Answer the following questions:

Q1. Discuss shortly each of the following: **(20 Marks)**

a- Auxins biosynthesis.

b- Gibberellins and genetic dwarfism.

c- Cytokinins and control of morphogenesis.

d- Abscisic acid and stomatal closure.

Q2. A. Complete the missing words in the following: **(10 Marks)**

1- Growth bio-regulators can be defined as……………………………….

2- Biosynthesis of zeatin occurs in…………..and translocate mainly within………….

3- Decline of IAA induces……….. in leaves.

4- Kinetin is a …………. cytokinins.

5- Gibberellins acts as a complimentary factor for……………………….

6- Phototropism induced mainly by ……………………….

7- Coconut milk diffusate is very rich with …………………..

8- Cell elongation induced by…………….

9- Plastids biogenesis induced mainly by …………………..

10- Inhibition of lateral buds growth by apical bud is called ……………………..

P.T.O   من فضلك اقلب الصفحة

Q2: B- Correct the following sentences: (10 Marks)

1- HY5 is one of the blue/UVA photoreceptors.

2- Pr and Pfr forms of phytochrome are both stable in the dark.

3- Plants grown under low R:FR ratio have reduced internode length.

4- Phytochrome causes degradation of chloroplasts.

5- Phytochrome is found in plant leaves.

6- In short day plants, these plants flower in winter when Pr < Pfr.

7- Root tips and stem tips exhibit positive phototropism to blue light.

8- Phytochromes have dual chromophores: FAD and a deazaflavin.

9- Phytochrome was first named by Butler et al. in 1963.

10- The stems of many plants elongate faster if they receive additional red light from the side.

Q3: Answer the following questions:

A- Differentiate between the following: (8 Marks)

   1- Photomorphogenesis and skotomorphogenesis.

   2- Mass pigments and sensor pigments (Give an example in each case).

B- Define the following terms: (6 Marks)

   1- Photoreactivation.

   2- Photoperiodism.

   3- Chryptochromes.

   4- Phototropins.

   5- Shade avoidance.

   6- Phototropism.

C- Write short notes on the following: (6 Marks)

   1- Ultraviolet radiation damage to DNA.

   2- The response of size and shape of leaves to light.

   3- The role of phytochrome in seed germination.
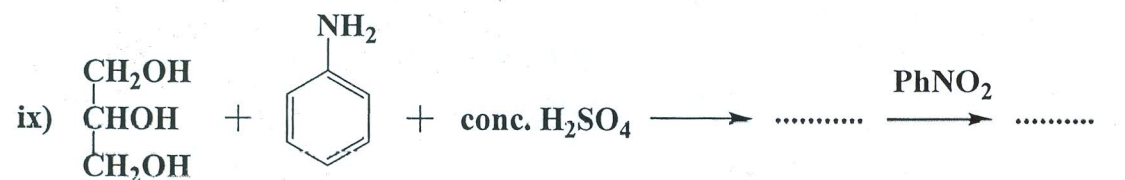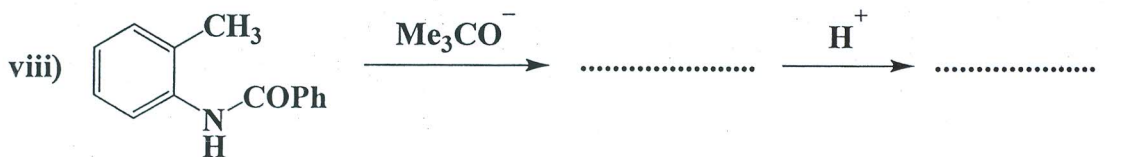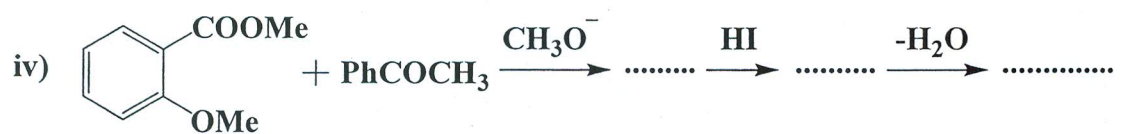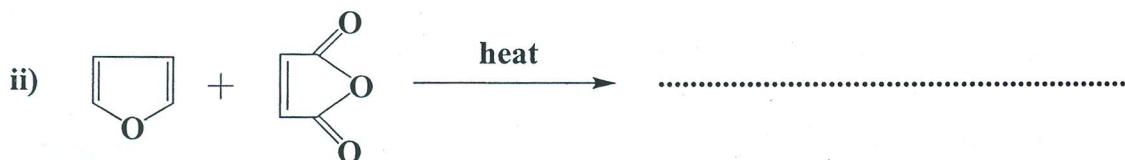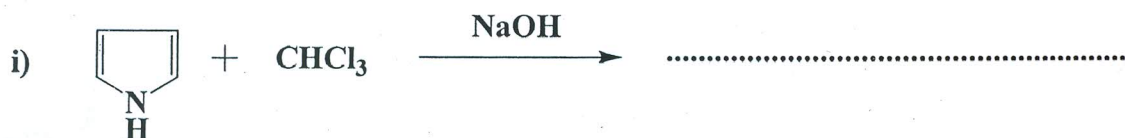
Best wishes

