Mansoura University Faculty of Science Department of Physics Phys. 102	Final Exam 2015-2016	Time Allowed: 2 h Date: 21/ 5 / 2016 First year: All programs Total Degree: 60

Answer the following Questions:

Q.1) Choose the correct answer: **(30 Marks)**

1. Biot-Savart Law *is* given by

(A) $dB = \frac{\mu_0}{4\pi} \times \frac{I\,dl \sin\theta}{r^2}$ (B) $dB = \frac{\mu_0}{2\pi} \times \frac{I\,dl \sin\theta}{r^2}$ (C) $dB = \frac{\mu_0}{4\pi} \times \frac{I\,dl \sin\theta}{r}$ (D) None

2. Calculate the electric field at a distance of 3.0cm on a positive test charge due to a charge of 2.0×10^{-6} C. Take ($1/4\pi\varepsilon_0 = 9.0 \times 10^9$ N.m^2/C^2).

(A) 2.0×10^7 N C^{-1}, (B) 6.0×10^7 N C^{-1}, (C) 5.4×10 N C^{-1}, (D) 4.05×10^{11} N C^{-1}

3. The capacitance of a capacitor may be increased by

(A) decreasing the amount of charge stored (B) increasing the surface area of the plate
(C) increasing the voltage across the plate (D) decreasing dielectric constant

4. In fiber optic thread, refractive index of inner core is

(A) Less than cladding (B) equal to cladding, (C) Both A and B (D)Higher than Cladding.

5. A wire (length = 2.0 m, diameter = 1.0 mm) has a resistance of 0.45Ω. What is the resistivity of the material used to make the wire?

(A). $5.6 \times 10^{-7}\ \Omega \cdot m$ (B). $1.2 \times 10^{-7}\ \Omega \cdot m$ (C) . $1.77 \times 10^{-7}\ \Omega \cdot m$

6. A 9.0-V battery is connected between two parallel metal plates 4.0 mm apart. What is the magnitude of the electric field between the plates?

(A) 2.3×10^3 N/C (B) 9.0 N/C (C) 2.3 N/C (D) 0.75×10^{-6} N/C

7. A uniform electric field, with a magnitude of 600 N/C, is directed parallel to the positive x-axis. If the potential at x = 3.0 m is 1000 V, what is the change in potential energy of a proton as it moves from x = 3.0 m to x = 1.0 m? ($q_p = 1.6 \times 10^{-19}$ C).

(A) 8.0×10^{-17} J (B) 1.9×10^{-16} J (C) 0.80×10^{-21} J (D) 2.2×10^{-15} J

8. If a body P, with a positive charge, is placed in contact with another uncharged body A. What is the charge on A?

(A). must be equal in magnitude to that on P (B). must be negative
(C). must be positive (D). must be greater in magnitude than that on P

9. Total internal reflection occurs when

(A) Light passes from a denser to a lighter medium (B) Light comes into the air from the vacuum (C) Light goes to vacuum from air (D) light passes from more denser to less denser medium.

10. Can electric field lines intersect in free space?

(A) Yes, but only at the midpoint between two equal like charges. (B) Yes, but only at the midpoint between a positive and a negative charge. (C) Yes, but only at the centroid of an equilateral triangle with like charges at each corner. (D) No.

11. What is the electric field (E) value when a force equals to 300 N affected on 6 μC charge?

(A) 5×10^7 N/C (B) 5.5×10^8 N/C (C) 7×10^7 N/C (D) 8.5×10^9 N/C

12. Two parallel plates having a potential difference of 30 V between them are spaced 0.04 mm. The electric field strength is .

(A) 7500 V/m (B) 34000 V/m (C) 750000 V/m (D) 6000 V

13. Which of the following about a magnetic field is correct?

(A) The unlike magnetic poles repel. (B) A magnetic pole can be isolated.
(C) Tanget of magnetic field lines indicate the direction of the magnetic field.
(D) A magnetic pole cannot induce magnetic poles in other materials.

