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
	Total =	**70**

Unit-I: Diversity of Living Organisms **25 Periods**

Chapter-1: The Living World

What is living? Biodiversity; Need for classification; three domains of life; taxonomy and systematics; concept of species and taxonomical hierarchy; binomial nomenclature; tools for study of taxonomy-museums, zoological parks, herbaria, botanical gardens.

Chapter-2: Biological Classification

History of biological classification; Five kingdom classification; Salient features and classification of Monera, Protista and Fungi into major groups; Viruses, Viroids, Prions and Lichens.

Chapter-3: Plant Kingdom

Salient features and classification of plants into major groups - Algae, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms; Angiosperms - classification upto class, characteristic features and examples; Plant life cycles and Alternation of generations.

Chapter-4: Animal Kingdom

Basis of classification; Salient features and classification of animals: non-chordates upto phyla level and chordates upto class level.

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

Chapter-5: Morphology of Flowering Plants

Morphology and modifications of root, stem and leaf; Morphology of inflorescence, flower and seed; semi technical description of a typical flowering plant; description of Fabaceae, Solanaceae and Liliaceae.

Chapter-6: Anatomy of Flowering Plants

Tissues and tissue system; anatomy of dicotyledonous and monocotyledonous plants; secondary growth.

Chapter-7: Structural Organisation in Animals

Animal tissues; organ and organ systems; morphology and anatomy of earthworm, cockroach and frog.

Unit-III: Cell- Structure and Function **40 Periods**

Chapter-8: Cell-The Unit of Life

What is a cell? Cell theory; an overview of a cell; structure and function of prokaryotic and eukaryotic cells.

Chapter-9: Biomolecules

Analysis of chemical composition; Primary and Secondary Metabolites; Structure and function of Biomacromolecules: Proteins, Polysaccharides, Lipids and Nucleic acids.
Metabolism: Concept; metabolic basis for living; the living state.
Enzymes: Properties; mechanism of enzyme action; factors affecting enzyme activity; classification and nomenclature; co-factors

Chapter-10: Cell Cycle and Cell Division

Cell cycle, mitosis, meiosis and their significance.

Unit-IV: Plant Physiology **45 Periods**

Chapter-11: Transport in Plants

Means of different types of transport; Plant water relations: water potential, osmosis, plasmolysis, imbibition; long distance transport of water: types and mechanism of absorption of water; mechanism of movement of water up a plant; Transpiration and guttation; mechanism of uptake and transport of mineral nutrients and food.

Chapter-12: 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- symbiotic and non-symbiotic.

Chapter-13: Photosynthesis in Higher Plants

Photosynthesis as a mean of autotrophic nutrition; site of photosynthesis, pigments involved in photosynthesis (elementary idea); photochemical and biosynthetic phases of photosynthesis; cyclic and non cyclic photophosphorylation; chemiosmotic hypothesis; photorespiration; C3 and C4pathways; factors affecting photosynthesis.

Chapter-14: Respiration in Plants

Exchange of gases; cellular respiration - glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); energy relations - number of ATP molecules generated;amphibolic pathways; respiratory quotient.

Chapter-15: Plant - Growth and Development

Growth: characteristic; phases of plant growth; growth rate; conditions of growth; differentiation, dedifferentiation and redifferentiation; sequence of developmental processes in a plant cell; growth regulators - auxin, gibberellin, cytokinins, ethylene, ABA; seed dormancy;vernalisation; photoperiodism.

Unit-V: Human Physiology 45 Periods

Chapter-16: Digestion and Absorption

Alimentary canal and digestive glands, role of digestive enzymes and gastrointestinal hormones;Peristalsis, digestion, absorption and assimilation of proteins, carbohydrates and fats; calorific values of proteins, carbohydrates and fats; egestion; nutritional and digestive disorders - PEM,indigestion, constipation, vomiting, jaundice, diarrhoea.

Chapter-17: Breathing and Exchange of Gases

Respiratory organs in animals; Respiratory system in humans; mechanism of breathing and its regulation in humans - exchange of gases, transport of gases and regulation of respiration,respiratory volume; disorders related to respiration - asthma, emphysema, occupational respiratorydisorders.

Chapter-18: Body Fluids and Circulation

Composition of blood, blood groups- ABO and Rh, 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.

Chapter-19: 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,atrial natriuretic factor, ADH and diabetes insipidus; role of other organs in excretion; disorders -uremia, renal failure, renal calculi, nephritis; dialysis and artificial kidney.

Chapter-20: Locomotion and Movement

Types of movement - ciliary, flagellar, muscular; skeletal muscle- contractile proteins and muscle contraction; skeletal system and its functions; joints; disorders of muscular and skeletal system -myasthenia gravis, tetany, muscular dystrophy, arthritis, osteoporosis, gout.

