



ملحوظة : الامتحان على صفتين

Answer these **THREE** questions: (20 degrees for each question)

**Q1. Put Yes OR No and correct the underlined word if false: (One degree for each statement)**

- 1- VR/Vs depends on Poisson's ratio.
- 2- Attenuation of surface waves with distance is smaller than that for body waves.
- 3- The low frequency waves are rapidly attenuated than high frequency ones.
- 4- The surface wave travels along the interface with the higher velocity  $V_2$ .
- 5- Velocity of most igneous rocks and evaporites is controlled by density.
- 6- In porous rocks, the velocity depends also on the fluid filling the pore-spaces.
- 7- Velocity normally decreases with depth of burial.
- 8- Using an array of air guns with equal capacities enhance S/N ratio.
- 9- The sensitive element in hydrophones is a magnet-coil system.
- 10- Explosives give a sweep signal of many seconds duration.
- 11- Geophones transduce the mechanical ground motion to an electric signal whose voltage is proportional to the velocity of this motion.
- 12- The output of vibroseis must be cross-correlated with the input source signal to be interpretable.
- 13- All marine reflection surveying are accomplished using CDP technique.
- 14- Primary reflections are discriminated from multiples by their amplitudes.
- 15- The single-ended and split-spread arrangements are both multi-channel but single-fold coverage.
- 16- Dynamic corrections include elevation and weathering corrections.
- 17- Static correction is usually called NMO correction.
- 18- Multiple reflections usually occur in marine surveying due to reverberation process between the upper and lower surfaces of the water layer.
- 19- Shallow reflection methods are used in the field of hydrogeology for estimation of depth to the water table.
- 20- In refraction surveying travel times of the earliest arrivals only are measured.

**Q2. Complete the following: (One degree for each statement)**

- 1- ----- are the seismic detectors in water-covered areas.
- 2- ----- waves are one of the most important components of ground-roll noise.
- 3- VP/Vs ratio is usually ----- than 1.0.
- 4- ----- is a line drawn so as to be always perpendicular to the wave front.
- 5- The rock particles move in the same direction as the direction of propagation of the ----- waves.
- 6- Snell's law states that -----.
- 7- The reflection coefficient in a normal incidence depends on -----.

- 8- Attenuation is less pronounced for ----- rocks.  
 9- Velocity of the common sedimentary rocks is controlled mainly by -----.  
 10- At a distance greater than the crossover distance;  $X_{cros}$ , ----- wave arrives first.  
 11- ----- can introduce a sweep of any desired frequency range for seismic prospecting.  
 12- ----- give a pulse of high frequency and amplitude.  
 13- ----- give an oscillatory pulse of variable frequency.  
 14- ----- is composed of two elements; permanent magnet and coil.  
 15- ----- is the sensitive element in hydrophone.  
 16- The ----- of the interface is  $\sin \theta_1 / \sin \theta_2 = V_1 / V_2$ .  
 17- ----- is a multi-channel and multi-fold coverage.  
 18- The position of the streamer is monitored as ----- usually deflect it from the line of the profile.  
 19- Air guns are usually detonated at ----- interval times depending on the ship's speed.  
 20- If the geologic section has a blind zone in-between, there will be an error in estimating -----.

**Q3. Complete from column B to make correct statement : (Two degrees for each statement)**

A		B	
1	Fermat's principle	1	is a measure of a material's resistance to shear.
2	Deconvolution	2	is defined as that velocity value which produces the maximum amplitude of reflection event in the stack of traces.
3	Migration	3	is the ability to recognize individual, closely spaced reflectors, and is determined by the pulse length.
4	Poisson's ratio	4	the ray path taken between two points is the one requiring the minimum amount of time.
5	Root-Mean-Square Velocity	5	is determined by the spacing of the individual depth estimates from which the reflector geometry is reconstructed (half the detector spacing).
6	The tuning thickness	6	$V^2_{rms} = (V_1^2 T_1 + V_2^2 T_2 + \dots + V_n^2 T_n) / (T_1 + T_2 + \dots + T_n)$
7	The rigidity modulus	7	is the process of reconstructing a seismic section so that reflection events are repositioned under their correct surface location and at a corrected vertical reflection time.
8	Vertical Resolution	8	is the ratio of radial to axial strain when a unidirectional stress is applied.
9	The stacking velocity	9	is used to improve seismic records by removing the adverse filtering effects encountered by seismic waves during their passage through the ground.
10	Horizontal Resolution	10	is that which equals $\frac{1}{4}$ wavelength.