Examiners:
Prof. Heshmat S. Aldesuquy
Dr. Heba M. M. Abdel-Aziz

Answer All Questions

1- Suggest the organic product(s), indicating the reaction mechanism of it is possible: [27 Marks]

i) pyrrole (N–H) + CHCl₃ $\xrightarrow{\text{NaOH}}$ ....

ii) furan + maleic anhydride $\xrightarrow{\text{heat}}$ ....

iii) 3-methylthiophene $\xrightarrow[\text{POCl}_3]{\text{DMF /}}$ .... $\xrightarrow[\text{reduction}]{\text{Wolf-Kischner}}$ ....

iv) methyl 2-methoxybenzoate $+ \text{PhCOCH}_3$ $\xrightarrow{\text{CH}_3\text{O}^-}$ .... $\xrightarrow{\text{HI}}$ .... $\xrightarrow{-\text{H}_2\text{O}}$ ....

v) isoquinoline $+ \text{NaNH}_2$ $\longrightarrow$ ....

vi) furfural (O–CHO) $\xrightarrow{\text{alc. KCN}}$ .... $\xrightarrow{[\text{O}]}$ ....

vii) $\text{Cl–CH}_2\text{–CH}_2\text{–NH–CHO}$ $\xrightarrow{\bar{\text{O}}\text{H}}$ .... $\xrightarrow{-\text{H}_2\text{O}}$ ....

viii) 2-methyl-N-(benzoyl)aniline (CH₃, N–H–COPh) $\xrightarrow{\text{Me}_3\text{CO}^-}$ .... $\xrightarrow{\text{H}^+}$ ....

ix) $\begin{array}{l}\text{CH}_2\text{OH}\\\text{CHOH}\\\text{CH}_2\text{OH}\end{array}$ + aniline (NH₂) $+ \text{conc. H}_2\text{SO}_4$ $\longrightarrow$ .... $\xrightarrow{\text{PhNO}_2}$ ....

P. T. O.

2- a) Give acceptable name of each of these heterocycles: [8 Marks]

i)   ii)   iii)   iv)
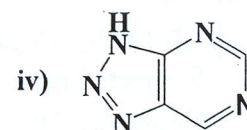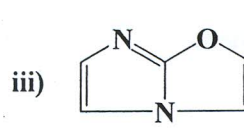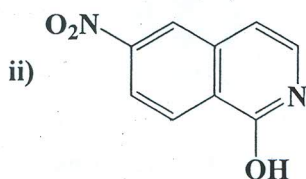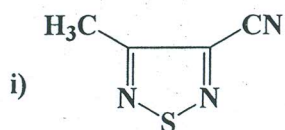
b) Design one synthesis for each of the molecules below: [18 Marks]
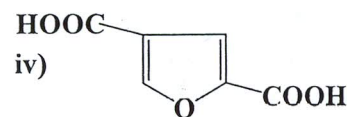
i)   ii)   iii)   iv)
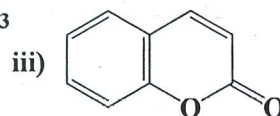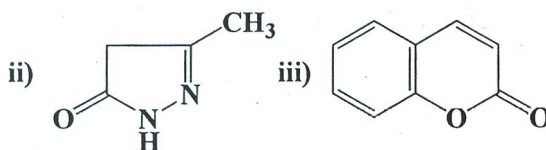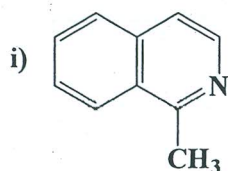
3- a) Diagram these conversions: [9 Marks]

i)

ii)

