المستوى: الأول المادة : تفاضل وتكامل كود المادة ر ١١٢	كلية العلوم – قسم الرياضيات	الزمن: ساعتين التاريخ : ١٤/ ٥/ ٢٠١١ الدرجة الكلية: ٨٠ درجة

البرنامج: جميع برامج المستوى الأول

أجب عن أربعة أسئلة فقط مما يلي

السؤال الأول إجباري للشعب الرياضية والفيزيائية:- (٢٠ درجة)

أ- أوجد مساحة المنطقة المحدودة بالمنحنيات $y = x + 2,\ y = x^2$. (٦ درجات)

ب- أوجد كلاً من التكاملات التالية: (٨ درجات)

$(i)\ \int_{-2}^{2}|x+1|dx$ $(ii)\ \int sin^2x\ cos^3x\ dx$

ج- حدد مناطق التزايد والتناقص والقيم العظمى والصغرى المحلية للدالة

$f(x) = \frac{1}{3}x^3 - x^2 - 3x + 3$. (٦ درجات)

السؤال الثاني:- (٢٠ درجة)

أ-أوجد $\frac{dy}{dx}$ لكل من الدوال التالية: (٨ درجات)

$(i) y = tan^{-1}(5x) + (tan5x)^{-1}$ $(ii)\ ysinx + x^3 = xe^x$

ب- أوجد كلاً من التكاملات التالية: (٨ درجات)

$(i)\ \int tan^{-1}x\ dx$ $(ii)\ \int \frac{1}{x(lnx)^2}dx$

ج- إدرس اتصال الدالة التالية عند $x = -3$، (٤ درجات)

$$f(x) = \begin{cases} \frac{x^2-9}{x+3} & ,x \neq -3 \\ 5 & ,x = -3 \end{cases}$$

السؤال الثالث:- (٢٠ درجة)

أ- أوجد $\frac{dy}{dx}$ لكل من الدوال التالية: (٦ درجات)

$(i)\ y = (x^2+1)^{cosx}$ $(ii)\ y = e^{sin3x}\sec(x^3+5)$ (٦درجات)

ب- أوجد كلاً من التكاملات التالية:

$(i)\ \int (tan3x + sec3x)^2\ dx$ $(ii)\ \int \frac{1}{\sqrt{4-x^2}}dx$

ج- إدرس إمكانية وجود معكوس للدالة $f(x) = \frac{x-3}{x+2}$ حيث $f: \mathbb{R} - \{-2\} \to \mathbb{R} - \{1\}$، ثم أوجده إن وجد. (٨ درجات)

إقلب الصفحة

السؤال الرابع:- (٢٠ درجة)

أ- أوجد كلاً من التكاملات التالية: (٦ درجات)

$$(ii)\int_0^{10}\frac{x}{\sqrt{x^2+4}}dx \qquad (i)\int_0^1 x^2\,e^x dx\ (ii)$$

ب- أوجد $\frac{dy}{dx}$ لكل من الدوال التالية: (٦ درجات)

$$(ii)\ y=\ln(\sec x) \qquad (i)\ y=2^{\sin^{-1}x}$$

ج- إذا كانت $f(x)=\sqrt{2-x}$، $g(x)=x^2+2x$ أوجد مجال تعريف كل منهما ثم أوجد $f°g$، $g°f$. (٨ درجات)

السؤال الخامس:- (٢٠ درجة)

أ- أوجد كلاً من النهايات التالية: (٨ درجات)

$$(ii)\ lim_{x\to 81}\frac{\sqrt[4]{x}-3}{\sqrt{x}-9} \qquad (i)\ lim_{x\to 0^+} xlnx$$

ب- أوجد المشتقة الثانية للدالة $f(x)=x^2+\frac{1}{x^2}$ عندما $x=1$. (٦درجات)