Chapter-21: Neural Control and Coordination

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; sensory perception; sense organs; elementary structure and functions of eye and ear.

Chapter-22: Chemical Coordination and Integration

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; dwarfism,acromegaly, cretinism, goiter, exophthalmic goiter, diabetes, Addison's disease.

BIOLOGY

(PRACTICAL)

CLASS-XI

Time : 3 Hours **Marks : 30** **Periods : 60**

1.	Experiments and spotting	**20 Marks**
2.	Record of one investigatory Project and Viva based on the Project.	**5 Marks**
3.	Class-record and Viva based on the experiments.	**5 Marks**
	Total =	**30 Marks**

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 traspiration 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, Rohu, 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, Sqamous 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 earthworm, cockroach and frog through models.

PRESCRIBED TEXTBOOKS : CLASS XI

1. Biology Text Book for Class XI
Published by : The Council of Higher Secondary Education, Manipur with copy right from the NCERT, New Delhi.

REFERENCE BOOKS :

1. A Textbook of Biology Book-I
by : R.C. Rajkhowa
Published by: Macmillan Publishers India Pvt. Ltd.

2. Elementary Biology Vol. I
By : K.N. Bhatia and M.P. Tyagi
Published by : Trueman Book Company, Jalandhar - 144 008.

3. Frank Senior Secondary Biology Practicals for Class XI (New Edition)
By Y.P. Purang & Vinay Kumar
Published by : Frank Bros & Co., (Publishers) Ltd., New Delhi - 110 002

4. Comprehensive Laboratory Manual in Biology for Class XI
By : Dr. J.P. Sharma
Published by : Laxmi Publications (P) Ltd., New Delhi - 110 002.

5. Biology Practical for Classes XI and XII
By : O. Binodkumar Singh
Published by : Students' Emporium

6. Practical Manual in Biology Class XI
By : Cinny Malhotra
Published by Dinesh & Co., Jalandhar - 144 008.

7. Modern Biology Vol. I
By : Veer Bala Rastogi & B. Kishore
Published by : Pitambar Publishing Company, New Delhi.

8. A Text Book of Biology for Class XI
By : P.S. Dhami and H.N. Shrivastava & G. Chopra
Published by : Pradeep Publications, Jalandhar - 144 008.

9. Companion Biology for Class XI
By : K. Bhatti.
Published by : S. Dinesh & Co. Jalandhar - 144 008.

10. Modern's abc of Biology for Class XI
By : Dr. B.B. Arora and Ashok Sabharwal
Published by : Modern Publishers, Jalandhar City.

11. A Textbook of Biology Practical Class XI
By: N. Mohendra Singh
Published by: Writers' Book Store,
Paona Bazar, Polo Ground Maning, Imphal.

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DESIGN OF QUESTION PAPER

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

I

WEIGHTAGE TO OBJECTIVES

Objectives	Marks	Percentage
Knowledge(K)	14	20
Understanding(U)	28	40
Application(A)	21	30
Skill(S)	07	10
Total :	70	100

II

WEIGHTAGE TO FORM OF QUESTIONS:

Form of Questions	No. of question	Time (in minute)	Marks	Percentage
Essay/Long Answer(E/LA)	3	60	15	21
Short Answer(SA-I)	7	56	21	30
Short Answer(SA-II)	10	40	20	29
Very Short Answer(VSA)	10	20	10	14
MCQ	4	4	4	6
Total:	**34**	**180 m**	**70**	**100**

III

WEIGHTAGE TO CONTENT:

Unit	CONTENTS	Marks	Percentage
I	Diversity of Living Organisms	07	10
II	Structural Organisation in Plants and Animal	12	17
III	Cell : Structure and Function	15	21
IV	Plant Physiology	18	26
V	Human Physiology	18	26
	Total :	**70**	**100**

IV **SCHEME OF SECTIONS : NIL**

V **SCHEME OF OPTIONS** : NIL

VI

DIFFICULTY LEVEL:

Difficulty:	20%
Average	50%
Easy:	30%

Abbreviation : K(Knowledge), U(Understanding), A(Application), S(Skill), E(Essay Type), SA (Short Answer Type), VSA (Very Short Answer Type), O(Objective Type), MCQ (Multiple Choice Question).

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DESIGN OF QUESTION PAPER

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.

(i)	Dissect and Display	–	1
(ii)	Diagram and labelling	–	2
(iii)	Comments on Floral Characters	–	1
		Total =	**4**

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

(i)	Preparation of slide	–	1
(ii)	Diagram and labelling	–	2
(iii)	Comments - 2 points	–	1
		Total =	**4**

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.

