hydrothermal solutions.
27. Crystallization of columbite and tantalite as disseminated grains or segregations in pegmatites is known as residual mineral deposits.
28. Diamond deposits are genetically associated with kimberlite rocks.
29. Cu, Mo, Pb and Zn mineralizations are genetically related to I-type granite .
30. Banded iron ore is formed via magmatic processes.

B. Choose the correct answer for each sentence of the following:

1. Lithophile elements are typically found associated with (basic and ultrabasic , felsic, intermediate) igneous rocks
2. Porphyry type deposits are spatially and genetically associated with (mafic, ultramafic, felsic to intermediate) intrusions.
3. In the porphyry type deposits Cu, Au, are derived from (mafic mantle, felsic crustal, mixing of crustal and mantle).
4. The inner zone of the hydrothermal alterations related to porphyry type deposits is represented by (phyllic, potassic, propylitic ) alteration.
5. VMS deposits are derived via (magmatic fractionation, fluid immiscibility, hydrothermal solution).
6. The metal zonation of VMS is represented in the inner zone by (1. pyrite and chalcopyrite, 2. pyrite- sphalerite - galena , 3. sphalerite-galena-pyrite).
7. Evaporites are (mechanical placer, chemical, supergene) type deposits
8. The main factor controlling the placer deposits is (pressure, temperature, specific gravity).
9. Residual mineral deposits produced as a result of (mechanical weathering, chemical weathering, evaporation)
10. The existing mineral deposits that turned into a more highly concentrated mineral deposits by weathering process is (secondary enrichment, placer deposits, residual deposits)
11. Hot aqueous solutions responsible for the formation of many ore deposits are named (magma melts, sea water, hydrothermal solutions).
12. Mineral Deposits formed from hot aqueous fluids are (magmatic, residual, hydrothermal) type deposits.
13. Bauxite and laterite are formed due to (residual, placer, metamorphic) process.
14. Pt—Cr Bushveld, South Africa deposits are formed via (fluid immiscibility, magmatic segregation, pegmatitic) process.
15. Cu – Ni deposits of Sudbury, Canada are formed by (fluid immiscibility, magmatic segregation, pegmatitic) process.



16. Li, deposits of Kings Mtn. N.C. is deposited by (pegmatitic, immiscibility, magmatic fractionation) process.
17. Skarn type deposits are (magmatic, sedimentary, metamorphic) process.
18. Concentration of heavy minerals into placer is (mechanical concentration, chameical precipitation, residual concentration) process
19. Leaching of certain elements from the upper part of a mineral deposit and their re-precipitation at depth to produce higher concentrations is named (supergene enrichment, placer deposits, residual concentration) process .
20. Ore deposits that form after their host rocks are ( epigenetic, pregenetic, syngenetic ) deposits.



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**Final Exam**

Subject: Hydrogeology and Petroleum Geology (460G), 4<sup>th</sup> level, special geology, geochemistry and geophysics groups, Total 50 Marks

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**Part I Petroleum Geology**

**The first question: 15 marks**

**I. Choose the correct answer (15 Mark):**

1. Primary migration of hydrocarbons is generally carried out:  
a. From source rock to Reservoir rocks      b. From reservoir rock to trap      c. From source rock to trap
2. The sedimentary environment in which huge amount of organic matter can be produced:  
a. Bathyal      b. Continental slope      c. Continental shelf
3. Post-discovery volumetric reserve calculation of hydrocarbons is estimated from:  
a. Surface geophysical results      b. Borehole geophysical results      c. Surface geochemical results
4. Which of the following factors are required for high organic productivity.  
a. High turbidity      b. nutrients      c. High temperature
5. kerogen type II can produce ..... at high thermal maturity levels  
a. Oil only      b. Gas only      c. Both of oil and gas
6. The Kerogen is described as immature during:  
a. Catagenesis      b. Diagenesis      c. Metagenesis
7. North Sinai province is characterized by predominate structure feature nominated as Syrian Arc system, accordingly, most of oil traps in this region are:  
a. Stratigraphic traps      b. Structural traps      c. Hydrodynamic traps
8. Permeability of reservoir rocks has direct effect on:  
a. Reservoir productivity      b. Reservoir continuity      c. Trapping of hydrocarbons
9. Petroleum quality is measured by API%, The light crude oil usually has:  
a. High API %      b. Low API%      c. Moderate API%
10. Capillary pressure in the reservoir is proportion inversely with:



- a. Grain size of the reservoir rocks      b. Saturation of the reservoir rocks      c. Reservoir continuity
11. Shale is called good source rock when contains amount of organic matter ranges between:
- a. TOC: 1-2 wt%      b. TOC: 0.5-1 wt%      c. TOC: >2 wt%
12. Most of hydrocarbon reserves all over the world are generally occurred in:
- a. Late Jurassic – Early Tertiary rocks      b. Pliocene – Recent rocks      c. Precambrian rocks
13. Gulf Suez constitutes major tectonic units includes pre- rifting, syn-rifting and post-rifting, the most oil traps in the pre-rifting stage are: -
- a. Stratigraphic traps      b. Structural traps      c. Diapiric traps
14. Most of hydrocarbon occurrences generally in:
- a. Regions of high tectonic and sedimentation      b. Regions of high tectonic and low sedimentation      c. Regions of low tectonic and high sedimentation
15. Rate of maturation is depending on:
- a. Time and pressure      b. Temperature and time      c. Temperature and pressure

## The second question: 10 marks

### II. Mark the true sentence by (T) and false sentence by (F) of the following:

1. Sour hydrocarbons have high content of Sulphur. ( )
2. Thermogenic gas is generated naturally at shallow depths and may artificially. ( )
3. Maturation is the process that is carried out at shallow depths and from which the gas and oil are generated. ( )
4. Critical moment in petroleum system is the time at which the petroleum is expelled ( )
5. Water drive production is the best method for producing from hydrodynamic traps. ( )
6. Hydrocarbon traps are the geologic feature in which the petroleum is generated. ( )
7. Petroleum pool is one lenticular petroleum reservoir.
8. Sealing rocks must be impermeable. ( )
9. Hydrocarbon reservoirs are classified by quantity based on porosity. ( )
10. Source rock is fine grained sediments rich in organic matter. ( )

- 32- The unsaturated zone extends from:
- A- The land surface till the capillary water zone
  - B- The land surface till the saturated zone
  - C- The land surface till the maximum depth to root zone

- 33- In the unsaturated zone, the gravitational water moves:
- A- Vertically upwards
  - B- Vertically downwards
  - C- Laterally

- 34- The contact springs are related to:
- A- Gravitational springs
  - B- Non- Gravitational springs
  - C- Volcanic springs

- 35- Ghanate systems is mainly composed of :
- A- Vertical wells and tunnels
  - B- Horizontal wells and tunnels
  - C- Star-Ray wells and tunnels

**Q4: Shade (T) for True or (F) for False statements. (15 marks: 1 mark each)**

- 36- In the Nile Delta aquifer, the thickness of the clay lenses increases towards the south
- 37- Darcy's law can be applied in case of unsaturated soil
- 38- At EL-Arish in Sinai, the middle fluvial gravely aquifer and the lower calcareous sand stone aquifer are hydraulically in contact
- 39 - Darcy's law can be applied of soil composed of coarse sands, gravels and boulders
- 40- The Fissured and Karstified Carbonate aquifers are mainly dominating the Nile delta
- 41- In case of equilibrium state the groundwater out flow through pumping exceed the groundwater recharge
- 42 - Field capacity is the amount of the remaining water in the soil after the excess gravitational water has drained away
- 43- Moisture equivalent is the amount of water at which a saturated soil will retain after being centrifuged at a centrifugal force 1000 times that of gravity



- 44- The field capacity and wilting point represent the upper and lower limits of moisture A needed for plant growth
- 45- The gravitational water forms thin films moisture on soil particle surface
- 46- The volcanic water is the water entrapped the sedimentary rock at the time it was deposited
- 47- The moisture concentration around the soil particle is more in the case of hydroscopic water than that in capillary water
- 48- An aquitard materials are not porose nor impermeable material
- 49- According to Darcy s law, the flow velocity is equal to the product of the coefficient of permeability and the hydraulic gradient
- 50- In the confined aquifers the water table serves as the upper surface of the aquifer

**Good luck**

Credit hour system: first semester; final examination

Geology and Geophysics Programs

Engineering Geology and Mining Geology (G 407)

Fourth Level

2023-2024

Allowed time 2 hours

ملحوظة: الامتحان في ثلاث صفحات

**Part 1: Engineering Geology Exam (25 M)**

**Shade the correct answer (A, B, C, or D) (10 marks, 1 mark each).**

1. Limestone and dolomite are widely recognized as:
  - a. very hard rocks.
  - b. excellent source for aggregates
  - c. weak and disintegrates easily.
  - d. soft but are acceptable for aggregates
2. Engineering geology is:
  - a. the application of geological knowledge to the siting, planning, and construction of the engineering works
  - b. the science dealing with physical nature, history of earth, the rock of which it is composed, and the changes which it has undergone or is undergoing.
  - c. a science concerned with putting scientific knowledge to practical uses.
  - d. measures properties and applies mathematical relationships to reach his conclusion
3. The approach of geologists is:
  - a. solve problems
  - b. quantitative analysis is emphasized.
  - c. models are often simplified or simplistic.
  - d. see Earth as complex (heterogeneous and anisotropic).
4. Pit Run is:
  - a. aggregate particles, mainly larger than 4.75 mm
  - b. aggregate particles mainly between the 4.75 mm size and the 75 mm sieve.
  - c. aggregate from a sand or gravel pit with no processing
  - d. resulting from the treatment of ore to produce iron, steel, and nickel
5. Granite is a:
  - a. good building stone
  - b. very durable
  - c. have high tensile strength
  - d. difficult to work.
6. ICOLD assumes a dam as big if:
  - a. the flood discharge is less than 2000 m<sup>3</sup>/s
  - b. its height is bigger than 15m.
  - c. the height of the dam is between 50m and 100m
  - d. the height of the dam is lower than 50m
7. Creep is characterized by:
  - a. rapid movement
  - b. result of freezing and thawing
  - c. basically a very viscous (thick) debris flow
  - d. downslope flow of relatively coarse material



