

**BIOLOGY**  
**THEORY**  
**COURSE STRUCTURE**  
**CLASS : XI**

**One Paper****Time : 3 Hours****70 Marks**

Unit	Topics	Marks
I	Diversity of Living Organisms	07
II	Structural Organisation in Plants and Animals	12
III	Cell: Structure and Function	15
IV.	Plant Physiology	18
V.	Human Physiology	18
<b>Total =</b>		<b>70</b>

**Unit I : Diversity of Living Organisms :****(25 Periods)**

- **Diversity of living organisms**
  - What is living ?
  - Concept of biodiversity .
- **Classification of living organisms**
  - Need for classification.
  - Three domains of life.
  - Five kingdoms of life and basis of five kingdom classification.
  - Lichens.
  - Virus and Viroids.
- **Systematics and binomial nomenclature**
  - Taxonomy & Systematics.
  - Concept of species and taxonomic hierarchy .
  - Binomial nomenclature.
  - Salient features and classification of Monera, Protocista (Protista) and Fungi into major groups.
  - Salient features and classification of plants into major groups – Algae, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms. Three to five salient and distinguishing features of each category and at least two examples of each.
  - Angiosperms – classification upto class, characteristic features and examples.
  - Salient features and classification of animals – Major non chordate phyla and chordate classes. Three to five salient features and at least two examples.
  - Tools for study of biodiversity – Museums, Zoos, Herbaria, botanical gardens.

**Unit II : Structural Organisation in Animals and Plants : (25 Periods)**

- Tissues in animals and plants.
- Morphology including modifications, microscopic anatomy and functions of different parts of flowering plants : Root, Stem, leaf, inflorescence, flower, fruit and seed. (To be dealt with along with the relevant practicals of the Practical Syllabus)
- Morphology, anatomy and functions of different systems (digestive, circulatory, respiratory, nervous and reproductive) of an insect (cockroach). (Brief account only)

**Unit III : Cell Structure and Function : (40 Periods)**

- Cell and its three major parts – cell membrane, cytoplasm, nucleus.
- Cell theory and cell as the basic unit of life.
- Structure of a prokaryotic and eukaryotic cell.
- Plant cell and animal cell. (Brief)
- Cell envelope, cell membrane, cell wall.
- Cell organelles – Structure and function : Mitochondria, golgi/bodies, endoplasmic reticulum, ribosomes, lysosomes, vacuoles, plastids, microbodies.
- Cytoskeleton, cilia, flagella, centrioles (ultrastructure and function).
- Nucleus – nuclear membrane, chromatin, nucleolus.
- Chemical constituents of living cells.
- Biomolecules – Structure and function of proteins, carbohydrates, fats, nucleic acids.
- Enzymes – types, properties, enzyme action.
- Cell division – Cell cycle, significance of, and differences between mitosis and meiosis.

**Unit IV : Plant Physiology (45 Periods)**

- **Movement of water, food, nutrients and gases**
  - Absorption of water, gases and nutrients.
- **Cell to cell transport**
  - Diffusion, facilitated diffusion, active transport.
- **Plant - water relations**
  - Imbibition, water potential, osmosis, plasmolysis.
- **Long distance transport**
  - Apoplast, symplast, root pressure, transpiration pull.

- **Transpiration and Guttation**
  - Opening and closing of stomata.
  - Role of  $k^+$  ions.
- **Uptake of mineral ions and their translocation**
  - Transport through xylem and phloem.
- **Plants and mineral nutrition**
  - Essential minerals, macro and micronutrients and their role.
  - Deficiency symptoms.
  - Mineral toxicity.
  - Elementary idea of Hydroponics as a Method to study mineral nutrition.
  - Nitrogen metabolism – Nitrogen cycle, biological nitrogen fixation.
- **Plant Respiration**
  - Exchange of gases.
  - Cellular respiration – glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic).
  - Energy relations – Number of ATP molecules generated.
  - Amphibiotic pathways.
  - Respiratory quotient of nutrients.
- **Photosynthesis**
  - Autotrophic nutrition.
  - Site of photosynthesis.
  - Photosynthesis pigments (Elementary idea).
  - Photochemical and biosynthetic phases of photosynthesis.
  - Cyclic and non cyclic photophosphorylation.
  - Chemiosmotic hypothesis.
  - Photorespiration.
  - $C_3$  and  $C_4$  pathways.
  - Factors affecting photosynthesis.
  - Law of limiting factors.
- **Plant growth and development**
  - Phases of plant growth and plant growth rate.
  - Conditions of growth.
  - Differentiation, dedifferentiation and redifferentiation.
  - Sequence of developmental process in a plant cell.
  - Growth regulators – auxin, gibberellin, cytokinin, ethylene, ABA.
  - Photomorphogenesis including brief account of phytochromes. (Elementary Idea)
  - Seed germination.
  - Seed dormancy.
  - Vernalisation.
  - Photoperiodism.

