

9. Observation and comments on experimental set up on:
  - a) Phototropism
  - b) Suction due to transpiration.
  - c) Apical bud removal
10. Study of specimens and their identification with reasons – *Sycon*, *Hydra*, Pleurobrachia, Liverfluke, *Ascaris*, Leech, Earthworm, **Prawn, Silkworm, Honey bee**, Snail, Star-fish, *Balanoglossus*, Shark, Rohu, Frog, Lizard, Pigeon and Rat.
11. Study of human skeleton (except skull, hand bones and foot bones) and **different types of joints (synovial, cartilaginous and fibrous joints with one suitable example)**.
12. Study of external morphology of earthworm, cockroach and frog through models.
13. **Study of mitosis** in onion root tips and animal cells (**grasshopper**) from permanent slides.

## Std. - XII Biology

### Section I – BOTANY

#### Unit 1: Genetics and Evolution :

##### Chapter 1 - Genetic Basis of Inheritance:

Mendelian inheritance. Deviations from Mendelian ratio (gene interaction-incomplete dominance, co-dominance, multiple alleles **and Inheritance of blood groups**), **Pleiotropy, Elementary idea of polygenic inheritance.**

##### Chapter 2 - Gene: its nature, expression and regulation:

Modern concept of gene in brief-cistron, muton and recon. **DNA as genetic**

**material**, structure of DNA as given by Watson and Crick's model, **DNA Packaging**, semi conservative replication of eukaryotic DNA.

RNA: General structure, types and functions.

Protein Synthesis; central dogma, Transcription; Translation-Genetic Code, Gene Expression and Gene Regulation (The *Lac* operon as a typical model of gene regulation).

#### Unit 2: Biotechnology and its application:

##### Chapter 3 - Biotechnology: Process and Application :

Genetic engineering (Recombinant DNA technology):

Transposons, Plasmids, Bacteriophages; Producing Restriction Fragments, Preparing and cloning a DNA Library, Gene Amplification (PCR).

Application of Biotechnology in Agriculture – BT crops

Biosafety Issues (Biopiracy and patents)

#### Unit 3: Biology and Human Welfare :

##### Chapter 4 - Enhancement in Food Production

Plant Breeding

Tissue Culture: Concept of Cellular Totipotency,

Requirements of Tissue Culture (in brief), Callus Culture, Suspension Culture.

Single Cell Protein. **Biofortification.**

##### Chapter 5 - Microbes in Human Welfare:

Microbes in Household food processing.

Microbes in Industrial Production.

Microbes in Sewage Treatment.

Microbes in Biogas (energy) Production.

Microbes as Biocontrol Agents.

Microbes as Biofertilizers.



**Unit 4: Plant Physiology :****Chapter 6 - Photosynthesis**

Autotrophic nutrition

Site of Photosynthesis

Photosynthetic Pigments and their role.

Light-Dependent Reactions (Cyclic and non-cyclic photophosphorylation)

Light-Independent Reactions (C3 and C4 Pathways)

Chemiosmotic hypothesis, Photorespiration, Factors affecting Photosynthesis.

Law of limiting factors.

**Chapter 7 - Respiration**

ATP as currency of Energy

Mechanism of Aerobic (Glycolysis, **TCA Cycle and Electron Transport System**) and Anaerobic Respiration. **Fermentation**

Exchange of gases

Amphibolic pathway. Respiratory quotient of Nutrients.

Significance of Respiration.

**Unit 5: Reproduction in Organisms :****Chapter 8 - Reproduction in Plants**

Modes of Reproduction (Asexual and Sexual).

Asexual reproduction; uniparental modes-vegetative propagation, micropropagation

Sexual Reproduction: **structure of flower**

Development of male gametophyte,

Structure of anatropous ovule.

Development of female Gametophyte.

Pollination: Types and Agencies.

Outbreeding devices; pollen-pistil interaction.

Double Fertilization: Process and Significance.

Post-fertilization changes (development of endosperm and embryo, development of seed and formation of fruit)

Special modes-apomixis, parthenocarpy, polyembryony. Significance of seed and fruit formation.

**Unit 6: Ecology and Environment****Chapter 9: Organisms and Environment -I : Habitat and Niche**

Ecosystems: Patterns, components, productivity and decomposition, energy flow; pyramids of number, biomass, energy; nutrient cycling (carbon and phosphorous).

Ecological succession, Ecological services-carbon fixation, pollination, oxygen release. Environmental issues: agrochemicals and their effects, solid waste management, Green house effect and global warming, ozone depletion, deforestation, case studies (any two).

**Std. - XII Biology****Section II - ZOOLOGY****Unit 1: Genetics and Evolution :****Chapter 10 - Origin and the Evolution of Life :**

Origin of Life: Early Earth, Spontaneous, assembly of organic compounds,

Evolution: Darwin's contribution, Modern Synthetic Theory of evolution, Biological Evidences, **Mechanism of evolution;**

**Gene flow and genetic drift;Hardy-Weinberg principle; Adaptive radiation.**

Origin and Evolution of Human being.

**Chapter 11 - Chromosomal Basis of Inheritance**

The Chromosomal Theory.

Chromosomes.

Linkage and Crossing Over.

Sex-linked Inheritance (Haemophilia and colour blindness).