ج- أوجد كل من التكاملات التالية: (٦ درجات)

$$(ii)\int sec^2x\,tan^3x\,dx \qquad (i)\int\frac{1}{\sqrt{x}(5+\sqrt{x})^2}dx$$

مع أطيب التمنيات

أسرة قسم الرياضيات

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) $5x10^7$ N/C (B) $5.5x10^8$ N/C (C) $7x10^7$ N/C (D) $8.5x10^9$ 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)

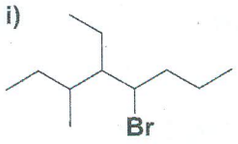
Examiners: Prof. Dr. Naer Bakr, Prof. Dr. Moustafa Tawfek, , Prof. Dr. Rezk Moustafa
Ass.Prof. Maysa Abdelhamed, Ass..Prof. Abdel Meguid Hassan, Ass.. Prof. Mahdy Elmahdy,
Dr. Afaf Sarhan, Dr. Moneim Ismail

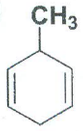
Mansoura University **Faculty of Science** **Chemistry Department** Total Marks: 60		**Second term** **1st Year, Students.** **Principles of Organic Chemistry** **(Chem131)**

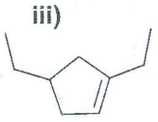
Answer the following questions as stated **(3 pages)** **Time allowed: 2 hours**

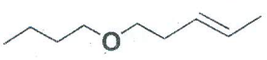
Question #1: [15 Marks]

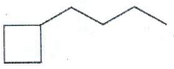
A) Write the IUPAC name for each of the following chemical structures: **[7.5 Marks]**

i) 

ii) 

iii) 

iv) 

v) 

B) Draw the corresponding chemical structures for each of the following names: **[7.5 Marks]**

i) Cyclopent-3-enol **ii)** 2-*tert*-butyl-4,5-dichloroaniline **iii)** dimethylacetylene

iv) 2,2-Dimethylpentane **v)** 1-Bromo-4-isopropyl-2-vinylbenzene

Question #2: [15 Marks]

A) Complete each of the following statements as specified. **[5 Marks]**

i. The chemical structure of sec-butylbromide is .....in which number of 1° carbons equal.....

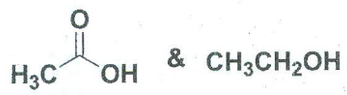
ii. Chlorination of n-butane with Cl_2 in the presence of sunlight yields..... as a major product and ..... as a minor product.

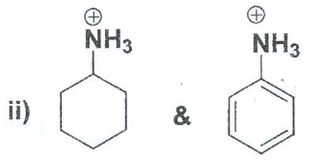
iii. Treatment of neopentylmagnesium bromide with water gives.....that has IUPAC name.....

iv. Catalytic hydrogenation of 3-heptene gives .....while that of .....gives 2-methylpropane.

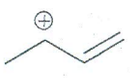
v. Condensed structural formula of allyl alcohol is.....and the hybridization of its oxygen atom is.....

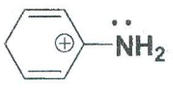
B) Rank each of the following sets of compounds in order of increasing acidity. Explain the reasons. **[4 Marks]**

i) 

ii) 

C) Draw all possible resonance structures for each of the following species using the proper arrows. Indicate the major contributor resonance if presence, and compare its stability to the minor ones. **[3 Marks]**

i) 

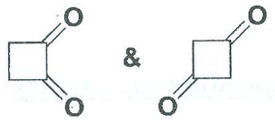
ii) 

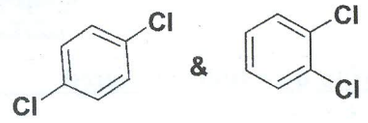
D) What is the shape for each of the following species, indicate the hybridization for the central atom in each case. **[3 Marks]**

i. Ammonium ion, NH_4^+ **ii.** Formaldehyde, HCHO

Question #3: [15 Marks]

A) Which compound you expect to have the highest dipole moment in each of the following sets of pairs. Indicate the direction of bond polarity for each compound below. **[3 Marks]**

i.  &

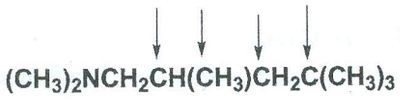
ii. 

