



**Maharashtra State Board of  
Secondary & Higher Secondary School, Pune**

***Department of Biology***

**Subject: Biology (56)  
Std: XII  
Faculty: Science**

***Syllabus***

**XII Biology (Theory & Practical)**

**XII Syllabus**  
**Theory Index**

<b>Sr. No.</b>	<b>Unit/Topic</b>	<b>Weightage</b>	
		<b>Compulsory</b>	<b>With option</b>
<b>1.</b>	<b>Reproduction in lower and higher plants</b>	<b>6</b>	<b>8</b>
<b>2.</b>	<b>Reproduction in lower and higher animals</b>	<b>6</b>	<b>8</b>
<b>3.</b>	<b>Inheritance and variation</b>	<b>4</b>	<b>6</b>
<b>4.</b>	<b>Molecular basis of inheritance</b>	<b>4</b>	<b>6</b>
<b>5.</b>	<b>Origin and evolution of life</b>	<b>4</b>	<b>6</b>
<b>6.</b>	<b>Plant water relation</b>	<b>5</b>	<b>7</b>
<b>7.</b>	<b>Plant growth and mineral nutrition</b>	<b>5</b>	<b>7</b>
<b>8.</b>	<b>Respiration and Circulation</b>	<b>7</b>	<b>10</b>
<b>9.</b>	<b>Control and Co-ordination</b>	<b>8</b>	<b>11</b>
<b>10.</b>	<b>Human Health and diseases</b>	<b>3</b>	<b>4</b>
<b>11.</b>	<b>Enhancement of Food Production</b>	<b>4</b>	<b>6</b>
<b>12.</b>	<b>Biotechnology</b>	<b>5</b>	<b>7</b>
<b>13.</b>	<b>Organism and Population</b>	<b>3</b>	<b>4</b>
<b>14.</b>	<b>Ecosystem and Energy flow</b>	<b>3</b>	<b>4</b>

<b>15.</b>	<b>Biodiversity, Conservation and Environmental Issues</b>	<b>3</b>	<b>4</b>
	<b>Total</b>	<b>70</b>	<b>98</b>

### Syllabus

Sr. No.	Name of the Topic	Scope of Syllabus
1.	<b>Reproduction in lower and higher plants</b>	<ul style="list-style-type: none"> <li>• Asexual Reproduction</li> <li>• Sexual Reproduction</li> <li>• Microsporogenesis</li> <li>• Structure of Anatroous ovule</li> <li>• Megasporogenesis</li> <li>• Pollination</li> <li>• Outbreeding devices (contrivances)</li> <li>• Pollen: Pistil Interaction</li> <li>• Double Fertilization</li> <li>• Development of Endosperm</li> <li>• Development of Embryo</li> <li>• Seed and Fruit Development</li> <li>• Apomixis</li> <li>• Parthenocarpy</li> <li>• Polyembryony</li> </ul>
2.	<b>Reproduction in lower and higher animals</b>	<ul style="list-style-type: none"> <li>• Asexual Reproduction in animals</li> <li>• Sexual Reproduction in animals</li> <li>• Menstrual Cycle (Ovarian cycle)</li> <li>• Gametogenesis</li> <li>• Fertilization/Syngamy</li> <li>• Embryonic development</li> <li>• Pregnancy</li> <li>• Placenta</li> <li>• Parturition</li> <li>• Lactation</li> <li>• Reproductive Health</li> <li>• Birth Control</li> <li>• Sexually Transmitted Diseases (STDs)</li> </ul>

		<ul style="list-style-type: none"> <li>• Infertility</li> </ul>
3.	<b>Inheritance and variation</b>	<ul style="list-style-type: none"> <li>• Chromosomes and Mechanism of inheritance</li> <li>• Genetic Terminology</li> <li>• Mendel's Laws of Inheritance</li> <li>• Back Cross and Test Cross</li> <li>• Deviations from Mendel's findings</li> <li>• Chromosomal Theory of Inheritance</li> <li>• Chromosomes</li> <li>• Linkage and Crossing Over</li> <li>• Autosomal Inheritance</li> <li>• Sex Linked Inheritance</li> <li>• Sex Determination</li> <li>• Genetic Disorders</li> </ul>
4.	<b>Molecular basis of inheritance</b>	<ul style="list-style-type: none"> <li>• The discovery of DNA</li> <li>• The Genetic Material is DNA</li> <li>• DNA packaging</li> <li>• DNA Replication</li> <li>• Regulation of gene expression</li> <li>• Operon concept</li> <li>• Genomics</li> <li>• Human Genome Project</li> <li>• DNA Fingerprinting</li> </ul>
5.	<b>Origin and evolution of life</b>	<ul style="list-style-type: none"> <li>• Origin of life</li> <li>• Chemical Evolution of life( Self assembly theory of origin of life)</li> <li>• Origin Evolution</li> <li>• Darwinism</li> <li>• Mutation Theory</li> <li>• Modern Synthetic Theory of Evolution</li> <li>• Mechanism of organic evolution</li> <li>• Hardy-Weinberg's principle</li> </ul>