(i)	Experimentation/Setting of experiment	–	1
(ii)	Observations	–	1
(iii)	Inference and Result	–	1
(iv)	Precautions	–	1
		Total =	**4**

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

(i)	Experimentation/Setting of experiment	–	1
(ii)	Observations	–	1
(iii)	Inference and result	–	1
(iv)	Precautions	–	1
		Total =	**4**

(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.

(i)	Experimentation	–	1
(ii)	Observations	–	1
(iii)	Inference and Result	–	1
(iv)	Precautions	–	1
		Total =	**4**

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

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

(i)	Identification	–	1
(ii)	Comments - 2 points	–	1
		Total =	**2**

SECTION - D **5 marks**

Q.4 Investigatory Project :

(i)	Aim and object	–	1
(ii)	Materials and Methods	–	1
(iii)	Summary of the project	–	1
(iv)	Viva Voce on record	–	2
		Total =	**5**

Q.5 Laboratory Record **5 Marks**

(i)	Completeness of practical work	–	1
(ii)	Regularity in submitting record	–	1
(iii)	Neatness and accuracy of record	–	1
(iv)	Viva Voce on record	–	2
		Total =	**5**

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BIOLOGY

THEORY
COURSE STRUCTURE
CLASS-XII

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

Unit	Title	Marks
VI.	Reproduction in Organisms	14
VII.	Genetics and Evolution	18
VIII.	Biology and Human welfare	14
IX.	Biotechnology	10
X.	Ecology	14
	Total =	**70**

UNIT VI:Reproduction **(35 periods)**

Chapter 1: Reproduction in Organisms
Reproduction, a characteristic feature of all organisms for continuation of species. Modes of reproduction-Asexual and sexual.

Chapter 2: Sexual Reproduction in flowering Plants
Flower; Pre-fertilisation: Structures and Events; Pollination-types, agencies and examples; Outbreeding devices; Pollen-pistil interaction; Double fertilization; Post fertilisation: structures and Events; Development of endosperm & embryo; Development of seed and formation of seed; Fruit formation; Parthenocarpy, apomixis and polyembryony.

Chapter 3: Human Reproduction
Male andfemale Reproductive systems; Gametogenesis-spermatogenesis & oogenesis; Menstrual cycle; Fertilization and Implantation; Pregnancy and Embryonic development; Parturition and Lactation.

Chapter 4: Reproductive Health
Reproductive Health – problems and strategies; Population Explosion and Birth control; Medical termination of Pregnancy; Sexually Transmitted Diseases; Infertility and Assisted reproductive technologies- assisted reproductive technologies - IVF, ZIFT, GIFT (elementary idea for general awareness).

UNIT VII: Genetics and Evolution (45 Periods)

Chapter 5: Principles of Inheritance and Variation

Mendel's Laws of Inheritance; Deviations from Mendelism: Incomplete dominance, Co-dominance, Multiple allelism; Chromosomal theory of Inheritance; Linkage and Recombination; Polygenic Inheritance; Pleiotropy; Sex Determination- in birds, humans and honey bee; Mutation; Pedigree analysis; Genetic Disorders: Mendelian disorders –Colour blindness,Haemophilia,sickle-cell anaemia, phenylketonuria, Thalassemia; Chromosomal Disorders – Down's syndrome, klinefelter's syndrome, Turner's syndrome.

Chapter 6: Molecular Basis of Inheritance

Structure of DNA and RNA; Packaging of DNA; The search for genetic material; RNA world; DNA Replication; Transcription; Genetic code; Translation; Regulation of Gene Expression; Human genome Project; DNA fingerprinting.

Chapter 7: Evolution

Origin of Life; Evolution of Life Forms; Evidences for Evolution; Adaptive radiation; Biological Evolution; Mechanism of Evolution; Hardy- Weinberg Principle; A brief account of evolution; Origin and Evolution of Man.

UNIT VIII: Biology and Human Welfare (35 Periods)

Chapter 8: Human Health and Disease

Common Diseases in Humans (typhoid, pneumonia, commoncold, malaria, amoebiasis, ascariasis, filariasis, ring worm);
Immunity (Innate, Acquired, Active and passive Immunity, Vaccination and Immunisation, Allergy, Auto Immunity); Immune System in the body;
AIDS, Cancer, Drugs and Alcohol Abuse.

Chapter 9: Strategies for Enhancement in food Production

Animal Husbandry; Animal Breeding; Bee Keeping; Fisheries; Plant Breeding; Single Cell Protein; Tissue culture.

Chapter 10: Microbes in Human welfare

Microbes in Household Products, Industrial Products,Sewage Treatment, and Production of biogas;
Microbes as Biocontrol agents and Biofertilisers.