iii)
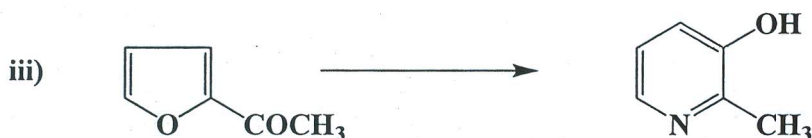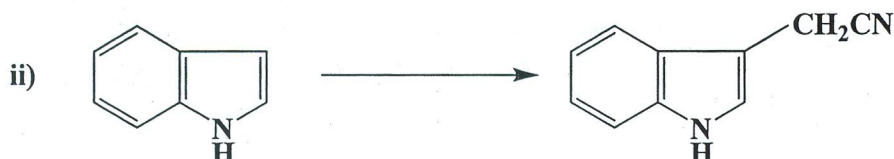
b) Show the following: [18 Marks]

i) Knorr synthesis of 2,4-dimethylpyrrole

ii) Preparation of saccharine

iii) Conversion of pyridine to penta-1,3-diene

iv) Fischer synthesis of 2-methylindole

Best Wishes and Good luck

Examiners: Prof. Dr. Ez Kandil, Prof. Dr. Evelin Boshra, A.Prof. Dr. Eman Keshk

Answer the Following Questions

1. a) Complete the following equations : **[20 Marks]**

    i) V_2O_5 + oxalic acid $\xrightarrow{\Delta}$

    ii) $2\ VCl_4 \rightarrow$

    iii) $La_2O_3 + Al \rightarrow$

    iv) $Zr\ Cl_4 + H_2O \rightarrow$

    v) $Cr + F_2 \rightarrow$

    vi) TiO_2 + conc.$H_2SO_4 \rightarrow$

b) Give reason(s) for the following :

    i) ScC_2 is paramagnetic and electrically conductor

    ii) The hydrated forms of $TiCl_3$ have different colors

    iii) The colour of $[Mn(H_2O)_6]^{2+}$ is pale whereas of $[Mn(CN)_6]^{4-}$ is intense

    iv) The hydrolysis of $TiCl_4$ is complete whereas $ZrCl_4$ is incomplete

2. a) How to extract the Cr and Ti from their main ores.   **[20 Marks]**

    b) Write briefly on the catalytic properties and oxidation states of transition elements.

3. a) Write the name, type of isomerism and the isomers of the following complexes :

                                            [20 Marks]

    i) $[Co\ Cl_2(NH_3)_4]\ NO_2$ ii) $[TiOCl_4]^{2-}$ iii) $[Fe\ (ac.ac)_3]$

    b) Write the formulae of the following :

       i) Potassium penta cyano nitrosyl ferrate (III)

       ii) μ- dihydroxy tetrakis ethylene diamine dichromium (III) chloride

4. a) Give one example for each type of monodentate and bidentate ligands   **[20 Marks]**

    b) How to prepare the following complexes :
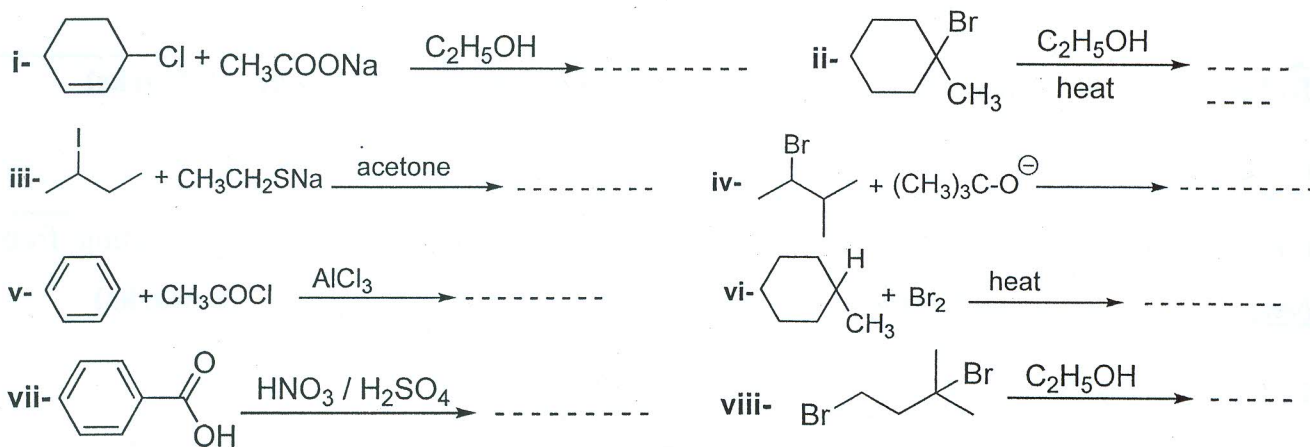
       i) $(Pt\ (py)_2\ Cl_2]$ **ii)** $[Fe(ac.ac.)_3]$

    c) Explain two methods for the detection of complex formation

أ.د جابر أبو الريش   مع أطيب التمنيات بالنجاح

Mansoura University		First Term
Faculty of Science		Time Allowed: 2 Hours
Chemistry Department		Date: Jan. 2016
Subject: Chemistry		Full Marks: 80
Course(s): Chem.336 Physical Organic Chemistry for 3rd Level Biochemistry, Chem. Zool. and Chem. Bot. students		

