

**Std. - XII Biology**  
**(Upgraded syllabus)**  
**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 Cricks 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)**

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