B) Rank the following compounds in order of increasing acidity. Illustrate the reasons "Ranking: while the lowest in acidity is number 1" **[3 Marks]**

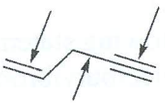
C) **[6 Marks]**

i) In compound **I**, classify the pointed carbon atoms as 1°, 2°, 3°, or 4°; then convert structure **I** into line-bond structure.

ii) In compound **II**, what orbitals are used to form each pointed bond. How many sigma bonds and how many π-bonds in the molecule.

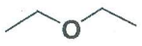


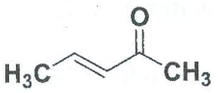
I

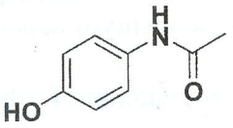


II

D) Identify the functional groups in each of the following organic compounds. **[3 Marks]**

i) 

ii) 

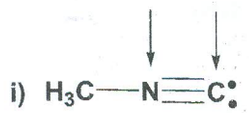
iii) 

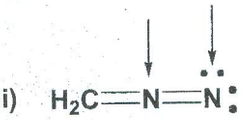
Question #4: [15 Marks]

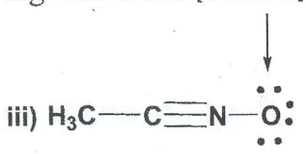
A) Which of the following reagents are likely to act as Lewis acids and which as Lewis bases. **[2 Marks]**

i. $CH_3CH_2NH_2$ ii. BF_3 iii. HF iv. CH_3SCH_3

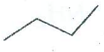
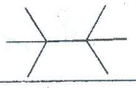
B) Calculate the formal charges for the pointed atoms in the following molecules: **[3 Marks]**

i) 

ii) 

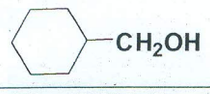
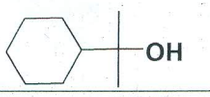
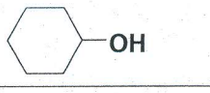
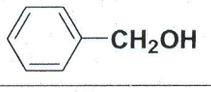
iii) 

C) Choose the correct answer for each of the following statements. **[10 Marks]**

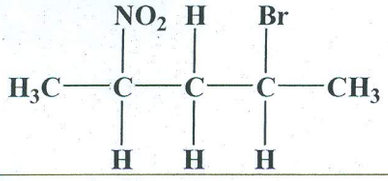
(i). Treatment of 2-bromopropane with sodium metal according to the proper condition of Wurtz reaction gives:			
a) $CH_3CH_2CH_3$	**b)** 	**c)** 	**d)** 

(ii). Which of the following compounds has the highest acidic character.			
a) CH_3COOH	**b)** $ClCH_2COOH$	**c)** $BrCH_2COOH$	**d)** FCH_2COOH

(iii). Which of the following compounds consider as a secondary alcohol.

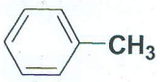
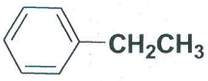
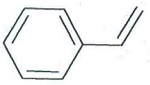
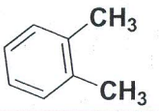
a) 	b) 	c) 	d) 

(iv). The IUPAC name for the compound below is.



a) 2-Bromo-4-nitropentane
b) 4-Bromo-2-nitropentane
c) 2-Bromo-4-nitropentene
d) 4-Bromo-2-nitropentene

(v). Chemical structure of toluene is .....

a) 	b) 	c) 	d) 

(vi). The more alkyl substituents bonded to the carbons of the double bond lead to more stable alkene, this statement is:

a) True	**b)** False

(vii). In general, electron-withdrawing substituents on the aromatic ring of aniline increase its basicity, this statement is:

a) True	**b)** False

viii). According to Bronsted-Lowry definition, in the following reaction propylene act as:

a) proton acceptor	**b)** proton donor

ix). In chloromethane, C-Cl bond consider as:

a) ionic bond	**b)** coordinate bond	**c)** polar covalent bond	**d)** non-polar covalent bond

x). Which of the following compounds has the highest dipole moment:

a) CO_2	**b)** CCl_4	**c)** CF_4	**d)** CH_2Cl_2

Best wishes

Prof. Dr. Evelen B. Moawad & Prof. Dr. Mohamed Ismail
A.Prof. Dr. Ebrahim Abdel-Galil