14. Several electrons are placed on a hollow conducting sphere. They

(A) clump together on the sphere's outer surface. (B) clump together on the sphere's inner surface. (C) become uniformly distributed on the sphere's outer surface- They get as far away from each other as possible (D) become uniformly distributed on the sphere's inner surface.

15. If a capacitor parallel- plate having a charge of 10 μC and a voltage of 10V is applied across it. Hence, the energy stored will be

(A) 20 μJ (B) 30 μJ (C) 50 μJ (D) 75 μJ

Q.2). Answer the following questions (15 Marks)

Q 2a.) Describe a general relationship between the net electric flux through a closed surface (often called a *gaussian surface*) and the charge enclosed by the surface.

Q 2b.) Find the frequency of a circulating charge in a magnetic field B.

Q 2c) Deduce the expression for the magnetic force due to a wire carrying current.

Q.3a) Write True or False for each statement. (10 Marks)

1. A positive charge placed in an electric field experiences a force in the direction of the field.
2. The equivalent capacitance of two capacitors connected in parallel is always greater than the larger of the two capacitance values.
3. The electric lines of force begin on positive charge and terminate on the negative charge.
4. Capacitors connected in series carry the same charge Q.
5. When light passes from one medium to another, its frequency does not change but its wavelength changes.
6. The electric field inside a conductor is zero in the static situation.
7. Lorentz Law State that $F = q_0(Ev_d + v \times B)$
8. Ampere's law states that $\oint B.dl = \mu_o i$.
9. In ohmic materials, the current density J is inversely proportional to the electric field E
10. The magnetic force has a maximum values when the directionof the magnetic field is parallel to the velocity direction (v) of the charge q.

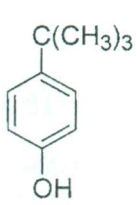
Q.3b) Three capacitors (4 μF, 8 μF and 16 μF) are connected in parallel across a 200 V power supply. Determine (A) the equivalent capacitance . (B) the charge on each capacitor. (5 Marks)

Examiners: Prof. Dr. Naer Bakr, Prof. Dr. Moustafa Tawfek, , Prof. Dr. Rezk Moustafa
Ass.Prof. Maysa Abdelhamed, Ass..Prof. Abdel Meguid Hassan, Ass.. Prof. Mahdy Elmahdy,
Dr. Afaf Sarhan, Dr. Moneim Ismail

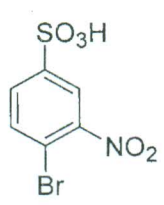
Mansoura University Faculty of Science Chemistry Department Subject: Organic Chemistry (Chem.236)		2nd level Date: 18/5/2016 Time allowed: 2 hours Full Mark: 80 Marks Second Term

Answer the FOLLOWING questions:

(1) (A) Read Carefully the compounds (1)-(4), then answer the equations: (12 Marks)



(1)



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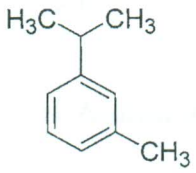
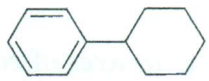


(3)



(4)

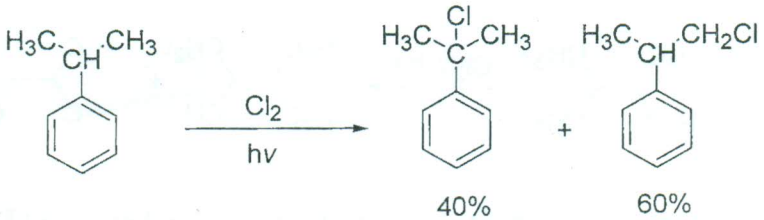
i) Show the product of the reaction of (**1**) with $(CH_3)_2C{=}CH_2$/ H^+

ii) Diagram the synthesis of (**2**) starting with benzene

iii) Show the product of the oxidation of (**3**) with $KMnO_4$

iv) Account for the synthesis of (**4**)

(B) Calculate the reactivity ratio between 1^o and 3^o H atoms in this reaction: (6 Marks)



