PRELIM ASSIGNMENT #3
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. Plasma Membrane and Associated Structures

1. Describe the structure of the plasma membrane, cilia, and flagella
    - Eukaryotic cells, like prokaryotes, have a plasma membrane composed of a phospholipid bilayer with embedded proteins that separates the cell's internal contents from its surroundings. A phospholipid is a type of lipid molecule that is made up of two fatty acid chains and a phosphate group. The plasma membrane regulates the passage of some substances, such as organic molecules, ions, and water, preventing the passage of some and actively bringing in or removing others to maintain internal conditions. Other molecules move across the membrane in a passive manner.
    - Flagella (singular : flagellum) are long, hair-like structures that extend from the plasma membrane and are used to move an entire cell, such as sperm, Euglena. When present, the cell has only one or a few flagellums. Cilia singular = cilium, on the other hand, are numerous and extend across the entire surface of the plasma membrane. They are short, hair-like structures used to move entire cells like paramecium or substances along the cell's outer surface.

2. Describe amoeboid movement, phagocytosis, pinocytosis, receptor-mediated endocytosis, and exocytosis.
    - Amoeboid movement involves extending parts of their cytoplasm to pull the cell through the extracellular matrix, much like a single celled animal. A type of cellular eating is phagocytosis. Pinocytosis is a type of nonspecific endocytosis in which many cells work together to form a deep, narrow furrow. The goal of receptor-mediated endocytosis is to bind with a specific type of receptor protein. The process by which cellular products are secreted into the extracellular environment is known as exocytosis.

B. CYTOPLASM AND ITS ORGANELLES

3. Describe the structure and functions of the cytoskeleton, lysosomes, peroxisomes, mitochondria, and ribosomes.
    - The cytoskeleton is a structure that assists cells in maintaining their shape and internal organization, as well as providing mechanical support that allows cells to perform essential functions such as division and movement. There isn't just one cytoskeletal component. The cytoskeleton is made up of several different components that work together to form it.
    - Lysosomes are essential cell organelles found in eukaryotic animal cells. Because of their unusual function, they are also known as the cell's "suicide bags." Lysosomes are membrane-bound organelles, and the area within the membrane containing hydrolytic enzymes and other cellular debris is known as the lumen.
    - The shape, size, and number of peroxisomes vary according to the cell's energy requirements. These consist of a phospholipid bilayer with numerous membrane-bound proteins. Lipid metabolism enzymes are synthesized on free ribosomes and selectively imported into peroxisomes. These enzymes contain one of two signaling sequences, the most common of which is Peroxisome Target Sequence 1 (PTS1). Peroxisome phospholipids are typically produced in the smooth endoplasmic reticulum. The peroxisome expands in size and divides into two organelles as a result of the ingress of proteins and lipids. Peroxisomes are not self-contained DNA units. Following translation, proteins are removed from the cytosol.
      Function of Peroxisomes
    - They take part in various oxidative processes.
    - They take part in lipid metabolism and catabolism of D-amino acids, polyamines and bile acids.
    - The reactive oxygen species such as peroxides produced in the process is converted to water by various enzymes like peroxidase and catalase.
    - In plants, peroxisomes facilitate photosynthesis and seed germination. They prevent loss of energy during photosynthesis carbon fixation.

4. Describe the structure and functions of the endoplasmic reticulum and Golgi complex, and explain how they interact.
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C. CELL NUCLEUS AND GENE EXPRESSION

5. Describe the structure of the nucleus and of chromatin, and distinguish between different types of RNA.
    - The nucleus is an organelle found in eukaryotic cells that is shaped like a sphere. It contains nucleic acids, which are the cell's genetic material. It is in charge of overseeing all of the cell's activities. And is made up of a nuclear membrane, chromosomes, a nucleolus, and nucleoplasm.
    - Chromatin is made up of DNA and histones that are bundled together into thin, stringy fibers. These chromatin fibers are not condensed, but can exist in either a compact (heterochromatin) or less compact (euchromatin) form (euchromatin). In euchromatin, processes such as DNA replication, transcription, and recombination take place.

6. Explain how DNA directs the synthesis of RNA in genetic transcription.
    - Transcription begins with the opening and unwinding of a small portion of the double helix of DNA to expose the bases on each DNA strand. The template for the synthesis of an RNA molecule is then one of the two strands of the double helix DNA.

D. PROTEIN SYNTHESIS AND SECRETION

7. Explain how RNA directs the synthesis of proteins in genetic translation.
   -The mRNA directs protein synthesis, which takes place in the cytoplasm. The mRNA that is formed in the nucleus is transported out of the nucleus and into the cytoplasm, where it binds to the ribosomes. Proteins are assembled on ribosomes with the help of the mRNA nucleotide sequence.

8. Describe how proteins may be modified after genetic translation, and the role of ubiquitin and the proteasome in protein degradation.
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E. DNA SYNTHESIS AND CELL DIVISION

9. Explain the semiconservative replication of DNA in DNA synthesis.
    - DNA replicates in a semi-conservative manner, with each of the two parental DNA strands serving as a template for new DNA synthesis. Each DNA strand has one parental or “old” strand and one daughter or “new” strand after replication.
10. Describe the cell cycle and identify some factors that affect it, and explain the significance of apoptosis.
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11. Identify the phases of mitosis and meiosis, and distinguish between them.
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