Mansoura University
Faculty of Science
Chemistry Department
Subject: Biochem. 376
Course(s): Biotechnology and its
Applications

Second Term
Final Exam
Third Level (Biochemistry)
Date: 18th May 2015
Time Allowed: <u>Two</u> hours
Full Mark: 60 Marks

Answer <u>ALL</u> the Following Questions; Each Question [20] Marks

[1] A- Choose the most suitable answer:

1- Microorganisms used in biotechnology shall not
(A) grow rapidly in cheap culture medium.
(B) be readily manipulated.
(C) be pathogenic.
(D) all of the above.

2- Secondary metabolites
(A) are essential to microbe function.
(B) are byproducts of metabolism that are not important to microbe function.
(C) are products that require additional processing before they can be packaged.
(D) are harvested during the exponential phase of growth.

3- Genetically engineered bacteria are being used in commercial production of
(A) melatonin.
(B) testosteron.
(C) human insulin.
(D) thyroxine.

4- Which one of the following enzymes in recombinant DNA technology makes sequence-specific cuts in DNA?
(A) Restriction endonuclease.
(B) Reverse transcriptase.
(C) DNA polymerase.
(D) DNA ligase.

5- Vectors are
(A) molecules those degrade nucleic acids.
(B) molecules those are able to covalently bond to and carry foreign DNA into cells.
(C) molecules that protect host cells from invasion by foreign DNA.
(D) DNA regulators.

6- Which of the following is not a primary nucleotide sequence database?
(A) DDBJ
(B) OWL
(C) NCBI
(D) EMBL

7- What is meant by a binding site?
(A) The area of a macromolecular target that is occupied by a drug when it binds.
(B) The portion of the drug to which a drug target binds.
(C) The functional groups used by a drug in binding to a drug target.
(D) The bonds involved in binding a drug to its target.

8- DNA fingerprinting was developed by
(A) Francis Crick
(B) Khorana
(C) Alec Jeffreys
(D) James Watson

9- *Ex situ* bioremediation involves the
(A) degradation of pollutants by microbes directly.
(B) removal of pollutants and collection at a place to facilitates microbial degradation.
(C) degradation of pollutants by genetically engineered microbes.
(D) none of the above.

10- Fermentation is the
(A) production of alcoholic beverages by microorganisms.
(B) mass, controlled culture of microbes to synthesize products.
(C) use of microbes in sewage and pollution control.
(D) all of the above.

[15] Marks

1

B- Complete the following sentences:

   i- An animal has gained new....(1)..... information from the acquisition of foreign DNA is a ......(2)...... animal.

   ii- Bacteria such as ......(3)...... and ....(4)........ have been shown to degrade the azodyes from .....(5)..... industry effluents.

                                                       [5] Marks

[2] State whether each of the Following Statements is True or False and Correct the false one(s):

a- During World War II, tetracycline made a major difference in the number of deaths and amputations caused by infected wounds.

b- In batch fermentation, substrates are added to the system twice and run until the product is harvested.

c- Gene therapy is a technique for analyzing the defective genes responsible for disease development

d- cDNA is a double-stranded DNA synthesized from an rRNA.

e- Sanger sequencing is based on the incorporation and detection of labelled dNTPs as terminal nucleotides in DNA amplification.

f- Biogenetics is an interdisciplinary field that develops methods and software tools for understanding biological data.

g- Drugs are generally larger than drug targets.

h- Drug discovery is the inventive process of finding new medications based on knowledge of a biological target.

i- The DNA fingerprint pattern of a child is 100% similar to the father's DNA print.

j- A recalcitrant pesticide may be converted by microbial action into a non-toxic compounds.

                                                    [20] Marks

[3] A- Enumerate the essential steps involved in the standard molecular cloning experiments of any DNA fragment.   **[7] Marks**

B- How can you select genes of interest from a genomic library using labelled DNA probes?   **[10] Marks**

C- Amelogenin gene marker has been used to identify the gender of two individuals.

i- What technique(s) would you use to detect the gender of each individual?