Answer All Questions

Q1: A) Draw the expected organic product(s) in each of the following equations, please remember to *discuss reaction mechanisms* in each reaction **(28 Marks)**

i- [cyclohexene-Cl] $+ CH_3COONa \xrightarrow{C_2H_5OH}$ - - - - - - - - -

ii- [cyclohexane with Br and CH_3] $\xrightarrow[heat]{C_2H_5OH}$ - - - - -

iii- [isopropyl-CH2-I structure] $+ CH_3CH_2SNa \xrightarrow{acetone}$ - - - - - - - -

iv- [structure with Br] $+ (CH_3)_3C\text{-}O^{\ominus} \longrightarrow$ - - - - - - - - - -

v- [benzene] $+ CH_3COCl \xrightarrow{AlCl_3}$ - - - - - - - - -

vi- [cyclohexane with H and CH_3] $+ Br_2 \xrightarrow{heat}$ - - - - - - - - -

vii- [benzoic acid structure] $\xrightarrow{HNO_3 / H_2SO_4}$ - - - - - - - - -

viii- Br [structure with Br] $\xrightarrow{C_2H_5OH}$ - - - - -
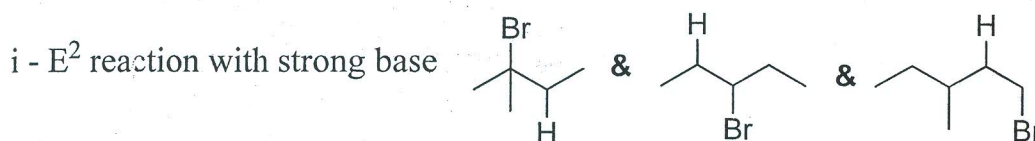

Q2: A) Show each of the steps used in the mechanism of chlorination of ethane. Calculate heat of reaction in propagation step knowing that hemolytic bond dissociation energy (DH^o) are shown below **(8 Marks)**

DH^o value	Cl_2	58 Kcal/mole	DH^o value	C-H	100 Kcal/mole
	HCl	103 Kcal/mole		C-Cl	84 Kcal/mole

B) Which compound of each pair of the following would you expect to be more rapid toward nucleophilic substitution reaction? *Explain* **(9 Marks)**

i- [structure with Br] & [structure with OH]   ii- [structure with Cl] & [structure with Cl]   iii- [structure with Cl] & [structure with Cl]

C) Arrange the following alkyl substrates in a decreasing order toward **(8 Marks)**

i - E^2 reaction with strong base   [structure with Br and H] & [structure with H and Br] & [structure with H and Br]

Please Turn to Next Page

ii - mononitration reaction C_6H_5—CH_3 & C_6H_5—CCl_3 & C_6H_5—OH
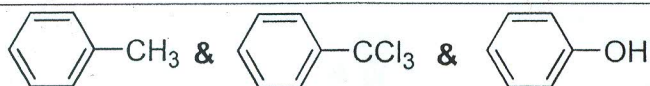
Q3: A) Provide a mechanism for the following reactions indicating the major and minor products   **(8 Marks)**

ii - (alcohol) $\xrightarrow{H_2SO_4,\ heat}$ (alkene) + (alkene)

ii - (allylic chloride) $\xrightarrow{H_2O}$ (alcohol) + (alcohol)
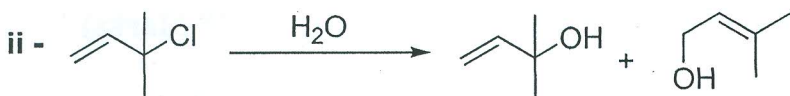
B) For each of the following pairs determine the **_stronger nucleophile_ , _why_** **(6 Marks)**

i - CH_3ONa & CH_3COONa **ii –** NH_3 & PH_3 **iii –** H_2O & HO^-

C) Show by equations how you would synthesis the following compounds starting from **_benzene_** any other needed reagents   **(8 Marks)**

i - C_6H_5—$CH_2\cdot CH_2\cdot CH_3$ **ii-** C_6H_5—CH_2—C_6H_5
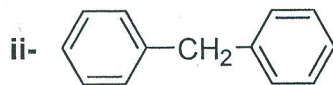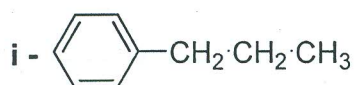
D) Using 2-methylbutane with Br_2 in presence of light, draw all the expected products and indicate the relative amounts of products you expect to be formed   **(5 Marks)**