**Unit V : Human Physiology : (45 Periods)****• Digestion and Absorption**

- Human alimentary canal and Digestive glands.
- Role of digestive enzymes and gastrointestinal hormones.
- Peristalsis.
- Digestion, absorption and assimilation of proteins, carbohydrates and fats.
- Calorific value of proteins, carbohydrates and fats.
- Egestion.
- Nutritional and digestive disorders - P E M, indigestion, constipation, Vomiting, jaundice.

**• Breathing and Respiration**

- Respiratory organs in animals. (Recall only)
- Respiratory system in humans.
- Mechanism of Breathing and its regulation in humans.
- Exchange of gases, transport of gases and regulation of respiration in humans.
- Respiratory volumes.
- Disorders related to respiration
- Asthma, Emphysema, Occupational Respiratory disorders.

**• Body fluids and Circulation**

- Composition of blood, Blood groups, Coagulation of blood.
- Composition of Lymph and its function.
- Human circulatory system.
- Structure of human heart and blood vessels.
- Cardiac cycle, Cardiac output, ECG.
- Double circulation.
- Regulation of cardiac activity.
- Disorders of circulatory system - Hypertension, Coronary artery disease, Angina pectoris, heart failure.

**• Excretory products and their elimination**

- Modes of excretion - Ammonotelism, ureotelism, uricotelism.
- Human excretory system - structure and function.
- Urine formation, Osmoregulation.
- Regulation of kidney function, Renin-angiotensin, Antinatriuretic factor, A D H and Diabetes insipidus.
- Role of other organs in excretion.
- Disorders - Uraemia, Renal failure, Renal calculi, Nephritis.
- Dialysis and artificial kidney.

**• Locomotion and movement**

- Types of movement - ciliary, flagellar, muscular.
- Skeletal muscle - contractile proteins and muscle contraction.

- Skeletal system and its functions. (To be dealt with the relevant practical of Practical Syllabus).
- Joints.
- Disorders of muscular and skeletal system.
- Myasthenia gravis, Tetany, Muscular dystrophy, Arthritis, Osteoporosis Gut.

**• Neural control and co-ordination**

- Neuron and nerves.
- Nervous system in humans.
- Central Nervous system, Peripheral Nervous system and Visceral Nervous system.
- Generation and conduction of nerve impulse.
- Reflex action.
- Sense organs.
- Sensory Perception.
- Elementary structure and function of eye and ear and general idea of other sense organs.

**• Chemical coordination and regulation**

- Endocrine glands and hormones.
- Human endocrine system - Hypothalamus, Pituitary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads.
- Mechanism of hormone action (Elementary Idea).
- Role of hormones as messengers and regulators.
- Hypo and hyperactivity and related disorders.  
(Common disorders e.g. Dwarfism, Acromegaly, Cretinism, goiter, exophthalmic goiter, diabetes, Addison's disease).

**IMP :** Diseases related to all the human physiology systems to be taught in brief.

**BIOLOGY**  
(PRACTICAL)  
CLASS-XI

Time : 3 Hours

Marks : 30

Periods : 60

1	Experiments and spotting	<b>20 Marks</b>
2	Record of one investigatory Project and V iva based on the Project.	<b>5 Marks</b>
3	Class-record and V iva based on the experiments.	<b>5 Marks</b>
<b>Total =</b>		<b>30 Marks</b>