8. Translational sliding refers to the:
  - a. sliding occurs on a planar surface or a slip plane.
  - b. sliding occurs along a curved slip plane.
  - c. rocks fall from a vertical face.
  - d. sinking of a mass of earth material below the level of the surrounding material
9. Arch dams make use of:
  - a. the strength of an arch to displace the load of water behind it onto the rock walls that it is built into.
  - b. their triangular shape and the sheer weight of their rock and concrete structure to hold back the water in the reservoir.
  - c. the strength of an arch to displace the load of water behind it onto the rock walls that it is built into.
  - d. multiple reinforced columns to support the dam, which has a relatively thin structure.
10. ill-graded granular soil (aggregates):
  - a. increased soil strength
  - b. high permeability
  - c. reduced future settlement
  - d. ability to achieve greater densities

**Shade (T) for true sentences or (F) for false sentences: (15 marks; 1 mark each)**

11. "Soft" rocks generally have higher unconfined compressive strengths and higher Young's moduli (E) than "soft" rocks
  12. Slate is very durable, high tensile strength and difficult to work.
  13. Vegetation has root systems that tend to provide an apparent cohesion which increases resistance to landsliding.
  14. Slump is a downslope movement of coherent block of earth material.
  15. Horizontal, vertical, and inclined layers have the same kinds of loading conditions for tunnels.
  16. Changes in river flow regimes and flood effects have environmental impacts on dam reservoirs.
  17. Crushed gravel is considered high quality aggregate
  18. The concept of sequential land use refers to the practice of using the same land for two or more purposes.
  19. Typically, a large section of a dam will be either an embankment or a gravity dam.
  20. Slopes formed by strong rocks, such as shale, or have thin soil deposits typically fail by rotational slides.
  21. The excavation of rocks is significantly influenced by the intensity of tectonic disturbances.
  22. Engineering geology becomes more important over time because the available building sites become less ideal as time goes on.
  23. Silt sticks to fingers and invisible to unaided eye.
  24. The discontinuities (layers, fissures) inclined inside or outside of the slope are very important regarding the stress and strength of the tunnel.
  25. Translational slides occur on a planar surface or on a slip plane.
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### Part (2) Mining Geology Exam (25 M)

- 1- What are the factors that determine the economic value of the ore? ( 5 Marks )
- 2- At the sampling position in the drift of a gold vein, the groove consists of five different sections. The thickness and assays obtained are as follows: (10 marks)

Sec	Thick, cm	Assay, %
A	12	25
B	10	20
C	8	45
D	15	12
E	11	15

Find:

- a. The clean av. assay.
- b. The av. thickness of sampling section.

- 3- Mention the importance of mining development? ( 5 Marks)
- 4- Mention the defects of the inclined shaft ( 5 marks)

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إنتهت الأسئلة وبالتوفيق

أ.د/ جمال يحيى - قسم هندسة التعدين والفلات

أ.د/ جلال حامد الحباك - قسم الجيولوجيا



بسم الله الرحمن الرحيم

جامعة أسيوط

كلية العلوم - قسم الجيولوجيا

امتحان المستوى الرابع بكلية العلوم شعبة الجيولوجيا والكيمياء

المادة: خريطة مصر الجيولوجية (410 ج)

(Geologic map of Egypt (410 G)

الزمن: ساعتان

الدرجة: 50 درجة

الفصل الدراسي الأول 2024/2023

الامتحان يتكون من صفحتين

**I- Choose the correct answer: (10 Marks)**

1- The Chronostratigraphic units consist of .....

A- rocks B- fossils C- rock and fossils D- time intervals

2- The arrangement of sedimentary rocks in separate layers is called .....

A- metamorphism B- stratification C- precipitation D- solidification

3- All rocks have ..... character.

A- lithostratigraphic

B- magnetostratigraphic

C- chronostratigraphic

D- all of these

4- Which of the following terms is an example of chronostratigraphic units?

A-Age

B- Stage

C- Bed

D- Eon

5- Disconformity is mainly inferred by.....

A- fossils

B- basal conglomerate

C- irregular surfaces

D- all of these

6- Sedimentary rock type made from bits of minerals and other earth material that were weathered and moved is ..... rocks.

A- clastic

B- chemical

C- organic

D- inorganic

7- The Archean rocks expose in ..... of Egypt.

A- Western Desert

B- Eastern Desert

C- Sinai

D- Nile Valley

8- The geologic age of the Pangaea Continent is .....

A-Early Paleozoic

B- Late Paleozoic

C- Early Mesozoic

D- Late Mesozoic

9- The correct arrangement of the Cretaceous formations in Sinai from older to younger are:

A- Malha, Risan Aneiza, Raha

B- Risan Aneiza, Malha, Raha

B- Raha, Risan Aneiza, Malha

C- Malha, Raha, Risan Aneiza

10- The correct arrangement of the Upper Cretaceous formations in the east Aswan from older to younger are:

A- Tamsah, Abu Agag, Umm Barmiel

B- Abu Agag, Tamsah, Umm Barmiel

C- Abu Agag, Umm Barmiel, Tamsah

D- Umm Barmiel, Tamsah, Abu Agag

**II- A- Give reasons for the following: (5Marks)**

- i- The difficult in the differentiation of the Paleozoic sediments into rock units in Egypt.
- ii- The variations in the thickness of the Paleozoic sediments in Egypt.
- iii- The well distributed of Cretaceous rocks in Egypt.
- iv- The difficulty in the determining the geologic age of the Paleozoic rocks.
- v- The restricted occurrence of marine Triassic rocks in the north eastern part of Egypt.

**B- Discriminate between the Cenomanian rock units in Sinai. (5 Marks)**

**III- A- Write the geologic age of the following rock units (formations) and discuss the stratigraphic relationship between every two formations. (10 Marks)**

- i- Lakia/Qaseib
- ii- Kohla/Basour
- iii- Bahrien/Wadi Natrun
- iv- Maghrabi/Bahariya
- v- Abu Balas/Sabaiya

**IV- Compare between the lithologic variates of the Precambrian Basement exposures in the Western Desert and those in the major domes of the Eastern Desert. (10 Marks)**

**V- Write brief notes about the lithologic sequence of the Fawakhier Ophiolites occurring east of the the Fawakhier rest. (10 Marks)**

أ.د/ على عبدالقادر خضير  
أ.د/ ناجح عبدالرحمن عبيدالله

أنتهت الأسئلة مع اطيب الأمنيات بالتوفيق



Credit hour system: first semester, final examination

Geology and Geophysics Programs

Ore Microscopy and Ore Petrology (G 431)

Fourth Level

2023/2024

Allowed time 2 hours

ملحوظة: الامتحان في ثلاث صفحات

(50 M) الجزء التحريري

Choose the correct answer from A, B, C, and D (one mark each) (25 M)

1. Chalcopyrite can be described as:  
(A) a mineral exhibiting weak anisotropy; (B) a mineral displaying strong anisotropy;  
(C) a non-metallic mineral; (D) a mineral that is formed under high-temperature conditions.
2. The ideal SEM coating choice for quantitative analysis and X-ray mapping is:  
(A) carbon; (B) gold; (C) sulfur; (D) silver
3. Galena and tetrahedrite show the following characteristics:  
(A) they are characterized as soft minerals; (B) they show internal reflection;  
(C) they are classified as hard minerals; (D) they are created under high-temperature conditions.
4. Growth twinning feature is described as  
(A) generally lamellae with uniform thickness; (B) spindle-shaped lamellae; (C) the fabric of several lamellae with different directions; (D) marks the beginning of recrystallization.
5. Uniradial minerals are usually not completely dark; this is the case with minerals of:  
(A) non-metallic minerals (B) low reflectivity; (C) medium reflectivity; (D) high reflectivity.
6. Twinning is best observed in:  
(A) isotropic minerals when viewed under crossed polars; (B) etched isotropic minerals;  
(C) poorly polished surfaces when examined under polarized light; (D) euhedral crystals.
7. The cleavage of a mineral can be more noticeable in:  
(A) a surface that has been polished to a high degree; (B) aggregates with a fine-grained texture;  
(C) ores that have undergone slight weathering; (D) samples that are fresh and have not been weathered.
8. Supergene minerals are:  
(A) formed by descending waters includes ores and minerals formed by downward enrichment;  
(B) formed by precipitation from generally ascending waters;  
(C) resulted from the alteration of primary minerals; (D) existed in a rock at the time of its formation
9. The minor sulphate and native metals exhibited the following changes in the temperature equilibrium:  
(A) a decrease in the temperature equilibrium; (B) an increase in the temperature equilibrium;  
(C) a constant temperature equilibrium; (D) dis-equilibrium.
10. Birefractance is expressed as strong in the mineral:  
(A) hematite; (B) ilmenite; (C) covellite; (D) chalcocite
11. Pyrite, chromite, and magnetite:

