

**CLASS XII (2014-15)**  
**(THEORY)**

Time: 3 Hours

Max. Marks: 70

Unit	Title	No. of Periods	Marks
1.	Reproduction	30	14
2.	Genetics and Evolution	40	18
3.	Biology and Human Welfare	30	14
4.	Biotechnology and its Applications	30	10
5.	Ecology and Environment	30	14
<b>Total</b>		<b>160</b>	<b>70</b>

**Note:** The question paper will include a section on **Open Case Studies** based-questions on two case studies of 7 marks each from the syllabus, a total of 14 marks. The case studies will be supplied to students in advance. These case studies are designed to test the analytical and higher order thinking skills of students.

**Unit 1: Reproduction****30 periods**

**Reproduction in organisms:** Reproduction, a characteristic feature of all organisms for continuation of species; modes of reproduction - asexual and sexual reproduction; asexual reproduction - binary fission, sporulation, budding, gemmule, fragmentation; vegetative propagation in plants.

**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 and embryo, development of seed and formation of fruit; special modes-apomixis, parthenocarpy, polyembryony; Significance of seed dispersal and fruit formation.

**Human Reproduction:** Male and female reproductive systems; microscopic anatomy of testis and ovary; gametogenesis - spermatogenesis and 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 and medical termination of pregnancy (MTP); amniocentesis; infertility and assisted reproductive technologies - IVF, ZIFT, GIFT (elementary idea for general awareness).

**Unit 2: Genetics and Evolution****40 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; chromosome theory of inheritance; chromosomes and genes; Sex determination - in humans, birds and honey bee; linkage and crossing over; sex linked inheritance - haemophilia, colour blindness; Mendelian disorders in humans - thalassemia; chromosomal disorders in humans; Down's syndrome, Turner's and Klinefelter's syndromes.

**Molecular basis of inheritance:** 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 - lac operon; genome and human genome project; DNA fingerprinting.

**Evolution:** Origin of life; biological evolution and evidences for biological evolution (paleontology, comparative anatomy, embryology and molecular evidence); Darwin's contribution, modern synthetic theory of evolution; mechanism of evolution - variation (mutation and recombination) and natural selection with examples, types of natural selection; Gene flow and genetic drift; Hardy - Weinberg's principle; adaptive radiation; human evolution.

### **Unit 3: Biology and Human Welfare 30 Periods**

**Health and disease:** Pathogens; parasites causing human diseases (malaria, filariasis, ascariasis, typhoid, pneumonia, common cold, amoebiasis, ring worm); Basic concepts of immunology - vaccines; cancer, HIV and AIDS; Adolescence, drug and alcohol abuse.

**Improvement in food production:** Plant breeding, tissue culture, single cell protein, Biofortification, Apiculture and Animal husbandry.

**Microbes in human welfare:** In household food processing, industrial production, sewage treatment, energy generation and as biocontrol agents and biofertilizers.

### **Unit 4: Biotechnology and Its Applications 30 Periods**

**Principles and processes 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; transgenic animals; biosafety issues, bio piracy and patents.

### **Unit 5: Ecology and Environment 30 Periods**

**Organisms and environment:** Habitat and niche, population and ecological adaptations; population interactions - mutualism, competition, predation, parasitism; population attributes - growth, birth rate and death rate, age distribution.

**Ecosystems:** Patterns, components; productivity and decomposition; energy flow; pyramids of number, biomass, energy; nutrient cycles (carbon and phosphorous); ecological succession; ecological services - carbon fixation, pollination, seed dispersal, oxygen release.

**Biodiversity and its conservation:** Concept of biodiversity; patterns of biodiversity; importance of biodiversity; loss of biodiversity; biodiversity conservation; hotspots, endangered organisms, extinction, Red Data Book, 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, diseases; dengue and chickengunia.