**A. List of Experiments.**

1. Study and describe three locally available common flowering plants from each of the following families (Solanaceae, Fabaceae and Liliaceae) including dissection and display of floral whorls and anther and ovary to show number of chambers. Types of root (Tap and Adventitious); Stem (Herbaceous and woody); Leaf (arrangement, shape, venation, simple and compound).
2. Preparation and study of T.S. of dicot and monocot roots and stems (primary).
3. Study of osmosis by Potato osmometer.
4. Study of Plasmolysis in epidermal peels (e.g. Rhoeo leaves).
5. Study of distribution of stomata in the upper and lower surface of leaves.
6. Comparative study of the rates of transpiration in the upper and lower surface of leaves.
7. Tests for the presence of sugar, starch, proteins and fats. To detect them in suitable plant and animal materials.
8. Separation of plant pigments through paper chromatography.
9. To study the rate of respiration in flower buds/leaf tissues and germinating seeds.
10. To test the presence of urea in urine.
11. To detect the presence of sugar in urine/blood sample.
12. To detect the presence of albumin in urine.
13. To detect the presence of bile salts in urine.

**B. Study/observation of the following (spotting)**

1. Study parts of a compound microscope.
2. Study of the specimens and identification with reasons – Bacteria, Oscillatoria, Spirogyra, Rhizopus, Mushroom, Yeast, Liverwort, Moss, Fern, pines, one monocotyledonous plant and one dicotyledonous plant and one lichen.
3. Study of specimens and identification with reasons – Amoeba, Hydra, Liverfluke, Ascaris, leech, earthworm, prawn, silkworm, honeybee, snail, starfish, shark, Rhu, frog, lizard, pigeon and rabbit.
4. Study of tissues, and diversity in shapes and sizes of plant and animal cells (e.g. palisade cells, guard cells, parenchyma, collenyma, sclerenchyma, Xylem, Phloem, Squamous epithelium, muscle fibres and mammalian blood smear) through temporary/permanent slides.
5. Study of mitosis in onion root tip cells and animal cells (grasshopper) from permanent slides.
6. Study of different modifications in root, stem and leaves.
7. Study and identification of different types of inflorescences.
8. Study of imbibitions in seeds/raisin.
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. To study human skeleton and different types of joints.
11. Study of external morphology of earth worm, cockroach and frog through models.

**PRESCRIBED TEXTBOOKS : CLASS XI**

- 1 Elementary Biology Vd.I  
By : K.N. Bhatia and M.P.Tyagi  
Published by : Trueman Book Company, Jalandhar – 144 008.
- 2 Biology Text Book for Class XI  
Published by : NCERT, New Delhi
- 3 Frank Senior Secondary Biology Practicals for Class XI (New Edition)  
By Y.P. Purang & Vinay Kumar  
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- 4 Modern's abc of Biology for Class XI  
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Published by : Modern Publishers, Jalandhar City.

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**DESIGN  
QUESTION PAPER/UNIT TEST**

**Subject : BIOLOGY**  
**Unit/Paper : Theory**  
**Class : XI**  
**Time : 3 Hours**  
**Full Marks : 70**

<b>I.</b>	<b>WEIGHTAGE TO OBJECTIVES :</b>						
	Objectives	<b>K</b>	<b>U</b>	<b>A</b>	<b>S</b>	<b>Total</b>	
	Percentage of Marks	35	45	15	05	100	
	Marks	25	31	10	04	70	
<b>II.</b>	<b>WEIGHTAGE TO FORM OF QUESTIONS :</b>						
	Forms of Questions	<b>E</b>	<b>SA-I</b>	<b>SA-II</b>	<b>VSA</b>	<b>O</b>	<b>Total</b>
	No. of Questions	03	07	10	10	04	34
	Marks Allotted	15	21	20	10	04	70
	Estimated Time (in Minutes)	60	42	40	30	08	180
<b>III.</b>	<b>WEIGHTAGE TO CONTENT :</b>						
	<b>Units/Topics</b>					<b>Marks</b>	
	I	Diversity of living Organisms				07	
	II	Structural Organisation in Plants and Animals				12	
	III	Cell : Structure and Function				15	
	IV	Plant Physiology				18	
	V	Human Physiology				18	
<b>Total</b>					<b>70</b>		
<b>IV.</b>	<b>SCHEME OF SECTIONS : Nil</b>						
<b>V.</b>	<b>SCHEME OF OPTIONS: Nil</b>						
<b>VI.</b>	<b>DIFFICULTY LEVEL :</b>						
	<b>Difficult : 15% marks</b>						
	<b>Average : 50% marks</b>						
<b>Easy : 35% marks</b>							