- (A) exhibit a low power of crystallization; (B) have the remarkable ability to develop well-formed crystals even under unfavorable conditions; (C) display an anisotropic feature; (D) form at low temperatures.
12. The existence of the pyrrhotite mineral suggests:
- (A) formed from a meteoric solution; (B) equilibrium at low temperatures during the cooling process; (C) deposited in a sedimentary environment; (D) equilibrium at moderate temperatures during the cooling process
13. 30-micron diamond grit equals:
- (A) 30 mesh ; (B) 300 mesh; (C) 600 mesh; (D) 1000 mesh
14. All transparent minerals in reflected light have
- (A) varying shades of gray; (B) generally relatively dark; (C) Both A and B; (D) High power of crystallization
15. Ilmenite is characterized by:
- (A) strong bireflectance; (B) medium bireflectance; (C) weak bireflectance ; (D) Isotropic
16. Skeletal crystals have:
- (A) the shape of a droplet or droplet; (B) a dendritic crystalline form; (C) large euhedral complete crystals; (D) produced from the primary deposition or metamorphism.
17. Complex fabric shapes are commonly produced due to:
- (A) cooling at high depth; (B) crystallization from slow cooling processes; (C) rapid deposition or superposition effects, especially replacement; (D) continuous deposition and slower growth.
18. The macroscopic scale of texture refers to:
- (A) grain-scale; (B) hand specimen scale; (C) mappable unit; (D) Ultra-fine scale;
19. Carbonate minerals can be removed during the preparation of polished sections by:
- (A) rinse sediments; (B) K-permanganate; (C) HCl, (D) trichlorethane
20. The approaches to texture classification used in the literature are:
- (A) a purely descriptive classification; (B) a genetic classification based on assumptions about the formation of deposits; (C) a technical classification, generally based on physical or chemical criteria. (D) all of the above.
21. Metallic Minerals:
- (A) can be easily identified under transmitted light; (B) appear black in plane-polarized light (PPL) regardless of the mineral's orientation or the presence of polarizers; (C) are recognized for their low hardness; (D) hardly polished.
22. Using appropriate chemicals in:
- (A) etching study; (B) polarization color identification; (C) microhardness test; (D) Internal reflections.
23. Intergrowths refer to:
- (A) simultaneous deposition of one mineral with another; (B) abrupt changes in the orientation of cleavages or of rows of inclusions; (C) any idiomorphic grains; (D) optical path in the specimen
24. Texture belonging to the original rock:
- (A) relic bedding; (B) blastic; (C) porphyroblastic; (D) poikiloblastic.
25. Cassiterite-wolframite-topaz-tourmaline assemblage indicates:
- (A) very high temperature; (B) high temperature; (C) medium temperature; (D) low temperature.



**Answer (T) for True sentences Or (F) for False sentences: (One mark each) (25 M)**

26. Sphalerite can be seen to have a much higher reflectance than neighboring pyrite.
27. Twinning is controlled by the crystal structure itself or by the influence of the surrounding crystal.
28. In polymetallic minerals, textures reflect the order of mineral formation and history after their establishment.
29. Examining the equilibrium mineral assemblages is necessary for understanding phase relations and the correct interpretation of geothermometric results.
30. Internal color reflection is a phenomenon that can be observed in various minerals, with notable examples including cassiterite, sphalerite, and hematite.
31. The grain shape is controlled by the crystal lattice arrangement.
32. Mineral assemblages and color change analysis are used in the qualitative geothermometry estimation.
33. In contrast with the study of thin sections in transmitted light, the properties of minerals studied in reflected light are qualitative.
34. Replacement is a more common phenomenon observed at lower temperatures and pressures, where open spaces are abundant and fluid flow is rather easy.
35. In the investigation of ceramic materials and cement clinker, the etching method plays an important role since the mineral components usually exhibit only small reflections and structural differences in incident light.
36. Poorly polished pyrite often shows apparent anisotropy, which will disappear if the polish is improved.
37. Generally, gangue minerals replace the host rock but not the ore minerals.
38. An incomplete filling gives a good indication for determining paragenesis.
39. Twinning is best seen in anisotropic minerals under crossed polars.
40. Graphic texture refers to the simultaneous deposition of one mineral with another.
41. In the complete filling of voids, porosity could result, so it will be hard to make a polished section of good quality.
42. Variations in the crystal structure of minerals can affect the abundance of internal reflections.
43. The replacement process is accompanied by a noticeable change in the volume of the rock.
44. Dissolved impurities may affect the degree of reflectivity.
45. Some isotropic minerals show a distinct and characteristic sequence of colors as the polarizer is turned, degree by degree, to and beyond the minimum position.
46. The occurrence of minerals with some chemical similarity in some textural relationship is often a good indication of replacement.
47. Relative hardness measurements include polishing and scratch hardness, whereas quantitative measurement is achieved through indentation hardness.



48. Zoning is defined as the ratio of the intensity of the light reflected by a mineral to the intensity of the light incident upon it, expressed in percent.
49. Reflection pleochroism is the change in intensity of the light reflected from a mineral as it is rotated on the microscope stage.
50. As the distance between the objective lens and the polished section is increased (i.e., the stage is lowered), the Kalb light line will move into the softer mineral.

إنتهت الأسئلة وبالتوفيق

أ.د/ جلال حامد الحباك - قسم الجيولوجيا



**Part I - Petrophysics ( 25 marks )**

**I. Define FIVE ONLY of the following :** (5 marks )

Bulk modulus - Poisson's ratio - Cleavage - Salinity -Hardness – Stress- Luster.

**II. Write on FOUR ONLY of the following:** (20 marks )

- 1- Initial Gas and Oil-water system.
- 2- Kozeny Correlation and Complex Matrix.
- 3- Factors affecting on Permeability and Gray wacke sediment.
- 4- Porosity on Carbonate rocks and Types of Conductivity.
- 5- Initial Oil and Absolute permeability.
- 6- The resistivity of Clay and Porosity of Clastic rocks.

**Part II - Well Logging ( 25 marks)**

**Answer the Required ONLY from the following questions:**

**1) Put a tick (✓) in front of the correct statement and (X) in front of the incorrect one:** (7 marks)

**i) The gamma rays detected in the bulk density log are:**

- a) Natural gamma rays are present in the formation. ( )
- b) Gamma rays from a thermal neutron source. ( )
- c) Gamma ray scattering from the formation. ( )
- d) Gamma rays resulting from neutron absorption. ( )

**ii) Which of the following log readings indicate that a rock is permeable?**

- a) Low resistivity. ( )
- b) Low SP deflection. ( )
- c) Low gamma-ray. ( )
- d) Smaller caliper relative to drilling bit size. ( )

**iii) SP log may be measured when:**

- a)  $R_{mf} = R_w$  ( ).
- b) The borehole is cased ( ).
- c) The borehole is dry. ( ).
- d)  $R_{mf} \neq R_w$  ( ).

بقية الأسئلة في الصفحة التالية

**iv) Focused logs are used to minimize the effect of :**

- a) The borehole. ( )                      b) The surrounding formations. ( )  
c) The invaded zone. ( )                      d) All of the above. ( )

**v) The bulk density log measures:**

- a) Formation density directly. ( )      b) Formation electron density ( )  
c) Formation fluid density only. ( )      d) Drilling fluid electron density. ( )

vi) If the measured resistivity of uninvasion zone ( $R_i$ ) is 19.2 ohm-m, the resistivity of water ( $R_w$ ) is 1.33 ohm-m, the saturation exponent ( $m$ ) is 2, constant ( $n$ ) is 2 and the computed value of hydrocarbon saturation ( $S_h$ ) is 20 %, the value of formation resistivity factor ( $F$ ) is:

- a) 9.42 ( )      b) 9.95 ( )      c) 9.24 ( )      d) 9.84 ( )

vii) The effect of gas and shale on the neutron measurement is:

- a) Similar effect, each causing high neutron porosity value. ( )
- b) Opposite effect, shale causing high and gas causing low neutron porosity value.( )
- c) Similar effect, each causing low neutron porosity value. ( )
- d) Opposite effect, shale causing low and gas causing high neutron porosity value.( )

2) Using sketches compare between the following (select TWO ONLY): (6 marks)

- a) Components of bulk density and neutron logging tools.
- c) Relations used for resistivity estimation from normal and lateral resistivity tools.
- c) Diffusion and shale membrane origin of self-potential (SP) log.

3) Write the formulas used for estimating TWO ONLY of the following (define-all symbols in each formula): (6 marks)

- Archie formula for mud filtrate saturation ( $S_{xo}$ ) of invaded flushed zone.
- Formation water resistivity ( $R_w$ ) from Self-Potential log.
- Total porosity and secondary porosity from bulk density, neutron logs and sonic logs.

4) Answer briefly and concisely **THREE ONLY** of the following **FOUR** questions: (6 marks)

- Lateral resistivity tools are better than normal resistivity tools - why?
- What are the basics of induction resistivity tools and the condition of their use in logging measurement?
- Reveal the environmental borehole factors influencing well logging tools and how they can be protected?
- The main differences between total gamma ray and spectral gamma ray logs?

