

Geology Department Faculty of Science Assiut University		Time: 2 H January-2015
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First Semester Final Examination –

Subject: Sandstone and carbonate reservoirs (PG 462)

Students: 4th Level of Petroleum Geology (50 Marks)

Answer the FIRST and the SECOND Question and Only THREE of the others:

I- The First Question (إجباري):

(10 Marks):

Indicate by the mark (X) or (✓) and correct the incorrect sentences:

- 1) Absolute porosity is the total void space in the rock whether or not it contributes to fluid flow ().
- 2) Carbonate rocks are the dominant reservoir type in the Middle East / Arabian Gulf area, which contains the majority of the world's giant oilfields ().
- 3) Authigenesis is the process in which new mineral phases are crystallized in the sediment or rock during diagenesis ().
- 4) Fibrous calcite is the most common marine calcite cement in ancient limestones ().
- 5) The calcite cement that precipitated from the meteoric water has a very high Mg/Ca ratio ().
- 6) Burrowing and boring by organisms can increase the compaction of the sediment and usually destroys any laminations or bedding ().
- 7) Asymmetric cement fringes and meniscus cements are recorded from some beachrocks and indicate precipitation in the marine phreatic zone ().
- 8) Rainwater is supersaturated with respect to CaCO_3 , so that dissolution is one of the main processes operating in the infiltration zone ().
- 9) The idiomorphic dolomite mosaic shows curved to serrated and irregular crystal boundaries ().
- 10) The precipitation of clay minerals and zeolites in sandstone increases its permeability and porosity ().

II- The Second Question (إجباري):

(10 Marks)

Compare briefly between the following:

- a) Reservoir rock and Source rock.
- b) Absolute porosity and effective porosity.
- c) Cementation and neomorphism processes in carbonate rocks.
- d) Poikilomorphic calcite crystals and drusy calcite spar cements in sandstones.
- e) Intergranular porosity and Intragranular porosity.

III- The Third Question (اختياري):

(10 Marks)

Write on of the Reservoir porosity in view of the following points:

- i) Definition
- ii) Classification
- iii) Factors controlling the reservoir porosity.

أنظر خلفه (بأقى الأسئلة فى الخلف)

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IV- The Fourth Question (اختياري): (10 Marks)

- a) Write on the factors controlling the heterogeneity (non-uniformity) in sandstone reservoirs. (6 marks)
- b) Discuss the parameters that affecting the reservoir quality in sandstones. (4 marks)

V- The Fifth Question (اختياري): (10 Marks)

Write on the dolomitization process in limestones and discuss only two moldels for dolomitization in limestones.

VI- The Sixth Question (اختياري): (10 Marks)

Write on of the following:

- a) Silica and carbonate cementation in sandstones. (7 marks)
- b) Dunham classification of limestones. (3 marks)

انتهت الأسئلة

Dr. Mahmoud Essa

الفصل الدراسي الأول
الزمن: ساعتان

جامعة أسيوط
كلية العلوم – قسم الجيولوجيا

شعبتي الجيولوجيا والجيوفيزياء (المستوى الرابع)
أمتحان مادة: جيولوجيا هندسية وجيولوجيا المناجم

Engineering Geology Exam

Answer Three Only of the following (25M)

Q1(8.5 M)

- a- Define the term "mass wasting" and mention the important types of mass wasting?
- b- Write on the environmental impacts of construction phase of dams?

Q2 (8.5 M)

- a- Explain the factors affecting slope stability?
- b- Define the soil (Engineering) and explain the importance of the gradation in grain size in highway aggregates?

Q3 (8.5 M)

- a- Mention the factors affecting to the place of the dam axis?
- b- Dealing with engineering geology, major projects often encounter major obstacles. Comment?

Q4(8.5 M)

- a- Who is the engineering geologist? And what are the professional responsibilities of engineering geologist?
- b- Explain the mechanical energy in flowing water?

Mining Geology Exam

Answer the following questions

- 1- Mention briefly:
 - a- The importance of mining development? (5M)
 - b- The defects of the inclined shaft? (5M)
- 2- Write notes on the types and purpose of supports? (5M)
- 3- Describe with aid of sketches Equidistant Spacing methods of sampling? (10M)

أنتهت الأسئلة وبالتوفيق



نموذج الاختبار النهائي - الفصل الدراسي الأول للعام الجامعي 2014 - 2015 م

أجب عن 5 أسئلة فقط مما يلي:-

- 1- أ) ما المقصود بكل من:- الفرضية الإحصائية - تحليل التباين- الخطأ من النوع الأول؟ (5 درجات)
- ب) في برنامج SPSS ما المقصود بالرمز OLAP ؟ (2 درجات)
- ج) في برنامج SPSS، أكتب فقط امتدادات ملفات البيانات - المخرجات - التعليمات ؟ (3 درجات)
- 2- أ) في برنامج SPSS، المتغيرات الوصفية تنقسم إلى قسمين فما هما؟ أعط أمثلة لكل قسم منها؟ (6 درجات)
- ب) اذكر اسم اختبار معلمي وآخر لا معلمي لقياس معامل الارتباط بين متغيرين؟ (4 درجات)
- 3- أ) اكتب نبذة مختصرة عن مقياسي ليكارد الثلاثي والخماسي موضحاً كيفية استخدام كل منهما؟ (6 درجات)
- ب) في برنامج SPSS، ما هي الشروط الواجب مراعاتها عند اختيار اسم متغير؟ (4 درجات)
- 4- أ) ما هي استخدامات (أوامر) Explore في برنامج SPSS ؟ (5 درجات)
- ب) ما الفرق بين مخطط الساق والورقة ومخطط المدرج التكراري؟ اكتب المسار المستخدم لإجراء كل منهما؟ (5 درجات)
- 5- أ) في برنامج SPSS، ما الفرق بين Name, Label؟ وضح إجابتك؟ (6 درجات)
- ب) أشرح استخدامات المخطط Boxplots ؟ ثم أكتب المسار المتبع لإجرائه؟ (4 درجات)
- 6- أ) الجدول التالي هو أحد مخرجات برنامج SPSS بدون بعض القيم. استكمل الفراغات A, B, C في هذا الجدول، ثم أكتب الاستنتاج الملائم لهذه المخرجات؟ (5 درجات)

VAR00001

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	25.000	...A...	8.333	3.509	.040
Within Groups	...B...	16	...C...		
Total	63.000	19			

- ب) الجدول التالي هو أحد مخرجات برنامج SPSS. اكتب اسم الاختبار المستخدم والمسار المستخدم للحصول على هذه النتائج وكذلك تفسيراً لها ؟ (5 درجات)

Coefficients

		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	-.279	.410		-.293	.776
	X	1.995	.079	.997	37.731	.000

a. Dependent Variable: Y

ملحوظة الامتحان في صفتين

Q1 (10 M) Answer the following question (إجباري)

Chose the correct answer

- 1- Map of areas of analytical interest is termed:
 - a- Macro-map
 - b- Micro-map
- 2- The better choice for SEM coating, because of its higher secondary electron yield:
 - a- CARBON coating
 - b- GOLD coating
- 3- Galena exhibits:
 - a-different reflectivities, in different optical directions.
 - b-constant reflectivity, regardless of the orientation of the crystal.
- 4- Pyrite:
 - a- remains unchanged in color and brightness as the stage of the microscope is turned
 - b-shows distinct changes in brightness or color, or both, with rotation of the stage
- 5- Ilmenite is characterized by:
 - a-strong bireflectance
 - b-medium bireflectance
 - c-weak bireflectance
- 6- Under crossed polars, an isotropic mineral:
 - a-remains completely dark through 360o of rotation
 - b- very faintly illuminated, but will show no change in color or intensity of illumination through 360o of rotation
 - c-Both of a&b
- 7- Quartz-pyrite-chalcopyrite-sphalerite-galena assemblage indicates:
 - a-High temperature of formation
 - b-Medium temperature of formation
 - c- Low temperature of formation
- 8- Botryoidal cassiterite is formed in:
 - a- high temperatures
 - b- medim temperatures
 - c- low temperatures
- 9- Crystals that formed at high temperatures have:
 - a- higher electrical conductivities
 - b- medium electrical conductivities
 - c- low electrical conductivities
- 10- Certain minerals undergo internal structural changes at definite temperatures and pressures. This is called:
 - a- fluid inclusions
 - b- thermoluminescence
 - c- inversion points

Answer Four Only of the following (40M)**Q1(10 M)**

- a- Assume you have assemblage consists of the following minerals: pyrite, quartz, sphalerite, chalcopyrite and galena where:
- pyrite and quartz are intergrown.
 - sphalerite replaces pyrite.
 - chalcopyrite crosses sphalerite.
 - galena crosses chalcopyrite.

Write the paragenetic sequence of the above assemblage?

- b- Mention the sequential steps to obtain a good polish surface?

Q2 (10 M)

- a- Explain the district zoning in ores with illustration?
b- Compare between birefractance and reflection pleochroism with some examples?

