

5. Study of mitosis in onion root tips cells and animals cells (grasshopper) from permanent slides.
6. Study of different modifications in root, stem and leaves.
7. Study and identification of different types of inflorescence (cymose and racemose)
8. Study of imbibition in seeds/raisins.
9. Observation and comments on the experimental set up for showing:
  - a. Anaerobic respiration
  - b. Phototropism
  - c. Apical bud removal
  - d. Suction due to transpiration
10. Study of human skeleton and different types of joints.
11. Study of external morphology of cockroach through specimens/models.

## CLASS XII (THEORY)

(180 Periods)

### Syllabus - Biology (XII)

**One Paper**

**Time : 3 Hours**

**Max. Marks : 70 Marks**

Unit	Title	Marks
6.	Reproduction	14
7.	Genetics and Evolution	18
8.	Biology and Human Welfare	14
9.	Biotechnology and its Applications	10
10.	Ecology and Environment	14
<b>Total</b>		<b>70</b>

#### 1. **Reproduction**

Reproduction in organisms: reproduction, a characteristic feature of all organisms for continuation of species; asexual reproduction modes of reproduction - asexual and sexual reproduction; modes - binary fission, sporulation, budding, gemmule, fragmentation; vegetative propagation in plants.

Sexual reproduction in flowering plant: flower structure; development of male and female gametophytes; pollination - types, agencies and examples; outbreeding devices; pollen-pistil interaction; double fertilization; post fertilization events - development of endosperm and

embryo, development of seed and formation of fruit; special modes-apomixis, parthenocarpy, polyembryony; Significance of seed and fruit formation.

Human Reproduction: male and female reproductive systems; microscopic anatomy of testis and ovary; gametogenesis - spermatogenesis and oogenesis; menstrual cycle; fertilisation embryo development upto blastocyst formation, implantation; pregnancy and placenta formation (elementary idea); parturition (elementary idea); lactation (elementary idea).

Reproductive health: need for reproductive health and prevention of sexually transmitted diseases (STD); birth control – need and methods, contraception and medical termination of pregnancy (MTP); amniocentesis; infertility and assisted reproductive technologies – IVF, ZIFT, GIFT (elementary idea for general awareness).

## **II. Genetics and Evolution (45 Periods)**

Heredity and variation: Mendelian inheritance; deviations from Mendelism - incomplete dominance, co-dominance, multiple alleles and inheritance of blood groups, pleiotropy; elementary idea of polygenic inheritance; chromosome theory of inheritance; chromosomes and genes; Sex determination - in humans, birds and honey bee; linkage and crossing over; sex linked inheritance - haemophilia, colour blindness; Mendelian disorder in humans - thalassemia; chromosomal disorders in humans; Down's syndrome, Turner's and Klinefelter's syndromes.

Molecular basis of inheritance: search for genetic material and DNA as genetic material; Structure of DNA and RNA; DNA packaging; DNA replication; Central dogma; transcription, genetic code, translation; gene expression and regulation - Lac Operon; Genome and human genome project; DNA fingerprinting.

Evolution: origin of life; biological evolution and evidences for biological evolution (paleontology, comparative anatomy, embryology and molecular evidence); Darwin's contribution, modern synthetic theory of evolution; mechanism of evolution - variation (mutation and recombination) and natural selection with examples, types of natural selection; Gene flow and genetic drift; Hardy - Weinberg's principle; adaptive radiation; human evolution.

## **III. Biology and Human Welfare (35 Periods)**

Health and disease: pathogens; parasites causing human diseases (malaria, filariasis, ascariasis, typhoid, pneumonia, common cold, amoebiasis, ring worm); Basic concepts of immunology - vaccines; cancer, HIV and AIDs; Adolescence, drug and alcohol abuse.

Improvement in food production : Plant breeding, tissue culture, single cell protein, Biofortification, Apiculture and Animal husbandry.

Microbes in human welfare: In household food processing, industrial production, sewage treatment, energy generation and as biocontrol agents and biofertilizers.

## **IV. Biotechnology and Its Applications (30 Periods)**

Principles and process of biotechnology: genetic engineering (recombinant DNA technology). application of biotechnology in health and agriculture: human insulin and vaccine production, gene therapy; genetically modified organisms - Bt crops; transgenic animals; biosafety issues- biopiracy and patents.

## V. Ecology and Environment

35 Periods

Organisms and environment: habitat and niche, population and ecological adaptations; population interactions - mutualism, competition, predation, parasitism; population attributes - growth, birth rate and death rate, age distribution.

Ecosystems: patterns, components; productivity and decomposition; energy flow; pyramids of number, biomass, energy; nutrient cycles (carbon and phosphorous); ecological succession; ecological services - carbon fixation, pollination, oxygen release.

Biodiversity and its conservation: concept of biodiversity; patterns of biodiversity; importance of biodiversity; loss of biodiversity; 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; agrochemicals and their effects; solid waste management; radioactive waste management; greenhouse effect and global warming; ozone depletion; deforestation; any three case studies as success stories addressing environmental issues.

## Practicals

Maximum Marks : 30

60 Periods

### A. List of Experiments

1. Study pollen germination on a slide.
2. 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.
3. Collect water from two different water bodies around you and study them for pH, clarity and presence of any living organisms.
4. Study the presence of suspended particulate matter in air at two widely different sites.
5. Study of plant population density by quadrature method.
6. Study of plant population frequency by quadrature method.
7. Prepare a temporary mount of onion root tip to study mitosis.
8. Study the effect of different temperatures and three different pH on the activity of salivary amylase on starch.

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

1. Flowers adapted to pollination by different agencies (wind, insect).
2. Pollen germination on stigma through a permanent slide.
3. Identification of stages of gamete development i.e. T.S. testis and T.S. ovary through permanent slides (from any mammal).
4. Meiosis in onion bud cell or grasshopper testis through permanent slides.
5. T.S. of blastula through permanent slides.

6. Mendelian inheritance using seeds of different colour/sizes of any plant.
7. Study prepared pedigree charts of any one of the genetic traits such as rolling of tongue, blood groups, ear lobes, widow's peak and colour blindness.
8. Exercise on controlled pollination - emasculation, tagging and bagging.
9. Identification of common disease causing organisms like Ascaris, Entamoeba, Plasmodium, ringworm through permanent slides or specimens. Comment on symptoms of disease that they cause.
10. Two plants and two animals found in xeric conditions. Comment upon their morphological adaptations.
11. Plants and animals found in aquatic conditions. Comment upon their morphological adaptations.