<<<<<<◇>>>>>> **Good Luck !!** <<<<<<◇>>>>>> **نهاية الأسئلة** <<<<<<◇>>>>>>

*Examiners: Prof. Dr. Awad A. Omran & Dr. Mohamed F. Khalil*



Credit hour system: first semester; final examination  
Geophysics Program (Academic Year 2023-2024)  
Geoarchaeology (G 458)

Fourth Level

Allowed Time: 2 Hours

ملحوظة: الامتحان في ثلاث صفحات

(50 M) الجزء التحريري

**Choose the correct answer from A, B, C, and D (one mark each).**

1. Assist in evaluating the impact of the post-depositional environment on the condition or safety of the archaeological deposits.  
(A) Conducting geochemical investigations; (B) Conducting geomorphological and geoarchaeological investigations; (C) Utilizing geophysical exploration techniques (D) Conducting biological studies
2. The Turin Papyrus Map illustrates a 15 km stretch of:  
(A) Western Desert; (B) Wadi Alaqi; (C) Wadi Hammamat, Eastern Desert; (D) Fayoum area
3. Plaster differs from mortar primarily in:  
(A) having high amounts of ash; (B) having high amounts of hematite;  
(C) having a temper dominated by sand rather than gravel-size material;  
(D) having a dominant silica content rather than feldspar
4. The stones commonly used as finely dressed blocks, slabs, or columns in monumental and costly buildings were:  
(A) Granites and marbles; (B) Limestone; (C) Sandstone; (D) Shale
5. The calcareous-sandstone temple at Qasr el-Sagha in northern Fayoum belongs to:  
(A) Islamic Era; (B) Middle Kingdom (C) Early Kingdom (D) Late Kingdom
6. Seasoning of stones:  
(A) darkens the stone; (B) increases the stone's porosity; (C) makes the stone hard and compact;  
(D) reduces the cost of the stone.
7. The study of the evolution of landforms is known as:  
(A) Geomorphology; (B) Geochemistry; (C) Petrography; (D) Archaeometry
8. The stones used in the construction of the Hibis sandstone temple were likely sourced from:  
(A) Isna shale; (B) Gebel el-Teir quarry; (C) Eastern Desert; (D) Minia quarry
9. From early Dynastic times onward, the preferred material for pyramids, mastaba tombs, and temples within the region was:  
(A) Diorite; (B) Limestone; (C) Gravels; (D) Sandstone
10. Tools for recreating ancient landscapes include:  
(A) Mineralogy; (B) Historical Geology; (C) Isotope Geology;  
(D) Geomorphology and Sedimentology
11. The beginning of trade around the Aegean can be marked by obsidian flakes, which occurred around:  
(A) 2000 BC; (B) 3000 BC; (C) 4000 BC; (D) 5000 BC
12. The earliest metal tool to be manufactured around 6000 BC was:  
(A) Gold; (B) Lead; (C) Zinc; (D) Copper

13. Geochemical exploration tools used to locate ancient settlements include:  
 (A) Analysis of silicon and aluminum; (B) Analysis of silicon and oxygen;  
 (D) Analysis of iron and aluminum (E) Analysis of phosphate, nitrogen, and carbon.
14. Soil phosphate mapping is the most widely used chemical method for archaeological site prospecting because:  
 (A) Phosphate is readily fixed to soil particles after the decomposition of organic material;  
 (B) Phosphate is more abundant in the soil; (C) Phosphate is easy to analyze;  
 (D) It is a cost-effective method.
15. Archaeologists analyze ancient civilizations by investigating various aspects, including:  
 (A) Geological formations; (B) Soil composition; (C) Artifacts; (D) Groundwater sources
16. Gold occurrences in Egypt and Sudan are located in:  
 (A) The Phanerozoic sediments; (B) The Precambrian basement rocks;  
 (C) Along the Mediterranean Coast; (D) In the Recent Basalt Volcanoes
17. Preferred location for urban civilizations:  
 (A) Adjacent to and within the floodplains of major river systems; (B) near oceans;  
 (C) within desert regions; (D) surrounding mining areas
18. 19. A chemical sedimentary rock formed by the deposition of silica from seawater and commonly found in many prehistoric sites:  
 (A) Limestone; (B) Phosphate; (C) Chert; (D) Anhydrite
19. Pottery is the general term for artifacts made mostly from:  
 (A) Granite; (B) Clay; (C) Limestone; (D) Tuffs
20. The ideal characteristics of the building stone are as follows:  
 (A) It should possess hardness, strength, and durability. (B) It should be soft. (C) It should have a light color. (D) It should be laminated.
21. The provenance of artifacts is determined by techniques such as:  
 (A) Mineralogy (B); Stable Isotopes (C); Trace Elements (D): All of them
22. The most crucial elements that were readily accessible in their native form and had significant value for ancient civilizations were:  
 (A) Iron; (B) Gold and copper; (C) Aluminum; (D) Cobalt.
23. The branch of science that provides a wealth of information for mineralogists, geologists, and archaeologists involved in archaeometry studies of our past is:  
 (A) GIS; (B) Remote Sensing; (C) Archaeomineralogy; (d) Archaeogeology
24. The main source material for archaeological ceramics is:  
 (A) Gypsum; (B) Sediments rich in clay; (C) Quartz; (D) Gneisses
25. Prehistoric knives and spear points in various regions across the globe were crafted using different materials. These materials included:  
 (A) Wood; (B) Obsidian flakes; (C) Conglomerate; (D) Talc

**Answer (T) for true sentences or (F) for false sentences: (One mark each)**

26. Diorite and gabbro were the main building stones of ancient Egypt.
27. Abrasion and fire resistance are the main physical properties of building stones.
28. Stable isotopes (isotopic ratios of oxygen, carbon, and strontium) are used for classical marbles and strontium for alabaster and gypsum.





**Fourth Level Examination in  
Sedimentary Basins & Sequence stratigraphy (G420)  
For Geology and Geophysics students**

**Time: Two Hours** (50 degree) **18-Janu.-2024**

**PART-I: Sedimentary Basins (25 degree)**

**I-Answer the following question:**

- 1- a. write an account on the basin shapes. (4.5 marks)  
b. what are pre-depositional basins? Mention the characteristics of these basins. (4.5 marks)

**II- Answer Two questions Only from the following:**

- 2- a. What is a rift basin? (4 marks)  
b. Why are rifts important? (4 marks)  
3- a. Where are the foreland basins formed? In subduction-related settings or collision-related settings? (4 marks)  
b. Describe briefly the sedimentary-fill in back arc basins. (4 marks)  
4- If you drill through a passive continental margin what is the rock succession you would expect to see from base to top? (8 marks)

**PART-II: Sequence Stratigraphy (25 degree)**

**I-Write a briefly on TWO question ONLY of the following:** (15 marks)

1. Explain the term "Depositional Sequence" and the different system tracts that may constitute a sequence. Relate the systems tracts to eustatic sea level changes.
2. The criteria of recognition of sequence boundaries.
3. Type (1) and Type (2) sequence boundaries.

**II- Choose the correct answer for the following statements:** (5 marks)

**4. The sequence stratigraphy method of stratigraphic interpretation**

- a. Supports the idea that convection currents and subduction zones are the key to understanding depositional models.
- b. Combines the stratal architecture (geometric relationship) of the sedimentary facies and the chronological order of their accumulation to enhance the interpretation of depositional setting and prediction of stratal continuity.
- c. Involves microseismic, and nothing more.
- d. Allows the geologist to rule out salt tectonics.



## 5. Bounding surfaces

- a. Are subdividing surfaces of the sedimentary section and are commonly generated by the ~~changing relative sea level~~.
- b. Surfaces that never tie to rebounds due to isostasy and eustasy.
- c. Are boundaries that never have to do shales and TOC, and cannot be considered key indicators of the kitchen.
- d. Are blurring surfaces that have to do with fracture patterns.

## 6. Highstand systems tract consists of

- a. All the regression deposits that accumulated after the onset of a relative sea-level fall and before the start of the next relative sea-level rise
- b. All the regression deposits that accumulated after the onset of a relative sea-level fall and before the start of the next relative sea-level rise
- c. Deposits that accumulate after the onset of relative a sea-level rise
- d. Deposits that contain characteristic transform fractures that often stream biogenetic fluids

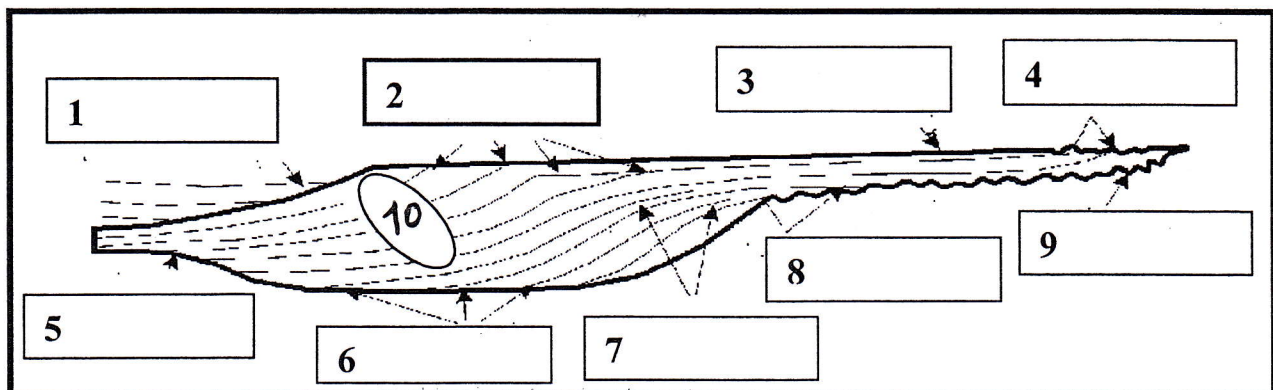
## 7. A systems tract consists of

- a. The regressive deposits that form when sediment accumulation rates exceed the rate of relative sea-level rise
- b. Genetically associated stratigraphic units that were deposited during specific phases of the relative sea-level cycle
- c. Tectonically active basins that adjoin each other
- d. Rising sea level

## 8. formed when the transgressing sea reworks either the prior sequence boundary or the sediments that may have collected during the forced regression that may have followed the generation of that sequence boundary.