Mansoura University
Faculty of Science
Math. Dept.
Final Exam, May 28, 2016
Full mark: 60 marks

Second Semester:2015-2016
Subject: Computer Science (1)
Course code: ١٠١ع
Time: 120 Minutes

First Level: Chemistry, Biochemistry, Zoology-Chemistry, Microbiology, Geology
Botany-Chemistry programs

Answer the following questions

First Question: [15 Marks]

a) Define the computer network and discuss the main components of this network. [5 Marks]

b) Write the basic functions for the following:
1) Motherboard 2) Operating system 3)ALU
[5 Marks]

c) List the five basic steps to solve problem in computer and draw a flowchart to input two numbers and print the smallest. [5 Marks]

Second Question: [15 Marks]

a) Name five types of data that a computer can process and show the steps are needed to convert audio data to bit patterns. [5 Marks]

b) Compare between ASCII and UniCode. [5 Marks]

c) Show the Octal equivalent of x2A4E. [5 Marks]

Third Question: [16 Marks]

(a) Store +124 in a 16-bit memory location using one's complement representation. Then interpret the result in a decimal using two's complement. [8 Marks]

(b) Show the representation of -71.3125 using single-precision format. [8 Marks]

Fourth Question: [14 Marks]

(a) Write a program to compute the sum and count of positive and negative numbers from list -4, 7, 9, 23, -11, 6, -90, -17, -29, 14, 38, -89, 52, -65, 76, 53, -49, 68, 90, -70. [6 Marks]

(b) Rewrite the program in figure (1) using if.....Go to. And write the output for the program in figure (2). [8 Marks]

```
Input n
F=1
For i=1 to n
F=F*i
Next i
Print "Factorial n =", F
End
```

Figure (1)

```
Read n
F=1:S=0
For i=1 to n step 2
Read x
S=S+x
F=F*x
Next i
Print "sum="; S
Print "fact=", F
Data 10,1,2,3,4,5,6,7,8,9,10
```

Figure (2)

Examiners: Dr. Yasser Fouda, Dr. AbdulFatah Moustafa, and Dr. Mohammed Abdel-Atheem

Mansoura University
Faculty of Science
Botany Department
El-Mansoura, Egypt

جامعة المنصورة
كلية العلوم
قسم النبات
المنصورة - مصر

Final Examination in Botany
Second Term: May . 2016

Educational Year: 1st Level **Program : Special Chemistry**
Subject: (N 106) **Courses: Basic of Plant Physiology and Microbiology**
Time: 2 hrs **Date: 31 / 5 / 2016** **Full mark:** 60 **Question mark: 15**

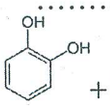
Answer the following questions:

Part I

Q1 I - Put right (√) or wrong (x) for the following statements and correct the wrong : **(10 Marks)**

1-Activation energy with enzyme is high than without enzyme . ( )
2-There were two types of membrane in plant cell. ( )
3-Plant cell becomes plasmolysed when put in isotonic solution. ( )
4- ATP consider as coenzyme from group carrier. ( )
5- High concentration of alcohol causes an irreversiable increase in permeability. ( )
6- Enzymes for photosynthetic reaction found in chloroplast. ( )
7- The state of Sol converts to Gel by decreasing temperature . ( )
8- At saturation : S = Pi . ( )
9- Peroxidase can split urea to $2NH_3$ and CO_2 . ( )
10- Brownian motion is the presumably random moving. ( )

II- Complete the missing in the following : **(5 Marks)**

1- Origin of the charge on colloidal particles was due to .... or .....
2-  + H_2O_2 -------???------→.....+ .....
3- Dialysis is the separation of a .....from .....&..... through.....
4- Metabolism in plant cell includes .....&.....
5- Accumulation of the end products decrease the rate of enzymatic reaction due to .....