                                                     [One] Mark

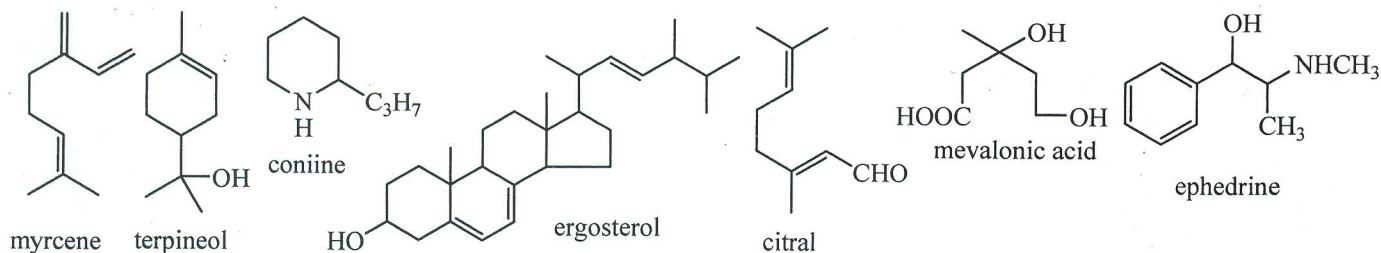ii- Differentiate between the two results, if one individual is male and the other is female.   **[2] Marks**

Examiner: Dr. Ahmed EL-Sokkary

-Good Luck-

Mansoura University
Faculty of Science
Department of Chemistry
Second Semester Exam (2014/2015)

CHEM 335
Natural Products' Chemistry
Time allowed: 2 hours
Full Mark: 60 Marks

ANSWER THE FOLLOWING QUESTIONS

myrcene   terpineol   coniine   ergosterol   citral   mevalonic acid   ephedrine

Question (I):

(A) In your answer notebook write the letter representing the right statement for the following (24 marks).

1- Phenylalanine [$PhCH_2CH(NH_2)COOH$] can be produced from:
    (a) Shikimic acid pathway   (b) Mevalonic acid pathway
    (c) Polyketide pathway   (d) All of them

2- Shikimic acid pathway starts by Aldol-like reaction between phosphoenol pyrovate and:
    (a) phosphorylated isoprene unit   (b) acetyl CoA
    (c) malonyl CoA   (d) erythrose-4-phosphate

3- The precursor of diterpenes is:
    (a) geraniol   (b) farnesol   (c) geranylgeraniol   (d) squalene

4- Myrcene reacts with maleic anhydride to give a Diels-Alder adduct.
    (a) True   (b) False

5- The number of isoprene units in sesquiterpenes is:
    (a) 1   (b) 2   (c) 3   (d) 4

6- Treatment of α-terpineol ($C_{10}H_{18}O$) with Br_2/CCl_4 gives a compound of the formula:
    (a) $C_{10}H_{18}BrO$ (b) $C_{10}H_{18}Br_2O$ (c) $C_{10}H_{18}Br_3O$ (d) $C_{10}H_{18}Br_4O$

7- Nerol cyclizes in dil. H_2SO_4 to form α-terpineol 9 times faster than Geraniol, this indicates that:
    (a) Nerol is the trans-isomer   (b) Nerol is the cis-isomer
    (c) Geraniol is the cis-isomer   (d) Both (a) and (c)

8- Distillation of a steroid with selenium gives:
    (a) Naphthalene   (b) Anthracene   (c) Phenanthrene   (d) Diel's hydrocarbon

9- Ozonolysis of Ergosterol indicated the presence of one double bond in the side chain between:
    (a) C-20 & C-21   (b) C-20 & C-22   (c) C-22 & C-23   (d) C-23 & C-24

<div dir="rtl">باقى الأسئلة فى الخلف</div>

10- Pregn-4-en-3,20-dione (Progesterone) belongs to:
    (a) Sex hormones   (b) Bile acids   (c) Sterols   (d) Cardenolides

11- Heating of coniine with hydroiodic acid at 300°C under pressure gives:
    a) Isooctane   (b) 2-Methyloctane   (c) n-Octane   (d) Cycloocatne

12- Cholesterol has a hydroxyl group (OH) at:
    (a) C-2   (b) C-3   (c) C-4   (d) C-6