With our Best Wishes

Examiners: Dr. Ebrahim Abdel-Galil, Dr. Soha M. Abdelmageed, Dr. Saad Shaaban

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

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Final Examination in Botany
Final Examination on Jan.٢٠١٦

Program : Chemistry and Botany

Educational Year: Third Level

Subject: Bot. (N٣١٣)   Course(s):Microbial Genetics and Molecular Biology

Time: ٢ hrs   Date: ١٤/١ /٢٠١٥   Full mark: ٦٠   Question mark: ٢٠

Answer the following questions:

Q١A- :Discuss the following:

a-Different strategies for viral replication (٧ marks).

b-Gene mapping of *E.coli chromosome* (٦marks).

B-Complete the following(٧marks):

a- Insertion or deletion of a single……leads to……….

b-…… can synthesize RNA from RNA during the replication of phage……

c- Non-sense mutation means that the base substitution alters the……which leads to……

d- Abortive transduction occurs when the……..fails to……with the bacterial chromosome .

e- A lysogenic bacterial cell is that contained a……..integrated into its…….

f-……and…….phages contain single stranded DNA whereas……….and……phages contain RNA.

Q٢ A :Answer the following either true or false and correct the false one(١٠marks)

a- Indirect intergenic suppression involves a second mutation in a different gene which cancel the effect of the first mutation.

b- Bacteriophage Mu normally integrates into the *E .coli* chromosome between the gal and bio genes .

c- Both leading and lagging strands are synthesizing in the direction of ٥ˉ to ٣ˉ.

d- During DNA replication , the polynucleotides chain synthesizes by the action of ligase enzyme.

e- According to Chargaff the amount of A+T is always equals the amount of G+C.

f- Natural competence will only develop at late log phase with a very low cell density.

g- Intragenic suppression involves a second mutation in a different gene from the first mutation .

h- Fʼ transfer the *E.coli* chromosome at a high frequency and the plasmid at very low frequency whereas Fˉ transfer the plasmid at a high frequency and the chromosome at a very low rate.

i- The frequency of transformation for two non- linked genes is much higher than if they are linked.

j- When ٢-aminopurine is found in imino form it pairs with cytosine and leads to a transition base substitution.

Q-٢ B- During your work for Ph.D. degree, you have obtained a peptide sequence (IEESQFAIVVFSENY) from a plant protein. Convert this into mRNA and then into DNA molecule. Use the provided table at the last page (١٠ marks)

Q-٣-A. Choose the correct answer (١ mark each):

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Final Examination in Botany
Final Examination on Jan.٢٠١٦

١- Splicing is the process that does which of the following?
    a. Remove introns and conserve exons
    b. Remove exons and conserve introns
    c. Remove mutated regions of primary transcript RNA
    d. Add multiple adenosine bases to the end of a primary RNA transcript

٢- **Which of the following is not a characteristic of eukaryotic DNA transcription?**
    a. Multiple RNA polymerases   b. TATA-binding protein
    c. Strict promoter sequences   d. Transcription factors

٣- **Which of the following statements regarding termination of transcription in prokaryotes is correct?**
    a. In Rho dependent termination the Rho factor moves along the DNA template ahead of the RNA polymerase.
    b. Rho factor has topoisomerase activity for relieving supercoiling
    c. Termination often involves a stem-loop structure forming in the RNA transcript.
    d. Termination often involves a stem-loop structure forming in the DNA template.

٤- **The ٣' end of a tRNA molecule contains which of the following sequences?**
    a. TATA   b. CAA   c. AUG   d. UAA

٥- **Which of the following is not a name for newly synthesized eukaryotic RNA?**
    a. Mature RNA   b. Primary RNA transcript   c. Pre-mRNA
            d. Transcript RNA

٦- **Which of the following best describes the 'cap' modification of eukaryotic mRNA?**
    a- A modified guanine nucleotide added to the ٣' end of the transcript.
    b- A modified guanine nucleotide added to the ٥' end of the transcript.
    c- A string of adenine nucleotides added to the ٣' end of the transcript.
    d- A string of adenine nucleotides added to the ٥' end of the transcript.

٧- **Which of the following statements regarding splicing of eukaryotic mRNA transcripts is correct?**
    a. Exons are spliced out and introns are retained in the mature mRNA transcript.
    b. Several reactions in the splicing process involve hydrolysis of ATP.
    c. Small nuclear RNAs are retained in the mature mRNA transcript.
    d. Splicing takes place in the cytosol.
    e. Which of the following statements regarding splicing of eukaryotic mRNA transcripts is correct?

