

Biomedical Engineering

Biochemistry  
Course Code : BME 291  
Level : 200

Allowed Time : 2 hours  
Second Semester 2017 /2018

Final term exam  
50 marks



Faculty Of Engineering  
30-12-2017

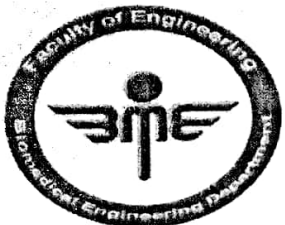
## Biochemistry exam

### تعليمات

- الإجابة في الأماكن المخصصة فقط في نفس ورقة الامتحان وكل سؤال على حدة.
- ممنوع تكرار أية إجابة أو إعادتها في أماكن أخرى.
- ليست هناك أية فرصة لإضافة ورق زائد.
- الصفحة الأخيرة مسودة ولا يعتد بأي كتابة فيها كإجابة.
- يتكون الإمتحان من خمسة اسئلة ويقع في 7 صفحات بالمسودة وجميع الأسئلة إجبارية.
- ممنوع أية كتابات خارجة عن مضمون الإجابة حتى لا تعرض نفسك للمسائلة القانونية.

### Directions

- All questions are to be attempted in the same exam papers.
- Answers should be written in the provided spaces.
- Do not repeat any answer in other places.
- No additional Booklets could be provided.
- The last paper is a Draft Paper not to be corrected.
- The exam consists of 5 questions in 7 pages including a draft page..



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## Part 1

**Question (1): Complete the following sentences:**

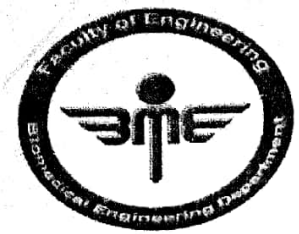
(12 marks, 0,5 mark/each)

- 1- Lactose is composed of **glucose** and **galactose** sugar units.
- 2- The outer part of starch is known as **amylopectin** and composed of **1,4 and 1,6** glycosidic linkages.
- 3- Raffinose is an example of **trisaccharide** regarding the number of sugar units.
- 4- The sulfur containing amino acids are **cysteine and methionine** while the amino acid containing imino group is **proline**.
- 5- Tyrosine is classified as **both glucogenic and ketogenic** while serine is classified as **glucogenic** regarding their biological values.
- 6- Alanine is classified as **nonessential** and tryptophan is classified as **essential** regarding their nutritional values.
- 7- The amino acids that are post-translationally modified in collagen are **proline and lysine**
- 8- Naming o polypeptide chain starts from the **N-terminal**
- 9- Disruption of  $\alpha$ -helix of protein structure may occur by **proline amino acid, bulky side chain or charged amino acid (only two are enough for answer)**
- 10- Examples of quaternary protein structure are **collagen and hemoglobin**
- 11- Secondary protein structure includes  **$\alpha$ -helix and  $\beta$ -pleated** sheets that are stabilized by **hydrogen** bonds.
- 12- The process of breaking peptide bonds of protein by adding water is known as **hydrolysis**

**Question (2): Give the name of each of the followings:**

(8 marks, 1 mark/each)

No.	Statement	Answer
1	Mirror image isomers of the same sugar molecule.	Enantiomers
2	Sugar acid derived from galactose after oxidizing both the aldehydic and last hydroxy groups.	Mucic acid



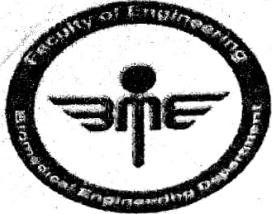
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3	An example of a disaccharide composed of a ketohexose as one of its monosaccharide units.	<b>Sucrose</b>
4	The storage form of carbohydrates in animals.	<b>Glycogen</b>
5	An optically inactive amino acid..	<b>glycine</b>
6	$\gamma$ -Glutamyl-cysteinylglycine.	<b>Glutathione</b>
7	The overall three-dimensional shape of an entire protein molecule.	<b>Tertiary protein structure</b>
8	Unfolding of protein structure without affecting peptide bonds.	<b>denaturation</b>



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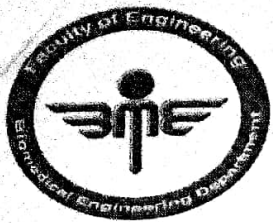
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## Part 2

