PRELIM ASSIGNMENT #4
PHYSIOLOGICAL & BIOLOGICAL PSYCHOLOGY

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SUBJ CODE: PY48

UNIT 1 TOPIC:

A. The study of body functions
B. Chemical Composition of the Body
C. Cell Structure and Genetic Control
D. Enzymes & Energy
E. Cell respiration & metabolism
F. Interactions between cells & the extracellular environment

SPECIFIC GUIDE QUESTIONS:

A. **ENZYMES AS CATALYSTS**

1. Explain the properties of a catalyst and how enzymes function as catalysts.
   - 1. A catalyst accelerates a reaction while also increasing the yield of the desired product.
     2. A catalyst participates in the reaction even though it is not consumed or used up during the process.
     3. A catalyst accelerates the reaction by providing a lower activation energy alternative pathway.
     4. A catalyst is a reaction-specific substance. Even if the two reactions are of the same type, it may not be effective in the other.
     5. A catalyst accelerates both the forward and reverse reactions in a reversible reaction. As a result, the presence of a catalyst has no effect on the equilibrium constant of a reversible reaction.
   - Enzymes function as biological catalysts. Catalysts reduce reaction activation energy. The lower the activation energy of a reaction, the faster it will occur. As a result, enzymes accelerate reactions by lowering activation energy. When substrates bind to many enzymes, they change shape. This is known as “induced fit,” and it means that the precise orientation of the enzyme required for catalytic activity can be induced by substrate binding.

2. Describe how enzymes are named.
   - Enzyme common names typically include a prefix describing either the name of the substrate that the enzyme affects or the chemical reaction that it catalyzes. The suffix 'ase' is added after the prefix. This suffix simply identifies the compound as an enzyme. Proteinase or protease, for example, is the enzyme that breaks down proteins into amino acids. Similarly, the enzyme responsible for the dehydration of alcohols is known as 'alcohol dehydrogenase.' However, older

trivial names are used to name some of the first studied enzymes, such as rennin, pepsin, and trypsin.

B. **CONTROL OF ENZYME ACTIVITY**

1. Describe the effects of pH and temperature on enzyme-catalyzed reactions, and the nature of cofactors and coenzymes.
    - The rate of an enzyme-catalyzed reaction increases with increasing temperature at low temperatures. When the protein is denatured at higher temperatures, the rate of the reaction slows dramatically.
    - Coenzymes are organic molecules that frequently bind loosely to an enzyme's active site and aid in substrate recruitment, whereas cofactors do not bind the enzyme.
2. Explain the law of mass action in reversible reactions.
    - The law of mass action states that reversible reactions will be driven from one side of the equation to the other. The same enzyme catalyzes both the forward and the backward reactions.
3. Describe a metabolic pathway and how it is affected by end-product inhibition and inborn errors of metabolism
    - A metabolic pathway is a series of interconnected biochemical reactions that convert a substrate molecule or molecules through a series of metabolic intermediates to produce a final product or products.
    - Inborn metabolic errors occur when a single gene that codes for an enzyme in a metabolic pathway is mutated. The products that would have been formed after this enzyme in the chain are not formed. Disease occurs as a result of a loss of end product.

C. BIOENERGETICS

1. Distinguish between endergonic and exergonic reactions, and explain how ATP functions as a universal energy carrier.
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2. Distinguish between oxidation and reduction reactions, and explain the functions of NAD and FAD
    - NAD and FAD are only AEROBIC (needs oxygen)
    - - both are H carriers
    - - oxidation and reduction