٨- **The natural functions of proteins are all except:**
    a- Enzymes catalyze most biochemical reactions.
    b- Membrane receptor.   c- Transport and storage of molecules

٩- **Posttranslational modified of polypeptides can include:**
    a- Removal of a signal peptide   b-Disulfide bond formation
    c-Removal of one or more terminal amino acid residue

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Final Examination in Botany
Final Examination on Jan.٢٠١٦

d-Removal of a peptide from an internal region

e-All of the above   f- none of the above

١٠- The *E. coli* lacZYA region will be transcribed at a rate greater than the low basal rate if:

- a- the operator has mutated so it can no longer bind repressor
- b- There is a defect in binding of the inducer to the product of the lac I gene
- c- glucose and lactose are both present in the growth medium, but there is a defect in the cell's ability to synthesize cAMP
- d- glucose and lactose are both readily available in the growth medium.

Q-٣-B- Write T for true and F for false answers; correct the F answers.

١١- Polyadenylation at the ٥' end of mRNA is a type of pre-mRNA processing that protects the transcript from exonucleases.

١٢- All living creatures are united by sharing many features of the genetic apparatus and many aspects of metabolism.

١٥- A mutation that alters one or more codons in a gene can change the amino acid sequence of the resulting polypeptide chain synthesized in the cell. Often the altered protein is functionally defective,

١٦- Proteins are either positively or negatively charged due to the presence of imidazole, guanidino, amino and carboxyl groups.

١٧- By switching genes off when they are not needed, depends on natural selection favoring the ability to switch genes on and off. This helps the cells preserve resources from being wasted.

١٨- Termination of many prokaryotic genes often involves a stem-loop structure forming in the RNA transcript.

١٩- The polyA tail on eukaryotic mRNA is encoded by a long string of Ts at the end of the gene.

٢٠- Both strands of DNA serve as template concurrently.

First Position 5'	Second Position				Third Position 3'
	U	C	A	G	
U	UUU F UUC F UUA L UUG L	UCU S UCC S UCA S UCG S	UAU Y UAC Y UAA stop UAG stop	UGU C UGC C UGA stop UGG W	U C A G
C	CUU L CUC L CUA L CUG L	CCU P CCC P CCA P CCG P	CAU H CAC H CAA Q CAG Q	CGU R CGC R CGA R CGG R	U C A G
A	AUU I AUC I AUA I AUG M	ACU T ACC T ACA T ACG T	AAU N AAC N AAA K AAG K	AGU S AGC S AGA R AGG R	U C A G
G	GUU V GUC V GUA V GUG V	GCU A GCC A GCA A GCG A	GAU D GAC D GAA E GAG E	GGU G GGC G GGA G GGG G	U C A G

Examiners: Prof. Dr. Yehia Ellazeik   *Dr. Linda Zakharie*

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قسم الرياضيات
التاريخ 18 / 1 / 2016 م
الدرجة الكلية : 80
الزمن : ساعتان

امتحان دور يناير 2016 م
المستوى : الثالث
اسم المقرر : احصاء حيوى
كود المادة : ر 301

برامج: فيزياء حيوى- ميكروبيولوجى - كيمياء و حيوان - كيمياء و نبات - علوم بيئة

Answer the following questions:

[Q1] a- Compute the Pearson's correlation coefficient r for the following data. Explain the reason for this value of r.   (10 Marks)

x	1	2	3	4	5
y	3	5	7	9	11

b- Let X be the number of heads when a coin is tossed three times.   (12 Marks)

Find i) The cumulative distribution function $F(x)$ ii) $E(2X+1)$ and $Var(3X+5)$

c- If the average number of visitors to a web server per minute is 6 . What is the

probability that   (8 Marks)

i) The number of visitors in one minute will be less than two ?

ii) There are exactly two visitors in 30 seconds ?

[Q2]a- The heights of 1000 students in a certain college are normally distributed with

mean 68 inches and standard deviation 3 inches. How many of these students would

you expect to have heights: i) More than 64 inches   ii) Between 67 and 71 inches.

($\Phi(1.33)=0.908$, $\Phi(-1.33)=0.092$, $\Phi(1)=0.841$, $\Phi(-0.33)=0.371$)   (10 Marks)

b-The contents of seven similar containers of sulfuric acid are 9.8 , 10.2 , 10.4 , 9.8 ,

10.0 , 10.2 , 9.6 liters. Find 95 % confidence interval for the population mean μ ,

assuming the population is normally distributed.

