Detailed Revision Notes for Biology Chapters 9-11

Chapter 9: Plant Biology

- Photosynthesis: Plants produce carbohydrates using energy from the Sun and carbon dioxide from the atmosphere. Photosynthesis is the process by which plants make carbohydrates using energy from light. They need carbon dioxide from the air and water from the soil. Light energy is captured by chlorophyll, usually from the Sun. This process occurs within the chloroplasts, and oxygen is also produced in the reaction.

- Importance of Plants: Plants are the producers for food chains and food webs all over the world. Plant crops are the source of most human food, both directly and as animal feed. Plants are part of the water cycle. Materials from plants are used for medicines, clothing, building, biofuels, and more.

- Plant Structures:

    - Roots: Anchor the plant in the ground and supply it with water and mineral nutrients from the soil.
    - Stems: Support the leaves, holding them out to capture the sunlight they need for photosynthesis. They also support the flowers and fruit.
    - Leaves: Capture energy from the Sun using the green colour chlorophyll. They use this for photosynthesis to make carbohydrates.
    - Flowers: The reproductive structures of plants, forming the seeds and fruit. They only appear at certain times in the life cycle of the plant.

- Minerals: Plants need minerals like nitrates and magnesium for healthy growth. Nitrates are needed to make proteins, which control many reactions in plant cells, including photosynthesis. Magnesium is a component of chlorophyll, the green molecule that traps light in photosynthesis.

- Transport Systems:

    - Xylem: Transports water and minerals from roots to leaves.
    - Phloem: Transports sugars from leaves to other plant parts.
- Transpiration: Water moves through plants from the roots to the leaves in the transpiration stream. On the underside of leaves, there are tiny holes called stomata, which allow carbon dioxide in and oxygen out. When stomata are open, water evaporates from the cells of the leaves and moves out through the stomata by diffusion. This process is called transpiration.

- Tips for Checkpoint Exam:

    - Understand the specific requirements for photosynthesis, including carbon dioxide, water, and light energy.
    - Be able to explain the role of chloroplasts in photosynthesis.
    - Know the specific functions of different plant structures and how they contribute to the plant's overall survival.
    - Understand the importance of minerals and how they are transported within the plant.
    - Be able to explain the process of transpiration and its role in water and

nutrient transport.

Chapter 10: Excretion and the Kidney

- Excretion: The removal of waste products from the body. In humans, this includes carbon dioxide from the lungs and urea through the kidneys.

- Importance of Excretion: Waste products from cells are toxic and can damage cells and stop them from working healthily if they build up.

- Kidneys: The kidneys are reddish-brown organs about 10 cm long, positioned against your back with a thick layer of fat around them for protection. They filter blood to remove urea and other waste products, forming urine.

- Human Excretory System:

    - Kidneys: Filter blood.
    - Ureters: Tubes connecting kidneys to the bladder.
    - Bladder: Muscular bag that stores urine.
    - Urethra: Tube through which urine exits the body.
- Kidney Function:

    - Filters blood to remove urea and other waste products.
    - Reabsorbs useful substances like glucose back into the blood.
    - Regulates water balance in the body by adjusting the amount of water

reabsorbed.

- Tips for Checkpoint Exam:

    - Understand the specific waste products excreted by humans and their origins.
    - Be able to explain the detailed structure and function of the kidneys, including the filtration process and the reabsorption of useful substances.
    - Know the pathway of urine formation and excretion through the different structures of the excretory system.
    - Understand how the kidneys regulate water balance and how this is affected by factors like hydration and exercise.

Chapter 11: Human Genetics and Development

- Reproduction: The process of creating new organisms.

- DNA: The genetic material located in the nucleus of a cell, carrying hereditary information. It forms chromosomes as a cell divides.

- Chromosomes: Thread-like structures made of DNA, carrying genes. Human body cells have 46 chromosomes (23 pairs).

- Genes: Sections of DNA that code for specific traits.

- Asexual Reproduction: One parent produces genetically identical offspring.

- Sexual Reproduction: Two parents produce offspring with a mix of genetic material.

- Gametes: Sex cells (sperm and egg) with half the number of chromosomes. Human gametes each contain 23 chromosomes.

- Fertilisation: The fusion of sperm and egg to form a zygote.

- Fetal Development: The process of a fertilised egg developing into a baby. It takes 40 weeks (9 months) for a human baby to develop.

- Factors Affecting Fetal Development: Maternal health, including diet, smoking, and drug use.

- Tips for Checkpoint Exam:

    - Understand the specific differences between asexual and sexual reproduction and the genetic outcomes of each.
    - Be able to explain the roles of DNA, chromosomes, and genes in detail.
    - Describe the process of fertilisation, including the formation and role of gametes.
    - Know the stages of fetal development and the specific factors that can influence its health and well-being.
    - Be able to discuss the importance of maternal health and the potential

risks of smoking and drug use during pregnancy.