Q3 (10 M)

- a- Compare between the color change of minerals and mineral textures as tools for geothermometry estimation?
b- Explain the procedure to recognize the anisotropy and polarization colors?

Q4(10 M)

- a- Mention the role of ionic substitutions in ores as a tool for geobarometry estimation?
b- What are the types of etching? Discuss briefly on the use of etching in industry?

Q4(10 M)

- a- Explain the exsolution textures in ores and their importance?
b- What are the applications of iron content in sphalerite in ore microscopy?

انتهت الأسئلة وبالتوفيق

Assiut University
Faculty of Science
Geology Department



جامعة أسيوط
كلية العلوم
قسم الجيولوجيا

First Semester, Fourth Level Final Examination

Time: 60 minutes	Total marks: 25	GPR and Paleomagnetism (G453)	Jan., 2015
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Part One: GPR
(25 marks)

Answer the following questions:

- 1) **True or False: (5 points)**
 - a) Penetrating depth in GPR method decreases with increasing frequency of electromagnetic waves.
 - b) At low frequencies ($<10^5$ Hz) and high conductive medium, the displacement currents are much smaller than the conduction current, and the conduction term ($i\omega\mu\sigma E$) dominates.
 - c) Penetrating depth in GPR method decreases with increasing electrical conductivity of subsurface geologic materials.
 - d) The larger the Fresnel zone, the higher the horizontal resolution.
 - e) We should use high operating frequency in GPR system in subsurface geologic materials with low dielectric constant.
- 2) **What are the five fundamental questions to be answered in order to define the problem of study in GPR survey? (5 points)**

Answer only five of the following questions:

- 1) **What are the main parameters (electrical, magnetic and physical) that control the ground penetrating radar method? (3 points)**
- 2) **List the two types of GPR system. (3 points)**
- 3) **Describe briefly two different ways of velocity analysis in GPR. (3 points)**
- 4) **List three different applications of GPR method. (3 points)**
- 5) **Describe with drawing the different acquisition modes in GPR. (3 points)**
- 6) **Describe the different sources of energy loss and attenuation in GPR method. (3 points)**
- 7) **Explain with appropriate equations, how station spacing and antenna separation are determined in GPR survey? (3 points)**
- 8) **For each equation below, define and explain the variables and carefully describe how the equation is used in near surface geophysics: (3 points)**

a) $\delta = (2/\sigma)(\sqrt{\epsilon/\mu})$

b) $\alpha = 1685 \sigma/\sqrt{\epsilon}$

GOOD LUCK Dr. Gamal Zidan

(2)

Assiut University
Faculty of Science
Geology Department



جامعة أسيوط
كلية العلوم
قسم الجيولوجيا

First Semester, Fourth Level Final Examination

Time: 60 minutes	Total marks: 25	GPR and Paleomagnetism (G453)	Jan., 2015
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Part Two: Paleomagnetism
(25 marks)

Answer all the following questions:

1. Two paleomagnetic specimens (observed at location $\lambda_s = 30^\circ\text{N}$, $\phi_s = 250^\circ\text{E}$) has the following orientation information (see below). The first and second specimen have volumes of 8.7 cm^3 and 11.2 cm^3 , respectively. Laboratory measurements yield the following components of the remanent magnetic moment of this specimen: (Note: M_{x1} , M_{y1} , M_{z1} are related to the first specimen, and M_{x2} , M_{y2} , M_{z2} are related to the second specimen)

(12 marks)

$$M_{x1} = -1.2 \times 10^{-3} \text{ G.cm}^3$$

$$M_{x2} = 2.3 \times 10^{-3} \text{ G.cm}^3$$

$$M_{y1} = -2.3 \times 10^{-3} \text{ G.cm}^3$$

$$M_{y2} = -1.2 \times 10^{-3} \text{ G.cm}^3$$

$$M_{z1} = -1.8 \times 10^{-3} \text{ G.cm}^3$$

$$M_{z2} = 2.7 \times 10^{-3} \text{ G.cm}^3$$

- Compute the intensity of NRM (in G), in each specimen.
 - Find the Pole longitudes and latitudes.
 - Is this paleomagnetic study case showing reversal polarity? why?
2. Shortly, describe three types of sampling techniques. (6 marks)
3. What is the core idea of the flux gate magnetometer? in detail. (7 marks)

End of questions

GOOD LUCK

Dr. Mostafa Thabet Mohammed

بسم الله الرحمن الرحيم

ASSIUT UNIVERSITY
FACULTY OF SCIENCE
GEOLOGY DEPARTMENT

جامعة أسيوط
كلية العلوم
قسم الجيولوجيا

الزمن ساعة

إمتحان المستوى الرابع جيولوجيا البترول

دور يناير 2015

مقرر 427 ج ب (تحليل حوضى وأحواض ترسيب مصرية)

Part 2: Sedimentary basins in Egypt (5 pages)

Answer TWO of the following questions:

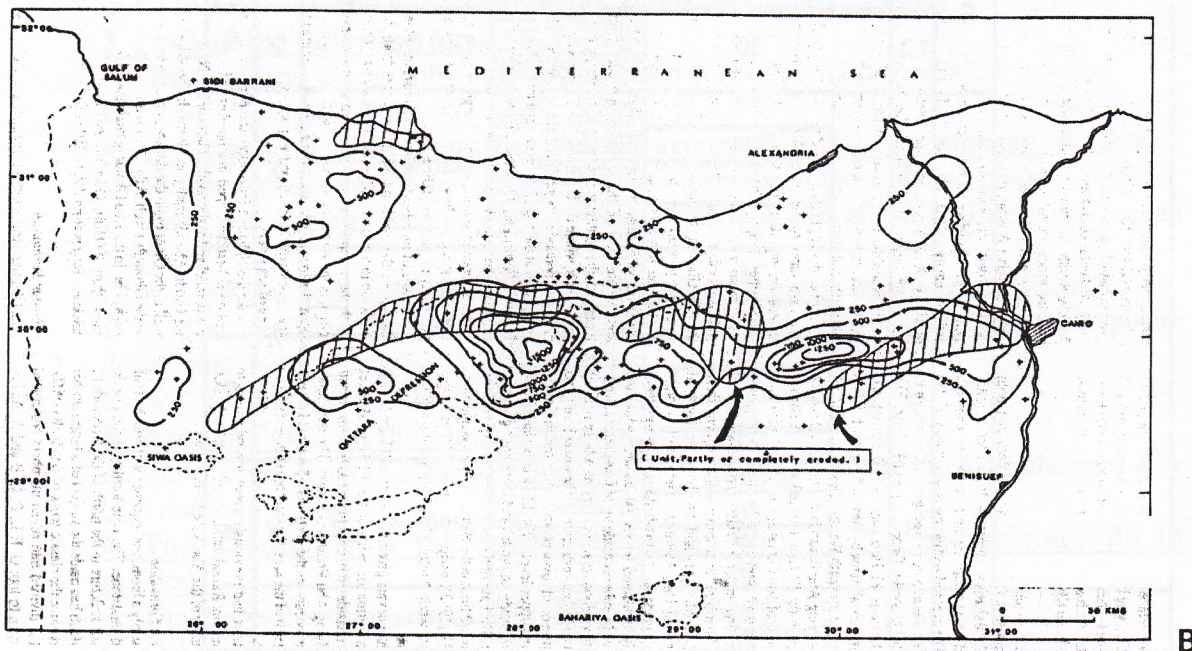
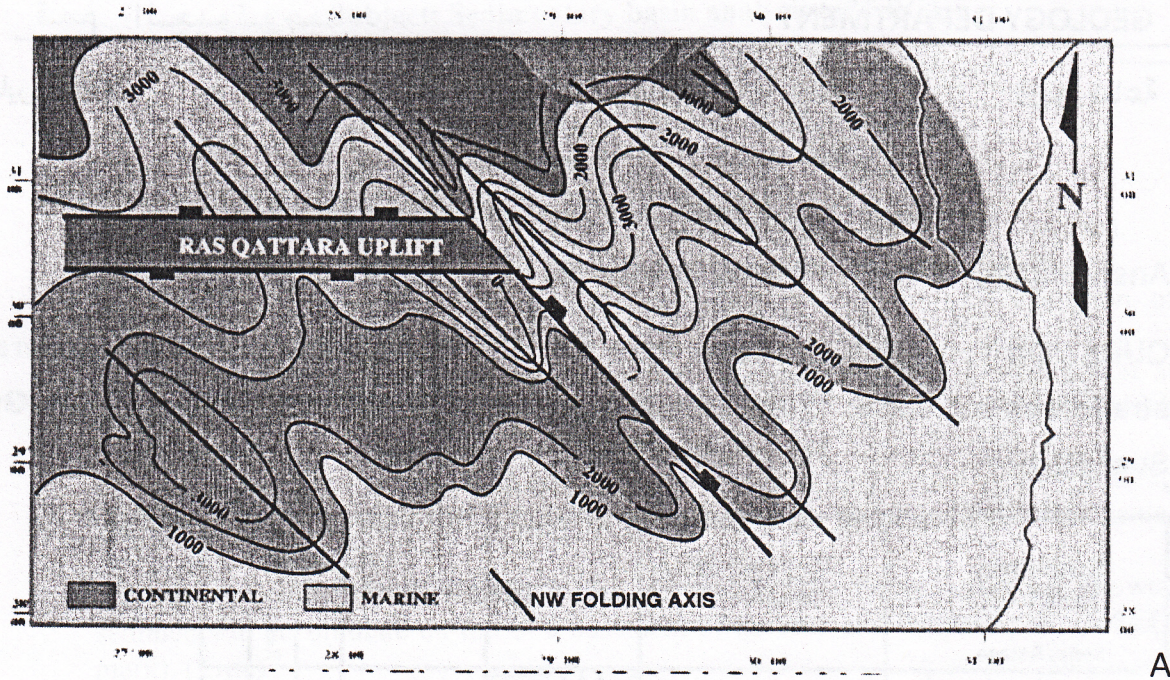
QUESTION 1: Identify the items from 1 to 33 in the given table of the generalized stratigraphic column of the Cenozoic basins and oil potentialities in the Gulf of Suez Region.