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لجنة التصحيح :



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**Answer the following questions**

**Question 1: Complete: (18 marks)**

- 1- The Paleocene Epoch includes ....., ....., and ..... ages.
- 2- The  $\delta^{34}\text{S}$  curve is potentially useful as means of chronocorrelation of ..... in ancient oceans whereas the positively increase in  $\delta^{18}\text{O}$  generally reflects .....
- 3- Three ranks of lithostratigraphic units in ascending order is....., ..... and .....
- 4- The methods of biocorrelation include ....., ..... and .....
- 5- The Ordovician Period is subdivided into ....., ..... and ..... epochs
- 6- The name of a biozone consists of ..... followed by .....
- 7- The folded overturned rocks are an exception of the principle of .....
- 8- Facies adjacent to one another in a continuous vertical sequence also accumulated adjacent to one another laterally, the stratigraphic principle is .....

**Question 2. Give YES or NO and when No give the true Answer: (20 marks)**

- 1- The "up direction" of a single bed is determined by studying the nature of **angles of sigmoidal cross bedding**.
- 2- The Geosol is a rank of **lithostratigraphic** units, whereas the system belongs to the **biostratigraphic** units.
- 3- The **baselap** is called when the sea is transgressive.
- 4- The types of **interval zones** include Taxon Range Zone and Concurrent Range Zone.
- 5- The cyclothems that are generated outside the sedimentary system are called **autocyclic**.
- 6- The **accommodation space** is the distance between the centre of the earth and the sea level.
- 7- The rocks of each facies become younger in a landward direction during a **marine transgression**.
- 8- The body of rock including the concurrent, coincident, or overlapping part of the ranges of two specified taxa is called a **lineage zone**.

**Question 3: Write briefly on: (22 marks)**

- 1- The formal nomenclature of chronostratigraphic units and geochronologic units. (7 marks)
- 2- The various types of conformable contacts in vertical and lateral successions with drawings.(7 marks)
- 3- The relation of strata to unconformity surfaces with drawings. (8 marks)



**Question One:- Complete the following: (25 Marks)**

- 1- The sequence of events in uranium resource development are.....and....
- 2- The Exploration for new radioactive sites dependent on the....and...
- 3- The geological studies in the explorations include.....and....
- 4- Some Occurrences of uranium in South Sinai include.....and....
- 5- The most important minerals in Abu Rushied area are.....and...
- 6- The Egyptian phosphate locates in .....areas.
- 7- The most important mineral bearing uranium and thorium in black sand is....
- 8- The most important primary uranium minerals are...and... and the secondary uranium minerals are.....and....
- 9- The unconformity uranium deposits are....
- 10- The sandstone uranium deposits are....

**Question Two:- Tick .( √ ) or (×) and correct: (25 Marks)**

- 1-The geological missions are responsible for following up the areas which were selected by the aircraft and/or car borne.
- 2-The geophysical studies in the exploration for uranium including seismic and magnetic.
- 3- Uranophane, monazite, zircon and Nb bearing minerals represent some important uranium hosting minerals in El-Sela granite pluton.
- 4- The surface and underground exploratory works in Gabal Gattar including trenching, tunneling and vertical shafts.
- 5- The uranium anomalies occur in granite and white silica in El Missikat area.
- 6- The uranium and gold are the most important minerals in El Missikat area.
- 7- The monazite and Egyptian phosphate ore are conventional uranium sources.
- 8- The Egyptian black sands extended from Alexanderia to El Arish.
- 9- The main representative deposits in hematite breccia uranium type is cigar lake.
- 10- The uranium content in the intrusive deposits are generally very high grade.

**Question Three: Write on: (20 Marks)**

- 1-Metasomatic uranium deposits.
- 2- Surficial uranium deposits.
- 3-Black shale uranium deposits.
- 4- The identified and inferred uranium resources.
- 5- The anomalous and fertile granites.