Sex Determination in Human being, **birds, honey bee.** **Mendelian disorders in humans-Thalassemia. Chromosomal disorders in human: Down's syndrome, Turner's syndrome and Klinefelter's syndrome.**

**Unit 2: Biotechnology and its application:**  
**Chapter 12- Genetic Engineering and Genomics**

DNA Finger Printing.  
Genomics and Human Genome Project.  
Biotechnological Applications in Health:  
Human insulin and vaccine production,  
Gene Therapy. **Transgenic animals.**

**Unit 3: Biology and Human Welfare**

**Chapter 13- Human Health and Diseases**

Concepts of Immunology: Immunity Types, **Vaccines,**  
Structure of Antibody, Antigen-Antibody Complex, Antigens on blood cells.  
Pathogens and Parasites (Amoebiasis, Malaria, Filariasis, Ascariasis, Typhoid, Pneumonia, Common cold and ring worm).  
Adolescence, drug and alcohol abuse.  
Cancer and AIDS.

**Chapter 14- Animal Husbandry**

Management of Farms and Farm Animals.  
Dairy.  
Poultry.  
Animal Breeding.  
Bee-Keeping.  
Fisheries.  
Sericulture  
Lac culture

**Unit 4: Human Physiology :**

**Chapter 15- Circulation**

Blood composition and coagulation, **Blood groups.**  
Structure and pumping action of Heart.

Blood Vessels.

Pulmonary and Systemic Circulation.

Heart beat and Pulse. Rhythmicity of Heart beat. **Cardiac output, Regulation of cardiac activity.**

Blood related disorders: Hypertension, coronary artery disease, angina pectoris, and heart failure.

ECG, Lymphatic System (Brief idea):  
**Composition of lymph and its functions.**

**Chapter 16- Excretion and osmoregulation**

Modes of excretion-Ammonotelism, ureotelism, uricotelism.

Excretory System.

Composition and formation of urine.

Role of Kidney in Osmoregulation.

**Regulation of kidney function: renin-angiotensin, atrial natriuretic factor, ADH and Diabetes insipidus, role of other organs in excretion.**

Disorders; Kidney failure, Dialysis, Kidney stone (renal calculi). Transplantation.

**Uraemia, nephritis.**

**Chapter 17- Control and Co-ordination**

Nervous System

Structure and functions of brain and Spinal cord, brief idea about PNS and ANS.

Transmission of nerve impulse.

Reflex action.

Sensory receptors (eye and ear), **Sensory perception, general idea of other sense organs.**

Endocrine System

Endocrine glands

Hormones and their functions

**Mechanism of hormone action.**

Hormones as messengers and regulators.

Hormonal imbalance and diseases:



**Common disorders (Dwarfism, Acromegaly, cretinism, goiter, exophthalmic goiter, Diabetes mellitus, Addison's disease)**

### **Unit 5: Reproduction in Organisms :**

#### **Chapter 18- Human Reproduction**

Reproductive system in male and female.

Histology of testis and ovary.

Reproductive cycle.

Production of gametes, fertilization, implantation.

Embryo development up to three germinal layers.

Pregnancy, placenta, parturition and **lactation** (Elementary idea).

Reproductive health-birth control,

Contraception and sexually transmitted diseases. **MTP, Amniocentesis; Infertility and assisted reproductive technologies- IVF, ZIFT, GIFT (elementary idea for general awareness).**

### **Unit 6: Ecology and Environment :**

#### **Chapter 19-Organisms and**

#### **Environment-II :**

Population and ecological adaptations: population interactions-mutualism, competition, predation, parasitism, population attributes- growth, birth rate and death rate, age distribution.

Biodiversity and its conservation- Biodiversity- concept, patterns, importance, loss. Threats to and need for biodiversity conservation, Hotspots, endangered organisms, extinction, red data book, biosphere reserves, national parks and sanctuaries. Environmental issues: air pollution and its control, water pollution and its control and radioactive waste management. (Case studies any two)

### **Std. XII**

#### **(Upgraded) Biology Practicals**

#### **Experiments**

1. Dissect the given flower and display different whorls. Dissect anther and ovary to show number of chambers.
2. Study pollen germination on a slide.
3. Collect and study soil from at least two different sites and study them for texture, moisture content, pH and water holding capacity of soil. Correlate with the kinds of plants found in them.
4. Study of plant population density and **frequency** by quadrat method.
5. Prepare a temporary mount of onion root tip to study mitosis.
6. Separation of plant pigments by paper chromatography.
- 7 A) To study the rate of respiration in flower buds/leaf tissue and germinating seeds.  
B) Demonstration of anaerobic respiration.
8. Study the presence of suspended particulate matter in air at the two widely different Sites.
9. Collect water from two different water bodies around you and study them for pH, clarity and presence of any living organisms.
10. To test the presence of urea and sugar in urine.
11. To test the presence of albumin and bile salts in urine.

#### **Study/observation of the following (Spotting):**

- 1 Study of flowers adapted to pollination by different agencies (wind, insect)



2. Study of pollen germination on stigma through a permanent slide.
3. To Study Mendelian inheritance using seeds of different colour/size of any plant.
4. Exercise on controlled pollination - Emasculation, tagging and bagging.
5. Study meiosis in onion bud cell or grass hopper testis through permanent slides.
6. Study of plants found in xerophytic and aquatic conditions with respect to their morphological adaptations.(Two plants each)
7. Study and identify stages of gamete development, i.e. T.S. of testis and T.S. ovary through permanent slides (from any mammal).
8. Study of V.S. of blastula through permanent slide.
9. To study prepared pedigree charts of genetic traits such as rolling of tongue, Blood groups, widow's peak, colour blindness.
10. To identify common disease causing organisms like *Plasmodium*, *Entamoeba*, *Ascaris* and ring worm through permanent slides or specimens. Comment on symptoms of diseases that they cause.
11. Study of animals found in xeric (desert) and aquatic conditions with respect to their morphological adaptations. (Two animals each)