Time units Epoch & Age = Series & Stage			Rock units Formations & members		Lithology	Thickness	33	Reservoir Rock	Oil Field
2	6	13	31			3000 feet		X	●
		12	30			2300 feet		X	●
	5	11	17	29		1400 feet		X	●
				Feiran					
				28					
				27					
		10	16	26		1000 feet	☐		●
				25					
	4	9	15	24		32	☐	X	●
				23					
				22					
				21					
		8	14	Khoshera		1200 feet	☐	X	●
				20					
				19					
				18					
1	3	7	Abu zenima & Tayiba Beds			450 feet			

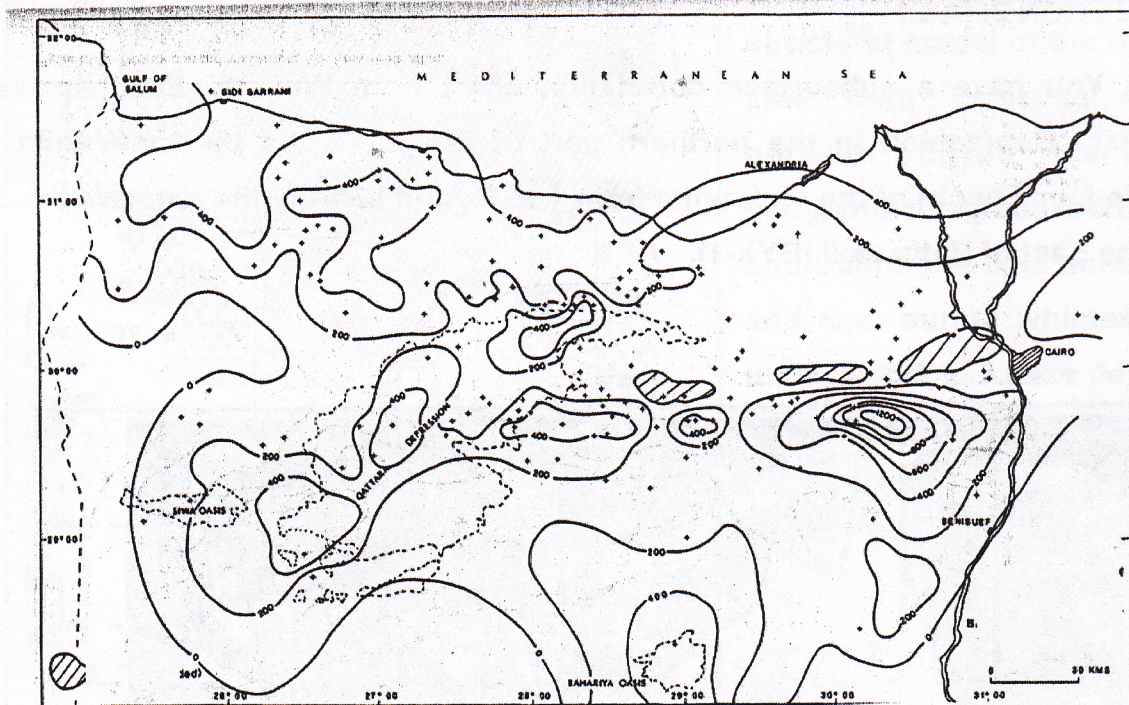
(2)

QUESTION 2 (A-D):

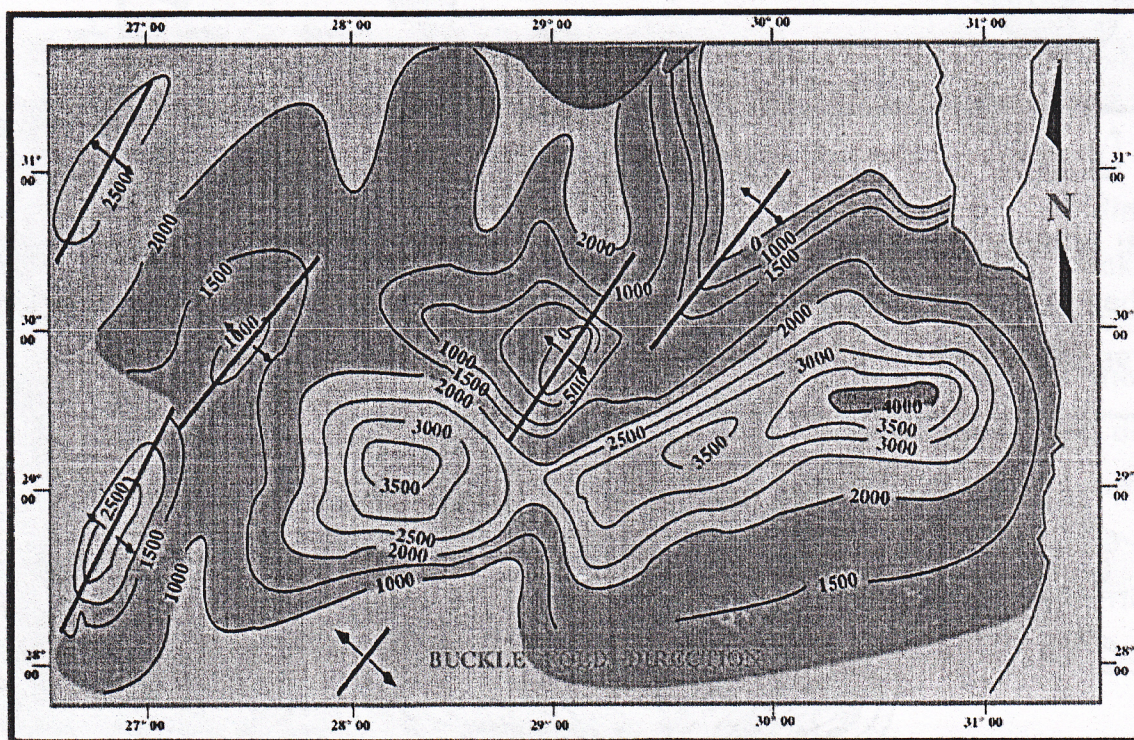
Identify the name , age , lithology and depositional environment of the subsurface rock units whose thickness and areal distribution in the northern Western Desert are given in the following isopach maps from A to F.



(3)