Answer the following Questions: (20 Marks for each one)

**Question One: Complete the following statements: (20 Marks)**

- The microspheric generation with small proloculus is termed...(1)... form, whereas the megalospheric phase is called ...(2)... form.
- Certain groups having a porcelaneous test as ...(3)..., ...(4)... and ...(5)... can live equally well in hyperhaline environments lagoons with a salinity > 35 parts per mille (‰).
- The test may be described as monoumbonate as in *Discorbis* or ...(6)....
- Foraminiferal tests from silty and muddy substrates are ...(7)..., ...(8)... and ...(9)... forms.
- The apertures in planktonic foraminifera may be partially covered by one or several flaps called ..(10)..
- Although inflated chambers are characteristic for planktonic foraminifera, some genera have club-shaped as in genus ...(11)..., while others, have keeled outer margins as in genus ... (12)... of Upper Cretaceous and ...(13)... of Paleocene – Recent.
- High...(14)... foraminiferid assemblages strongly suggest a wide range of available food resources.
- Foraminifera are single-celled animals belonging to class ...(15)...
- Planktonic foraminifera provide the basis of important schemes for intercontinental correlation of ...(16)... and ...(17)... rocks.
- The planktonic foraminiferal family ...(18)... became extinct at the end of the Cretaceous.
- Foraminifera with hard tests were scarce until Devonian, during which period the genus.....(19)..... began to flourish, culminating in the complexly constructed tests of .....(20)... in Late Carboniferous and Permian times.

**Question Two:**

Answer the following statements with Yes or No and correct the false one. (20 Marks)

- 1-The ratio of CO<sub>2</sub> to O<sub>2</sub> decreases with depth in marine waters. ( )
- 2-CaCO<sub>3</sub> solubility decreased with pressure. ( )
- 3-The sutures may be described grooved as in *Bulimina*. ( )
- 4-The biserial arrangement of chambers arranged in two alternating rows, the initial test may be calcareous as *Textularia* or agglutinated as in *Bolivina*. ( )
- 5-All planktonic foraminifera have calcareous test. ( )
- 6-The *Heterohelix* is considered as benthic of agglutinated test. ( )
- 7-The *Lagena* is considered as benthic of agglutinated test. ( )
- 8-All marine microfossils are protists. ( )
- 9-Nummulites gizehensis is so abundant in the middle Eocene of Mokattam limestone in Egypt. ( )
- 10-The ditsch samples taken from deep wells are most suitable than cores. ( )
- 11-The gametes conjugate outside in open sea to reproduce zygotes and the A form then develops and mature in the second summer. ( )
- 12-The photic zone is deeper in tropical waters (<200 m) and decreases in depth towards the poles where it also varies marked seasonality. ( )
- 13-Each species of foraminifera is adapted to a certain range of temperature conditions. ( )
- 14-The solubility of CaCO<sub>3</sub> is more in warm than in cool waters. ( )
- 15-PH decreases with depth in marine waters. ( )

**Question Three: Answer the following:**

**(20 Marks)**

"Stratification of the oceans results in the lower layers of water being cooler, as for example in tropical waters where the surface may average 28°C but the bottom waters of the abyssal plains may average less than 4°C. These cooler, deeper waters may be characterized by cool-water benthic assemblages that otherwise are found at shallower depths nearer the Poles. Planktonic foraminifera are also adapted to different oceanic layers of particular temperatures and densities".

- 1- State at least two benthic genera for each layer of oceans stratification and at least one species of planktonic in relation to temperature changes? (8.5 Marks)
- 2- Three foraminiferal genera of Discorbacea? (3 Marks)
- 3- Three foraminiferal genera of Lituolacea? (3 Marks)
- 4- The factors that are controlling the deposition of Globigerina ooze? (3 Marks)
- 5- State the taxonomic rank of each of the following: (2.5 Marks)  
( Nodosariacea, Buliminidae, *Polymorphina*, Rotaliina, *Elphidium crispum*)



## FINAL EXAM IN PETROLEUM GEOLOGY (G228) FOR THE SECOND LEVEL PETROLEUM GEOLOGY AND MINING PROGRAM

QUESTION ONE: Fill-in the spaces with suitable word(s) (20 marks)