- a. Condensed sequence
- b. Ravinement erosion surface
- c. Contact metamorphosis
- d. Secondary dolomite mixed with sphalerite

## 9. Identify the different types of seismic reflections and terminations given in the following figure. (5 marks)



بسم الله الرحمن الرحيم

جامعة أسيوط  
كلية العلوم  
قسم الجيولوجيا

Assiut University  
Faculty of science  
Geology Department

إمتحان المستوى الرابع (شعبتي الجيولوجيا والجيوفيزياء)

مقرر 415 ج (جيولوجية مصر)

Course 415 G (Geology of Egypt)

الزمن ثلاث ساعات

الدرجة: 50 درجة

دور يناير 2024

الإمتحان مكون من أربعة صفحات

**Part I (PreCambrian) 10 Markes**

**Question 1:** Answer the following question (10 Marks).

- 1- Display an accepted concept for the development of the basement complex in the Arabian Nubian Shield.

**Part II 'Phanerozoic (30 Marks)**

Answer Three Questions of the following:

**Question 2: (10 Marks)**

- 2- Describe in a time table the litho-, bio- and chemostratigraphy as well as the paleoenvironment and paleontology of the Paleocene-Eocene boundary interval as given in the Global Stratotype Section and Point (GSSP) at Dababiya village , south Luxor, and correlate stratigraphically the rock units of this interval in both Dababiya and Abu Ghurra. (10 Marks)

**Question 3: (10 Marks)**

- 3- Compare and correlate in a time table the Oligocene-Miocene rock units in the Northern Western Desert, the Nile Delta and the Gulf of Suez. (10 Marks)



**Question 4 (A- B): (10 Marks)**

**4- A: Mark the correct word from the three words in the brackets (5 Marks).**

1. The Alamein Member is dolomitic limestone belonging to the (Lower Cretaceous) (Upper Cretaceous) (Upper Jurassic) age.
2. The Jurassic Wadi Natrun Formation is made up of (dolomitic limestone) (sandstone) (shale).
3. Fossiliferous Devonian strata were identified in (10) (5) (3) wells in the subsurface of the northern Western Desert.
4. Cambrian Strata were fully penetrated in (5) (10) (3) wells in the subsurface of the northern Western Desert.
5. Bahrein Formation is (Jurassic) (Cretaceous) (Silurian) in age.

**4-B: Compare and correlate the Middle –Upper Eocene rock units and their equivalent time units in Fayoum, Nile Valley, Cairo and Sinai. (10 Marks)**

**Question 5 (A- B): (10 Marks)**

**5-A: Select from list B the equivalent rock units to those of list A, and re-arrange the units of list A in stratigraphic order according to their ages. (5 Marks)**

**List A**

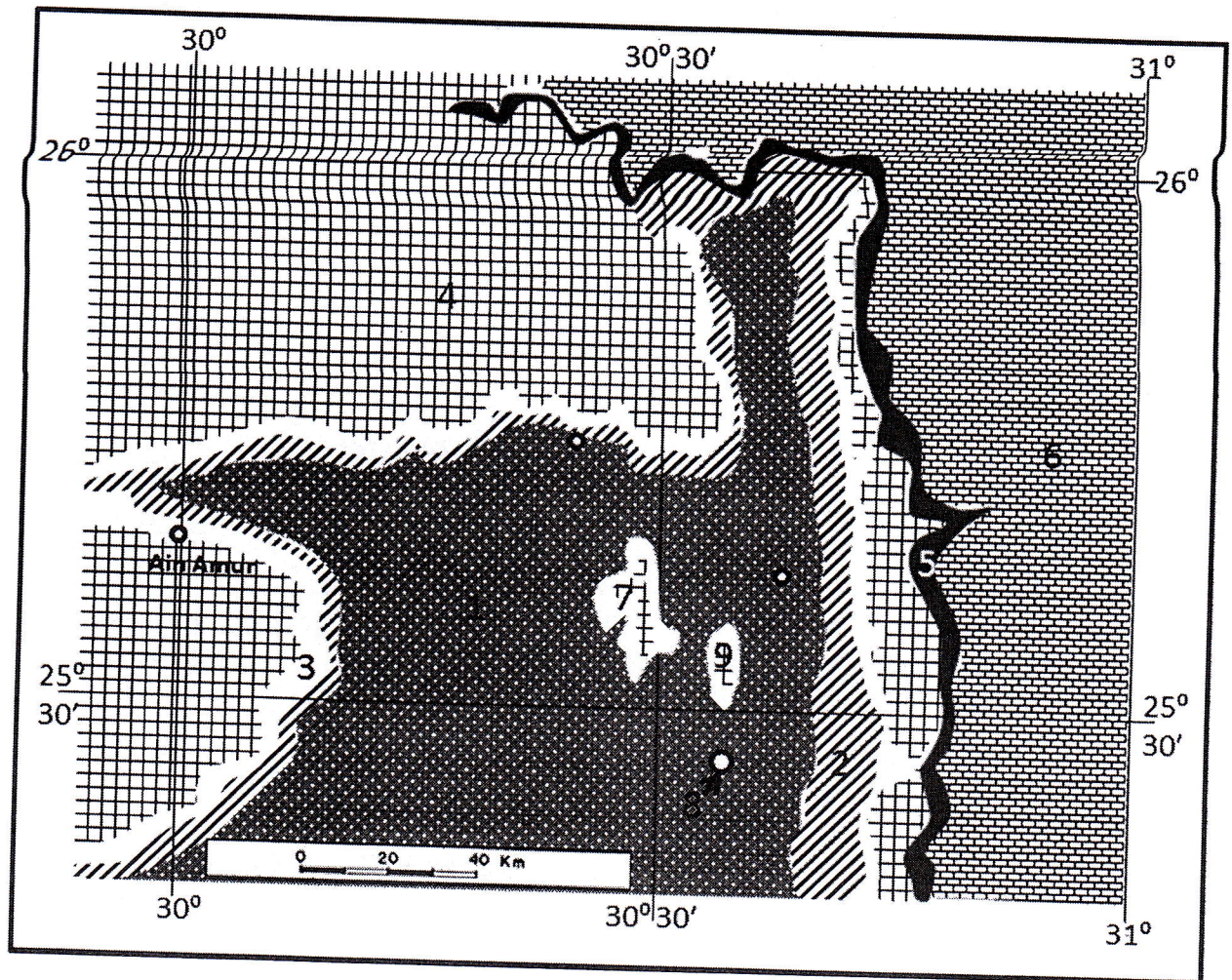
Belayim Formation  
Kiseiba Formation  
Dabaa Formation  
Garra Formation  
Birket Qarun Formation  
Mamura Formation  
Ryan Formation  
Tanka Formation  
Bir El Temsah Formation  
Kareem Formation

**List B**

Rudeis Formation  
Mokattam Formation  
Um Mahara Formation  
Quseir-Dakhla Formations  
Syatin Formation  
Tarawan Formation-Hanadi Member  
Observatory Formation  
El Qurn-Wadi Garawi Formation  
Abu Madi Formation  
Geisum Formation  
Qasr El Sagha – Qattrani Formation  
Dungul Formation

**5-B: Look to the following map and define: a) the name of district, b) the names , lithology and age of rock units from 1 to 6, C) the name of topographic and geographic features from 7-9 (5 Marks)**





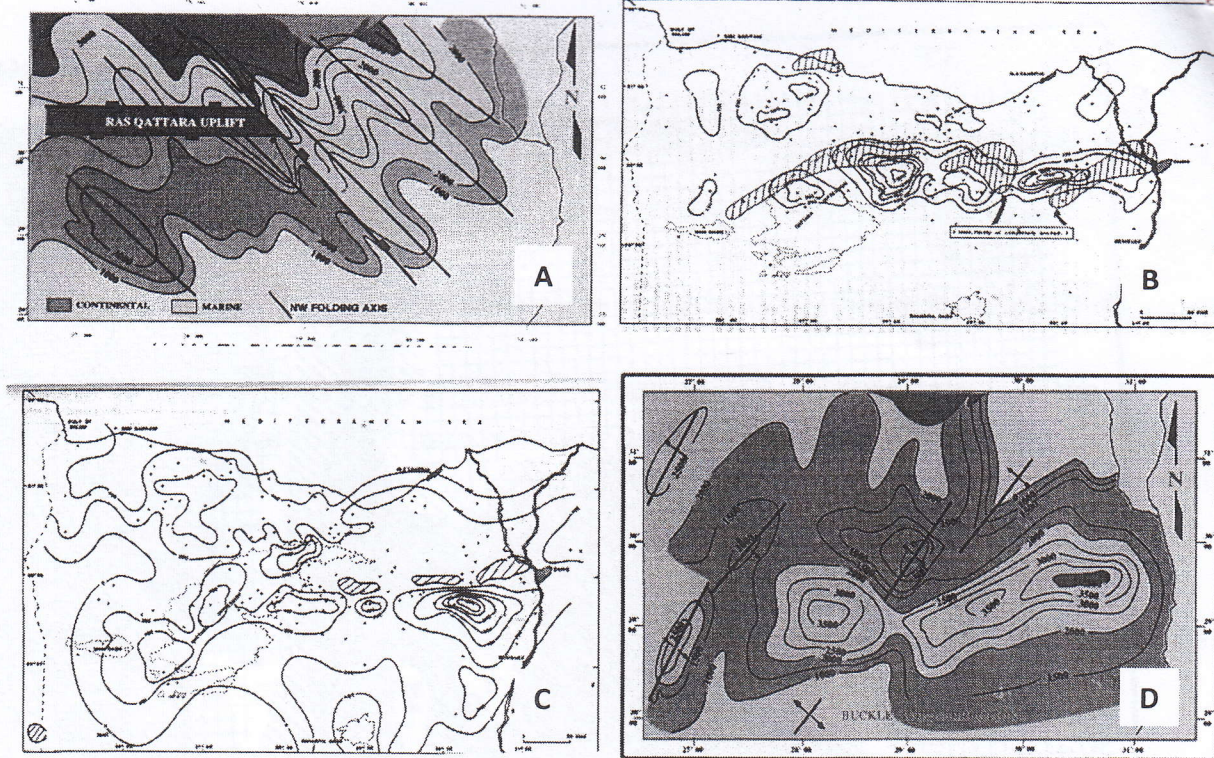
**Part III (Structural Framework, Paleogeography and Paleoenvironment)**  
**(10 Marks)**