C

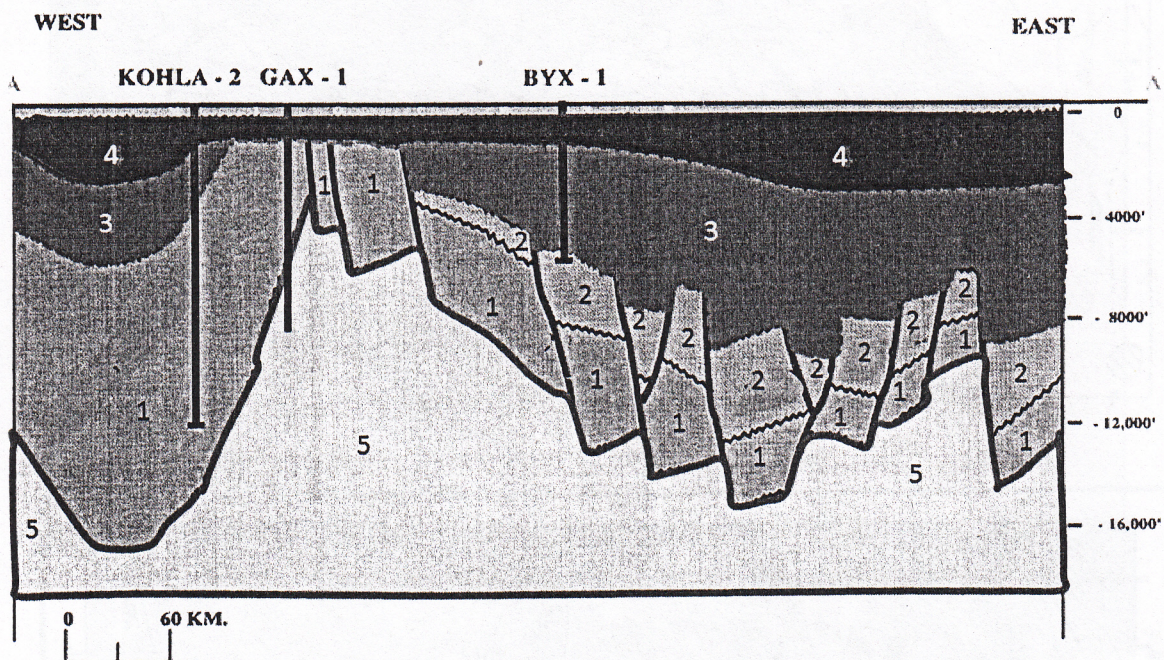


D

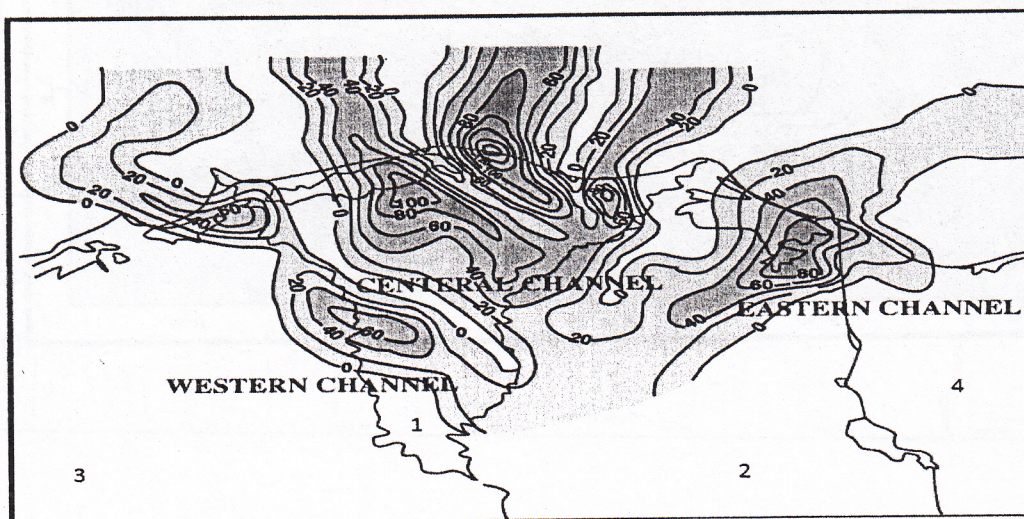
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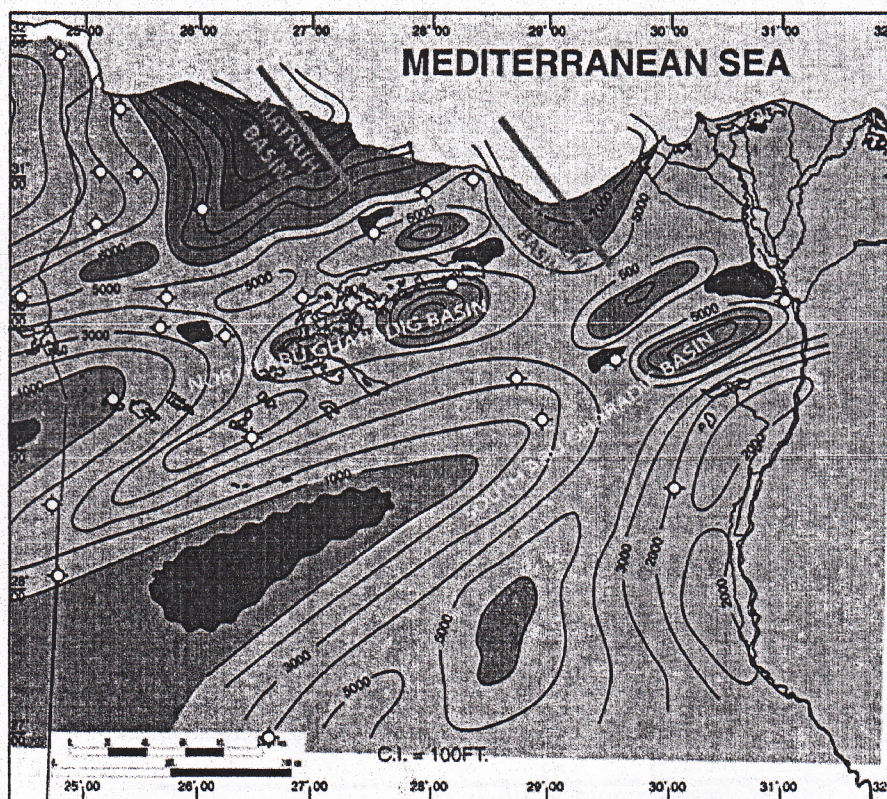
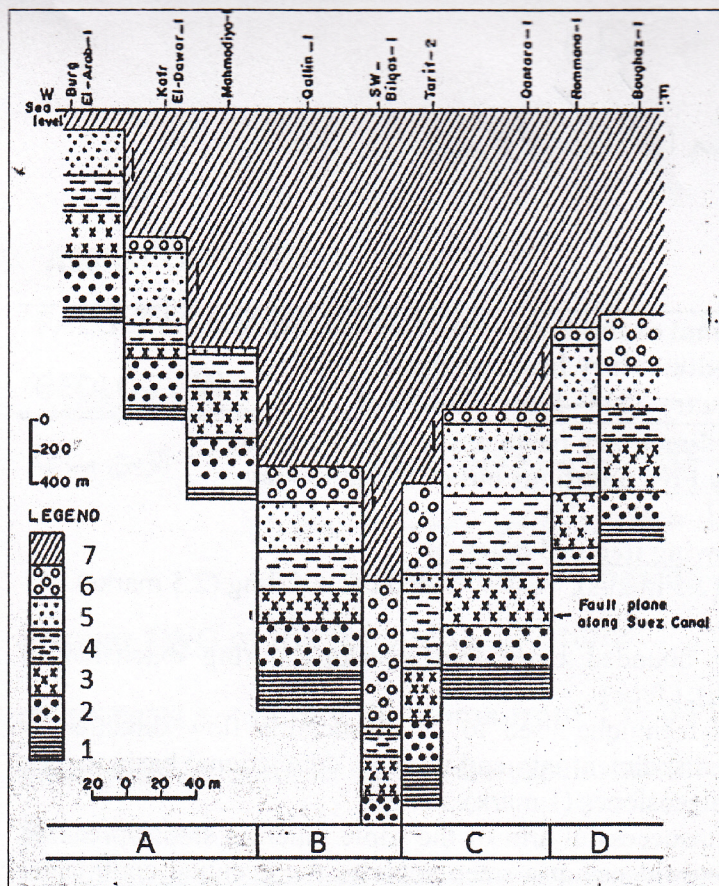
QUESTION 3: (A-D)

3-A: You have a subsurface correlation chart from West to East across the Qattara Depression in the northern part of Egypt. Define the time units (Era, Period, or Epoch) of the rock units from 1 to 5, and identify the name of the basin to the East of Betty well (BYX-1).



3-B: Identify the name, age, lithology and depositional environment of the subsurface rock unit whose thickness and areal distribution in the Nile Delta is given in the following isopach map.





First semester final exam- Petroleum Geology Students
Subject: Sedimentary basin analysis (427 PG)
January 2015- Time: One hour

Part One: Sedimentary basin analysis (25 marks)
Answer only Five questions out of the following

1. Write in detail on the following items (5 marks):

A. Sedimentary basin shapes (2.5 marks). Tectonics and basin filling (2.5 marks).

2. True or false (5 marks):

A. A rift is a normal fault bounded basin that develops during extension of continental lithosphere (1 mark). (True)

B. Paleocurrent analysis is a technique used to determine, the flow direction at ancient currents that transported sediment into and within a depositional basin, which reflects the local or regional palaeoslopes (1 mark). (True)

C. Aulacogens are the third, unsuccessful arm of the triple junction stops spreading and form elongated zones of subsidence at a steep angle to the eventual continental margins (1 mark). (True)

D. Sedimentary basins are places where subsidence of the Earth's crust has allowed sediments to accumulate on top of a basement of igneous and metamorphic rocks (1 mark). (True)

E. A geosyncline is large trough like or basin like down warping of the crust in which thick sedimentary and volcanic rocks accumulated (1 mark). (True)

3. Explain the following items (5 marks)::

A. Bedrock and topography controls on sediment supply (2.5 marks).

B. Isopach maps (2.5 marks).

4. A transform plate boundary is characterized by.....(5 marks): A. Strato-volcanoes on the edge of a plate and shield volcanoes on the adjacent plate.

B. Two, converging, oceanic plates meeting head-on and piling up into a mid-ocean ridge.

C. A divergent boundary where the continental plate changes to an oceanic plate.

D. A deep, vertical fault along which two plates slide past one another in opposite directions.

E. Both (a) and (b). F. None of the above.

5. Write in detail on the following items (5 marks):

A. Lithofacies maps (2.5 marks). B. Formation of sedimentary basins by thermal way (2.5 marks).

6. The depocenter is the part of the basin with..... sedimentary fill (5 marks):

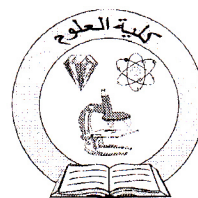
A. The thickest sedimentary fill. B. No sedimentary fill.