1. The driving mechanism for secondary migration is (1) ..... between the petroleum and water.
2. (2) ..... are characterized by high molecular weight and large size, and forms one of the heaviest molecules in crude oils.
2. Oils derived from carbonate or siliceous source facies are usually of (3) ..... API than those from other lithologies.
3. Nickel and vanadium and other metals are present dominantly in a specific group of cage-like compounds, called (4) .....
4. (5) ..... and (6) ..... are both branched alkanes which are found in chlorophyll, whose relative abundance in crude oils is an indication of the depositional environment of their source rock.
5. Three basic requirements for the generation and preservation of organic matter in sediments are (7) ..... (8) ..... and (9) .....
6. Type-I kerogen is containing alginite, (10) ..... and (11) ....., amorphous organic matter, cyanobacteria, freshwater algae, and land plant resins.
7. An under-filled trap can occur when (12) ....., or because (13) .....
8. The sonic tool works by sending a (14) ..... pulse into the formation and measuring the (15) ..... for the sound wave to return to a receiver located further up (or down) the tool.
9. Tertiary migration includes (16) ....., seepage, dissipation, and (17) ..... as it reaches the Earth's surface.
10. (18) ..... is an intrinsic property of a material that determines how easily a fluid can pass through it.
11. There are two broad methods whereby the presence of petroleum in a basin may be proven ahead of acreage acquisition and drilling are (19) ..... and (20) .....



**QUESTION TWO: Write short notes on each of the following terms**

**(20 marks)**

1. Wax content of crude oil,
2. Dilution,
3. Evidences support oil migration,
4. Upwelling,
5. Type-II kerogen,
6. Catagenesis,
7. Criteria on the organic origin of petroleum and objections,
8. Nuclear Magnetic Resonance tools (NMR),
9. Acquisition of acreage, and
10. Seal failure.

**QUESTION THREE: Compare between the following counterparts with drawing**

**(10 marks)**

1. Membrane and hydraulic seals,
2. Farm-ins and farm-outs deals,
3. Rift and passive margins basins,
4. Lenticular and pinch-out stratigraphic traps, and
5. Gravity and magnetic as a tools for hydrocarbon exploration.

**QUESTION FOUR: Read the statements below and decide whether they are true (T) or false (F).**

**Explain your choice**

**(10 marks)**

1. Membrane fault seals fail when the pressure of the petroleum is bigger than the entry pressure of the largest pores along the fault plane.
2. Unconformity traps are those that resulted from the truncation of reservoir rocks by an unconformable, relatively permeable, coarse-grained rock unit.
3. The higher the API gravity of an oil, the larger the yields of the lower boiling point cuts.
4. Freshwater lakes on continents are sites for high productivity and preservation in the anoxic bottom waters that characterize the lake bed.
5. Type-III Kerogen is formed from terrestrial plant matter that is rich in lipids or waxy matter.

**Good luck**

**Dr. Waleed Shukry El Diasty**





**Answer the Following Questions**

Question One : Tick (  ) or ( X ) and correct

- 1- When the argillaceous rock is fissile it is mudstone.
- 2- The treatment of clay samples by acetic acid is to remove organic matter.
- 3- The clay minerals belong to the tectosilicates.
- 4- Kaolinite is formed by crystallization of volcanic ash under marine condition.
- 5- Swelling is the required property of ethylene glycol to differentiate between clay minerals.
- 6- Illite is a clay mineral belongs to mica groupe.
- 7- Clay is a fraction of clastic sediments with grain size > 10µm.
- 8- Decantation is the only technique used for clay particles separation.
- 9- Peak weight is normally used in semi-quantitative analysis of clays.
- 10- Brucite layer is the chief constituent of illite structure.
- 11- Endothermic peak at 552°C in the DTA curve is due to montmorillonite dehydration.
- 12- Chemical composition is the most important in determining the use of clays in industry.
- 13- Print quality is the most important property in papermaking.
- 14- A very large use of kaolinite is in ceramic industry.
- 15- Ca-montmorillonite has a very high thixotropy.
- 16- Because Na- montmorillonite has white color it is preferred in fruit juices refining.
- 17- The most important use of attapulgite is in drilling muds.
- 18- Because the elongate shape of its particles, palygorskite is used in environmental application.