**Abbreviation :** K (Knowledge), U (Understanding), A (Application), S (Skill), E (Essay Type), SA (Short Answer Type), VSA (Very Short Answer Type), O (Objective Type)

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**DESIGN  
QUESTION PAPER/UNIT TEST**

**Subject : BIOLOGY  
Unit/Paper : Practical  
Class : XI  
Time : 3 Hours  
Full Marks : 30**

**MARKING SCHEME :**

**SECTION - A (Any one) 4 marks**

**Q. 1**

**(a) Item 1 :** Description of a flowering plant.

⊕	Dissect and Display	-	1
⊖	Diagram and labelling	-	2
⊗	Comments on Floral Characters	-	1
			<b>Total = 4</b>

**(b) Item 2 and 5 :** Preparation of Slide of Transverse Section of dicot and monocot roots and stems (primary) and observation of distribution Stomata

⊕	Preparation of slide	-	1
⊖	Diagram and labelling	-	2
⊗	Comments - 2 points	-	1
			<b>Total = 4</b>

**SECTION - B (Any two) 4+4 = 8 marks**

**Q.2**

**(a) Item 3,4,6 & 9 :** Plant Physiology experiments : Potato Osmometer, Plasmolysis, Transpiration and Respiration.

⊕	Experimentation/Setting of experiment	-	1
⊖	Observations	-	1
⊗	Inference and Result	-	1
⊘	Precautions	-	1
			<b>Total = 4</b>

**(b) Items 7 & 8 :** Tests for presence of Sugar, Starch, Proteins and Fats in suitable plant materials, paper chromatography of plant pigments.

⊕	Experimentation/Setting of experiment	-	1
⊖	Observations	-	1
⊗	Inference and result	-	1
⊘	Precautions	-	1
			<b>Total = 4</b>

**(c) Item 7,10,11,12&13 :** Test for presence of sugar, starch, proteins and fats in animal materials, urine test for urea, presence of sugar in urine/blood, presence of albumin and bile salts in urine.

⊕	Experimentation	-	1
⊖	Observations	-	1
⊗	Inference and Result	-	1
⊘	Precautions	-	1
			<b>Total = 4</b>

**SECTION - C (Spotting) 4+4 = 8 marks**

**Q.3 Item 1-11 :** (Two spots each from plants and animals)

⊕	Identification	-	1
⊖	Comments - 2 points	-	1
			<b>Total = 2</b>

**SECTION - D 5 marks**

**Q.4 Investigatory Project :**

⊕	Aim and object	-	1
⊖	Materials and Methods	-	1
⊗	Summary of the project	-	1
⊘	Viva Voce on record	-	2
			<b>Total = 5</b>

**Q.5 Laboratory Record 5 Marks**

⊕	Completeness of practical work	-	1
⊖	Regularity in submitting record	-	1
⊗	Neatness and accuracy of record	-	1
⊘	Viva Voce on record	-	2
			<b>Total = 5</b>

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**BIOLOGY**  
**THEORY**  
**COURSE STRUCTURE**  
**CLASS-XII**

**One Paper****Time : 3 Hours****70 Marks**

Unit	Title	Marks
I	Reproduction in Organisms	14
II	Genetics and Evolution	18
III	Biology and Human welfare	14
IV	Biotechnology and its applications	10
V	Ecology and environment	14
<b>Total =</b>		<b>70</b>

**Unit I : REPRODUCTION****(35 Periods)**

- **Reproduction in Organisms**

- Reproduction, a characteristic feature of all organisms for continuation of species.
- Modes of reproduction – Asexual and sexual.

- **Asexual reproduction**

- Uniparental.
- Modes – binary fission, sporulation, budding, gemmule, fragmentation, regeneration.
- Vegetative propagation in plants.
- Micropropagation.

- **Sexual reproduction in flowering plants**

- 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 & embryo.
- Development of seed and formation of fruit.
- Seed development.
- Fruit formation.
- 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 & 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 & Medical Termination of Pregnancy (MTP)
- Amniocentesis.
- Infertility and assisted reproductive technologies – IVF, ZIFT, GIFT (Elementary idea for general awareness).