C. The modest sedimentary fill. D. Mixed carbonate/siliciclastic sedimentary fill.

E. the shallowest sedimentary fill. F. Both (A) and (D). G. None of the above.



(11)



Geology Department

G433 Geochemistry

Final Exam

Date : 8th of January 2015

Time allowed : One Hour

Total Points : 50 points

Total pages : 4 pages

Answer only twenty questions from the following

Multiple Choice

1) How do we know how old the Earth is?

- A) From radioactive dating of rocks and meteorites.
- B) From the layering of materials within the Earth.
- C) By measuring the rate of change of the Sun's luminosity
- D) From the cratering history of Earth's surface
- E) From fossils of ancient life.

2) What do meteorites reveal about the solar system?

- A) They reveal that the early solar system consisted mostly of hydrogen and helium gas.
- B) They reveal that meteorites are much older than the comets and planets.
- C) They reveal that the age of the solar system is approximately 4.6 billion years.
- D) They reveal that the solar system once contained 10 planets.
- E) Nothing, because they come from other star systems.

3) Why does Earth have the strongest magnetic field among the terrestrial worlds?

- A) It is by far the largest terrestrial world.
- B) It is the most volcanically active world.
- C) It is the only one that has both a partially molten metallic core and reasonably rapid rotation.
- D) It rotates much faster than any other terrestrial world.
- E) It is the only one that has a metallic core.

4) Meteorites with high metal content probably are

- A) pieces of comets rather than of asteroids.
- B) chunks of large, differentiated asteroids that were shattered by collisions.
- C) chunks of rock chipped off the planet Mars.
- D) leftover chunks of rock from the earliest period in the formation of the solar system.
- E) chunks of rock chipped off the planet Mercury.

5) What is the second most common element in the solar system?

- A) Iron
- B) Hydrogen
- C) Methane

(2)

- .) Helium
- .) Nitrogen

6) The meteorite impact that caused the extinction of the dinosaurs was the Chicxulub meteorite that hit the

(1) _____ about (2) _____ years ago.

- A. (1) Arizona desert, USA (2) 49,000
- B. (1) Arizona desert, USA (2) 66 million
- C. (1) Yucatan Peninsula, Mexico (2) 66 million
- D. (1) Yucatan Peninsula, Mexico (2) 49,000
- E. (1) Tunguska region, Siberia (2) 66 million

7) Which **chemical parameters** are very useful in distinguishing magmatic groups

- a- Total Alkalis ($\text{Na}_2\text{O} + \text{K}_2\text{O}$)
- b- Silica (SiO_2) and silica saturation
- c- Alumina (Al_2O_3)
- d- All the above

8. The two most abundant elements of the Earth's crust are

- A. oxygen and iron.
- B. iron and silicon.
- C. magnesium and iron.
- D. silicon and oxygen.

9. Which pair of rocks are associated with high silica content?

- A. Basalt and gabbro.
- B. Granite and andesite.
- C. Ultramafic rocks and rhyolite.
- D. Rhyolite and granite.
- E. Diorite and andesite.

10. Which type of silicate minerals crystallize at the highest temperature?

- A. Double chain silicates.
- B. Sheet silicates.
- C. Framework silicates.
- D. Isolated tetrahedra silicates.

Give one word for the following

11) is the volume % of minerals seen =

12) a calculated "idealized" mineralogy =

Fill In the Blanks

13) The Recycled Metals are :

14)Alkali vs. Silica diagram seems to be two distinct groupings for discriminating between :

True or False

15) Recycling of metals takes less energy than processing metal-bearing rocks - our original source of metals.

Review Questions

16) Define the **following giving examples:**

- a) The major elements
- b) The minor elements
- c) The trace elements

17) The important differences between the three series (alkaline, tholeiitic, calc-alkaline)

18) What is the ***Thermal divide*** ?

19) What are the Positives of recycling?

(4)

20) What are the main processes in Paper recycling?

21) What are the main processes in Metal recycling?

22) What are the main processes in Glass recycling?

23) Why do we recycle?

(11)

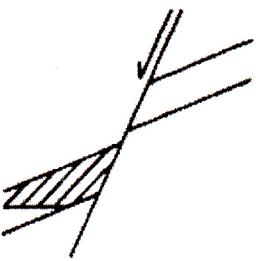
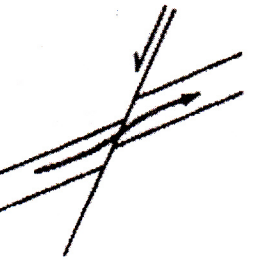
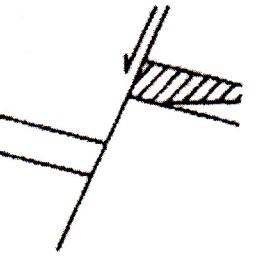
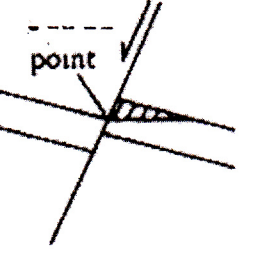
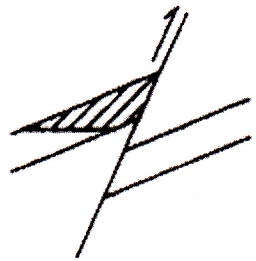
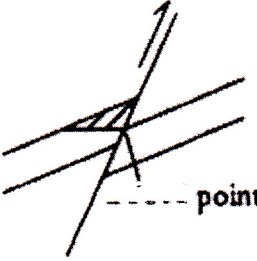
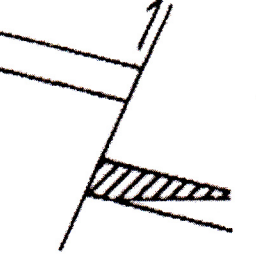
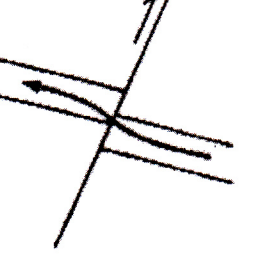
Assiut University Geology Department		جامعة أسيوط كلية العلوم - قسم الجيولوجيا
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One hour Only**Jan. 10, 2015****Final Exam of Petroleum Geology (G460) for 4th year students,**

1- Given that the drawn bed in the following figures is composed of permeable sand and the rest is shale, it is required to:

"Complete the gaps in the descriptions of the eight configurations of petroleum traps associated with faulting, assuming that oil can move across and not up the fault plane when permeable sands are juxtaposed."

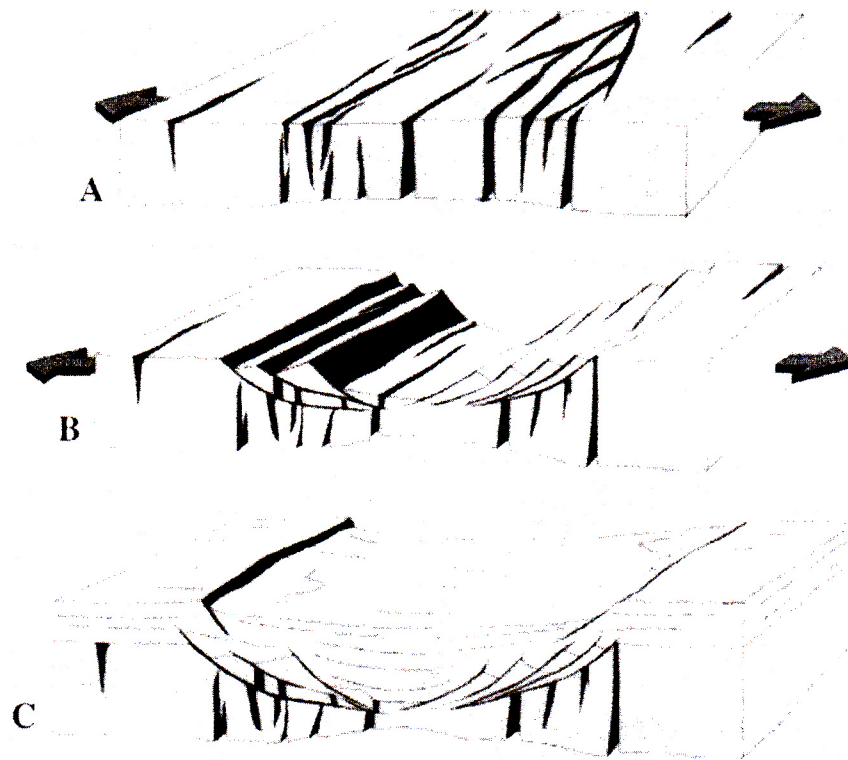
(5 degrees)

	Dip ----- fault		Dip ----- fault	
	Throw > -----	Throw < -----	Throw > -----	Throw < -----
----- fault				
	----- closure	closure -----	----- closure	----- closure
fault				
	----- closure	----- closure	----- closure	closure -----

Assumption: Shale against sand is sealing.
Sand against sand is nonsealing.

