BIOLOGICAL SCIENCE (BIOS)

CLASS – XI

Full Marks - 100

THEORY - 70 Marks

Unit-1	DIVERSITY OF LIVING ORGANISMS	07 marks
Unit-2	STRUCTURAL ORGANIZATION OF PLANTS	12 marks
Unit-3	CELL: STRUCTURE & FUNCTION	15 marks
Unit-4	PLANT PHYSIOLOGY	18 marks
Unit-5	HUMAN PHYSIOLOGY	18 marks

UNIT – I DIVERSITY OF LIVING ORGANISMS

1. Science of life

	Periods
1.1 Science of Life – Introduction	1
1.2 Characteristics of life	1
1.3 Definition and concept of biodiversity	
Total -	2

2. Taxonomy and Systematic

2.1 Taxonomy and Systematics – Definition	1
2.2 Taxonomic hierarchy-(Linnaeus) with Example	1
2.3 Bionomical nomenclature	1
Total -	3

3. Classification of Living Organisms

3.1	What is classification (Definition)	1
3.2	Need for classification	
3.3	Five kingdoms of life and the basis of classification of five kingdoms.	1
3.4	Salient features and classification of Monera, Protoctista (Protista), Fungi and Lichens into major groups.	1
3.5	Virus and viriods – a brief General account.	1
3.6	Salient features and classification of plant into major group – Algae, Bryophytes Pteridophytes, Gymnosperms and Angiosperms (three to five salient and distinguishing features of each category and at least two examples of each category	2
3.7	Angiosperm – classification upto class, characteristic features (three to five) and examples.	1
3.8	Salient features and classification of Animals – major non chordata upto phyla And chordatas upto class level (three to five Salient features and at least two examples)	5
3.9	Tools for study of biodiversity – Museums, Zoos, Botanical Garden & Herberia.	1
	Total -	**13**

Unit – II STRUCTURAL ORGANISATION IN PLANTS AND ANIMALS

4. Structural Organisation in Plants

4.1	Tissues (Definition)	1
4.2	Tissues in plants – Meristematic and Permanent (Structure and function)	1
4.3	Morphology of Root, Stem and leaf (including modifications, microscopic	3

Anatomy and functions)(To be dealt along with relevant practicals)

4.4 Inflorescenes (Major types – Racemose And Cymose) 1

4.5 Morphology of flower (including aestivation And placentation), fruit and seed (one Monocot-Maize and one Dicot-Gram) 2

Total- 8

5. Structural Organisation in Animals

5.1 Tissues in animals (structure, occurrence and function in brief). 3

5.2 Morphology, anatomy and functions of different systems (digestive, circulatory respiratory, nervous and reproductive) of an insect-cockroach.(brief account) 3

Total- 6

Unit-III CELL STRUCTURE AND FUNCTION

6. Cell

6.1 Cell theory and cell as the basic unit of life 1

6.2 Cell and its major parts - cell membranes and protoplasm (cytoplasm and nucleus) 1

6.3 Structure of a prokaryotic and eukaryotic cell (in brief). 1

6.4 Structure of plant cell and animal cell (in brief). 1

6.5 Cell envelop - cell membrane and cell wall (ultrastructure and function) 2

6.6 Cell organelles-Ultrastructure and function; Mitochondria, golgi bodies, endoplasmic reticulum, ribosomes, lysomes,vacuoles, plastids, micro bodies (peroxisomes, spherosomes and glyoxysomes). 3

6.7	Ultra structure and function of cytoskeleton, Cilia, flagella and centrioles.	2
6.8	Nucleus- nuclear membrane,nucleoplasm, Chromatin,nucleolus(ultrastructure and function)	2
	Total-	**13**

7. Chemical constituents of living cell

7.1	Chemical constituents of living cell	1
7.2	Biomolecules-structure and function of protein, carbohydrate, lipid and nucleic acid.	3
7.3	Enzyme-types,properties and enzyme action (lock and key, induced fit model and allosterism)	1
	Total-	**5**

8. Cell Division

8.1	Introduction	
8.2	Definition and types	1
8.3	Cell cycle	
8.4	Mitosis- Definition and significance (process not required)	1
8.5	Meiosis- Definition,types,process and Significance	2
8.6	Difference between mitosis and meiosis	1
	Total-	**5**