**Unit 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.
- Chromosomes 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.**

- Chromosomal disorders in humans.
- Down 's syndrome, Turner 's and Klinefelter 's syndromes.

- **Search for genetic materials and DNA as genetic material.**

- Structure of DNA and RNA
- DNA packaging.
- DNA replication.
- Central dogma.
- Transcription, genetic code, translation.
- Gene expression and regulation.

- **Genome and human genome project.**
- **DNA finger printing.**
- **Evolution**
- **Origin of life**
- **Biological evolution and evidences for biological evolution (Paleontological, from comparative anatomy and embryology and molecular evidence)**
  - Darwin's contribution, Modern Synthetic theory of Evolution.
  - Hardy – Weinberg's principle.
- **Mechanism of evolution - Variation (Mutation & Recombination) and Natural Selection with examples, types of natural selection.**
  - Gene flow and genetic drift.
  - Adaptive Radiation.
- **Human evolution.**

**Unit III : BIOLOGY AND HUMAN WELFARE****(35 Periods)**

- **Health and Disease**
  - Basic concepts of immunology – vaccines.
  - Pathogens, parasites causing human disease (Malaria, Filariasis, Ascariasis, Typhoid, Pneumonia, common cold, amoebiasis, ring worm).
  - Cancer, HIV and AIDS.
  - Adolescence, drug and alcohol abuse.
- **Insects and human welfare**
  - Silk, Honey, Lac.
- **Improvement in food production**
  - Plant breeding, tissue culture, single cell protein.
  - Biofortification, Animal husbandary.
- **Microbes in human welfare**
  - in household food processing, industrial production, sewage treatment, energy generation and as biocontrol agents and biofertilizers.

**Unit 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.
  - Biosafety Issues.
  - Biopiracy and patents.

**Unit V : ECOLOGY AND ENVIRONMENT****(35 Periods)**

- **Meaning of ecology, environment, habitat and niche**
  - Organisms and environment
- **Population and ecological adaptations**
  - Population Interactions – mutualism, competition, predation, parasitism.
  - Population attributes – growth, birth rate and death rate, age distribution.
- **Ecosystems**
- **Patterns, components, energy flow, nutrient cycling (carbon and phosphorous), decomposition and productivity.**
  - Pyramids of number, biomass, energy.
  - Ecological succession.
  - Ecological Services : Carbon fixation, Pollination, Oxygen release
- **Biodiversity and its conservation**
  - Threats to, and need for biodiversity conservation
  - Hotspots, endangered organisms, extinction, Red Data Book.
  - Biodiversity conservation – 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.

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**BIOLOGY****PRACTICAL  
CLASS-XII****Time : 3 Hours****Marks : 30****Periods : 60**

1	Experiments and spotting	20 Marks
2	Record of one investigatory project and V iva based on the project	5 Marks
3	Class record and V iva based on experiment.	5 Marks
<b>Total =</b>		<b>30 Marks</b>

**List of Experiments**

1. Study of pollen germination on a slide.
2. Collect and study soil from at least two different sites and study them for texture, moisture contents, 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 the two widely different sites.
5. Study of plant population density by quadrat method.
6. Study of plant population frequency by quadrat method.
7. Prepare a temporary mount of onion root tip to study mitosis.
8. To study the effect of the 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, insects).
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 slide. (from any mammal)
4. Meiosis in onion bud cell or grasshopper testis through permanent slide.
5. T.S. of blastula through permanent slide.
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 organism 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.

**PRESCRIBED TEXTBOOKS : CLASS XII**

1. Elementary Biology Vol. II  
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6. Practical Manual in Biology for Class XII  
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**DESIGN  
QUESTION PAPER/UNIT TEST**