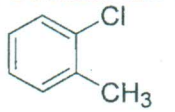
(C) Diagram these Conversions: (9 Marks)

i) $CH_3CH_2CH_2OH \longrightarrow CH_3CH_2CH_2COOH$

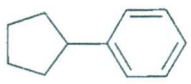
ii) $CH_3COOH \longrightarrow CH_3NH_2$

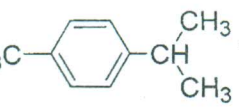
iii) $CH_3COCl \longrightarrow H_3C{-}\overset{O}{\overset{\|}{C}}{-}\overset{H_2}{C}{-}COOC_2H_5$

(2) Predict the organic product(s): (20 Marks)

i) 

$\xrightarrow[H_2SO_4]{HNO_3/}$ .....

ii)  $\xrightarrow{NBS/\ h\nu}$ .....

iii) 

$\xrightarrow{Cl_2 / Fe}$ .....

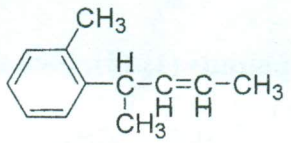
iv) $CH_3CH_2COOAg + Br_2 \longrightarrow$ .....

v) $CH_3COCl + H_2 \xrightarrow{Pd / BaSO_4}$ .....

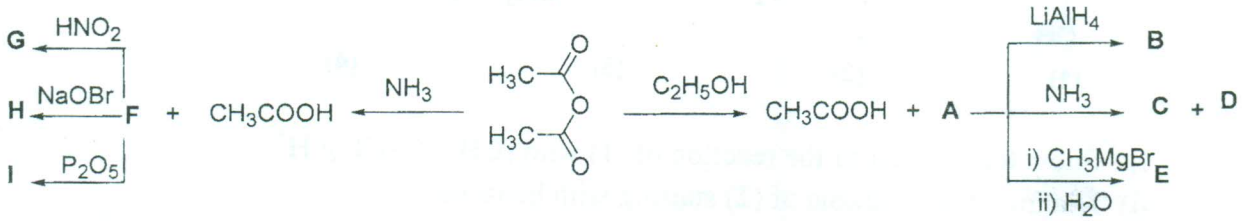
Best wishes

Examiners: **Prof. Dr. M. Mansour, Prof. Dr. Ez Kandil, Dr. M. Yosef , Dr. M. El fedawy & Dr. N. Shaker**

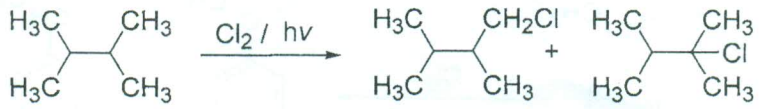
(B) Draw the structures of the possible products of chlorination (Cl_2 / hν) of the compound below, Arrange the sites of reaction in decreasing reactivity: (7 Marks)



(3) (A) Draw the structures of compounds A-I: (18 Marks)



(B) It was found that the reactivity ratio between 1° and 3° H atoms in the reaction below is 1: 4.5; calculate the percentage of each isomer: (6 Marks)



(C) Diagram the conversion of toluene into 1,3,5-trinitrobenzene (TNB).

(2Marks)

Best wishes

Examiners: Prof. Dr. M. Mansour, Prof. Dr. Ez Kandil, Dr. M. Yosef , Dr. M. El fedawy & Dr. N. Shaker

Mansoura University **Faculty of Science** **Chemistry Department** **Subject: Chemistry** **Course(s): Chemical Thermodynamics** **Code: Chem 241**		**Second Term** **2nd Level Students** **Date: 29 may 2016** **Time allowed: 2 hours** **Full mark: 60 marks**

Answer the Following Questions: الامتحان في صفحتين

Question 1: **(21 marks)**

Choose the response that best complete for each statement:

1- Thermodynamic parameter, which is state function and is also used to measure disorder of the system is:

a) entropy b) internal energy c) fugacity d) free energy

2- The change in enthalpy of a system is measured by measuring:

a) heat of the process at constant volume b) heat of the process at constant temperature

c) heat of the process at constant pressure d) none of these

3-Which of the following contains only intensive property:

a) mass b) volume c) internal energy d) density

4- The heat capacity at constant pressure is related to heat capacity at constant volume by the relation

a) $C_P + R = C_V$ b) $C_P - C_V = R$ c) $C_V - R = C_P$ d) $R - C_P = C_V$

5- Which out of the following is incorrect?

a) Work done on the system is –ve b) heat flow out of the system is –ve

c) Heat flow into the system is +ve d) none of these

6- A system that can exchange neither energy nor matter to and from its surrounding is:

a) a closed system b) an isolated system

c) an open system d) a homogeneous system

7- In an adiabatic process ---------- can flow into or out of the system.

a) no heat b) heat c) matter d) no matter

8- From the equation dG = -S dT + V dP. Which of the following expression is true?

a) $\left(\frac{dG}{dP}\right)_T = V$ b) $\left(\frac{dG}{dT}\right)_P = -S$ c) $\left(\frac{dG}{dP}\right)_V = \mu$ d) $\left(\frac{dG}{dP}\right)_T = -S$

9-A process which proceeds of its own accord, without any outside assistance, is called

a) non-spontaneous process b) spontaneous process

c) reversible process d) irreversible process

10-The entropy of a pure crystal is zero at absolute zero. This is statement of

a) first law of thermodynamics b) second law of thermodynamics

c) third law of thermodynamics d) none of these

11- The efficiency of a reversible Carnot cycle is maximum when:

a) Temperatures of hot source and cold sink are maximum

b) temperatures of hot source and cold sink are minimum

c) temperature of hot source is maximum and that of cold sink is minimum

d) temperature of hot source is minimum and that of cold sink is maximum

12- The correct expression for Helmholtz free energy (dA) is

a) -SdT + VdP b) TdS + PdV c) -SdT – PdV d) TdS + VdP

13- The internal energy (ΔE) of process does not depend upon:

a) amount of substance b) temperature c) pass of the process d) all of these

14- The chemical potential for real gas is given by

a) $\left(\frac{dG}{dn}\right)_{T,P}$ b) $\mu^\circ + RT \ln a$ c) $\mu^\circ + RT \ln P$ d) $\mu^\circ + RT \ln f$

15-The mathematical expression for work done in adiabatic reversible expansion is
a) $nC_V\Delta T$ b) -PdV c) $-nC_V\Delta T$ d) PdV
16-A machine that can do work by using heat which flows out spontaneously from a high-temperature source to a low-temperature sink is called
a) Carnot machine b) cyclic machine c) heat machine d) heat engine
17- When water is cooled to ice, its entropy
a) increases b) decreases c) remains the same d) becomes zero
18- A chemical reaction proceeds with decrease in both the enthalpy and entropy. This reaction will be spontaneous if:
a) $\Delta H < T\Delta S$ b) $\Delta H = T\Delta S$ c) $\Delta H > T\Delta S$ d) none of these
19-Which of the following equations is used to calculate the heats of reaction when ΔG at two temperatures is given?
a) Van't Hoff equation b) Clapeyron equation c)Gibbs Helmholtz equation d) none of these
20-For an ideal gas at constant temperature, the entropy is given by
a) $\Delta S_T = nRln\frac{V_1}{V_2}$ b) $\Delta S_T = C_P ln\frac{T_2}{T_1}$ c) $\Delta S_T = nRTln\frac{V_2}{V_1}$ d) $\Delta S_T = nRln\frac{P_1}{P_2}$
21- At any temperature T, the entropy of a solid substance (S_T) given by the expression
a) $C_P dT$ b) $\int_0^T \frac{C_P}{T} dT$ c) C_P/dT d) $\frac{C_P - C_V}{T}$

Question 2: (From 1-5, each of 5 marks)

1- For molar amounts, the standard Gibbs free energy (ΔG°) for the following reaction:

$$2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(g)} \text{ at } 25°C \quad \text{is} \quad 2457.14 \text{ kJ}$$