($t_{(0.025, 6)} = 2.447$, $Z_{0.025} = 1.96$)   (15 Marks)

[Q3]a- The following table shows the weights (in kilogram) of 60 children   (18 Marks)

weight	9.5 – 19.5	19.5 – 29.5	29.5 – 39.5	39.5 – 49.5	49.5 – 59.5
frequency	5	10	18	20	7

Find i) The sample mode by two different methods.   ii) The sample median.

iii) Graph the cumulative frequency and deduce the median from it.

b-If we choose randomly two tubes in succession from a shipment of 86 tubes of which

12 are defective. What is the probability that both tubes will be defective?   (7 Marks)

مع أطيب التمنيات بالنجاح   د. فاتن شيحه – د. عبد الفتاح مصطفى – د. محمد عبدالرحمن

Mansoura University
Faculty of Science
Botany Department
Mansoura - Egypt

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Final Examination in Botany (Jan. 2016)

Educational Year: 3rd level

Course(s): Stress Physiology

Time: 2 hrs

Full mark: 60

Subject: Botany (B. 315)

Program: Chemistry - Botany

Date: 21 /1 / 2016

Question mark: 20

Answer the following questions:

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

1- Chloroplast enzymes become unstable at high temperature. ( )

2- Cytological changes may be reversible or irreversible depending upon time of exposure to low temperature. ( )

3- Increase in activity of fatty acid *de-saturases* was found in chilling susceptible plants. ( )

4- Ice formation substantially lowers the water potential (Ψ_w)in the apoplast. ( )

5- The acclimation process in stress resistant species is usually irreversible upon removal of the external stress. ( )

6- Production of reactive oxygen species (ROS) cause cell damage and death.( )

7- Leaf orientation for the protection against overheating during water deficit.( )

8- Heat shock proteins (HSPs) show improved thermal tolerance. ( )

9- Calmodulin-calcium is a part of carbon compounds. ( )

10- Potassium is important in water-splitting reaction during photosynthesis through which oxygen is produced. ( )

II- Complete the missing in the following: (10 marks)

1- Phosphorus deficiency leads to…………………

2- Freezing injury was due to………………&……………..

3- Cell wall's flexibility measured as………………

P.T.O.⟶

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Mansoura - Egypt

جامعة المنصورة
كلية العلوم
قسم النبات
المنصورة - مصر

4- Developmental and physiological mechanisms against environmental stress may be in the form of…………, ………….. or ……………

5- Homeostasis means that……………………………….

Q2: **I- Compare between each two of the following:** **(10 marks)**

1- Effect of high and low temperature on the plant cell membrane.

2- Short-term processes and long-term processes.

3- Adaptation and phenotypic plasticity.

4- Stress resistant and stress avoidance.

5- Deficiency symptoms of mobile and immobile elements.

II- Briefly write on the following: **(10 marks)**

1- In higher plants, water absorption is complicated process.

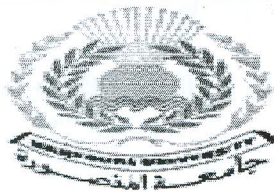2- The response of growth regulators, photosynthesis and respiration to water stress.

Q3: Regarding the structural features of stomata as stress biotic factor, account on the mechanism of stomatal movement. **(20 marks)**

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Examiners:

Prof. Dr. Omar A. El-Shahaby   **Prof. Dr. Wafaa Shokry**

Answer the following questions: (الأسئلة فى صفحتين)

Section A: (Volumetric analysis and Gravimetric analysis) (30 marks)

Question 1: (14 marks)

A. Put true (√) or false (×) and correct the wrong one: (5 marks)

1. The phenol phethaline indicator is suitable for the titration of NH_4OH against HCl.
2. The **ppb** unit for concentration can be expressed as **µg/L**.
3. For precipitation reactions, the ionic product should be higher than the solubility product.
4. The complexometric titration between **EDTA** and Ca^{2+} shouldn't be carried out at pH=3.
5. The equivalent weight = Molecular mass for **NaHCO$_3$**.

B. Write on the properties of metallochromic indicators. (2 marks)

C. A 0.5 g sample containing Ca and Mg carbonates was dissolved in diluted HCl and completed with distilled water to 250 ml. 10 ml of the resulting solution were titrated with 0.01M EDTA solution. Using EBT indicator, 19 ml of EDTA were consumed, while on using murexide indicator, 8 ml of EDTA were consumed. Calculate the percentage of both Ca and Mg carbonates in the sample. **(3 marks)**

D. Define each of the following: (4 marks)

i- Peptization. ii- Co-precipitation. iii- Post precipitation. iv- Digestion.