**Question (1): Complete the following sentences:**

**(12 marks, 0,5 mark/each)**

- 1- Margarine has many disadvantages as it does not contain fat-soluble vitamins (A, D, E and K) and essential fatty acids.
- 2- Fats and oils can be protected from rancidity by replacing O<sub>2</sub> by inert gas e.g. N<sub>2</sub> (put the food in vacuum) and add antioxidant material to the food e.g. vitamin E (Protect oil from direct light).
- 3- Diffusion is the net movement of particles from an area with a high (initial) concentration to an area with a low (initial) concentration.
- 4- Active transport requires energy as molecules must be pumped against the concentration gradient.
- 5- GLUT1 glucose carrier is an example for uniport protein carrier however adenine nucleotide translocase (ADP/ATP exchanger) is an example for antiport protein carrier.
- 6- Cofactors are inorganic substances which are loosely attached to the protein part of the enzyme.
- 7- LDH1 is produced by heart while LDH5 is produced by muscles and liver.
- 8- Bacterial proteases are used in making leather, textiles and in laundry in industry.
- 9- Phosphatidic acid is formed from glycerol, 2 fatty acids and a phosphate group.
- 10- lecithinase A enzyme causes removal of unsaturated fatty acid from lecithin producing a compound called lyssolecithin which is haemolytic in action.
- 11- Phospholipids are amphipathic molecules as they contain hydrophobic and hydrophilic regions.
- 12- Organisms control membrane fluidity by regulating their temperature (fastest method) , (By changing the fatty acid profile of their membranes (slow process)) and by adding fluidity modifiers or stabilizers like cholesterol ("fluidity buffer" usually always present).



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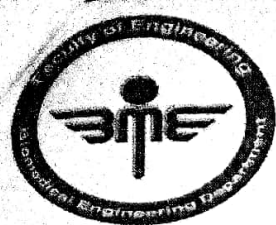


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**Question (2): Give the name of each of the followings:**

**(12 marks, 1 mark/each)**

No.	Statement	Answer
1	The substance which is produced in industry by hydrolysis of neutral fats with NaOH.	<u>Soap</u>
2	Phospholipid which is formed from glycerol, two fatty acids, phosphoric acid and choline nitrogenous base.	<u>Lecithins</u>
3	A special class of phosphoglyceride in which the fatty acid on the carbon atom number one is replaced by an $\alpha$ - $\beta$ unsaturated fatty alcohol, forming ether linkage.	<u>Plasmalogens</u>
4	Lipoprotein which removes excess cholesterol from peripheral tissues and deliver it to the liver for excretion.	<u>HDL</u>
5	The name of the sugar which is present in DNA.	<u>deoxyribose</u>
6	The basic proteins which are tightly bound with eukaryotic DNA.	<u>histones</u>
7	Circular rings of DNA that replicate independently of the chromosomes in prokaryotic organisms.	<u>plasmids</u>
8	A group of specialized cells that work together to perform the same function.	<u>Tissues</u>
9	Type of membrane proteins which penetrate the hydrophobic core of bilayer.	<u>Integral membrane proteins</u>
10	The tissue which carries impulses back and forth to the brain from the body.	<u>Nerve tissue</u>
11	A group of two or more different types of tissue that work together to perform a specific function.	<u>Organs</u>
12	The high order of DNA organization where DNA is condensed at least by 10,000 times onto itself.	<u>Chromosomes</u>



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**Question (3): Read the sentences carefully then write (True) if the sentence is correct and (False) if it is incorrect:** (6 marks, 0,5 mark/each)

Sentence	Answer
1- Cholesterol is used for synthesis of adrenal cortical hormones, vitamin D3 and bile acids.	<u>True</u>
2- Stearic acid containing 16 carbon atoms and is present in both animal and vegetable fats.	<u>False</u>
3- Pure fats and oils when freshly prepared are colourless, odourless and tasteless.	<u>True</u>
4- Waxes are esters of fatty acids combined with glycerol.	<u>False</u>
5- Higher concentrations of LDL cholesterol have been associated with increasing severity of cardiovascular disease.	<u>True</u>
6- Cephalins may contain ethanol amine or serine as nitrogenous base.	<u>True</u>
7- Specific gravity of neutral fats is less than 1.	<u>True</u>
8- Adenine and guanine are pyrimidines nitrogenous bases.	<u>False</u>
9- Adenine (A) always pairs with thymine (T), and guanine (G) always pairs with cytosine (C).	<u>True</u>
10- mRNA carries the amino acid to be incorporated into the developing protein.	<u>False</u>
11- The rate of transport of polar compounds through cell membrane is low.	<u>True</u>
12- Biological membranes can be considered as a three-dimensional liquid.	<u>False</u>