In a system where $P_{H_2} = 0.775$ atm, $P_{O_2} = 2.88$ atm, and $P_{H_2O} = 0.556$ atm, determine ΔG then equilibrium constant for the reaction when will be in equilibrium
2- Calculate the work done when 3.5 mol of an ideal gas at 27°C expands isothermally and reversibly from a volume 5 L to 25 L.
3- At 373.6 K and 372.6 K the vapour pressure of $H_2O_{(l)}$ are 1.018 and 0.982 atm respectively. What is the heat of vaporization of water (ΔH_{vap})?
4-An ideal gas at STP is expanded adiabatically from 1 L to 5 L. Calculate the final temperature ($C_P/C_V = 1.4$)
5- Define or explain the following terms:
Molar heat capacities - Gibbs free energy - Van't Hoff isotherm - System and surroundings - Internal energy - Second law of thermodynamics - Chemical potential
6- 2-Derive the following:
a) Van't Hoff equation b) Derive the Clapeyron equation **(each one 7 marks)**

Best wishes;

Prof. Dr. A.S. Fouda, Dr. G.Y. Elewady and Dr. K. Shalabi

الفرقة: الثانيـــــة الشعب: كيمياء-كيم/ح-كيم/ن- جيولوجيا -علوم بيئة-ميكروبيولوجي . المادة: رياضيات بحتة – ر201	كلية العلوم – قسم الرياضيات	دور مايو 2016 الزمن: ساعتـــــان التاريخ: 2016/6/1

أجب على الأسئلة الآتية:

[1] أ. اختبر وجود كل من النهاية التكرارية والنهاية العامة للدالة $f(x,y)=\frac{x^2y^2}{x^4+y^4}$ وذلك عندما تؤول النقطة (x,y) إلى النقطة $(0,0)$. [10 درجات]

ب. حل مسألة الشرط الابتدائي : $(x+y)^2\,dx-x^2\,dy=0$, $y(1)=1$. [10 درجات]

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[2]أ. إذا كانت الدالة z معرفة كالآتي : $z=\cos^{-1}\left(1+\frac{x^4+y^4}{(x-y)^2}\right)$ ، فاثبت أن $xz_x+yz_y=2(\operatorname{cosec} z-\cot z)$ [10 درجات]

ب. اوجد الحل العام للمعادلة : $(2y-\cos x)\,dx+x\,dy=0$. [10 درجات]

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[3] أ. اثبت أن قيمة التكامل : $\int_{(0,0)}^{(1,3)}(y^2-4xy-1)\,dx+(2xy-2x^2-3)\,dy$ لا تعتمد على شكل المنحنى الواصل من النقطة $(0,0)$ إلى النقطة $(1,3)$ ، ثم احسب قيمة التكامل. [10 درجات]

ب. حل المعادلة : $e^x y'-4xy^2=-e^x y$ [10 درجات]

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[4] أ. اوجد الحل العام للمعادلة : $(y^2\cos x+2y\sec^2 x-1/x)\,dx+(2\tan x+2y\sin x)\,dy=0$ [10 درجات]

ب. استخدم نظرية "جرين" لتحويل التكامل $\int_c(3x^3-y^3)\,dx+(x^3+5y^3)\,dy$ إلى تكامل ثنائي ، ثم احسب قيمة التكامل الثنائي الناتج ، حيث c هو منحنى الدائرة $x^2+y^2=4$. [10 درجات]

أطيب التمنيات بالتوفيق ط

Mansoura University
Faculty of Science
Geology Department
Course :General Stratigraphy
Code: (G 206)
Full marks: 60

Second Semester (May 2016)
2rd level, Geology & Geophysics
Time: 2 hours
Date: / /2016

QUESTION 1:

Wright short notes on 5 only of the followings: (30marks, each 6 marks)

1-Different method used for determination of the absolute ages.

2- The statements of six stratigraphic laws.

3- Definition with illustrations of the conformable and the unconformable contact types.

4- The law of Walter, the cycle of transgression and regression of the sea and the stratigraphic cycles with their orders.