Question 2: Choose the correct answer: (16 marks)

1) What do you understand by the term "Quantitative analysis"?
   a. Involves determining the individual constituents of a given sample.
   b. Involves the determination of the relative or absolute amount of an analyte in a given sample.
   c. Involves the addition of measured volume of a known concentration of reagent into a solution of the substance to be determined (analyte).
   d. Involves determining the level of purity of an analyte.
   e. Involves determining the quality of a sample.

2) If the concentration of H^+ ions in an aqueous solution is 2.5×10^{-4} then,
   a-Its pH <7   b-The solution is acidic   c- Its pOH >7
   d-Its OH^- concentration is less than the concentration of OH^- in neutral solution   e. All

3) The chemical formula of the indicator formed at the end point in volhard's method is:
   a- $FeCl_3$ b- $[Fe(SCN)_6]^{2+}$ c- $Fe(OH)_3$ d- none

4) Which one of the following considered as a monodentate ligand:
   a- $H_2N-CH_2-CH_2-NH_2$ b- NH_3
   c- EDTA   d- $C_2O_4^{2-}$

5) 3.60 M Sulphuric acid solution that is 29% H_2SO_4 (Molar mass = 98 g mol^{-1}) by mass, the density (in g.mL^{-1}) will be:
   a- 1.45   b- 1.64   c- 1.88   d- 1.22

6) In the precipitation of Ag^+ as AgCl, which one of the following can be used as a washing solution?
   a- HNO_3 b-H_2O c-NaCl   d-$Ba(NO_3)_2$

7) Mohr's titration should be carried out at pHs:
   a- 7   b- 9   c-12

8) Indicator used in complexometric titration is.......
   a- Eriochrome black T   b- Xylenol orange   c- Murexide   d- all

Please turn the page→

Section B: (Chromatography) (30 marks)

Question 3: (15 marks)

a. **Complete each of the following sentences: (5 marks)**
   1. **Mikhail Tswett** used……..……… to separate……………according to …….…….. mechanism.
   2. Mobile phase in column chromatography is moved under the effect of…….……..or….………
   3. The aim of elution process is to get ………………..……… and to regenerate………………..……….
   4. Number of theoretical plates (**N**) is depends on………….…..and independent on ……………...
   5. Degassing process in **HPLC** can be proceed using……….…..…..or……..………or……….……

b. **Sketch the plot which represents:** Van-Deemeter equation. **(3 marks)**

c. **Give the scientific term for each of the following statements: (2 marks)**

   1. Number of replaceable sites which available in one gram of the resin.
   2. A chromatographic technique which can be used for isolation of cells and viruses.

d. The following data were obtained for **three** compounds separated on a **50-cm** capillary column:

Compound	t_r (sec.)	w_b (sec.)
A	75	15
B	120	20

   If the retention time for the **unretained** solute is **15 sec. calculate:**
   1. The height of a theoretical plate **only** for **(B)** compound. **(2 marks)**
   2. Resolution and selectivity factor. **(3 marks)**

Question 4: (15 marks)

a. **Mention only one disadvantage for each of the following: (5 marks)**

   1. Adsorption chromatography.
   2. SEC.
   3. Synthetic organic ion exchanger.
   4. GC.
   5. HPLC.

b. **Choose the correct answer for each the following statements: (5 marks)**

   1. We can separate basic compounds using: **a.** Silica gel. **b.** Alumina.
   2. RPLC can retain compounds with: **a.** Polar nature. **b.** Non-polar nature.
   3. If resin surface contain sulfonic group, it will act as: **a.** Cationic exchanger. **b.** Anionic exchanger.
   4. In calibration curve, as t_r value increase so the separated sample is: **a.** Complicated. **b.** Simple.
   5. Bio-specific elution can produce: **a.** Narrow solute peak. **b.** Broad solute peak.

c. The following data were collected for a series of normal alkanes using **Carbowax 20M** stationary phase:

Normal alkane	t_r (min)
Ethane (C_2H_6)	2.3
Propane (C_3H_8)	5.6
Butane (C_4H_{10})	9.8

   What is the retention index for a compound whose adjusted retention time is **7.6 min**? **(3 marks)**

d. Sulphate ion is separated on anion exchange column with **30 cm**-length and **2 cm²**-cross section area using potassium nitrate as eluent. If the distribution coefficient (K_p) is **90**, calculate V_{max} (knowing that: void volume is **50%** of column volume). **(2 marks)**

Good luck: Prof. M. El-Defrawy, Dr. W. Abo El-Maaty, Dr. Y. Gaber and Dr. H. Moustafa