**Question 6 (A-C) :Answer the following question: (10 Marks)**

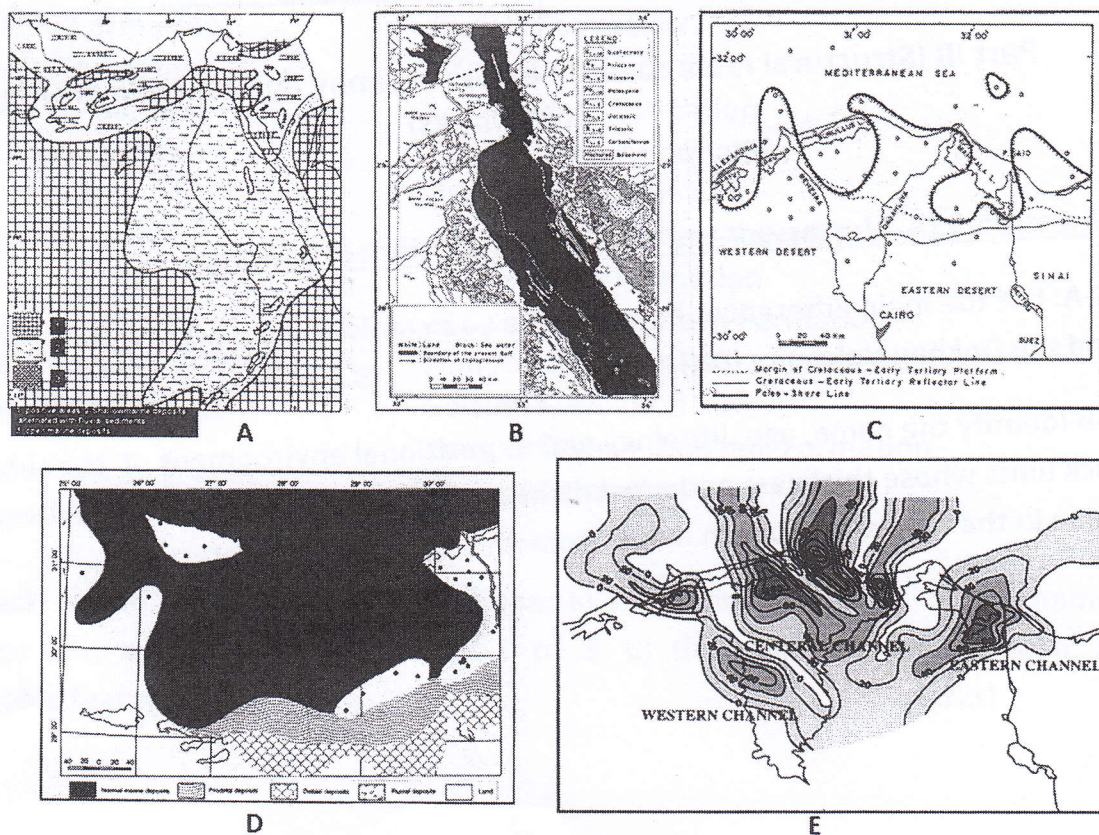
**6-A: List the main differences between the younger island arc Metavolcanics (YMV) and the Dokhan Volcanics (DV). (3.5 Marks).**

**6-B Identify the name, age, lithology and depositional environment of the subsurface rock units whose thickness and areal distribution in the northern Western Desert are given in the following isopach maps from A to D . (2.5 Marks)**





6-C: Look to the following paleogeographic maps and define the Period, Epoch and Absolute age during which the Egyptian land was submerged in a way such as in figures A, B, C, D and E. (4.0 Marks)



Good Luck. Prof. Khaled Ouda; Prof. Ali Khudeir





**First Semester, Fourth Level Final Examination**

<b>Time: 1 hour</b>	<b>Total marks: 25</b>	<b>Paleomagnetism (G453)</b>	<b>January, 2024</b>
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**Answer the following questions**

**A. Define the following terms (5 marks)**

1. Geomagnetic secular variation
2. Magnetic domains
3. Ferromagnetism
4. Curie temperature
5. Natural Remanent Magnetization

**B. Put a check mark (✓) or wrong (X) with correction. (10 marks)**

1. Magnetic dip or magnetic inclination varies at different points on the Earth's surface with positive and negative values in the southern and northern hemisphere, respectively. ( )
2. The magnetic coercivity of a single-domain particles is lower than the magnetic coercivity of a multi-domain particles. ( )
3. According to geocentric axial dipole model, the magnetic field is produced by a single magnetic dipole at the center of the Earth and aligned with the rotation axis. ( )
4. Alternating field demagnetization technique can be applied on rocks containing hematite particles. ( )
5. Paramagnetic solids contain atoms with atomic magnetic moments and interaction between adjacent atomic moments, and acquire induced magnetization. ( )
6. Saturation magnetization of magnetite decreases with increasing temperature and become zero at the Curie temperature, which is 580°C. ( )
7. Formation of magnetic domains increases the magnetostatic energy because the percent of surface covered by magnetic charges is reduced. ( )
8. The procedure for thermal demagnetization involves heating a specimen to an elevated temperature, then cooling to room temperature in zero magnetic field. ( )
9. Thermoremanent magnetism (TRM) is a natural remanent magnetization (NRM) produced by cooling from above the Curie temperature ( $T_c$ ) in the presence of a magnetic field. ( )
10. The Earth's magnetic field is generated by electric currents due to the motion of convection currents of molten iron in the Earth's inner core. ( )



(10 marks)

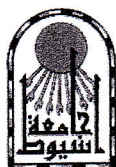
C. Choose the correct answer

1. ....solids have atoms with magnetic moment and acquire remanent magnetization  
a) Paramagnetic                      b) Ferromagnetic                      c) Diamagnetic
2. Magnetic declination, the angle from geographic north to horizontal component, ranges from.....  
a) zero to 360 degree              b) zero to 90 degree              c) -90 to +90 degree
- 3.....is the solid solution series formed between two end members magnetite ( $\text{Fe}_3\text{O}_4$ ) and Ulvospinel ( $\text{Fe}_2\text{TiO}_4$ )  
a) Titanohematite                      b) Titanomagnetite                      c) Pseudobrookite
4. Origin of geomagnetic secular variation is.....  
a) non-dipole field changes              b) dipole-field changes              c) both (a) and (b)
5. With increasing grain size of ferromagnetic particle, the number of magnetic domains.....  
a) increases                      b) decreases                      c) does not change
6. Magnetic susceptibility for a diamagnetic material is negative and.....on temperature.  
a) dependent                      b) independent                      c) neither a nor b
7. .... are the most important ferromagnetic minerals.  
a) Iron-titanium oxides                      b) Iron-oxyhydroxides                      c) Iron-sulfides
8. A paleomagnetic ..... is an exposure of a particular bed in a sedimentary sequence or a cooling unit in an igneous complex.  
a) site                      b) sample                      c) specimen
9. Magnetite grains of diameter  $d > 10 \mu\text{m}$  contain scores of domains and are referred to as ..... grains  
a) multi-domain                      b) single-domain                      c) pseudo-single-domain
10. ....remanent magnetization is one of the types of natural remanent magnetizations acquired during deposition and lithification of sedimentary rocks.  
a) Detrital                      b) Chemical                      c) Thermal

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**End of Questions**

Good luck.....Dr. Ahmed Nasser Mahgoub



First Semester, Fourth Level Final Examination

Time: 2hours	Total marks: 50	Paleomagnetism and Ground Penetrating Radar (G453)	January, 2023
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**Second Part: Ground Penetrating Radar**

(25 marks)

**Answer the following questions:**

1. Choose the correct answer from (a), (b), and (c). (10 marks)
  - 1) One of the frequency- dependent properties that control the behavior of electromagnetic energy in a medium is.....
    - (a) transmitter frequency
    - (b) magnetic permeability
    - (c) GPR wavelength
  - 2) The primary effect of conductivity on electromagnetic waves is .....
    - (a) energy loss
    - (b) energy amplification
    - (c) energy reflection
  - 3) The relative permittivity of sediment is governed by its .....
    - (a) magnetite content
    - (b) clay content
    - (c) water content
  - 4) ..... material, the original pulse amplitude ( $A_0$ ) decreases exponentially with depth ( $z$ ) according to  $A = A_0 e^{-\alpha z}$ , where the attenuation constant  $\alpha = 0.5\sigma \sqrt{\mu/\epsilon}$ .
    - (a) In porous
    - (b) In high-loss
    - (c) In low-loss
  - 5) ..... greatly influences the electromagnetic wave propagation in terms of velocity.
    - (a) dielectric constant
    - (b) magnetic permeability
    - (c) permittivity
  - 6) For most geological materials, the relative magnetic permeability ( $\mu_r$ ) is near.....
    - (a) 1
    - (b) 10
    - (c) 100
  - 7) Good insulator ..... GPR signal.
    - (a) refracts
    - (b) reflects
    - (c) absorbs
  - 8) The dielectric constant has ..... proportionality with propagation velocity.
    - (a) inverse
    - (b) no
    - (c) direct
  - 9) The higher GPR attenuation is caused by the high ..... of the soil layers and result in short penetration depth.
    - (a) magnetic permeability
    - (b) electrical conductivity
    - (c) permittivity
  - 10) Short GPR wavelengths are suitable for concrete structures using ..... transmitter frequency.
    - (a) high
    - (b) medium
    - (c) low