5- Different types of Stratotype, the Steps of description of a new stratigraphic unit and the characters of the Global Boundary Stratotype.

6- Physical correlation and its application.

7- Both the Chronocorrelation and the Applications of Magnetostratigraphy.

QUESTION 2:

A- Complete the followings (14marks)

1- The four ways of telling time and making correlation in geology are.....
2- Milankovitch cycles include 1.....2.....3.....
3- The six subdisciplines of stratigraphy are.....
4- The following are the hierarchy of lithostratigraphic units.....
5- The orders of the chronostratigraphic units above the upper Cretaceous are as such.....

6- The illustration of the concept of depositional sequence is given in the following fig.....
7- The Formation is defined by its.....,.....,and.....

B- Answer by yes or no (8marks):

1- **The Late Late Cretaceous order is Age.**
2- **The Super Biozone is mentioned in the North American Stratigraphic Code.**
3- **Zones constitute the basic unit of biostratigraphic classification.**
4- **The age of mineral containing one quarter of gram of parent radioactive element (with half life time 10 million years) and three quarters of gram of daughter element is 10 million years.**
5- **(FAD) is the earliest (lowest) occurrence in stratigraphic section for a particular species.**
6- **The assemblage zones include the Abundance zone, the Assemblage Zone and the Composite Zone.**
7- **Polarity intervals are independent of lithology.**
8- **The relative sea-level changes affect only local areas.**

C- Give the proper English Stratigraphic Term by yes or no (4 marks):

1- وحدة طباقية من "تعاقب متوافق لطبقات متحدة المنشأ يحدها سطحان من عدم التوافق".

2- من وحدات أزمنة القطبية.

3- أحد فروع الطباقية الجديدة التى تهتم بدراسة تتابع المغناطيسية القديمة.

4- نظام جيولوجى (system) فى حقب الحياة القديمة يقسم فى أمريكا الشمالية فقط إلى نظامين.

5- من وحداتها الزمان (Eon) و الحقب (Era) والأوان (Chron).

6- أحد فروع الطباقية التى تعتنى بالحدث وراء الوحدة الطباقية أكثر من مميزات الوحدة ذاتها.

7- وحدة طباقية حجرية متعددة الأزمنة.

8- وصف لحالة بحر نتج عنه أن الرواسب الناعمة التحبب تغطى الرواسب الخشنة التحبب.

مع أطيب التمنيات بالنجاح: أ.د. حسنى حمدان حمامة

Mansoura University
Faculty of Science
Geology Department
Date: 25/5/2016

Second Term Exam (May 2016)
The Second Level (Geology)
Subject: Geo (208)
Course: Invertebrate Micropaleontology
Time: 2 hours **Full Mark: 60**

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

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

- All ammodiscaceans are smaller benthic foraminifera although …(1)… can be up to 10 mm in diameter.
-High …(2)… foraminiferid assemblages strongly suggest a wide range of available food resources.
-The …(3)… died out at the end of the Paleozoic
-The larger pore spaces of sands and gravels contain …(4)… nutrients and therefore support sparser populations.
- Ammodiscaceans resembling …(5)… has been reported from Lower Cambrian rocks.
-Foraminifera from these coarser substrates may be …(6)…, …(7)… ornamented and of …(8)… or …(9)… shape.
-Three factors are important in controlling the deposition of *Globigerina* ooze …(10)…, …(11)… and …(12)…
- Foraminifera are single-celled animals belonging to class …(13)…
- In Foraminifera, the most structures occur in the …(14)…
- Planktonic foraminifera provide the basis of important schemes for intercontinental correlation of …(15)… and …(16)… rocks.
- The wall of the Globigerinacea is composed of optically …(17)… and …(18)…, low magnesian calcite.
- In nonionacean tests two involute planispiral tests of the genera …(19)… and …(20)… differ largerly in the degree of chamber inflataion.