(2)

2- Identify the three stages of development of "Extensional basins" shown below. Describe very briefly their structural, sedimentational characteristics and possible oil traps. (10 degrees)



Name:

A:stage.

B:stage.

C:stage.

Structural Characteristics:

A:

B:

C:

Sedimentational Characteristics and Traps:

A:

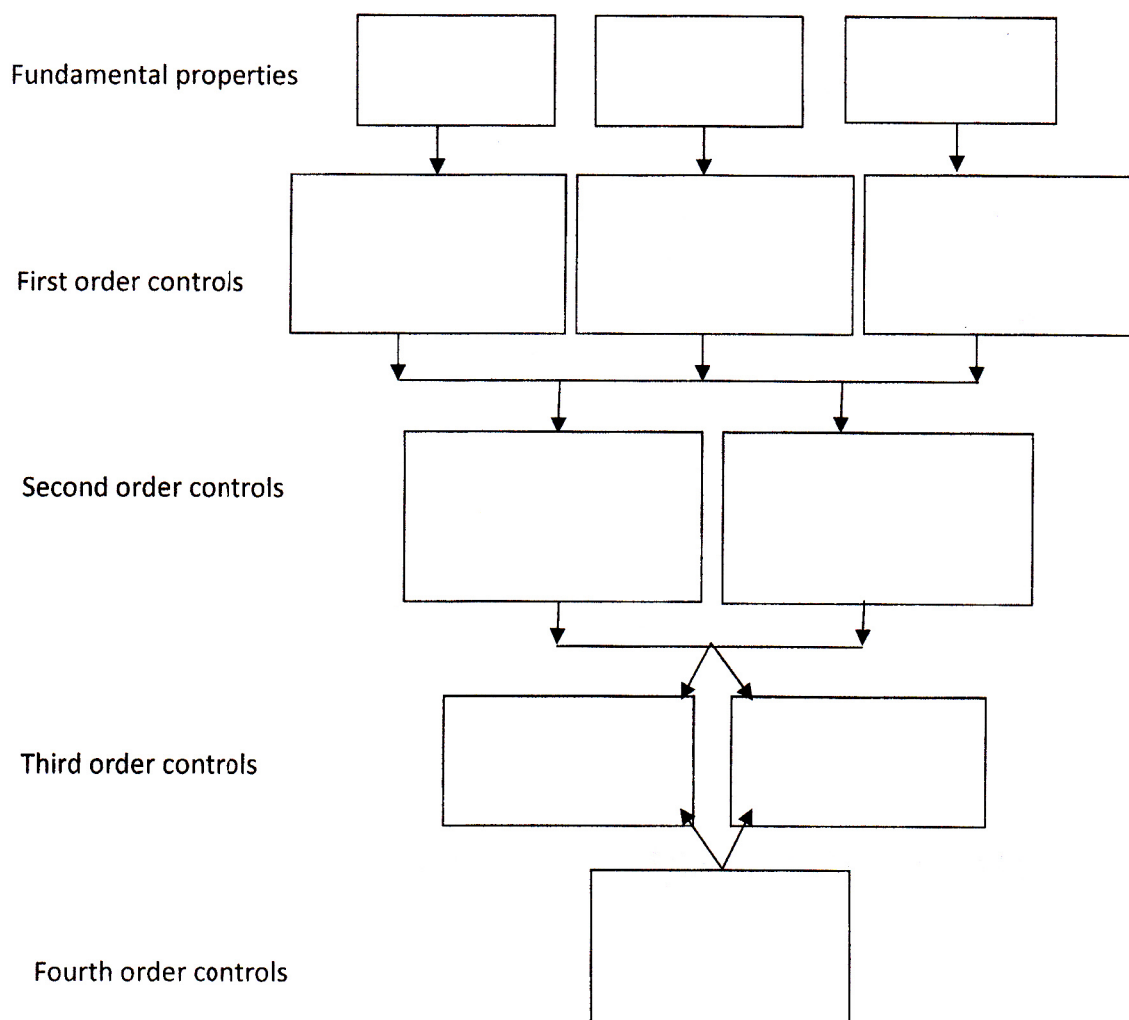
B:

C:

(4)

3- Write in the given boxes the properties and controls on reservoir quality:

(5 degrees)



4- Complete the following sentences:

(5 degrees)

1. Primary migration is the migration of hydrocarbons from ----- to -----.
2. Oil viscosities vary depending on -----, ----- and -----.
3. Natural gas generates at depths ranging from-----to----- and temperatures ranging from-----to-----.
4. API units are a measure for -----.
5. Type 1 Kerogen is essentially derived from-----, Type 2 from-----and Type 3 from-----.

(5)

Assiut University - Faculty of Science
Geology Department



جامعة أسيوط - كلية العلوم
قسم الجيولوجيا

Final Examination, Hydrogeology 1

Jan. 2014	Hydrogeology 1 (460G)	25 Points	Time: 1 Hour
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Answer the following questions

1. Groundwater is an important water resource, it is found in aquifers that have to be evaluated for its potentiality and storage capabilities, for this, Aquifer Tests should be established. Summarize the concept, methods and procedures of a Pump Test(8)

II. Define **only four** of the following with drawings:(4)

A: Transmissivity

B: Storativity

C: Sinkhole spring

D: Contact spring

E: Confined aquifer

(2)

III. Choose the correct answer of the following:..... (7 points)

1. Water resistance in rivers is:

- | | |
|---------------------|----------------------|
| a. Up to one week | c. Up to two weeks |
| b. Up to 4000 years | d. Up to 10000 years |

2. In an Aquifer system, when the water table is higher than the water level in an adjacent stream, this stream is called:

- | | |
|--------------------|--------------------|
| a. Dry stream | c. losing stream |
| b. Influent stream | d. Effluent stream |

3. The groundwater volume in a given aquifer depends mainly on:

- | | |
|---------------------------|-------------------|
| a. The total porosity | c. Homogeneity |
| b. The effective porosity | d. Transmissivity |

4.is a geologic unit that has the same properties and thickness at all locations

- | | |
|-----------------------|---------------------|
| a. Homogeneous unit | c. Isotropic unit |
| b. Heterogeneous unit | d. Anisotropic unit |

5. Water availability means that the water resource is

- | | |
|----------------|----------------------|
| a. Much enough | c. Accessible enough |
| b. Safe enough | d. Both b and c |

6.is a rock which contains no interconnected openings or interstices and therefore neither stores nor transmits water:

- | | |
|--------------|-------------|
| a. Aquiclude | c. Aquifuge |
| b. Aquitard | d. Aquifer |

7.is a measure of how easily water will pass through a particular earth material

- | | |
|---------------------------|-------------------|
| a. Permeability | c. Porosity |
| b. Hydraulic conductivity | d. Transmissivity |

8. The vertical or horizontal flow of water underground under the force of gravity within the vadoze zone and aquifers is described by:

- | | |
|-----------------|--------------------|
| a. Infiltration | c. Subsurface flow |
| b. Percolation | d. Base flow |

9. A closed system describing the movement of water on, above and below the surface of the Earth is

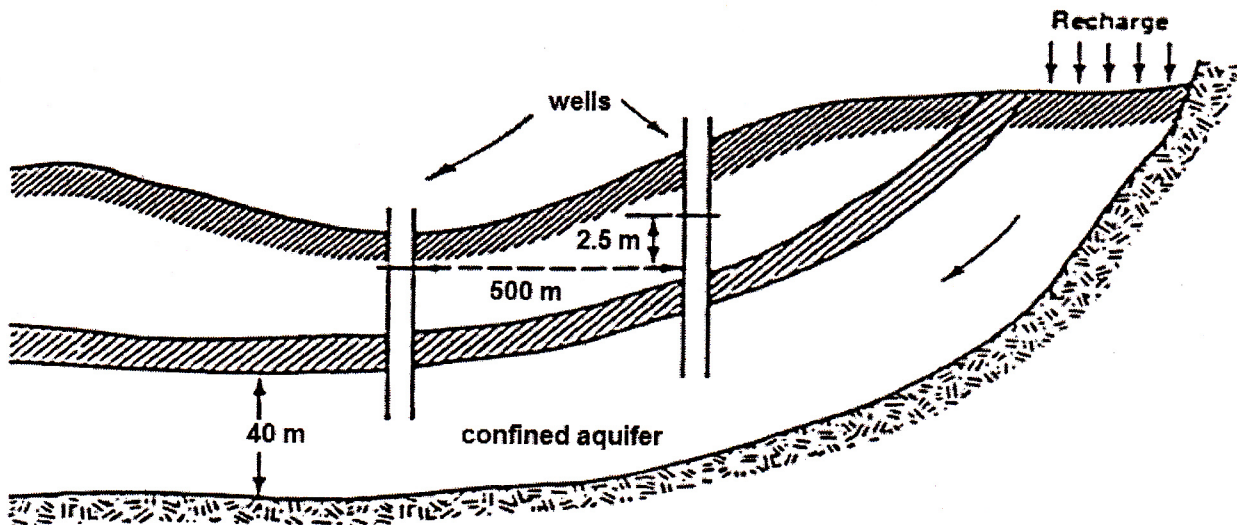
- | | |
|---------------------|---------------------|
| a. Hydrologic cycle | c. Groundwater flow |
| b. Runoff | d. Both a and b |

10. Groundwater percentages of fresh water and total water, respectively, are:

- | | |
|--------------------|---------------------|
| a. 0.26 and 0.007 | c. 0.006 and 0.0002 |
| b. 0.03 and 0.0008 | d. 30.1 and 0.76 |

(8)

In the following Figure, a confined aquifer with an effective porosity of 14% and hydraulic conductivity of 35 m/day was tapped two wells as illustrated.