2. Put (True) or (False) at each point.

(15 marks)

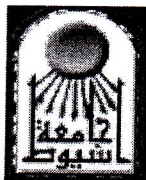
1. The most commonly used antenna orientation is the one designed perpendicular (PR) - broadside (BD).
2. Calculating the GPR velocity using reflection pattern from point source is similar to the reflection pattern planar interface with this equation  $V=(X^2/(t^2-t_0^2))^{0.5}$ .
3. short GPR wavelengths are suitable for mapping geological layers using low transmitter frequency.
4. Higher GPR resolution for subsurface targets achieved by high transmitter frequency and Short GPR wavelength.
5. Low GPR resolution for subsurface targets caused by high transmitter frequency and long GPR wavelength.
6. The lower GPR attenuation is caused by the high electrical conductivity of the soil layers and result in short penetration depth.
7. GPR velocity is high in materials such as dry sand because of high dielectric constant.
8. GPR velocity is low in saturated materials such as wet sand because of low dielectric constant.
9. The magnetic permittivity must be lesser than  $30,000 \times 10^{-5}$  SI to influence the GPR signal.
10. Good conductor normally absorbs GPR signal.
11. The presence of iron and iron oxides can enhance the relative magnetic permittivity.
12. The relative permittivity plays an important role in both propagation and reflection of electromagnetic waves.
13. The reflection strength of GRP waves being inversely proportional to the magnitude of change in impedance between different layers.
14. GPR is ineffective in materials such as those under saline conditions or with high clay contents.
15. Zero-offset profiling (ZOP) uses a configuration where the transmitter and receiver are moved in two parallel boreholes with a constant distance, resulting in parallel ray paths in the case of homogeneous.

End of questions

GOOD LUCK

Assoc. Prof. Mostafa Thabet Mohammed





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### **Frist Semester Final Examination**

Subject: Subsurface Geology (409G)

Student: Fourth level (all groups).

Total marks 50

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#### **Answer the following questions**

##### **I- Answer (T) for true sentences or (F) for false sentences ( 0.5 mark each).**

1. Local sources of subsurface data are generally include surface and subsurface sources. The surface sources such as borehole temperature, porosity and permeability of the reservoir rocks.
2. The subsurface sources of data are such as cores, cuts and logs .....
3. In structure contour map, normal faults of downthrown more than the thickness of the faulted bed, the contour lines at the location of the fault plane show repetition of contours.
4. In isopach map, reverse fault of downthrown more than the thickness of the faulted beds, the contour lines show fault gap.
5. The erosional surfaces between two rock units can defined from the isopach maps of the two units by alternative thick in the lower unit opposite thin in the upper unit.
- 6- The main objectives of subsurface sectioning and mapping are mainly industry.
- 7- The reference surface in constructing structure cross section and structure contour map is the main sea level.
- 8- The reference surface in constructing geoelectric and geosiesmic cross sections is the bedding plane.
- 9- In normal cross sections or fence diagrams the vertical scale is similar to the horizontal.
- 10- In case of construction structure contour map for any bedding plane, this plane may be eroded or truncated.
- 11- Structure contour maps can show the tectonic history of many tectonic phases.
- 12- Structure contour maps, of bedding planes can show the parameters of the fault planes.
- 13- Paleogeologic maps can used in reservoir evaluation.
- 14- For studying the paleotectonics, structure contour maps are used in conjunction with palinospastic maps.
- 15- Ratio maps are constructed to show ratio of one component to the total components of the rock unit.
- 16- Percentage maps are generally applied in defining the paleoenvironment.
- 17- Isopach maps are constructed by using the drilled thickness of the rock unit.
- 18- Isolith maps are constructed to show the aerial distribution of the sedimentary facies.
- 19- Isochore maps are constructed based on the true thickness of the rock unit.
- 20- Folding on the structure contour maps is identified by repetition of contour line along definite direction.

- b- Structure contour maps
  - c- Both a & b
- 44- Beds attitudes (strike & dip) and fault parameters can be determined from
- a- subsurface stratigraphic cross section
  - b- Subsurface normal structural cross section
  - c- Subsurface schematic cross section
- 45- In log correlation for structures identification, the correlation must look for:-
- a- Missing of one or more layers in some logs
  - b- Thinning or thickening of layers in some logs
  - c- Both a & b
- 46- Drilling horizontal layers by directional drilling TMT is increasing with:-
- a- Decreasing of deviation angle
  - b- Increasing of deviation angle
  - c- Increasing of dip angle
- 47- In isopach map, abrupt increasing of contours in the upthrow side of the fault plane in compared with in the downthrown side indicating to:-
- a- Normal growth faults
  - b- Reverse growth faults
  - c- Wrench growth faults
- 48- Repetition of layers during vertical drilling without definite changing in the repetition interval along the section in different wells indicts to:-
- a- Reverse fault
  - b- normal fault
  - c- recumbent fold
- 49- For tracing the subsurface structures along definite direction, the collected subsurface depth to the bedding planes must be referred to:
- a- Non- eroded bedding plane.
  - b- Main sea level
  - c- Unconformity surface
- 50- Geochemical cross sections and fence diagrams are applied to:-
- a- Detect subsurface structures
  - b- Detect the subsurface environments
  - c- Lateral and vertical chemical variations of the rock components
- 51- 3D geologic model is generally constructed by :-
- a- Correlating the similar rock units along more than one horizontal direction.
  - b- Importing the subsurface geology data into specialized software.
  - c- Looking for missing rock units along the used Wells.
- 52- Data derived from well sampling are:-
- a- Cores and cuts
  - b- Porosity and permeability
  - c- Rock seismic velocities



- 21- Nosing in contours with acute angle on the structure contour maps pointing to strike slip faults.
- 22- Missing of contours in a definite location on structure contour maps indicates normal fault of downthrow more the thickness of the faulted bed.
- 23- Regular oval contour lines in isopach map of definite rock unit indicating to shelf area.
- 24- Random contours in isopach map of definite rock unit indicating to intercratonic area.
- 25- Reverse faults with different downthrows are easily detected from structure contour map alone.
- 26- Isolith with isopach maps are generally used in defining the erosional surfaces.
- 27- France diagrams are considered 3D models
- 28- Fence diagrams are considered 3D viewer.
- 29- Symmetrical folds in case of structure contour maps are identified by un-equal contour spacing of the repeated contours along definite direction.
- 30- The general outlines of the salt domes can identified from isopach maps of the successive rock units outside the dome periphery.
- 31- Isopach maps are more accurate than structure contour maps in defining structures especially faults.
- 32- Paleorelief maps are considered structure contour maps for unconformity surfaces.
- 33- For studying the geologic and tectonic history of Egypt isopach and facies maps are constructed for the Egyptian sequence from the basement rocks to the Thebes formation
- 34- Offlap and onlap phenomime's are recognized from isopach map of one rock unite.
- 35- In isolith maps contours closed rapidly to zero indicate truncation.
- 36- Cross sections are classified based on scale only.
- 37- Mechanical contouring is applied in case of random data.
- 38- Interpretive contouring is consider equals space contouring.
- 39- Facies map can apply in reservoir evaluation.
- 40- Structure contour maps can constructed for bedding planes, axial planes of folds and fault planes

## II- Choose the correct answer A, B or C of the following (one mark each)

- 41- Offlap phenomena in subsurface can be recognized from successive isopach maps by:
  - a- Upward regular migration of zero thickness toward the recent layers
  - b- Upward regular migration of zero thickness toward the old layers
  - c- Upward irregular migration of zero thickness toward the recent layers
- 42- concordance in contours of ratio, percentage, isolith and isopach maps for different facies of rock unit indicates to:-
  - a- Regular sedimentation
  - b- Discontinuities in sedimentation
  - c- Migration of strand line
- 43- The salt-dome morphology and the related petroleum traps can be recognized and evaluated from:-
  - a- Isopach maps

