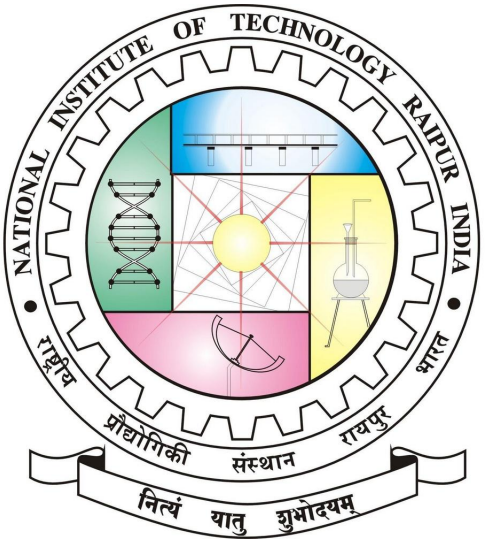


National Institute Of Technology

RAIPUR

ASSIGNMENT 01

# SUMMARY OF CHAPTER 1

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# Contents

# 1 Anatomy and Physiology

**Anatomy** is the science of body structures and the relationships among them.
**Dissection** is the careful cutting apart of body structures to study their relationships.
**Physiology** is the science of body functions—how the body parts work.

# 2 Level of Structural Organisation and Body Systems

There are six levels of Organisations from smallest to largest which are as follows:

1. **Chemical level:** The smallest units of matter , atoms , which participate in chemical reaction and molecules. Certain atoms, such as carbon (C), hydrogen (H), oxygen (O), nitrogen (N), phosphorus (P), calcium (Ca), and sulfur (S), are essential for maintaining life.
2. **Cellular level:** Molecules combine to form cells. Cells are the smallest living and the basic structural and functional unit of the body. Eg: muscle cells, nerve cells, and epithelial cells.
3. **Tissue level:** Tissues are groups of cells and the materials surrounding them that work together to perform a particular function.There are four basic types of tissues in your body: epithelial tissue, connective tissue, muscular tissue, and nervous tissue.
4. **Organ level:** Organs are group of two more than two types of tissues that have specific functions and recognizable shapes. Examples of organs are the stomach, skin, bones, heart, liver, lungs, and brain.
5. **System level:** A system consists of related organs with a common function. An example of organ-system level is digestive system which breaks down and absorbs food. Sometimes an organ can be a part of more than one system. For eg, Pancreas is the part of digestive system as well as hormone producing endocrine-system.
6. **Organismal level:** All the systems working together constitute an organism.

# 3 Characteristics of the Living Human Organisms

There are 6 life processes of human body:

1. **Metabolism** is the sum of all chemical processes that occur in the body. There are two phases in metabolism, one is catabolism, which is Breaking Down of complex chemical substances into simpler components. And the second one is anabolism, which is building up of complex chemical substances from smaller simple components.
2. **Responsiveness** is the ability to detect and respond to changes.
3. **Movement:** It's the motion of the whole body, individual organs, single cells and even tiny structures inside cells.
4. **Growth:** It's the increase in body size that results from an increase in the size of existing cells, increase in number of cells, tissues sometimes.
5. **Differentiation:** It's a development of a cell from an unspecialized two specialised state. Such precuser cells, which can divide and give rise to sells that undergo differentiation, are known as stem cells.

6. **Reproduction:** It refers either the formation of new cells for tissue growth, repair or replacement, are the production of a new individual.

When any one of the life processes ceases to occur properly, the result is death of cells and tissues, which may lead to death of the organ- ism. Clinically, loss of the heartbeat, absence of spontaneous breath- ing, and loss of brain functions indicate death in the human body.

# 4 Homeostasis

**A condition of equilibrium (balance) in the body's internal environment. It is a dynamic condition meant to keep body functions in the narrow range compatible with maintaining life. Example: Blood glucose levels range between 70 110 mg of glucose/dL of blood.**

**Body Fluids:**Dilute, watery solutions containing dissolved chemicals inside or outside of the cell.
– Intracellular Fluid (ICF) is the fluid within cells
– Extracellular Fluid (ECF) is the fluid outside cells
– Interstitial fluid is ECF between cells and tissues.

**Some important body fluids:**
– Blood Plasma is the ECF within blood vessels.
– Lymph is the ECF within lymphatic vessels.
– Cerebrospinal fluid (CSF) is the ECF surrounding the brain and spinal cord.
– Synovial fluid is the ECF in joints.
– Aqueous humor is the ECF in eyes.

**Control of homeostasis is constantly being challenged by:**

**Physical insults:**: intense heat or lack of oxygen
• Changes in the internal environment: a drop in blood glucose due to lack of food

**Physiological stress:**demands of work or school
– Intense disruptions that are prolonged can result in disease (poisoning or severe infections) or death.
– Mild disruptions can be restored quickly with minimal to no harm done.
∗ Done so via Feedback Systems

# 5 Feedback Systems:

*** Three basic components:**

**Receptor:**

– A body structure that monitors changes in a homeostatic controlled condition (body temperature) and sends input to the control center.
∗ Example: Specialized nerve endings in the skin and brain act as temperature receptors and can cause a nerve to fire in response to temperature changes.

**Control Centre:**
– Sets the range of values to be maintained usually this is done by neural tissue/brain.
– Evaluates input received from receptors and generates an output command.

∗ Output involves nerve impulses, hormones, or other chemical agents.
∗ Example: Brain acts as a control center receiving nerve impulses from skin temperature receptors.

**Effectors:**
– Receives output from the control center and produces a response or effect that changes the condition:
∗ Example: skeletal muscle or sweat

## 5.1 Negative Feedback Loop:

• Body senses a change and activates mechanisms to reverse the change.
– Physiologic Example:
∗ Blood Pressure regulation.
· External or internal stimulus increases BP.
· Baroreceptors (receptors) detect higher BP and send a nerve impulse (input) to the brain (control center).
· Brain sends nerve impulses (output) to the heart (effector organ) causing it to slow which causes BP to drop (homeostasis is restored.)
• Thermoregulation - HOT
– Receptors in skin or brain sense increase in blood temperature.
∗ Send neural input to brain.
– Control center in brain sends neural output to effector organs.
– Blood vessels in the skin dilate and sweat glands initiate sweating.
∗ Blood temperature should decrease.
• Thermoregulation - COLD
– Receptors in skin or brain sense decrease in blood temperature.
∗ Send neural input to brain.
– Control center in brain sends output to effector organs.
– Blood vessels in the skin constrict and skeletal muscles initiate shivering.
∗ Blood temperature should increase.

## 5.2 Positive Feedback System:

• Body senses a large divergence from homeostasis and initiates a self amplifying change.
– Leads to change in the same direction.
∗ In contrast, negative feedback ALWAYS reverses the direction of a sensed change.
• Normal way of producing rapid changes.
– Examples: childbirth, blood clotting, protein digestion, and generation of nerve signals.
∗ Childbirth:
· Fetal pressure on the cervix is detected by pressure receptors.
· Nerve input is sent to the control center in the brain.
· Oxytocin (output) is release from the brain into the blood.
· Oxytocin causes effector uterine contractions which further push the baby against the cervix.