Question Two:

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

1- The sutures may be described grooved as in Bulimina.( )
2- $CaCO_3$ solubility decreased with pressure. ( )
3- Nummulites are rotaliacean larger foraminifera widely used in correlating Eocene rocks. ( )
4- The young gemots with the smaller proloculus are termed megalospheric generation. ( )
5- Rapid appearance of planktonic Globigerinidae and Globorotalidae in Cenozoic Era. ( )
6- The ratio of CO_2 to O_2 decreases with depth in marine waters. ( )
7- The Lagena is considered as benthic of calcareous test. ( )
8- Foraminifera are usually scarce in silts and fine sands. ( )
9- The biserial arrangement of chambers arranged in two alternating rows, the initial test may be calcareous as Textularia or agglutinated as in Bolivina. ( )
10- The photic zone is deeper in tropical waters (<200 m) and decreases in depth towards the poles where it also varies marked seasonality. ( )
11- The shape of the aperture may be toothed as in Textularia. ( )
12- All planktonic foraminifera have calcareous test. ( )
13- The Heterohelix is considered as benthic of agglutinated test. ( )
14-All marine microfossils are protists. ( )
15-Foraminifera are usually scarce in silts and clay but they are often abundant in medium sands. ( )
16-Nummulites gizehensis is so abundant in the middle Eocene of Mokattam limestone in Egypt. ( )
17- The cores samples taken from deep wells are most suitable than ditsch. ( )
18-The microspheric generation is termed A form. ( )

Question Three:

Draw and give the main difference between the following genera: (20 Marks)

1	*Nodosaria & Frondicularia*	6	*Bigenerina &Ammobaculites*
2	*Gaudryina & Clavulina*	7	*Elphidium* & Nonion
3	*Globigerina & Globigerinoides*	8	*Bulimina & Uvegerina*
4	*Robolus & Ammonia*	9	*Bathysiphon & Ammodiscus*
5	*Textularia & Bolivina*	10	Lagena & Orbulina

- لجنة الإمتحان والتصحيح*: أ.د.صلاح نصر عياد* أ.د. عمر حجاب أ.د. صلاح البيلى د. عادل كامل

Mansoura University **Faculty of Science** **Geology Department** **Date: 5 / 6 / 2016** **Full Mark: 60**	كلية العلوم جامعة المنصورة	**Second Term Exam (2016) Second Program** **Program: Geology** **Subject: 207 ج (Geo 207)** **Course: Igneous Petrology** **Time: 2 hours**

ANSWER The FOLLOWING QUESTIONS

Question One: (20 Marks)

A- Complete the following: (10 Marks)

i- Sources of magma are ....., ... and ..... .

ii- Heat resources are ....., ... and ..... .

iii- Leucochratic rocks include less than ..... % of mafic minerals.

iv- basaltic magma can generate from ..... .

v- Fabric of the rocks include ....., ..., ..., and ..... .

B- Answer using (√ or X), and why. (10 Marks)

i- Partial melting of upper mantle can be activated by frictional heat.

ii- Radioactive heat can help in partial melting of the lower portion of the crust and producing acidic magma.

iii- Granitic magma can be generated from lower crust of the earth.

iv- Peridotite magma can be generated from asthenosphere mantle.

Question Two: (20 Marks)

(10 Marks for each)

A-Write on the origin of magma (melt) due to the increasing the geothermal gradient.

B- Complete the following:

- Fictional heating can produce at ..... zone.
- Alkaline rocks are rich in .....and ..... oxides.
- Factors that determine the textures of igneous rocks are : 1- .....
  2-..... 3- ..... and 4- .....
- Alignment (Oriented) textures include the following types..... and ..... .
- Over-growth textures include the following types..... .

Question Three: (20 Marks)

A- Write on the forms of plutons. (6 Marks)

B- What are the effects and the relation between rate of cooling, nucleation rate and the rate of crystals growth. (8 Marks)

C- Alumina saturation in the rocks is used in chemical classification of rocks. (6 Marks)

لجنة التصحيح:

أ.د./ أحمد عبد اللطيف أ.د. / أمين غيث أ.د. / محمود الشربينى د./ أحمد شلبى