UNIT IX: BIOTECHNOLOGY (30 Periods)

Chapter 11: Biotechnology: Principles and Processes

Principles of Biotechnology; Tools of Recombinant DNA Technology; Process of Recombinant DNA Technology.

Chapter 12: Biotechnology and Its Application

Biotechnological Applications in agriculture (GMO and Bt cotton) and medicine (genetically engineered insulin, gene therapy, molecular diagnosis);
Transgenic animals; Ethical Issues.

UNIT X: ECOLOGY (35 periods)

Chapter 13: Organisms and Populations

Organisms and its environment:abiotic factors, response to abiotic factors,Adaptations.
Populations: Population Attributes; Population Growth,Life history variation; Population Interactions- Predation, Competition, Parasitism, Commenselism and Mutualism.

Chapter 14: Ecosystem

Structure and Function; Productivity; Decomposition; Energy Flow; Ecological Pyramids; Ecological Succession; Nutrient Cycling; Ecosystem Services.

Chapter 15: Biodiversity and Conservation

Biodiversity: Patterns of Biodiversity; Importance of Species diversity to the Ecosystem; Loss of Biodiversity;
Biodiversity Conservation.

Chapter 16:Environmental Issues

Air Pollution and Its Control; Water Pollution and Its Control; Solid Wastes; Agro – chemicals and their Effects; Radioactive Wastes; Greenhouse effects and Global Warming; Ozone depletion.
Degradation by Improper Resource utilization and maintenance.
Deforestation, Case Study of People's Participation in Conservation of forests.

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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 Viva based on the project	5 Marks
3.	Class record and Viva based on experiment.	5 Marks
	Total =	**30 Marks**

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 pediqree 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. Biology (Text Book for Class XII)
Published by : The Council of Higher Secondary Education, Manipur with copy right from the NCERT, New Delhi.

REFERENCE BOOKS :

1. A Textbook of Biology Book-II
by : R.C. Rajkhowa
Published by: Macmillan Publishers India Pvt. Ltd.
2. Elementary Biology Vol. II
By : K.N. Bhatia and M.P. Tyagi
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Paona Bazar, Polo Ground Maning, Imphal.

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DESIGN OF QUESTION PAPER

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

I — WEIGHTAGE TO OBJECTIVES

Objectives	Marks	Percentage
Knowledge(K)	14	20
Understanding(U)	28	40
Application(A)	21	30
Skill(S)	07	10
Total :	**70**	**100**

II — WEIGHTAGE TO FORM OF QUESTIONS:

Form of Questions	No. of question	Time (in minute)	Marks	Percentage
Essay/Long Answer(E/LA)	3	60	15	21
Short Answer(SA-I)	7	56	21	30
Short Answer(SA-II)	10	40	20	29
Very Short Answer(VSA)	10	20	10	14
MCQ	4	4	4	6
Total:	34	180 m	70	100

III — WEIGHTAGE TO CONTENT:

Unit	CONTENTS	Marks	Percentage
I	Reproduction in Organisms	14	20
II	Genetics and Evolution	18	26
III	Biology and Human Welfare	14	20
IV	Biotechnology	10	14
V	Ecology	14	20
	Total :	**70**	**100**

IV — SCHEME OF SECTIONS : NIL

V — SCHEME OF OPTIONS : NIL

VI — DIFFICULTY LEVEL:

Difficulty:	20%
Average	50%
Easy:	30%

Abbreviation : K(Knowledge), U(Understanding), A(Application), S(Skill), E(Essay Type), SA (Short Answer Type), VSA (Very Short Answer Type), O(Objective Type), MCQ (Multiple Choice Question).

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DESIGN OF QUESTION PAPER

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.

(i)	Slide Preparation	–	1
(ii)	Observations	–	1
(iii)	Diagram and labelling	–	1
(iv)	Comments	–	1
		Total =	**4**

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

(i)	Preparation of slide	–	2
(ii)	Labelled diagram	–	1
(iii)	Description	–	1
		Total =	**4**

Section - B (Any two) **4+4 = 8 Marks**

Q.2

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

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

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

(i)	Setting of Field experiment	–	1
(ii)	Identification of Species	–	1
(iii)	Data and Comments	–	1+1
		Total =	**4**

(c) Item 8 : Effect of different temperatures on the activity of Salivary amylase on starch.
Effect of three different P^H on the activity of Salivary amylase on starch

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

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

Q.3

Item 1-11: Spotting

(i)	Identification	–	1
(ii)	Comment	–	1
		Total =	**2**

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)	Viva Voce on record	–	2
		Total =	**5**

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)	Viva Voce on record	–	2
		Total =	**5**

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