## PRACTICALS

Evaluation Scheme	Maximum Marks: 30
One Major Experiment	5 Marks
One Minor Experiment	4 Marks
Slide Preparation	5 Marks
Spotting	7 Marks
Practical Record + Viva Voce	4 Marks
Project Record + Viva Voce	5 Marks
<b>Total</b>	<b>30 Marks</b>

### A. List of Experiments 60 Periods

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. 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 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. Study the effect of different temperatures and three different pH on the activity of salivary amylase on starch.
9. Isolation of DNA from available plant material such as spinach, green pea seeds, papaya, etc.

### B. Study/observation of the following (Spotting)

1. Flowers adapted to pollination by different agencies (wind, insect, bird).
2. Pollen germination on stigma through a permanent slide.
3. Identification of stages of gamete development, i.e., T.S. of testis and T.S. of ovary through permanent slides (from grasshopper/mice).
4. Meiosis in onion bud cell or grasshopper testis through permanent slides.
5. T.S. of blastula through permanent slides.
6. Mendelian inheritance using seeds of different colour/sizes of any plant.
7. Prepared pedigree charts of any one of the genetic traits such as rolling of tongue, blood groups, ear lobes, widow's peak and colour blindness.
8. Controlled pollination - emasculation, tagging and bagging.
9. Common disease causing organisms like Ascaris, Entamoeba, Plasmodium, Roundworm through permanent slides or specimens. Comment on symptoms of disease that they cause.

10. Two plants and two animals (models/virtual images) found in xeric conditions. Comment upon their morphological adaptations.
11. Two plants and two animals (models/virtual images) found in aquatic conditions. Comment upon their morphological adaptations.

**Prescribed Books:**

1. Biology Part I, Class-XII, Published by NCERT
2. Biology Part II, Class-XII, Published by NCERT

**BIOLOGY (CODE - 044)**  
**QUESTION PAPER DESIGN**  
**Class - XII (2014-15)**

Time 3 Hours

Max. Marks: 70

S. No.	Typology of Questions	Very Short Answer (VSA) (1 mark)	Short Answer-I (SA-I) (2 marks)	Short Answer -II (SA-II) (3 marks)	Value based question (VBQ) (4 marks)	Long Anser (L.A.) (5 marks)	Total Marks	% Weigh-tage
1	<b>Remembering-</b> (Knowledge based Simple recall questions, to know specific facts, terms, concepts, principles, or theories, Identify, define, or recite, information)	2	1	1	-	-	7	10%
2	<b>Understanding-</b> (Comprehension -to be familiar with meaning and to understand conceptually, interpret, compare, contrast, explain, paraphrase information)	-	2	4	-	1	21	30%
3	<b>Application</b> (Use abstract information in concrete situation, to apply knowledge to new situations, Use given content to interpret a situation, provide an example, or solve a problem)	-	2	4	-	1	21	30%
4	<b>High Order Thinking Skills ( Analysis &amp; Synthesis-</b> Classify, compare, contrast, or differentiate between different pieces of information, Organize and/or integrate unique pieces of information from a variety of sources)	2	-	1	-	1	10	14%
5	<b>Evaluation and Multi-Disciplinary-</b> (Appraise, judge, and/or justify the value or worth of a decision or outcome, or to predict outcomes based on values)	1	-	2	1	-	11	16%
<b>TOTAL</b>		<b>5x1 = 5</b>	<b>5x2 = 10</b>	<b>12x3 = 36</b>	<b>1x4 = 4</b>	<b>3x5 = 15</b>	<b>70(26)</b>	<b>100%</b>

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## QUESTION WISE BREAK UP

Types of Question(s)	Mark(s) per Question	Total No. of Questions	Total Marks
VSA	1	5	05
SA-I	2	5	10
SA-II	3	12	36
VBQ	4	1	04
LA	5	3	15
<b>Total</b>		<b>26</b>	<b>70</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 three questions of 5 marks weightage.*
2. *The above template is only a sample. Suitable internal variations may be made for generating similar templates keeping the overall weightage to different form of questions and typology of questions same.*