If the average width of the aquifer was 3 km, answer the following questions.

11. The rate of flow within the given cross sectional area of this aquifer is

- a. $210 \text{ m}^3/\text{d}$
- b. $21000 \text{ m}^3/\text{d}$
- c. $2100 \text{ m}^3/\text{d}$
- d. $210000 \text{ m}^3/\text{d}$

12. The Darcy Velocity is:

- a. 5.71 m/d
- b. 0.571 m/d
- c. 175 m/d
- d. None of the above

13. The seepage velocity is

- a. 1.25 m/second
- b. $1.446 \times 10^{-5} \text{ m/second}$
- c. 125 m/d
- d. 12.5 m/d

14. The time needed for water to travel 4.5 km downstream is:

- a. 3600 years
- b. 4500 days
- c. 9.86 years
- d. 9860 days

(8) (9)

IV. Write down the equations describing the following systems (6 points)

1. Water Budget in a groundwater system
2. General governing equation for steady-state, saturated, heterogeneous, anisotropic conditions
3. General governing equation for transient, saturated homogeneous, and isotropic conditions
4. Laplace's Equation for 2D aquifers
5. Darcy's law
6. Fourier's law

Best wishes

Dr. Ahmed Seif

Page# 6 of 6



Time: 2hrs

Subject: *Petrophysics and well logging (G459) Exam
for Geophysics Group Students*

Total 50 marks

مطلوب تسليم ورقة الاسئلة مع كراسة الاجابة

I-PETROPHYSICS (25 marks)

Answer the following questions: (9 marks)

- 1) Explain in some details the effect of salinity and saturation on the resistivity of the rocks.
- 2) Write on **only Four** of the following: (16 marks)
 - a. Matrix and Arkose sediments.
 - b. Absolute Permeability and Oil-Water System.
 - c. Types of Carbonate Porosity and Factors influence on porosity.
 - d. The resistivity of Clays.
 - e. Carbonate Reservoir Rocks and Types of Conductivity of rocks.
 - f. Shale distribution effect on the Resistivity.

II- WELL LOGGING (25 marks)

Answer the following questions:

1) Define the following terms: (5 marks)

- | | | |
|------------------------------------|-------------------------------------|------------------|
| a) Geothermal Gradient. | b) Formation factor. | c) Flushed zone. |
| d) Breakout, washout and mud cake. | e) Residual hydrocarbon saturation. | |

2) Select **the correct answer(s)** by putting the **sign (√)** : (5 marks)

- i) The SP log cannot be recorded when:

a) $R_{mf} > R_w$	b) $R_{mf} = R_w$	c) $R_{mf} < R_w$
d) The mud is oil based	e) The borehole is cased	f) The borehole is dry.
- ii) Mud invasion occurs due to (mud mobility – low formation fluid pressure – increase in mud pressure) in (shale - non permeable – permeable) layers and causes problems to logging measurements due to (mud cake – variable resistivity zones – virgin zone), but it helps in detecting (fluid types – reservoir rocks – source rocks).
- iii) The density log measures:

a) Formation density directly.	b) Electron density of formation.	c) Formation fluid density only.
d) Drilling fluid electron density.	e) None of above.	f) All of above.

بقية الاسئلة في الصفحة التالية

iv) Which of the following formulas used for S_w estimation:

$$\text{a) } S_w = \pi \sqrt{\frac{R_o}{R_t}} \quad \text{b) } S_w = \pi \sqrt{\frac{R_t}{R_o}} \quad \text{c) } S_w = \pi \sqrt{\frac{R_w}{R_t}} \quad \text{d) } S_w = \pi \sqrt{\frac{FR_w}{R_t}}$$

v) Variation of temperature in the well with depth can be encountered due to changes in:

- a) Surface temperature. b) Formation thermal conductivity.
c) Heat flow. d) Formation resistivity factor. e) All of the above.

3) Write short notes on the following subjects, illustrating by sketches: (6 marks)

- Steps used for estimating formation water resistivity (R_w) from SP log.
- The components of logging cable and its functions.
- Liquid junction and membrane potentials.

4) Explain ONLY by drawing with writing data on the sketch: (4½ marks)

- (a) Induction logging tool. (b) Factors that disturb the SP deflections.
(c) Normal and lateral resistivity devices.

5) Put (✓) against the correct answer and (X) against the wrong answer: (4½ marks)

- The SP log will deflect to the left in the clean water bearing sand compared to the shale when $R_{mf} > R_w$ ().
- Induction logging tool developed to measure the formation resistivity in boreholes containing Oil base mud (). Water base mud (). Air-drilled boreholes (). All of these (). None of these ().
- The Scintillation counter measures The GR radiation from Uranium (). The GR radiation from Potassium and Thorium (). The total and spectral GR radiation (). All of these (). None of these ().
- Gamma Ray log works well in cased hole ().
- Microresistivity logs are used to measure the resistivity of the Flushed zone (). Uninvaded zone (). Both (). None of these ().
- An upward decrease in the gamma ray in an interval in a well is taken as an indication that the grain size is increasing upwards in that interval ().
- The resistivity of a rock varies with temperature, when the temperature increases, the resistivity decreases ().
- The electron density of a material shows how large the bulk density of material ().
- Focusing of resistivity tools aims at reducing the environmental corrections ().

>>>>>>>><<<<<<<<<<<<<<< ***Good Luck !!*** >>>>>>>>>>>>>>>>>>>><<<<<<<<<<<<

Examiners: Prof. Dr. Awad A. A. Omran and Dr. Mohamed Fekry Khalil

(1)

بسم الله الرحمن الرحيم

جامعة أسيوط
كلية العلوم - قسم الجيولوجيا

امتحان التحريرى لطلاب كلية العلوم شعبتى الجيولوجيا والجيوفيزياء

المادة: جيولوجية مصر (415 ج)
(Geology of Egypt) (415 G)

الزمن: ثلاث ساعات

الدرجة: 50 درجة

دور يناير 2015/2014م

ملحوظة: الامتحان يتكون من أربع صفحات من 1-4

Part one (10 Marks)

Answer the following question:

- 1- Is there a Pre-Pan-African infrastructure in the Eastern Desert of Egypt? Discuss this debate in detail giving the evidences for and against. (10 Marks)

Part two (10 Marks)

Answer the following question:

- 2- A) Describe and correlate the Cenomanian rocks at Sinai and Bahariya Oasis. (7 Marks)

B) Give reasons for only three of the following: (3 Marks)

- i- The important of Jurassic rocks in Egypt.
- ii- The occurrence of thick Paleozoic sequences at northern Western Desert.
- iii- The occurrence of the Nubian Sandstone on the Basement rocks of the Eastern Desert of Egypt.
- iv- The restricted occurrence of the Triassic rocks at northeastern part of Egypt.

Part three (20 Marks)