**Subject : BIOLOGY**  
**Unit/Paper : Theory**  
**Class : XII**  
**Time : 3 Hours**  
**Full Marks : 70**

<b>I.</b>	<b>WEIGHTAGE TO OBJECTIVES :</b>						
	Objectives	<b>K</b>	<b>U</b>	<b>A</b>	<b>S</b>	<b>Total</b>	
	Percentage of Marks	35	45	15	05	100	
	Marks	25	31	10	04	70	
<b>II.</b>	<b>WEIGHTAGE TO FORM OF QUESTIONS :</b>						
	Forms of Questions	<b>E</b>	<b>SA-I</b>	<b>SA-II</b>	<b>VSA</b>	<b>O</b>	<b>Total</b>
	No. of Questions	03	07	10	10	04	34
	Marks Allotted	15	21	20	10	04	70
	Estimated Time (in Minutes)	60	42	40	30	08	180
<b>III.</b>	<b>WEIGHTAGE TO CONTENT :</b>						
	<b>Units/Topics</b>						<b>Marks</b>
	1.	Sexual Reproduction					14
	2.	Genetics and Evolution					18
	3.	Biology and Human Welfare					14
	4.	Biotechnology and its application					10
	5.	Ecology and Environment					14
<b>Total</b>						<b>70</b>	
<b>IV.</b>	<b>SCHEME OF SECTIONS : Nil</b>						
<b>V.</b>	<b>SCHEME OF OPTIONS : Nil</b>						
<b>VI.</b>	<b>DIFFICULTY LEVEL :</b>						
	<b>Difficult : 15% marks</b>						
	<b>Average : 50% marks</b>						
	<b>Easy : 35% marks</b>						

**Abbreviation :** K (Knowledge), U (Understanding), A (Application), S (Skill), E (Essay Type), SA (Short Answer Type), VSA (Very Short Answer Type), O (Objective Type)

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**DESIGN  
QUESTION PAPER/UNIT TEST**

**Subject : BIOLOGY**  
**Unit/Paper : Practical**  
**Class : XII**  
**Time : 3 Hours**  
**Full Marks : 30**

**MARKING SCHEME :**

**Section - A (Any two)**

**4 Marks**

**Q.1**

**(a) Item 1 :** Pollen germination.

Ⓐ	Slide Preparation	–	1
Ⓑ	Observations	–	1
Ⓒ	Diagram and labelling	–	1
Ⓓ	Comments	–	1
<b>Total =</b>			<b>4</b>

**(b) Item 7:** Preparation of temporary slide of mitosis in Onion root tip cells.

Ⓐ	Preparation of slide	–	2
Ⓑ	Labelled diagram	–	1
Ⓒ	Description	–	1
<b>Total =</b>			<b>4</b>

**Section - B (Any two)**

**4+4 = 8 Marks**

**Q.2**

**(a) Item 2,3 & 4:** Soil test, P<sup>H</sup> and water holding capacity, P<sup>H</sup> clarity and presence of any living organisms and presence of suspended particulate matter in air.

(i)	Experimentation/Setting of experiment	–	1
Ⓐ	Observations	–	1
Ⓑ	Inference and Result	–	2
<b>Total =</b>			<b>4</b>

**(b) Item 5 & 6 : Quadrant Method :** Plant population density and plant population frequency

Ⓐ	Setting of Field experiment	–	1
Ⓑ	Identification of Species	–	1
Ⓒ	Data and Comments	–	1+1
<b>Total =</b>			<b>4</b>

**(c) Item 8 :** Effect of different temperatures on the activity of Salivary amylase on starch.

Effect of three different P<sup>H</sup> on the activity of Salivary amylase on starch

(i)	Experimentation/Setting of experiment	–	1
(ii)	Observations	–	1
(iii)	Inference and Result	–	2
		<b>Total =</b>	<b>4</b>

**Section - C (Two spots each from plants and animals)      2x4=8 Marks**

**Q.3**

**Item 1-11: Spotting**

(i)	Identification	–	1
(ii)	Comment	–	1
		<b>Total =</b>	<b>2</b>

**Section - D**

**Q. 4      Investigatory Project      5 Marks**

(i)	Aim and object	–	1
(ii)	Materials and Methods	–	1
(iii)	Summary of the project	–	1
(iv)	V i a Voce on record	–	2
		<b>Total =</b>	<b>5</b>

**Q. 5      Laboratory Record Book      5 Marks**

(i)	Completeness of practical work	–	1
(ii)	Regularity in Submitting record	–	1
(iii)	Neatness and accuracy of record	–	1
(iv)	V i a Voce on record	–	2
		<b>Total =</b>	<b>5</b>

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