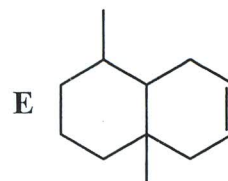(B) Sesquiterpene **A**, $C_{15}H_{26}$, when hydrogenated gave **B**, $C_{15}H_{28}$.
Treatment of **A** with hot acidic permanganate gave acetone and **C**, $C_{12}H_{20}O$.
Treatment of **C** with $LiAlH_4$ gave **D**, $C_{12}H_{22}O$.
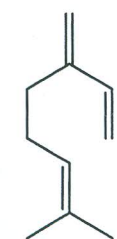Treatment of **D** with hot conc. H_2SO_4 gave **E**.
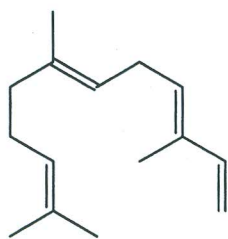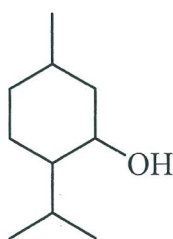Give the structure of **A**.   (6 marks).

E

Question (II):

1. Locate the isoprene units in the following terpenes, use the sign - - - - - to indicate "head to tail" joint and the sign ⋀⋀⋁⋀ to indicate the ring closure.   (9 Marks)

Myrcene   α-Farnesene   Menthol   Vitamin A
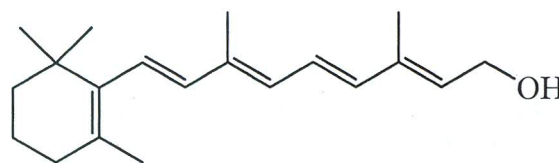
2. How can you prove that nicotine ($C_{10}H_{14}N_2$) contains a pyridine ring substituted at the 3-position by a group $C_5H_{10}N$? Write the complete structure of nicotine.   (6 Marks)

Question (III): Illustrate by chemical equations the following conversions: (15 Marks, 3 for each)

1. Mevalonic acid into α-terpineol.
2. Citral into a mixture of α-ionone and β-ionone.
3. Ergosterol into vitamin D2.
4. Benzyl chloride into β-phenyl ethyl amine.
5. 1-Phenyl-1,2-propandione into ephedrine.

Best Wishes: Prof. Mamdouh Abdel-Mogib, Prof. Dr. Ehab Abdel-Latif and Dr. Mona Elsayed

ANSWER THE FOLLOWING QUESTIONS

I. Define the following: **[35 Marks]**

1) DNA polarity

2) Double-Strand Break Repair

3) Renaturation of DNA

4) Gel Mobility Shift technique

5) Okazaki fragments

6) Filter binding technique

II. Write down the scientific terms represent the following definitions. [25 Marks]

1)   Enzyme that transfers a methyl group from S-adenosylmethionine to an adenine contained in any GATC sequence in DNA.

2)   A bond which binds the C1 carbon of the sugar moiety with the N9 atom of purine bases.

3)   The strand of DNA that matches the RNA transcript for the expression of protein.

4)   A number of forces that stabilize the DNA double helix and the single polynucleotide chains as well.

5)   A variety of enzymes break phosphodiester bonds in nucleic acids.

6)   Enzyme induces negative supercoiling in bacterial DNA using ATP as energy source.

7)   A light-induced enzymatic cleavage process of a thymine and cytosine dimmers to yield two base monomers.

8)   A stretch of double-stranded secondary structure of RNA.

9)   An enzyme seals the gaps between the Okazaki fragments into a continue strand.

10)   Enzyme that catalyzes topologic changes of DNA and supercoil insertions as well.