Unit- IV PLANT PHYSIOLOGY

9. Movement of Water, Food, Nutrition And Gases

9.1	Introduction Absorption of water,gases and nutrients.	1
9.2	Cell to cell transport- diffusion,facilitated diffusion,active transport	1

9.3	Plant-water relation- imbibitions,water potential,osmosis and plasmolysis.	1
9.4	Long distance transport-apoplast,symplast, root pressure transpiration pull, Uptake of mineral ions	1
9.5	Transpiration and guttation, opening and closing of stomata	1
9.6	Translocation- transport through xylem and phloem, Mass flow hypothesis	1
	Total-	**7**

10. Plant Nutrition And Minerals

10.1	Introduction	
10.2	Essential minerals-macro and micro nutrients, their roles and deficiency symptoms (in tabular form)	1
10.3	Mineral toxicity	1
10.4	Elementary idea of the Hydroponics	1
10.5	Nitrogen metabolism-nitrogen cycle, biological nitrogen fixation.	1
	Total-	**4**

11. Respiration

11.1	Introduction	
11.2	Exchange of gases	1
11.3	Cellulare respiration-glycolysis, fermentation (anaerobic), T.C.A cycle and E.T.S (aerobic) Definition, process and significance	3
11.4	Energy relations-number of A.T.P molecules generated in respiration.	1
11.5	Amphibolic pathways	
11.6	Respiratory quotient of nutrients	1
	Total-	**6**

12. Photosynthesis

12.1 Introduction-Autotrophic nutrition: photo and chemo-autotrophic, nutritions.	1
12.2 Definition and the site of Photosynthesis.	
12.3 Photosynthetic pigments (elementary idea-structure not required)	1
12.4 Photochemical and biosynthetic phases of photosynthesis.	1
12.5 Cyclic and non cyclic photophosphorylation.	1
12.6 Chemo osmotic hypothesis	1
12.7 Photo respiration	1
12.8 C_3 and C_4 pathways	1
12.9 Factors Controlling photosynthesis	1
Total-	**8**

13. Plant Growth And Development

13.1 Introduction	
13.2 Phases of plant growth and plant growth rate	1
13.3 Condition of growth.....(light, temperature, water,hormone,nutrients only)	1
13.4 Differentiation, De-differentiation, and Re-differentiation-definition and example only.	1
13.5 Sequence of developmental process in a plant cell through chart.	1
13.6 Growth regulations-auxin, gibberellins cytokinin, ethylene, A.B.A	1
13.7 Seed germination	1
13.8 Seed dormancy	1
13.9 Vernalisation	
13.10Photoperiodism-definition, types of plants on the basis of the length of the photoperiod.	1
Total-	**8**

Unit- V HUMAN PHYSIOLOGY

14. Digestion and Absorption

14.1	Introduction	
14.2	Structure (in brief) of human Alimentary canal including dental arrangement and digestive glands.	2
14.3	Role of the digestive enzymes and the G -1 Hormone in digestion.	1
14.4	Peristalsis	
14.5	Digestion, absorption and assimilation of protein, carbohydrate and fat	4
14.6	[Caloric value of proteins, carbohydrates and fats.] Box item-not to be evaluated.	
14.7	Egestion	1
14.8	Nutritional and digestive disorders- PEM (protein energy malnutrition,) indigestion, constipation vomiting, jaundice, diarrhoea.	1
	Total-	**9**

15. Breathing and Respiration

15.1	Introduction	
15.2	Respiratory organs in animals (through chart, recall only)	1
15.3	Respiratory system in human (outline)	1
15.4	Mechanism of breathing and its regulation in human.	1
15.5	Exchange of gases, transport of gases and regulation of respiration.	2
15.6	Repertory volumes	1
15.7	Disorders related to respiration Asthma, emphysema, occupational respiratory disorders- (e.g. Silicosis, Asbestosis)	1
	Total-	**7**

16. Body Fluids And Circulation

16.1	Introduction	1
16.2	Composition of Blood (Tabular form)	
16.3	Blood groups, ABO Blood groups	1
16.4	Coagulation of blood	1
16.5	Composition of lymph and its function	1
16.6	Human circulatory system-(outline idea)	1
16.7	Structure of Human heart and blood vessels.	1
16.8	Cardiac cycle	2
16.9	Cardiac output (stroke volume and minute volume, determination of cardiac output- Fick's Principle)	2
16.10	E.C.G (brief idea, no analysis required)	1
16.11	Double circulation	2
16.12	Regulation of cardiac activity (neutral and hormonal) including factors regulating Blood Pressure	
16.13	Disorders of the circulatory system hypertension, corornary artery disese, angina pectoris, heart failure.	1
	Total-	**14**