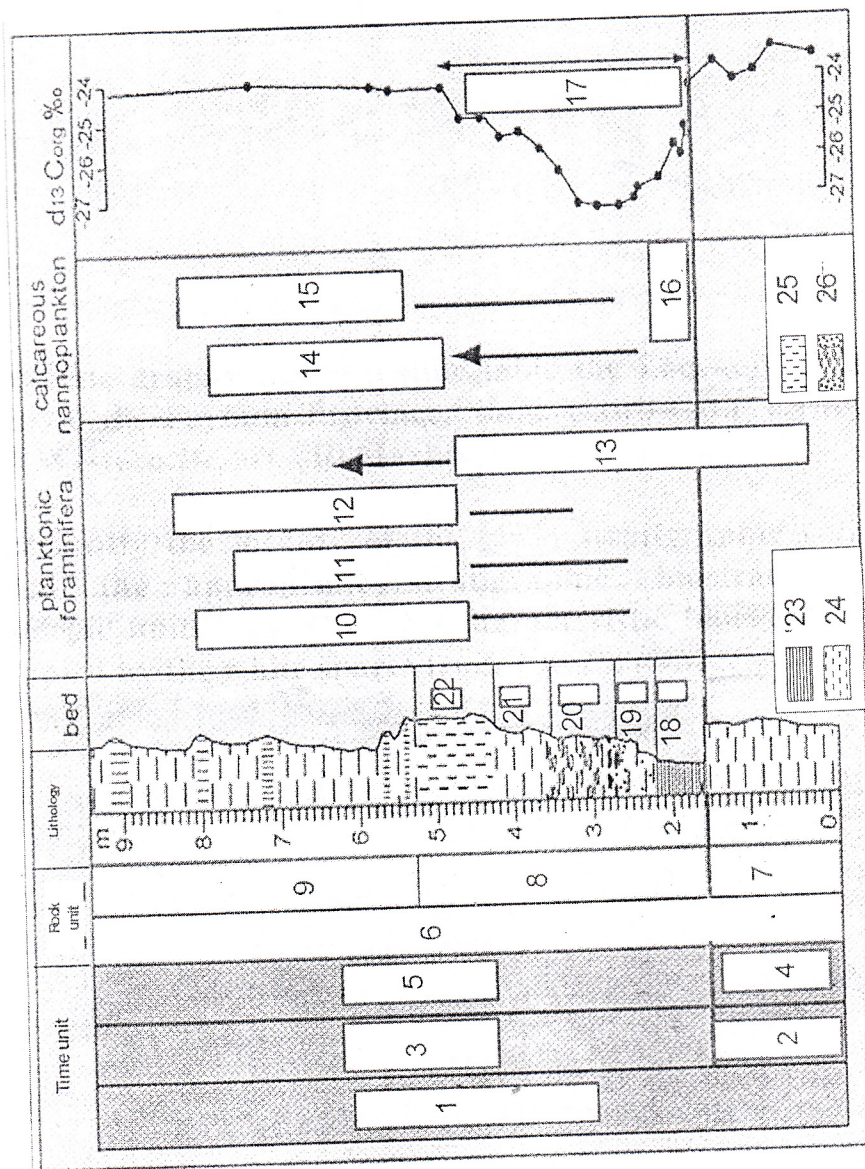
Answer only two questions from the following:

- 3- Correlate graphically in a time table the Oligocene-Miocene rock units in the northern Western Desert, the Nile Delta, the Gulf of Suez and the northern Red Sea. (10 Marks)

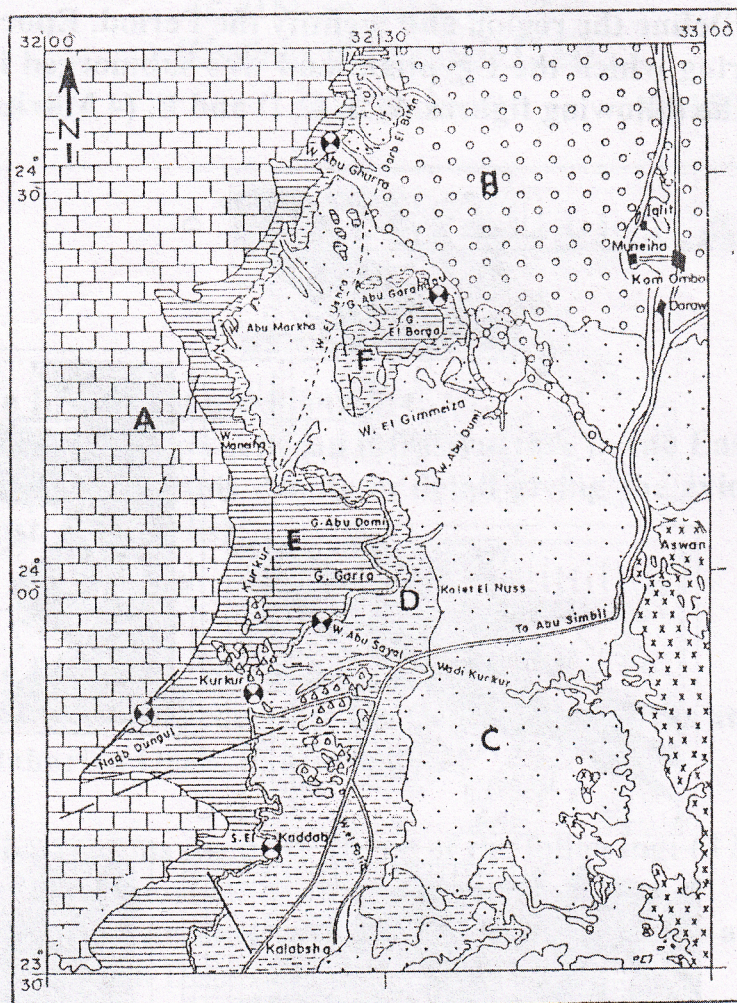
Ques 2)

4- Correlate graphically in a time table the Eocene-Oligocene rock units in the Fayoum Province, Sinai, Cairo-Giza, Eastern Desert and Western Desert. (10 Marks)

5- A: Identify the locality of the given stratigraphic column, and define the appropriate stratigraphic, biostratigraphic and lithologic units as well as the characteristic bioevents which are occupied by the white spares from 1 to 25. (7 Marks)



- (3)
- 6- B: Look to the following map and define the name of the district and the names of the rock units given from A to F as well as their equivalent ages. (3 Marks)



Part four (10 Marks)

Answer the following question: (10 Marks)

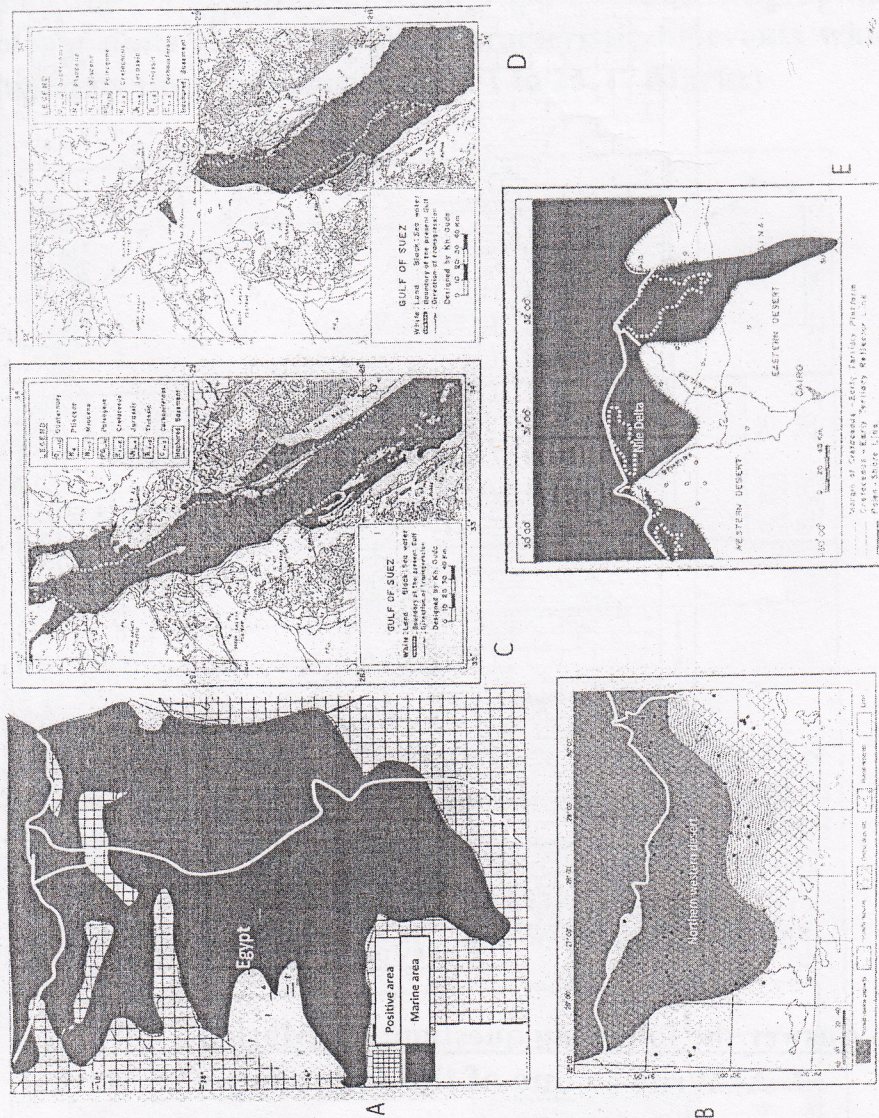
7- A) Write on one of the following: (3.5 Marks)

- i- Discuss in detail the metamorphic phases and the metamorphic types reported from the Egyptian basement.
- ii- Compare between the ophiolite suites and the fresh ultramafic-mafic associations occurring in the Egyptian basement.

(4)

7- B) Discuss and compare between the sediments of the early Cretaceous System at Sinai. (2.5 Marks)

7- C) Define the region and identify the Period, Epoch and Age during which the Egyptian land was submerged in a way such as in the following figures A, B, C, D and E. (4 Marks)



Good Luck!

Prof. Dr. Khaled A. Ouda

Prof. Dr. Ali A. Khudeir

Prof. Dr. Nageh A. Obaidalla

تنبيه هام: الامتحان الشفوي بعد الامتحان التحريري مباشرة