

West Bengal Board Class 12 Biological Sciences Syllabus

BIOLOGICAL SCIENCES (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.
- 1.2 Modes of reproduction:
Asexual and sexual
- 1.3 Asexual reproduction:
definition, characteristics
- 1.4 Modes of asexual reproduction:
General discussion of the following
types in brief with common examples &
diagram of each type:
 - a) Binary fission
 - b) Sporulation
 - c) Budding

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- d) Gemmule
- e) Fragmentation
- f) Regeneration
- 1.5 Vegetative propagation in plants:
 - a) Natural: (general discussion in brief, Mention common example and give figures)
 - b) Artificial: (brief description of method, example and diagram)- cutting grafting layering and gootee.

2. Sexual Reproduction In flowering Plants

- 2.1 Flower structure: Typical structure of a complete regular flower with diagram.
- 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.
- 2.3 Development of male gametophyte
- 2.4 Development of female gametophyte
- 2.5 Outbreeding devices
- 2.6 Pollen- pistil interaction
- 2.7 Double fertilization
- 2.8 Post fertilisation events - development of endosperm and embryo (details not required).
- 2.9 Formation of fruit and development of seed (elementary)
- 2.10 Special modes - apomixes, parthenogenesis, Parthenocarp and Polyembryony (brief account)
- 2.11 Significance of seed and fruit formation

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3. Human Reproduction

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

4. Reproductive Health

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

Unit- II **GENETICS AND EVOLUTION**

5. Heredity and Variation

- 5.1 Introduction
- 5.2 Mendelian Inheritance (laws only)
- 5.3 Deviations from Mendelism
 - i) Incomplete dominance
 - ii) Co-dominance
 - iii) Multiple alleles and Inheritance of Blood groups (ABO & Rh)
 - iv) Pleiotroph
- 5.4 Polygenic inheritance (elementary)
- 5.5 Chromosome theory of inheritance
- 5.6 Chromosomes and genes
- 5.7 Sex determination in - human, bird and honey bee
- 5.8 Linkage and crossing over
- 5.9 Sex- linked inheritance - Haemophilia and colour blindness
- 5.10 Mendelian disorder in human:
Chromosomal disorders:
 - 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)

6. Molecular Basis of Inheritance

- 6.1 Search for genetic material
- 6.2 DNA as genetic material:
(experiments on Bacterial transformation by F. Griffith; Avery, McLeod and Harshey & Chase)

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- 6.3 Structure of DNA
- 6.4 Structure of RNA
- 6.5 Types of RNA - mRNA; rRNA & tRNA
- 6.6 DNA Packaging
- 6.7 Central dogma (elementary),
DNA replication, transcription,
genetic code and translation.
- 6.8 Regulation of Gene expression
(elementary) Lac Operon
- 6.9 Genome and Human genome project
- 6.10 DNA finger printing

7. Evolution

- 7.1 Introduction
- 7.2 Origin of life - Origin of earth-
theories on the origin of life on earth:
 - 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?
 - b) Evidence for Biological Evolution
 - i) Paleontological
 - ii) From comparative anatomy
 - iii) Embryological
 - iv) Molecular
- 7.4 Theories of organic evolution
Introduction - Darwin's contribution-
Modern Synthetic Theory-
Hardy Weinberg's Principle

8. Mechanism of Evolution

- 8.1 Variation- Sources of variation
- 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)
- 8.4 Natural selection with examples:
Types of Natural selection
- 8.5 Gene Flow and genetic drift;
Hardy-Weinberg's Principle
- 8.6 Adaptive radiation
Human evolution (with diagram)

Unit-III

BIOLOGY AND HUMAN WELFARE

9. Health and Diseases

- 9.1 Basic concept of immunology - vaccines
Introduction-immune system- Antigen, Antibody, Antigen-Antibody reaction-Types of immunity-vaccines and vaccination
- 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)
- 9.3 Cancer, HIV and AIDS - Symptoms of disease, causative agent, mode of transmission, preventive measures
- 9.4 Adolescence : drug and alcohol abuse

10.Improvement in Food Production

- 10.1 Plant breeding
- 10.2 Tissue culture

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- 10.3 Single cell protein (SCP)
- 10.4 Biofortification
- 10.5 Animal husbandary (poultry and dairy, farm management, animal breeding, beekeeping and fisheries)

11. Microbes In Human Welfare

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

Unit- IV BIO TECHNOLOGY ITS APPLICATION

12. Biotechnology and its Application

- 12.1 Introduction
- 12.2 Principle
- 12.3 Process - Genetic Engineering
(Recombinant DNA technology)
- 12.4 Application of Biotechnology in health and agriculture – introduction
- 12.5 Human insulin and vaccine production- gene therapy
- 12.6 Genetically modified organisms- BT crops
(What is G.M.O.? example- cotton),
Transgenic animals.
- 12.7 Bio safety issues
- 12.8 Bio piracy and patents

Unit- V ECOLOGY AND ENVIRONMENT

13. Ecology Environment & Population

- 13.1 Meaning of ecology, environment, habitat and niche

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13.2 Organisms and environment

- i) Introduction- biome concept and distribution
- ii) Major abiotic 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
- ii) Population attributes – growth, birth rate and death rate, age distribution

14. Ecosystem

- 14.1 What is ecosystem and its pattern
- 14.2 Components of ecosystem
- 14.3 Energy flow
- 14.4 Nutrient cycling (carbon and phosphorus)
- 14.5 Productivity and Decomposition
- 14.6 Pyramids of number, biomass and energy
- 14.7 Ecological Succession
- 14.8 Ecological service: Carbon fixation, Pollination and Oxygen release

15. Biodiversity And Conservation

- 15.1 What is biodiversity?
- 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
- 15.4 Hotspots, endangered organisms, extinction, Red Data book
- 15.5 Biodiversity conservation –

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- a) Biosphere reserve
- b) National parks and sanctuaries

16. Environment Issues

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