17. Excretory Products And their Elimination

17.1	Introduction	1
17.2	Modes of excretion- Ammonotelism Ureotelism, Uricotelism (Definition and Examples)	
17.3	Human excretory system- structure and function (Histology of nephron)	2
17.4	Urine formation and Osmo- regulation	1
17.5	Regulation of Kidney function, Renin, angiotensin, Antidiuretic factor A.D.H and diabetes insipidus	1

17.6	Role of other organs in excretion- Liver, skin , lung and salivary gland.	1
17.7	Disorders- Uraemia, renal failure, Renal calculi, Nephritis.	1
17.8	Dialysis and artificial kidney	1
	Total-	8

18. Locomotion and Movement

18.1	Introduction- What is locomotion and movement?	1
18.2	Types of movement ciliary Flagellar and muscular.	2
18.3	Skeletal muscle-contractile proteins and muscle contraction.	1
18.4	Skeletal system and its function. (To be dealt with relevant portion of practical syllabus)	1
18.5	Joints	1
18.6	Disorders of muscular and skeletal system- Myasthenia gravis, tetany, Muscular dystrophy, arthritis osteoporosis and gout.	1
	Total-	6

19. Neural control and coordination

19.1	Introduction- what is neural control and co-ordination	1
19.2	Neurones and nerves (Revisionary)	1
19.3	Nervous system in human	1
19.4	Central Nervous System, Peripheral Nervous System (P.N.S), and visceral Nervous System. Brain and its major parts- cerebral cortex, thalamus, hypothalamus and lymbic system, mid brain, pons, medulla, cerebellum and Spinal	3

	cord (function only), Mode of distribution and function of P.N.S and autonomic nervous system.	1
19.5	Generation and Conduction of nerve impulse.	1
19.6	Reflex action and Reflex Arc	3
19.7	Sense Organs- sensory perception outline structure and function of eye and ear.	
	Total-	**10**

20. Chemical Coordination And Regulation

20.1	Introduction- endocrine glands and hormones.	1
20.2	Human endocrine system- Hypothalamus, Pituitary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas,Gonads (location and function only)	2
20.3	Mechanism of hormone action (elementary idea)	1
20.4	Role of hormones as messengers and regulators.	1
20.5	Hypo and Hyper activity of endocrine glands and related Disorders (common disorders e.g., Dwarfism Acromegaly Cretinism,Goiter, Exopthalmic goiter, Diabetes, Addisons disease. (Important diseases related to physiology of all Systems of human are to be taught briefly.)	1
	Total-	**6**

A. Weightage to form of questions

Sl.no	Type of Question	Marks for each question	No. of question	Total Marks
1	Very Short Answer (VSA)	1	8	8
2	Short Answer- II (SA II)	2	10	20
3	Short Answer- I (SA-I)	3	9	27
4	Long Answer (LA)	5	3	15
	Total		**30**	**70**

Sl.no	UNIT	VSA (1 Marks)	SA I (2 Marks)	SA II (3 Marks)	LA (5 Marks)	Total
1	Diversity of Living Organisms	2 (2)	2 (1)	3 (1)	-	7 (4)
2	Structural Organisation in Plants and Animals	1 (1)	2 (1)	9 (3)	-	12 (5)
3	Cell: Structure and Function	2 (2)	10 (5)	3 (1)	-	15 (8)
4	Plant Physiology	-	2 (1)	6 (2)	10 (2)	18 (6)
5	Human Physiology	1 (1)	4 (2)	3 (1)	10 (2)	18 (6)
	Total	**6 (6)**	**20 (10)**	**24 (8)**	**20 (4)**	**70 (30)**

BIOLOGICAL SCIENCE (BIOS)

CLASS – XI

(PRACTICAL)

Time: 3 Hrs **30 Marks / 60 period**

1.	Experiments (one experiments out of 4) and spotting (one spotting out of 3)	10 + 10marks
2.	Record of one investigatory project and viva based on the project	5 marks
3.	3. Class record and viva based on experiments	5 marks
		30 marks

I. List of Experiments

1. Study and describe three locally available common flowering plants from each of the following families (solanacease, fabaceae and liliaceae) including dissection and display of floral whorls, 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 plasmolysis 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 tissue 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.

