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**GARISSA UNIVERSITY**

**UNIVERSITY EXAMINATION 2018/2019 ACADEMIC YEAR THREE**

**SECOND SEMESTER EXAMINATION**

**SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES**

**FOR THE DEGREE OF BACHELOR OF EDUCATION**

**COURSE CODE: CHE 306E**

**COURSE TITLE: BIOCHEMISTRY**

**EXAMINATION DURATION: 2 HOURS**

**DATE: 07/02/2020 TIME: 09.00-11.00 AM**

**INSTRUCTION TO CANDIDATES**

* **The examination has FIVE (5) questions**
* **Question ONE (1) is COMPULSORY**
* **Choose any other TWO (2) questions from the remaining FOUR (4) questions**
* **Use sketch diagrams to illustrate your answer whenever necessary**
* **Do not carry mobile phones or any other written materials in examination room**
* **Do not write on this paper**

**This paper consists of FIVE (5) printed pages *please turn over***

**QUESTION ONE (COMPULSORY)**

1. What is the primary characteristics that distinguishes prokaryotes from Eukaryotes? **[2 marks]**
2. Prokaryotic cells are always larger than eukaryotic cells
3. Eukaryotes have internal organelles; prokaryotes do not
4. Eukaryotes produce and use ATP, Prokaryotes do not
5. Eukaryotic cells have both DNA and RNA; Prokaryotic cells possess RNA only.
6. None of the above
7. The rough endoplasmic reticulum **[3 marks]**

A) Plays a role in steroid synthesis

B) Protein synthesis occurs here

C) Genetic material is found here

D) Detoxification occurs here

E) Is found in the lysosomes.

1. Which of the following happens when protein folds **[2 marks]**

A) Protein adopts its lowest energy state form

B) Most of non-polar and hydrophobic residues are found buried in the protein

C) The charged residue are found on the outside of the protein

D) Secondary structural elements form

E) All of the above

1. The double bond character of the peptide is important because **[2 marks]**

A) Allows the Peptide bond to be protonated

B) Allows the R-groups to interact with each other

C) Limits the free rotation about the peptide backbone

D) Promotes C-configuration of the R-groups

E) All of the above

1. The structure of deoxyribonucleic acid does not have: **[3 marks]**

A) Adenine.

B) Cytosine.

C) Uracil.

D) Guanine.

E) Thymine

1. Which of the following is not true about an α -Helix? **[3 marks]**

A) The side chains extend radially outwards from the helix axis

B) It is held together primarily by hydrogen bonds

C) It usually involves multiple polypeptide bonds

D) The peptide backbone is on the inside of the helix

E) It has a rod-like structure

1. Enzymes **[2 marks]**

A) Are composed primarily of polypeptides, which are monomers of amino acids

B) Have define structures

C) Can bind prosthetic groups such as metal ions or cofactors that participate in enzyme reaction

D) Bind their structures at active sites

E) All the statements are true

1. Seven of the ten reactions in the glycolytic pathway have free energy (ΔG) values close to Zero. What does this tell us about those reactions? **[3 marks]**

A) They are near equilibrium reactions

B) They are not control points for pathway regulation

C) They are reversible reaction

D) All of the above

E) None of the above

1. Dehydrogenase is an enzyme that catalyses: **[3 marks]**

A) A phosphorylation reaction

B) An oxidation-reduction (redox) reaction

C) The release of proton from an acid

D) A hydrolysis reaction

E) An isomerization reaction

1. Elevated levels of the hormone \_\_\_\_\_\_\_\_ stimulates release of glucose from glycogen **[3 marks]**

A) Insulin

B) Estrogen

C) Epinephrine

D) Ergosterol

E) Testosterone

1. Which of the following is not a medical condition associated with blood PH? **[2 marks]**
2. Metabolic acidosis
3. Respiratory alkalosis
4. Respiratory Acidosis
5. Metabolic alkalosis
6. Phenylketonuria
7. Beta pleated sheets are a part of which structure of proteins **[2 marks]**

A) primary

B) Secondary

C) Tertiary

D) Quarterly

**QUESTION TWO**

1. What is meant by the ‘Primary,’ ‘Secondary,’ ‘Tertiary,’ and ‘Quaternary’ structures of a protein **[3 marks]**
2. Why do almost all enzyme-catalysed reactions show a pH optimum **[2 marks]**
3. State the biological importance of lipids? **[2 marks]**
4. What are the two forces or bonds that contribute strongly to the stability of specifically folded DNA and RNA structures? **[2 marks]**
5. Identify 3 polysaccharides existing naturally and mention their biological importance **[3 marks]**
6. State any three biological functions of Carbohydrates? **[3 marks]**
7. State 5 biological roles of minerals and vitamins to the body? **[5 marks]**

**QUESTION THREE**

1. State four agents of protein denaturing **[4 marks]**
2. Shown below is the structure of the amino acid Tyrosine, draw the predominate form(s) of Tyrosine at the following PH values **[6 marks]**



1. PH 5
2. PH 10
3. Explain the effects of temperature on enzyme catalysed reactions **[4 marks]**
4. Briefly discuss the following classes of carbohydrates giving examples of each class **[6 marks]**
   1. Monosaccharide’s;
   2. Disaccharides;
   3. Polysaccharides

**QUESTION FOUR**

1. State the 4 major non-covalent forces involved in the structure and functions of biomolecules **[4 marks]**
2. Define what is Hydrophobic effect in substances **[2 marks]**
3. Differentiate between Starch and Cellulose? **[2 marks]**
4. Discuss in detail models for enzyme/substrate interactions **(8 marks)**
5. Explain the use of H-bonding in drug design **[4 marks]**

**QUESTION FIVE**

1. Explain how Enzymes works using Michaels-Menten model? **[7 marks]**
2. Discuss the four main Diseases associated with blood PH **(8 marks)**
3. Describe different classification of protein on the basis of Biological roles **[5 marks]**