(18 mark )

Question Two: Complete.

- 1- Montmorillonite is formed from.....
- 2- Heat treatment in X-ray analysis of clays is used to.....
- 3- The clays are removed from the.....of the soil profile by.....
- 4- Sepiolite is the chief constituent of the..... group .
- 5- Using Bragg equation in X-ray analysis ,the..... is measured.
- 6- In brucite layer, the octahedrons are occupied by.....but in the gibbsite layer by.....
- 7- The chlorite clay mineral belongs to..... group.
- 8- The (002) of chlorite and the (001) of kaolinite peak positions are at.....
- 9- The edge of clay particles can be.....or.....charged.
- 10- Kaolin occurs in where it is formed is..... kaolin.
- 11- Flint clay is composed principally of..... kaolinite.
- 12- In paper industry kaolin is used as.....and as.....
- 13- The two principle objectives of kaolin refining are to.....and.....
- 14- The mineral impurities in kaolin are.....and.....
- 15- Removal of iron oxides from kaolin is done using.....
- 16- The use of montmorillonite in pharmaceuticals is to produce.....and.....
- 17- The use of montmorillonite in sugar industry is for.....
- 18- The main attapulgite colloidal applications are.....and.....

(18 mark )

p.t.o.»

Question Three: Choose the correct answer :

- 1-Mudstone and shale in the sedimentary rocks of the earth crust represent  
a- 50%                                      b- 30%                                      c-75%
- 2-Which of the following clay minerals contain brucite layer in its structure  
a- illite                                      b- kaolinite                                      c- chlorite
- 3- Which of the following minerals does not belong to the sheet clay structure  
a-attapulgit                                      b-chlorite                                      c-ilite
- 4- The (002) peak at  $7^{\circ}A$  belongs to  
a- kaolinite                                      b-illite                                      c- chlorite
- 5- Montmorillonite with (001) at  $14^{\circ}A$  is  
a- sodic                                      b- calcic                                      c- potassic
- 6- The ASTM cards are used for identification of minerals in  
a-powder samples                                      b-oriented aggregates                                      c-solution samples
- 7- The flocculated fabric of clay particles is  
a- domain                                      b-cluster                                      c- ped
- 8- The oriented aggregates of clay particles are mount to obtain  
a- (001) plane                                      b-(010 )plane                                      c- (100) plane
- 9- X-rays are electromagnetic waves following in the spectra  
a-ultraviolet                                      b- radio waves                                      c-infra red
- 10-The filtration of the characteristic X-ray eliminate  
a-  $K\beta$                                       b- $M\beta$                                       c-  $L\beta$
- 11-Which of the following clays are greatly used in paper industry  
a-kaolin                                      b-bentonite                                      c- atapulgite
- 12-Kaoline is used in paint industry because of its  
a- high oil absorption                                      b- whiteness                                      c- large particle size
- 13- In ceramic industry the products are fired twice in the production of  
a-wall tiles                                      b- roof tiles                                      c-floor tiles
- 14- In paper industry the coating kaolin has particle size relative to the filler kaolin  
a-larger                                      b- equal                                      c-smaller
- 15- The chemical composition of kaolin is critical in  
a-paper industry                                      b- ceramic industry                                      c-paint industry
- 16- The montmorillonite used in oil refining is  
a- natural                                      b- acid activated                                      c- Na activated
- 17- Palygorskite is preferred for montmorillonite in drilling mud because it  
a- highly swell                                      b- highly thixotropic                                      c-does not react with electrolytes
- 18- Attapulgit is used in pharmaceuticals preparation because of  
a- lack of toxicity                                      b- low absorption                                      c- low swelling

( 18 mark )

Question Four: write in Two of the following

- 1- The basic structure and classification of clay minerals.
- 2- The preparation of clay samples for X-ray analysis.
- 3- The refining of kaolin to be suitable for industrial application.
- 4- The use of kaolin in paper industry.

( 16 mark )

Good Luck

Prof. Omar Hegab