II. 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, pine, one monocotyledonous plant, one dicotyledonous plant and one lichen.
3. Study of specimens and identification with reasons – Amoeba, Hydra, Liver fluke, Ascaris, leech, earthworm, prawn, silkworm, honeybee, snail, starfish, shark, rohu, frog, lizard, pigeon and rabit.
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 fibers 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 inflorescence.
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 earthworm, cockroach and frog through models.

BIOLOGICAL SCIENCE (BIOS)

CLASS – XII

Full Marks - 100

THEORY - 70 Marks

Unit-1	REPRODUCTION IN ORGANISMS	14 marks
Unit-2	GENETICS AND EVOLUTION	18 marks
Unit-3	BIOLOGY AND HUMAN WELFARE	14 marks
Unit-4	BIOTECHNOLOGY AND ITS APPLICATIONS	10 marks
Unit-5	ECOLOGY AND ENVIRONMENT	14 marks

Unit I REPRODUCTION IN ORGANISMS

1. Reproduction in Organisms

1.1 Introduction: Reproduction a characteristic features of all organism froms, continuation of species. — 1

1.2 Modes of reproduction: Asexual and sexual

1.3 Asexual reproduction: definition, characteristics — 1

1.4 Modes of asexual reproduction: General discussion of the following types in brief with common examples & diagram of each type: — 2

a) Binary fission
b) Sporulation
c) Budding

d) Gemmule
e) Fragmentation
f) Regeneration

1.5	Vegetative propagation in plants:	
	a) Natural: (general discussion in brief, Mention common example and give figures)	1
	b) Artificial: (brief description of method, example and diagram)- cutting grafting layering and gootee.	1
	Total-	**6**

2. Sexual Reproduction In flowering Plants

2.1	Flower structure: Typical structure of a complete regular flower with diagram.	1
2.2	Pollination: Definition, types-Self pollination (autogamy and geitonogamy) and cross pollination. (allogamy and xenogamy); agents of pollination- wind, water, animals, insects and birds- brief description with example, significance.	2
2.3	Development of male gametophyte	1
2.4	Development of female gametophyte	1
2.5	Outbreeding devices	1
2.6	Pollen- pistil interaction	
2.7	Double fertization	1
2.8	Post fertilisation events - development of endosperm and embryo (details not required).	
2.9	Formation of fruit and development of seed (elementary)	1
2.10	Special modes - apomixes, parthenogenesis, Parthenocarpy and Polyembryony (brief account)	1
2.11	Significance of seed and fruit formation	1
	Total:	**10**

3. Human Reproduction

3.1	Introduction	1
3.2	Male Reproductive system (outline with diagram)	
3.3	Female Reproductive system (outline with diagram)	1
3.4	Microscopic anatomy of testis and ovary	2
3.5	Gametogenesis- Definition and type	
3.6	Spermatogenesis (brief account)	1
3.7	Oogenesis (brief account)	1
3.8	Menstrual cycle	1
3.9	Fertilization and development of embryo upto blastocyst formation and implantation.	1
3.10	Pregnancy and Placenta formation (elementary idea)	1
3.11	Parturition (elementary idea)	1
3.12	Lactation (elementary idea)	
	Total-	**10**

4. Reproductive Health

4.1	Introduction: what is reproductive health?	1
4.2	Need for reproductive health	
4.3	Sexually Transmitted diseases (STD) And its prevention	1
4.4	Birth control- Needs and Methods: i) Contraception ii) Medial termination of pregnancy (MTP)	1
4.5	Amniocentesis: What it is and it's Significance	1
4.6	Infertility and assisted reproductive Technologies - IVF (in vitro fertilization), ZIFT (Zygote intrafallopian transfer), GIFT (Gamete intrafallopian transfer), Elementary idea for general awareness.	1
	Total-	**5**