III. Protein   biosynthesis is   the   process   whereby   biological cells generate new proteins. Describe the different steps of Protein synthesis.   [20 Marks]

Best wishes for our dear students,

Dr. Amr Negm

جامعة المنصورة – كلية العلوم
قسم الرياضيات
التاريخ 1: / 6 / 2015 م
الدرجة الكلية : 80
الزمن : ساعتان

امتحان دور مايو 2015 م
برنـامج : كيمياء حيوى + كيمياء
المستوى : الثالث
اسم المقرر : احصاء حيوى
كـود المادة : ر 301

Answer the following questions:

[Q1] a- A sample of size 25 with $\overline{X} = 15$ is drawn from a normal population with

unknown mean μ and variance $\sigma^2 = 16$. Find the 95 % confidence interval for μ

(8 Marks)

b-Suppose that the random variable X is normally distributed with mean 24 and

standard derivation 4 . Find the probability that X will be

i) More than 28   ii) Between 20 and 32   (8 Marks)

c- A Coin is tossed 10 times , let X denotes the number of heads occurs . Find

i) $P(X > 0)$ ii) $E(2X - 1)$ iii) $Var(3X + 5)$ (8 Marks)

d- If for a sample we have $\sum_{i=1}^{5} x_i^2 = 61$, $\sum_{i=1}^{5} x_i = 15$. Find

i) The coefficient of variation C.V   ii) $\sum_{i=1}^{5} (x_i - \overline{x})^2$ (6 Marks)

[Q2] a-A machine fills containers of coffee labeled as 113 grams . Because of machine

variability, the amount per container is normally distributed with μ = 113 and each day

4 of the containers are selected randomly and the mean amount in the 4 containers is

determined. If the mean amount in the four containers is either less than 112 grams or

greater than 114 grams, the machine is stopped and adjusted. Find the probability that

the machine is adjusted.   (8 Marks)

b- Let X be a random variable with the density function

$$f(x) = \begin{cases} k\,x\left(16 - x^2\right) & , \quad 0 < x < 4 \\ 0 & , \quad \text{elsewhere.} \end{cases}$$

Find 1) The value of the constant k 2) $P(1 < X < 2)$ and $E(X)$ (8 Marks)

c- A random variable X takes the values 1, 2, 3, where $P(X = 1) = 0.5$ and $\mu = 1.7$.

Find i) $P(X = 3)$ ii) $Var(X)$ (6 Marks)

d- Consider the following frequency table (8 Marks)

X	0	2	3	4
frequency	15	10	20	5

Find   1) The sample mean   2) The sample variance

3) The sample median   4) The sample mode

[Q3] Choose the correct answer: (20 Marks)

1- The set of all possible outcomes of an experiment is said to be

a) Population   b) Sample   c) Sample space

2- If A and B are independent with $P(A) = 0.4$, $P(B) = 0.5$ then $P(A \cap B) =$

a) 0.2   b) 0.5   c) 0.9

3- The qualitative variables is the variable which has valued are

a) word descriptions   b) numbers   c) non is correct

4- A die is tossed 2 times, then the total number of outcomes is…

a) 64   b) 36   c) 12

5- The sum of relative frequencies of any frequency table is equal to

a) 100 %   b) sample size   c) 1

6- If $P(A) = 0.2$, $P(B) = 0.5$ and $P(A \cap B) = 0.1$ then, $P(A/B) =$

a) 0.5   b) 0.1   c) 0.2

7- If $P(A) = 0.2$, $P(B) = 0.5$, A and B are mutually exclusive, then $P(A \cap B) =$

a) 0   b) 0.5   c) 1

8- The range of the data: 3 , 5 , 6 , 10 , 3   is equal to

a) 3   b) 7   c) 5

9- The Correlation Coefficient r satisfy

a) $r \geq 1$ b) $-1 \leq r \leq 1$ c) $r \leq -1$

10-Any subset of the population is said to be

a) Sample space   b) Event   c) Sample

$Z_{0.025} = 1.96$, $\Phi(-2) = 0.0228$, $\varphi(1) = 0.8413$, $\Phi(2) = 0.9772$, $\varphi(-1) = 0.1587$

مع أطيب التمنيات بالنجاح د. فاتن شيحه – د. محمد عبدالرحمن

Mansoura University
Faculty of Science
Chemistry Department
Subject : Biochem.377
Course : Body Fluids

Second Term Exam 2014/2015
Third Level Biochem. Students
Date : 4 June, 2015
Time Allowed : 2 hours
Total Mark   : 60 Marks

Answer the following questions
Provide your answer with formula, equations, pathways, figures or tables

---

[1] Discuss in Brief of the following: **(15 marks)**
   A) Types of hemolytic anemia.
   B) Stages of Erythropoiesis.
   C) Composition of saliva and synovial fluid.

