

NCERT Class 12 Biology Syllabus

CLASS XII (THEORY)

(Total Periods = 180)

I. Reproduction

(Periods 35)

Reproduction in organisms: Reproduction, a characteristic feature of all organisms for continuation of species; Modes of reproduction – Asexual and sexual; Asexual reproduction; Modes- Binary fission, sporulation, budding, gemmule, fragmentation; vegetative propagation in plants.

Sexual reproduction in flowering plants: Flower structure; Development of male and female gametophytes; Pollination–types, agencies and examples; Outbreedings 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 dispersal and fruit formation.

Human Reproduction: Male and female reproductive systems; Microscopic anatomy of testis and ovary; Gametogenesis- spermatogenesis & 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

(Periods 45)

Heredity and variation: Mendelian Inheritance; Deviations from Mendelism– Incomplete dominance, Co-dominance, Complementary genes, 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, honey bee; Linkage and crossing over; Sex linked inheritance- Haemophilia, Colour blindness; Mendelian disorders in humans– Thalassaemia; 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 finger printing.

Evolution: Origin of life; Biological evolution and evidences for biological evolution (Paleontological, 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

(Periods 35)

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

(Periods 30)

Principles and process of Biotechnology: Genetic engineering (Recombinant DNA technology).

Application of Biotechnology in health, agriculture and industry: Human insulin and vaccine production, gene therapy; Genetically modified organisms- Bt cotton; Transgenic Animals; Biosafety issues– Biopiracy and patents.

V Ecology and environment

(Periods 35)

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 cycling (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

(Total Periods = 60)

List of Experiments

1. Study of the reproductive parts of different flowers
2. Study of flowers adapted to pollination by different agencies (wind, insect).
3. Study of per cent pollen germination on a slide.
4. Study pollen tube growth on the stigma.
5. Study fruits and seeds of any common fruit (e.g. legume) at different stages of development.
6. Study and identify stages of gamete development in t.s.testis and t.s. ovary
7. Study mitosis in onion root tips (preparation).

8. Study meiosis in onion bud cells and grasshopper testis (permanent slides).
9. Study of t.s. of blastula through permanent slide.
10. Study Mendelian inheritance using seeds of different colours/size of any plant.
11. Prepare pedigree charts for genetic traits such as rolling of tongue, blood groups, widows's peak, colourblindness.
12. Exercise on controlled pollination – emasculation, tagging and bagging.
13. Stain tissue section for nucleic acids (aceto carmine stain).
14. To identify common disease causing organism like Ascaris, Entamoeba, Plasmodium, ring worm. Comment on the symptoms of the diseases that they cause.
15. Collect and study soil from different sites and study them for texture and moisture content.
16. Study the pH and water holding capacity of soil. Correlate with the kinds of plants found in them.
17. Study plants and animals found in dry conditions. Comment upon on their adaptations/ecosystems.
18. Study plants and animals of aquatic conditions. Comment upon on their adaptations/ecosystems.
19. Collect water from different water bodies around you and study them for pH, clarity and presence of any living organisms.
20. Study the amount of suspended particulate matter in air at the two widely different sites.
21. Study of plant population density by quadrat method.
22. Study of plant population frequency by quadrat method.
23. Study analogous and homologous organs in various plants and animals.

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 grass hopper testis through permanent slides.
5. T.S. of blastula through permanent slides.
6. Mendelian inheritance using seeds of different colour/size of any plant.
7. Prepared pedigree charts of genetic traits such as rolling of tongue, blood groups, widow's peak, 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 diseases that they cause.
10. Two plants and two animals found in xerophytic conditions. Comment upon their morphological adaptations.
11. Plants and animals found in aquatic conditions. Comment upon their morphological adaptations.

Disclaimer:

Dropped Chapters - Chapter 1: Reproduction in organisms, Chapter 9: Strategies for Enhancement in Food Production and Chapter 16: Environmental Issues