		<ul style="list-style-type: none"> <li>• Adaptive Radiation</li> <li>• Evidences of organic evolution</li> <li>• Speciation</li> <li>• Geological time scale</li> <li>• Human Evolution</li> </ul>
6.	<b>Plant water relation</b>	<ul style="list-style-type: none"> <li>• Properties of water</li> <li>• Water absorbing organ</li> <li>• Water available to roots for absorption</li> <li>• Absorption of water by roots from soil</li> <li>• Water potential</li> <li>• Plasmolysis</li> <li>• Path of water across the root( i.e from epiblema up to xylem in the stelar region)</li> <li>• Mechanism of absorption of water</li> <li>• Translocation o water</li> <li>• Transport of mineral ions</li> <li>• Transport of food</li> <li>• Transpiration</li> </ul>
7.	<b>Plant growth and mineral nutrition</b>	<ul style="list-style-type: none"> <li>• Plant growth</li> <li>• Phases of growth</li> <li>• Condition of growth</li> <li>• Growth Rate and types of growth</li> <li>• Growth curve</li> <li>• Differentiation, De-Differentiation, Re-Differentiation</li> <li>• Development</li> <li>• Plasticity</li> <li>• Growth Hormones</li> <li>• Photoperiodism</li> <li>• Vernalization (Yarovization)</li> <li>• Mineral Nutrition</li> <li>• Nitrogen cycle</li> </ul>

8.	<b>Respiration and Circulation</b>	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Organs of Respiratory Exchange</li> <li>• Human Respiratory System</li> <li>• Mechanism of respiration</li> <li>• Regulation of Breathing</li> <li>• Modified Respiratory Movements</li> <li>• Common disorders of respiratory system</li> <li>• Transportation in living organisms</li> <li>• Circulation in animals</li> <li>• Circulatory system in Human</li> <li>• Red blood corpuscles/Erythrocytes</li> <li>• White blood corpuscles/Leucocytes</li> <li>• Thrombocytes/ Platelets</li> <li>• Heart</li> <li>• Working Mechanism of human heart</li> <li>• Blood pressure (B.P)</li> <li>• Electrocardiogram</li> <li>• Lymphatic System</li> </ul>
9.	<b>Control and Co-ordination</b>	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Nervous Coordination</li> <li>• Nervous system in <i>Hydra</i></li> <li>• Nervous system in <i>Planaria</i>(flatworm)</li> <li>• Neural tissue</li> <li>• Synapse</li> <li>• Transmission of nerve impulse</li> <li>• Human Nervous System <ul style="list-style-type: none"> <li>1. Central Nervous System (CNS)</li> <li>2. Peripheral Nervous System (PNS)</li> <li>3. Autonomic Nervous System (ANS)</li> </ul> </li> <li>• Eye</li> <li>• Ear</li> <li>• Disorders of Nervous System</li> <li>• Endocrine system</li> <li>• Major endocrine glands <ul style="list-style-type: none"> <li>A. Hypothalamus</li> <li>B. Pituitary gland/hypophysis gland</li> <li>C. Pineal gland</li> <li>D. Thyroid gland</li> </ul> </li> </ul>

		<ul style="list-style-type: none"> <li>E. Parathyroid gland</li> <li>F. Thymus gland</li> <li>G. Adrenal gland/ Suprarenal gland</li> <li>H. Pancreas</li> <li>I. Gonads</li> <li>• Diffuse endocrine glands</li> </ul>
10.	<b>Human Health and diseases</b>	<b>Human Health and diseases</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Immunity</li> <li>• Structure of Antibody</li> <li>• Common Human Diseases <ul style="list-style-type: none"> <li>A. Malaria</li> <li>B. Amoebiasis</li> <li>C. Ascariasis</li> <li>D. Filariasis/ Elephantiasis</li> <li>E. Typhoid</li> <li>F. Pneumonia</li> <li>G. Common Cold</li> <li>H. Ring Worm (Dermatophytosis)</li> <li>I. Dengue</li> <li>J. Cancer</li> <li>K. AIDS</li> </ul> </li> <li>• Adolescence</li> <li>• Addiction</li> <li>• Drugs Abuse</li> </ul>
11.	<b>Enhancement of Food Production</b>	<ul style="list-style-type: none"> <li>• Improvement In Food Production</li> <li>• Plant breeding <ul style="list-style-type: none"> <li>A. Hybridization and its technique</li> <li>B. Mutation Breeding</li> </ul> </li> <li>• Tissue culture</li> <li>• Biofortification</li> <li>• Animal Husbandry <ul style="list-style-type: none"> <li>A. Animal breeding</li> <li>B. Dairy farm management</li> <li>C. Poultry farm management</li> <li>D. Apiculture or keeping</li> <li>E. Fishery</li> </ul> </li> </ul>