- 53- Data derived from well measurements are:-
- a- Cores and cuts
  - b- Rock seismic velocities, resistivity and saturation
  - c- Topographic maps
- 54- Subsurface mapping is applied for:-
- a- Academic purposes
  - b- Industry purposes
  - c- Both a&b
- 55- Reverse fault of downthrown more than thickness of the down- faulted beds can be recognized from structure contour map by:
- a- Presence of fault gap
  - b- Repetition of contour lines within the fault zone area
  - c- Repetition of only one or two contours in a very narrow area
- 56- Nosing in the structure contour map with centre- ward decreasing of contour values and similar contour distance in both sides denoting to:
- a- Asymmetric plunging syncline
  - b- Symmetrical plunging anticline
  - c- Symmetrical double plunging syncline
- 57- Wrench Faults of horizontal displacement can be recognized on structure contour map by:
- a- Nosing of the contour lines
  - b- Pending of the contour lines
  - c- Repetition of the contour lines
- 58- Nosing in the structure contour map with centre- ward increasing of contour values and similar contour distance in both sides denoting to:
- a- Asymmetric plunging anticline
  - b- Symmetrical plunging syncline
  - c- Symmetrical double plunging syncline
- 59- Intersection and irregularity in contours of ratio, percentage, isolith and isopach maps of time rock unit indicate to:-
- a- Regular sedimentation
  - b- Erosion
  - c- Migration of strand line
- 60- Syn-sedimentary subsidence in subsurface can be recognized by:
- a- Migration of maximum thickness of the subsurface layers toward the shore line
  - b- Fixing of the maximum thickness of the subsurface layers in the depo- centre of the basin
  - c- Migration of the maximum thickness of the subsurface layers toward the depo- centre of the basin
- 61- Uplift phenomena in subsurface can be recognized from preparing successive isopach maps of conformable rock units by:
- a- Upward regular migration of zero thickness toward the recent layers



- 53- Data derived from well measurements are:-
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  - b- Rock seismic velocities, resistivity and saturation
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  - a- Upward regular migration of zero thickness toward the recent layers

- b- Upward regular migration of zero thickness toward the old layers
  - c- Upward irregular migration of zero thickness toward the recent layers
- 62- Vertical drilling of horizontal layers, the drilled thickness is:-
- a- More than the true thickness of the drilled layers
  - b- Less than the true thickness of the drilled layers
  - c- Equal to the true thickness of the drilled layers
- 63-Directional drilling of horizontal layers, the drilled thickness is:-
- a- More than the true thickness of the drilled layers
  - b- Less than the true thickness of the drilled layers
  - c- Equal to the true thickness of the drilled layers
- 64-Bed and fault attitude can directly measure from:-
- a- Structure cross section
  - b- Normal structure cross section
  - c- Geophysical cross section
- 65-Convergence of zero thickness in isopach maps of successive rock units in the same location indication to:-
- a- Strand line
  - b- Depocenter of the basin
  - c- Onlap phenomena
- 66-Ratio, percentage and lithofacies maps are considered:-
- a- Isopach maps
  - b- Facies maps
  - c- Structure contour maps
- 67-Contour distance in structure contour map depends on:-
- a- Depth of the mapped surface
  - b- Dip of the mapped surface
  - c- Truncation of the mapped surface
- 68-Regional isopach map is prepared to show:-
- a- The paleoenvironment of member within the subsurface stratigraphic unit
  - b- The paleoenvironment of the subsurface stratigraphic unit
  - c- The local structures that affecting on the subsurface stratigraphic unit
- 69-The most accurate data used in subsurface sectioning and mapping are that given from:-
- a- Core samples
  - b- Cut samples
  - c- Well logging
- 70-Paleotectonic maps are generally prepared to study:-
- a- Tectonic phases allow over the tectonic history of an area
  - b- The last tectonic acting in the area
  - c- The tectonics which were act in a definite geologic age
- 
- 
- Best wishes
- 
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Assiut University  
Faculty of Science  
Geology Department

**Geochemistry G433**

**Final Exam**

January 23rd 2024

Time allowed: 90 minutes

No. of pages = 4

**Each question worth one point**

**Multiple Choice**

**Choose from the lettered expression that choice which best answer the question**

**1) Which mineral is the most stable towards weathering?**

- A. Quartz
- B. Feldspar
- C. Hornblende
- D. Olivine

**2) The upper layer of crust is made up of?**

- A. Silicon and Iron
- B. Silicon and Aluminium
- C. Iron and magnesium
- D. Silicon and magnesium

**3) Kimberly in Africa famous for what reason?**

- A. Monument
- B. Museum
- C. National Park
- D. Diamond

**4) The Sahara is a desert located on which continent?**

- A. Africa
- B. Asia
- C. Australia
- D. North America

**5) Egypt connects those two continents?**

- A. Asia and Europe
- B. Asia and Africa
- C. South America and North America
- D. Asia and Australia

**6) In the periodic table of elements, the elements are arranged in order of**

- A. Decreasing atomic weight.

- B. Increasing atomic number.
- C. Increasing volume.
- D. Decreasing atomic number.

**7) Which is the most abundant element in the universe?**

- A. Oxygen
- B. Hydrogen
- C. Carbon Dioxide
- D. Silicon
- E. None of these

**8) Which is the most abundant element in the Earth's crust?**

- A. Oxygen
- B. Hydrogen
- C. Carbon Dioxide
- D. Silicon
- E. None of these

**9) These oxides are major, except**

- A. MgO, CaO, K<sub>2</sub>O
- B. Na<sub>2</sub>O, P<sub>2</sub>O<sub>5</sub>
- C. SrO, BaO, Cr<sub>2</sub>O<sub>3</sub>
- D. SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, MnO

**10) TAS diagram separates**

- A. Major from minor oxides
- B. Metaluminous from peraluminous rocks
- C. Minor from trace elements
- D. alkali and sub-alkalis rocks

**11) In which diagram you can see many elements at a time**

- A. Harker diagram
- B. Spider diagram
- C. Chondrite normalized diagram
- D. PGE diagrams

**12) Which lava from the following crystallizes at highest temperature**

- A. Komatiites (ultramafic lava)
- B. Basalts
- C. Rhyolite
- D. Carbonatites

**13) What is the measurement unit of dynamic viscosity**

- A. ppm
- B. wt%
- C. Pascal - second



D. none of the above

**14) This magma is formed by wet partial melting of the mantle**

- A. Rhyolitic magma
- B. Andesitic magma
- C. Basaltic magma
- D. None of the above

**15) The process by which magma change from mafic to felsic composition is called**

- A. Assimilation
- B. Fractional crystallization
- C. Mixing
- D. Assimilation + Mixing

**16) The mineralogical composition of a rock in volume % is called**

- A. Norm
- B. Mode

**17) Can we find in a rock olivine with quartz?**

- A. Yes
- B. No

**18) Which minerals in the norm you can find in the case of metaluminuos rocks**

- A. Corundum
- B. Acmite
- C. Nepheline
- D. Anorthite and diopside

**19) What is the kind of forces in rift volcanism?**

- A. Compressional
- B. Tensional
- C. Hot spot
- D. All the above

**20) They occur in very low concentrations in rocks, expressed in  $10^{-4}$  weight%), tend to concentrate in fewer minerals, commonly used for the interpretation of the petrogenesis of igneous rocks. This refers to**

- A. Radiogenic elements
- B. Minor elements
- C. Major elements
- D. Trace elements

**21) This is a measure of how a particular trace element substitutes for a major element within a mineral.**

- A. Incompatibility
- B. Compatibility
- C. Atmophile elements

D. Chalcophile elements

**22) Two ions with the same radius and valence should enter into solid solution in amounts proportional to their concentration. In other words, they should behave about the same.**

- A. CAPTURE
- B. ADMISSION
- C. CAMOUFLAGE
- D. All the above

**23) Which rock has the highest magnesium oxide content**

- A. Plagioclase basalts
- B. Plagioclase - clinopyroxene basalts
- C. Olivine basalts
- D. Picrites

**24) These rocks are strongly peraluminous, potassic, have moderately high silica contents (64-77 wt % SiO<sub>2</sub>), contain low CaO, Na<sub>2</sub>O and Sr contents, with the presence of aluminous phases such as muscovite, cordierite and garnet. This refers to**

- A. I type granites
- B. A type granites
- C. S type granites
- D. M type granites

**25) These rocks are not associated with orogenesis, they are rarely deformed and are thought to intrude after the main orogenic event, they are peralkaline and commonly contain pyroxene in the place of hydrous amphibole and biotite. This refers to**

- A. I type granites
- B. A type granites
- C. S type granites
- D. M type granites





First Semester Final Examination      Subject: Course No. G433 (Geochemistry)  
Students: B.Sc. Students (Geology and Geology-Chemistry)      Date: Jan., 23 , 2024  
**Part II- Geochemistry of sediments**      **Time allowed: one hour**

Write on 3 only from the following (8.5 marks for each)      أجب في كراسة الإجابة

**1- Give possible explanations for the following geochemical signatures in stratigraphic record**

- A- Sharp decrease in  $\delta^{13}\text{C}$  associated with increase in chalcophile elements
- B- Sharp decrease in  $\delta^{18}\text{O}$  associated with increase in bauxite
- C- Precipitation of elements such as Zn, Mn, Cr, and Ga as hydroxides along with the clay sediments.

**Question 2 - Write on:**

- A- Siderophiles,      B- Stony meteorites      C- Reduzates

**Question 3**

- A- Discuss briefly the formation of marine evaporates.
- B- The primary factors affecting the manner of migration of iron are the presence or absence of  $\text{O}_2$  and  $\text{CO}_2$  -----How can you explain that?
- C- The products of chemical weathering processes can be put into four groups: Explain that and Give examples for the four groups?

**Question 4- Write by the chemical equation**

- A- The effect of chemical weathering on the mineral albite (2.5 marks)
- B- The hydrolyses of the mineral forsterite (2 marks)
- C- The oxidation of the mineral marcasite (2 marks)
- D- The extensive dissolution of the mineral magnesite in nature? (2 marks)

**Question 5**

- A- When dissolved oxygen becomes depleted, organic matter decomposition can continue using oxygen from secondary oxidants: What are these secondary oxidants in order of decreasing energy?
- B- Compare between Bauxites and Laterites
- C- There is an important and consistent decrease in  $\delta^{13}\text{C}$  with depth of water (Why?)