Unit- II GENETICS AND EVOLUTION

5. Heredity and Variation

5.1	Introduction	1
5.2	Mendelian Inheritance (laws only)	
5.3	Deviations from Mendelism	2
	i) Incomplete dominance	
	ii) Co-dominance	
	iii) Multiple alleles and Inheritance of Blood groups (ABO & Rh)	
	iv) Pleiotroph	
5.4	Polygenic inheritance (elementary)	1
5.5	Chromosome theory of inheritance	1
5.6	Chromosomes and genes	1
5.7	Sex determination in - human, bird and honey bee	1
5.8	Linkage and crossing over	1
5.9	Sex- linked inheritance - Haemophilia and colour blindness	1
5.10	Mendelian disorder in human: Chromosomal disorders:	2
	i) Autosomal - thalassemia	
	ii) Sex-linked - Down's Syndrome, Turner's Syndrome and Klinefelter's Syndrome (cause & symptoms only, process of inheritance is not required)	
	Total:	**11**

6. Molecular Basis of Inheritance

6.1	Search for genetic material	1
6.2	DNA as genetic material: (experiments on Bacterial	2

	transformation by F. Griffith; Avery, McLeod and Harshey & Chase)	
6.3	Structure of DNA	1
6.4	Structure of RNA	1
6.5	Types of RNA - mRNA; rRNA & tRNA	1
6.6	DNA Packaging	1
6.7	Central dogma (elementary), DNA replication, transcription, genetic code and translation.	4
6.8	Regulation of Gene expression (elementary) Lac Operon	1
6.9	Genome and Human genome project	1
6.10	DNA finger printing	1
	Total-	**14**

7. Evolution

7.1	Introduction	1
7.2	Origin of life - Origin of earth- theories on the origin of life on earth:	2
	i) Special creation	
	ii) Spontaneous generation	
	iii) Extra-terrestrial or cosmic origin (all with brief statement)	
	iv) Abiogenic origin or chemical origin of life - Oparin-Haldane Hypothesis supported by Miller's experiment, conclusion	
7.3	Biological Evolution	
	a) What is biological Evolution?	1
	b) Evidence for Biological Evolution	4
	i) Paleonotological	
	ii) From comparative anatomy	
	iii) Embryological	
	iv) Molecular	

7.4	Theories of organic evolution	
	Introduction - Drawin's contribution-	1
	Modern Synthetic Theory-	1
	Hardy Weinberg's Principle	1
	Total-	11

8. Mechanism of Evolution

8.1	Variation- Sources of variation	1
8.2	Mutation as a sources of variation (types not needed, mention only Hugo de V ries experiment)	
8.3	Recombination as a source of Variation (process is not needed)	1
8.4	Natural selection with examples:	1
	Types of Natural selection	1
8.5	Gene Flow and genetic drift; Hardy-Weinberg's Principle	1
8.6	Adaptive radiation	1
	Human evolution (with diagram)	1
	Total-	7

Unit-III ***BIOLOGY AND HUMAN WELFARE***

9. Health and Diseases

9.1	Basic concept of immunology - vaccines	1
	Introduction-immune system- Antigen, Antibody, Antigen-Antibody reaction-Types of immunity-vaccines and vaccination	3
9.2	Pathogens, parasites causing human diseases- Malaria, Filariasis, Ascariasis, Typhoid, Psneumonia,common cold, Amoebiosis and ring worm. (symptoms of Disease, name of causative agent, mode of Transmission, preventive measures)	6
9.3	Cancer, HIV and AIDS - Symptoms of disease, causative agent, mode of transmission,	2

	preventive measures	
9.4	Adolescence : drug and alcohol abuse	2
	Total-	**14**

10. Improvement in Food Production

10.1	Plant breeding	1
10.2	Tissue culture	1
10.3	Single cell protein (SCP)	1
10.4	Biofortification	1
10.5	Animal husbandary (poultry and diary, farm management, animal breeding, beekeeping and fisheries)	3
	Total-	**7**

11. Microbes In Human Welfare

11.1	In household food processing	1
11.2	Industrial production	
11.3	Sewage treatment	1
11.4	Energy generation	1
11.5	Bio control agents and bio fertilizers	1
	Total-	**4**

Unit- IV ***BIO TECHNOLOGY ITS APPLICATION***

12. Biotechnology and its Application

12.1	Introduction	1
12.2	Principle	
12.3	Process - Genetic Engineering (Recombinant DNA technology)	2
12.4	Application of Biotechnology in health and agriculture – introduction	1
12.5	Human insulin and vaccine production-gene therapy	1