		<p>F. Sericulture G. Lac culture</p> <ul style="list-style-type: none"> <li>• Microbes in human welfare</li> <li>• Role of microbes in Industrial Production</li> <li>• Microbes in Sewage Treatment</li> <li>• Microbes in Energy Generation</li> <li>• Role of Microbes as Biocontrol Agents</li> <li>• Role of microbes as Biofertilizers</li> </ul>
12.	<b>Biotechnology</b>	<ul style="list-style-type: none"> <li>• Biotechnology</li> <li>• Principles and processes of Biotechnology</li> <li>• Tools and techniques for gene cloning/ rDNA technology <ul style="list-style-type: none"> <li>1. Different instruments(devices): Polymerase Chain Reaction (PCR)</li> <li>2. Biological tools: <ul style="list-style-type: none"> <li>a. Enzymes</li> <li>b. Cloning vectors</li> </ul> </li> </ul> </li> <li>• Methodology for rDNA technology</li> <li>• Applications of Biotechnology</li> <li>• Effects of Biotechnology on the Environment</li> <li>• Effects of Biotechnology on Human Health</li> <li>• Biopatent and Biopiracy</li> </ul>
13.	<b>Organism and Population</b>	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Organisms and the environment around</li> <li>• Major Abiotic Factors</li> <li>• Adaptation</li> <li>• Population Interactions</li> <li>• Mutualism</li> <li>• Competition</li> <li>• Parasitism</li> <li>• Predation</li> <li>• Commensalism</li> </ul>



14.	<b>Ecosystem and Energy flow</b>	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Ecosystem</li> <li>• Energy Flow</li> <li>• Ecological Pyramids</li> <li>• Nutrient Cycles</li> <li>• Ecological Succession</li> <li>• Ecosystem Services</li> </ul>
15.	<b>Biodiversity, Conservation and Environmental Issues</b>	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Levels of Biodiversity</li> <li>• Patterns of Biodiversity</li> <li>• Biodiversity Current Scenario</li> <li>• Loss of Biodiversity</li> <li>• Conservation of Biodiversity</li> <li>• Biological diversity Act 2002</li> <li>• Environment issues</li> <li>• Greenhouse effect and Global warming</li> <li>• Ozone depletion</li> <li>• Deforestation</li> </ul> <p>Mission Harit Maharashtra</p>

## Practical Index

Sr. No.	Practical's Name
<b>A. List of experiments to be performed</b>	
1.	Study of osmosis by potato osmoscope
2.	Study of plasmolysis in epidermal peels
3.	Study of structure and distribution of stomata on upper and lower surfaces of leaf
4.	Study of pollen germination on slide
5.	Study of soil samples at least from two different localities/sites with respect to their texture and Ph and correlate plants found thereof
6.	Study of suspended particulate matter in air at the two widely different sites, in your area.
7.	Study of water samples collected from different water bodies for their Ph, clarity and presence of living organisms (microscopic/ planktonic).
8.	Study of population density and frequency of different plant populations, by quadrant method.
9.	Isolation of DNA from given sample.
10.	Dissect and display floral whorls. Dissect anther and take T.S or V.S of ovary to show pollen grains and locules of ovary, respectively.
11.	To study wing shape and eye colour in <i>Drosophila</i>
12.	To examine the presence or absence of Barr body in the given sample.
13.	Detection of commonly used adulterants in milk.
14.	To detect the presence of starch, added as an adulterants to the milk.
15.	To study various syndromes and their karyotypes in human beings
<b>B. Demonstrative experiments (Spotting)</b>	
1.	Comparative study of rates of transpiration in the upper and lower surfaces of leaf, using four-leaf experiment.
2.	Separation of plant pigments by paper chromatography.
3.	Study of imbibition by using dried seeds/raisins.
4.	Study of flowers adapted to pollination by different pollinating agencies (Wind and Insects).
5.	Study of V.S of anatropous ovule through a permanent slide/ relevant slides.
6.	Study of T.S of testis, T.S of ovary and V.S of blastula, through permanent slides.
7.	Study of meiosis in onion flower bud with the help of permanent slides.
8.	Study of plants found in xerophytic and aquatic conditions/habitats. And comment on their adaptations.
9.	Demonstration of hybridization technique.
10.	To study the prepared pedigree charts of genetic traits such as rolling of tongue, widow's peak, blood groups and colour blindness.
11.	Study of morphological adaptations of animals, found in xeric and aquatic conditions or habitats.
12.	To identify common diseases causing organisms like, <i>Plasmodium</i> ,

	<i>Entamoeba</i> , <i>Ascaris</i> and Ringworm with the help of permanent slides and or specimens. Comment on symptoms of diseases that they cause.
13.	Study of structure or parts of human eye, ear and brain with the help of models or charts.
14.	Observe the prepared slides of blood smear to identify different types of blood cells.