

TRIPURA BOARD OF SECONDARY EDUCATION

SYLLABUS

(effective from 2015)

SUBJECT : BIOLOGY

(Class – XII)

BIOLOGY
COURSE STRUCTURE
CLASS XII (Theory)

One Paper

Time : 3 Hours

Marks : 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
	Total	70

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)

Reproduction in Organisms

- 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.
- 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

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

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.
- 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 diseases (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 APPLICATION

(30 periods)

Principles and process of Biotechnology

- Genetics 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.

PRACTICAL

Time : 3 hours

Marks 30

60 Periods

Evaluation Scheme

1. One major experiment	5 marks
2. One minor experiment	4 marks
3. Slide preparation	4 marks
4. Spotting(four nos.)	8 marks
(each spotting carries 2 marks : Identification $\frac{1}{2}$ marks + Characteristics(3 nos.) $1\frac{1}{2}$ marks)	
5. Practical record and Viva voce	4 marks
6. Project record and viva voce	5 marks
Total	30 marks

A. List of Experiments (any five from the list)

1. Study pollen germination on a slide.
2. Collect and study soil from the 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.

B. 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 seed 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 xeric conditions. Comment upon their morphological adaptations.
11. Plants and animals found in aquatic conditions. Comment upon their morphological adaptations.

UNIT WISE QUESTION TYPES WITH MARKS DISTRIBUTION

Unit	Title	MCQ/ VSA 1 mark	SA-I 2 Mark	SA-II 3 marks	LA 5 marks	Total
I	Reproduction in Organism	1	1	2	1	14
II	Genetics and Evolution	1	3	2	1	18
III	Biology and Human Welfare	1	1	2	1	14
IV	Biotechnology and its applications	3	2	1	-	10
V	Ecology and Environment	2	3	2	-	14
	No. of questions	3+5=8	10	9	3	
	Total marks					70

N.B. 1. Internal choice : There is no overall choice in the paper. However, there is an internal choice in one question of 2 marks weightage, one question of 3 marks weightage, and all the questions of 5 marks weightage.

2. In SA-II and LA types, marks may be sub-divided into parts, if necessary.

3. Questions should be set covering each unit.