Put (√) for right sentence and put (X) for wrong sentence and correct the wrong sentence.   **(10 marks)**

1. The lymph enters the lymph vessels from the interstitial space and leak back because of presence of valves.
2. The anterior chamber between the posterior surface of the cornea and the iris while the posterior chamber between the iris and the front of the vitreous.
3. Glaucoma is a condition characterized by decreased intraocular pressure.
4. Low sperm concentration may be caused by presence of fructose in specimen.
5. Mother milk has been shown to supply a type of 3-arachidonyl glycerol .
6. Foremilk is water, low in fat and high in carbohydrates related to hindmilk.
7. A positive leukocyte esterase test results from the presence of red blood cells or lysed cells in urine.
8. A positive nitrate test indicates that bacteria in urine such as *E.Coli*.
9. The viscosity of the blood is dcreases in polycythemia and increases in anemia.
10. Alpha 2-antiplasmin and alpha 2-macroglobulin are activates plasmin.

                                        PTO

[3] Write an account of the followings: (20 marks)
   A) Formation of sperm cells and what the spermatozoon looks like?.
   B) Functions and Composition of bile juice and discuss the abnormal
      conditions associated with the bile.
   C) Complication related to amniotic fluid..
   D) Common crystals in urine.

[2]   Discuss the followings: (15 marks)
   A) Functions and composition of Aqueous humour.
   C) Leukopoiesis and erythropoiesis.
   D) Function of the tissue macrophage.

Good Luck   Prof. A.F.Abdel-Aziz

Note: Questions are in TWO pages

I –Write briefly on <u>Four Only</u> of the followings:

i- Direct and indirect volatilization methods (four examples).

ii- Experimental factors that must be considered in elaborating thermal analysis measurements.

iii- Colloidal state & super-saturation and relative super-saturation.

iv- Combustion analysis. Give examples.

v- The properties of organic reagents as precipitating agents.

II- Discuss three only of the following:-

i- Effect of complex ion formation on the precipitation step.

ii- The weighed form is, some times, different from the precipitate.

iii- Types of contamination in gravimetric analysis.

iv- TGA(Mechanisms of weight change) What can TGA tell you?

III- Solve <u>TWO ONLY</u> of the following problems:

A. Will we get a precipitate of AgCl, if 0.01 mg of NaCl is added to 200 ml of 2×10^{-5}M AgNO$_3$? Given $S_{AgCl}= 1.2 \times 10^{-10}$, Na= 23, Cl=35.5)

B. Having a solution containing Ca^{+2} and Mg^{+2} ions and you wish to precipitate the Mg^{+2} leaving Ca^{+2} in solutions. If the concentration of both ions is 0.100 M, is it possible for you to quantitatively remove the Mg^{+2} ions as $Mg(OH)_2$ leaving Ca^{+2} ions in solution? If it is possible, at what pH would this occur? $Ksp_{Ca(OH)2}= 6.5 \times 10^{-6}$, $Ksp_{Mg(OH)2}= 7.1 \times 10^{-12}$

C- A newly discovered iron ore weighted (5.408 g) was treated and produced 0.3785g of ignited Fe_2O_3 precipitate. What is the percent purity of the iron in the sample?

Page 1/2

VI. Choose the correct answer:

1- Increasing the ionic strength of a saturated solution by adding a compound with ions not common to the precipitate usually .... The solubility of the precipitate.

   a) Increases.   b) Decreases.   c) Doesn't affect.

2- Which of the following saturated solutions has the highest F^+ ion concentration:

   a) BaF_2 (S= 1.8×10^{-7}).   b) CaF_2 (S= 1.5×10^{-10}).

   c) MgF_2 (S= 7.0×10^{-11}).   d) PbF_2 (S= 7.1×10^{-7}).

V. Shortly, give an account on <u>Four Only</u> of the followings:

   i-   Basic principles and properties of ion selective membrane.

   ii-   Nernst equation and Electrochemical cell.

   iii-   Ohm's Law & Standard electrode potential.

   iv-   Liquid junction potential and salt bridge.

   v-   The indicator electrodes.

   vi-   Faradic and non Faradic current.

WITH MY BEST WISHES
PROF. MAGDA AKL