Q2 Discuss each of the following **(15 Marks)**

1- Hydrolyase enzymes .
2- Effect of temperature on enzyme action .
3- Roles of osmosis in plant life.
4- The permeability of non-electrolytes through plasma membrane .
5- Competitive inhibitor of enzyme action .

P.T.O→

Part II

Q 3 I : Provide the missing word (s) **(10 marks)**

1-The scientific name of a microorganism is composed of .....and .....
2-Chemically, viruses are .....
3- Viruses that infect bacteria are known as .....
4- Bacteria that adapted to live in hot water are known as .....
5- The cell wall of Archaebacteria lacks .....
6-*Cocci* bacteria that remain in pairs after dividing are called .....
7-The cell wall of fungi is mainly composed of .....
8- Fungal nutrition is totally .....
9-The algal flagellum contains special protein called .....
10-In algea , the vegetative reproduction occurred by ..... and .....

Q3 II : Choose the most correct answer **(5 marks)**

1-The human immunodeficiency virus (AIDS) is :
a : bacteriophage b: retrovirus c: viroid d: prion
2- The fine hair like bristle extending form the bacterial cell surface and help in adhesion to other cells and surface is called :
a-pilus b:flgellum c : actin cytoskeleton d: fimbria
3- In bacterial growth , the period of little or no division is known as :
a-log phase b-lag phase c-stationary phase d-decline phase
4- In fungal reproduction , the fusion of haploid nuclei is called :
a-karyogamy b-plasmogamy c-conjugation d- other (define) .
5- The microalga Chlorella reproduces asexually by :
a-endospores b-exospores c-autospores d-zoospores

Q4 I : Mention only one function of :
reverse transcriptase enzyme , caside , bacterial capsule , bacterial spore , pilus , ascospore , conidia , chloroplast , algal flagella . (5 marks)

Q4 II : Using a labeled diagram ,
explain the different phases of bacterial growth . (6 marks)

Q4 III : Define :
prion , monotrichous , Deutromycetes , pantonematic flagellum (4 marks) .

Examiners: **Prof.Dr. Wafaa M. Shukry** **Prof.Dr. Mohamed A. Ismaiel**

Mansoura University
Faculty of Science
Chemistry Department
Subject: Chemistry
Course: **Chem. 121**

Second Term
First Level
Date: **4/6/2016**
Time Allowed: **2** hours
Full Mark: **60** Marks

Q.I a. Complete the following table: **[6Marks]**

Element	Electronic configuration	Element type	Period number	Group number	Quantum Numbers			
					n	l	m	s
^{19}Z	.....	.....	.....	.....	....	....	....	....
^{31}Z	.....	.....	.....	.....	....	....	....	....

b. State the following: **[6 Marks]**

1. Pauli Exclusion Principle.
2. Heisenberg's uncertainty principle.

c. Zinc & sulfur react to form zinc sulfide, a substance used in phosphors that coat the inner surfaces of TV picture tubes. The equation for the reaction is: **[3 Marks]**

$$Zn + S \rightarrow ZnS$$

How many grams of ZnS can be formed when 12.0 gm of **Zn** reacted with 6.5 gm of **S**?

(The atomic weights of Zn = 65.4 & S = 32.1)

d. What is the empirical formula of a compound containing 50% oxygen and 50% sulphur?