12.6 Genetically modified organisms- BT crops (What is G.M.O.? example- cotton), Transgenic animals. 1

12.7 Bio safety issues 1

12.8 Bio piracy and patents

Total- 7

Unit- V ECOLOGY AND ENVIRONMENT

13. Ecology Environment & Population

13.1 Meaning of ecology, environment, habitat and niche 1

13.2 Organisms and environment 3

i) Introduction- biome concept and distribution

ii) Major abdiotic factors- water, light, temperature and soil

iii) Responses to abiotic factors

iv) Adaptations

13.3 Population and ecological adaptations-

i) Population interactions – mutualism, competition, predation,parasitism 1

ii) Population attributes – growth, birth rate and death rate, age distribution 1

Total- 6

14. Ecosystem

14.1 What is ecosystem and its pattern 1

14.2 Components of ecosystem

14.3 Energy flow 1

14.4 Nutrient cycling (carbon and phosphorus) 1

14.5 Productivity and Decomposition 1

14.6 Pyramids of number, biomass and energy 1

14.7	Ecological Succession	1
14.8	Ecological service: Carbon fixation, Pollination and Oxygen release	1
	Total-	**7**

15. Biodiversity And Conservation

15.1	What is biodiversity?	1
15.2	Levels of biodiversity (genetic, species and Ecological) Patterns of biodiversity Importance and loss of Biodiversity	
15.3	Threats to need for biodiversity conservation	1
15.4	Hotspots, endangered organisms, extinction, Red Data book	1
15.5	Biodiversity conservation – a) Biosphere reserve b) National parks and sanctuaries	1
	Total-	**4**

16. Environment Issues

16.1	Introduction	
16.2	Air Pollution and its control	1
16.3	Water Pollution and its control	1
16.4	Agro-Chemicals and their effects	1
16.5	Solid waste management	1
16.6	Radioactive waste management	1
16.7	Green House effect and global warming	1
16.8	Ozone depletion	
16.9	Deforestation	1
16.10	Three success stories addressing environmental issues – Chipko movement, Dasholi Gram Swarajya Mandal (DGSM) movement; Silent valley or Amrita Devi – Bishnoi (Jaipur) movements	
	Total-	**7**

QUESTION PATTERN

Class XII (Theory)

A . Weightage to form of questions

Sl.no	Type of Question	Marks for each question	No. of question	Total Marks
1	Very Short Answer (VSA)	1	8	8
2	Short Answer- II (SA II)	2	10	20
3	Short Answer- I (SA-I)	3	9	27
4	Long Answer (LA)	5	3	15
	Total		**30**	**70**

B . Scheme of option

1. There will be no overall option
2. Internal choices (either/ or type) on a very selective basis has been provided. This choice has been given in one question of 3 marks and all the three questions of 5 marks weight age.

C. Weightage to form of questions

Sl.no	Estimated difficulty level	Percentage
1	Easy	15
2	Average	70
3	Difficult	15

About 20% weightage has been assigned to questions testing higher order thinking skills of learners.

Sl.no	UNIT	VSA (1 Marks)	SA I (2 Marks)	SA II (3 Marks)	LA (5 Marks)	Total
1	Reproduction	2 (2)	4 (2)	3 (1)	5 (1)	14 (6)
2	Genetic and Evolution	2 (2)	2 (1)	9 (3)	5 (1)	18 (7)
3	Biology in Human Welfare	1 (1)	10 (5)	3 (1)	-	14 (7)
4	Bio technology	1(1)	-	9 (3)	-	10 (4)
5	Ecology and Environment	2 (2)	4 (2)	3 (1)	5 (1)	14 (6)
	Total	**8 (8)**	**20 (10)**	**27 (9)**	**15 (3)**	**70 (30)**

BIOLOGICAL SCIENCE (BIOS)

CLASS – XII

(PRACTICAL)

Time: 3 Hrs **30 Marks / 60 period**

1. Experiments (1 experiments out of 3) and spotting (1 spotting out of 3)	10 + 10marks
2. Record of one investigatory project and viva based on the project	5 marks
3. Class record and viva based on experiments	5 marks
	30 marks

I. 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 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.

II. 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-Emascular, 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. Comments upon their morphological adaptations.
11. Plants and animals found in aquatic conditions. Comment upon their morphological adaptations.