(O = 16 & S = 32) **[3 Marks]**

Q.II a. True and false (Give the reason for the correct response): **[10 Marks]**

1. *T – F* The size of **Na** is smaller than Na^+ ($_{11}$**Na**).
2. *T – F* Bond angle in H_2O is less than 120°.
3. *T – F* The frequency is the distance between two adjacent crests or troughs.
4. *T – F* The maximum number of electrons in subshell = $2n^2$.
5. *T – F* The ionization energy of $_7$**N** atom is less than $_8$**O** atom.
6. *T – F* Fluorine is the most electronegative element in the periodic table.
7. *T – F* Principle quantum number describes the orientation in space of orbital.
8. *T – F* The intensity of the radiation is proportion to the square of amplitude.
9. *T – F* When an electron jumps from one orbit to another, it absorb energy only
10. *T – F* $BeCl_2$ molecule has a linear structure ($_4$Be, $_{17}$Cl).

b. Draw the Lewis structure & calculate formal charge for the following: **[6 Marks]**

1. NO_3^- 2. $POCl_3$

c. On the basis of MOT, answer the following: **[6 Marks]**

1. Which molecule is more stable O_2 or O_2^+?
2. Which molecule is paramagnetic B_2 or F_2?
3. Calculate the bond order of Li_2 and Be_2?

Q.III a. On the basis of VSEPR theory, predict the geometry of the following: **[5 Marks]**

1. ClF_3 2. SF_6

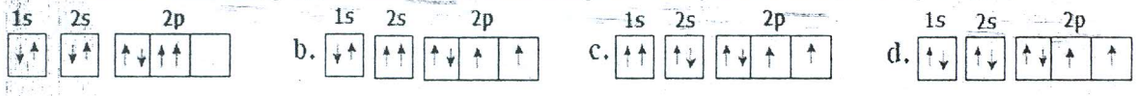
Please turn over

b. **Complete the following statements**: **[5 Marks]**

1. On the basis of VSEPR theory, H_2O has ..... structure with bond angle....., while CH_4 has ..... structure with bond angle .....
2. How many moles of O_2 are needed when 3.34 moles of Al_2O_3 are formed? .....
3. From Born-Haber cycle for NaCl: ΔH_f = ... +.....+ ..... - .....
4. The maximum number of electrons in the d-subshell equal to .....
5. Each shell consists of one or more .....

c. **Choose the correct answer**: **[10 Marks]**

1. If an electron in an hydrogen atom jumps from the 4th to the 2nd permissible orbit, what will be the wave length of light emitted, ($R = 1.097 \times 10^7\ m^{-1}$)
   a. 3.56×10^{-7} b. 4.86×10^{-7} c. 9.61×10^{-7}
2. The s-orbitals are ..... shaped, while d-orbitals are ..... Shaped
   a. Not spherical & polar b. Spherical & not spherical c. Spherical & polar
3. The four quantum number of the last electron ($_9F$) are n =....., l =....., m =....., s =.....
   a. 2, 1, 0, +1/2 b. 2, 1, +1, -1/2 c. 2, 1, 0, -1/2
4. The $_{11}Na$ is ....., while $_{14}Si$ is .....
   a. Semi-metal & non-metal b. Metal & non-metal c. Metal & semi-metal
5. Calculate the wave length of first line in lyman series for hydrogen atom, ($R = 1.097 \times 10^7 m^{-1}$).
   a. 2.57×10^{-7} b. 1.215×10^{-7} c. 4.91×10^{-7}
6. The atomic number of an atom is the number of .....
   a. Neutron b. Protons c. Protons + electrons d. Protons + neutron
7. Which one of the following is the correct orbital diagram for ground state nitrogen ($_8O$)?



8. The electronegativity ..... on descending a group, but the atomic size .....
   a. Increase, decrease b. Decrease, increase c. Constant
9. The ..... energy released when oppositely charged ions in gas phase join to form a solid
   a. Ionization b. Lattice c. Formation
10. Max Planck proposed the Quantum theory of radiant energy in which radiation could absorbed or emitted only in definite quantities called .....
    a. Quanta b. Photon c. Both a & b

[Atomic number: $_1H$, $_3Li$, $_4Be$, $_5B$, $_6C$, $_7N$, $_8O$, $_9F$, $_{15}P$, $_{16}S$, $_{17}Cl$]

****

Best Wishes from

Prof. Dr.Magdy Bekhit Prof. Dr. Nagwa Nawar Dr. Rania Zaky