

CLASS-XII
44. BIOLOGY

Time: 3 Hrs

Theory: 70 Marks
Practical: 20 Marks
C.C.E.: 10 Marks
Total: 100 Marks

STRUCTURE OF QUESTION PAPER (THEORY)

- 1 There will be one theory paper comprising of 26 questions.
- 2 Question no. 1 to 8 will be of one mark each and all are compulsory.
- 3 Question no. 9 to 16 will be of two marks each and all are compulsory.
- 4 Question no.17 to 23 will be of four marks each. Question no. 17 to 21 are compulsory (one question from each unit) There will be 100% internal choice in question no 22 & 23. Q no.22 will be from unit III and Q no. 23 will be from unit IV and all are compulsory.
- 5 Question no.24 to 26 are of six marks each. There will be 100% internal choice in these questions.
- 6 Distribution of marks over different dimensions of the paper will be as follows.

LEARNING OUTCOMES	MARKS	PERCENTAGE OF MARKS
KNOWLEDGE	25	36%
UNDERSTANDING	31	44%
APPLICATION	14	20%
Total	70	100%

- 7 Out of eight one mark questions, 4 questions can be of the objective type such as Yes/No, tick/cross, fill in the blanks, multiple choice, true/false etc. Other four should be of statement type.

UNIT WISE DISTRIBUTION OF MARKS

Unit	Title	Marks
I	Reproduction	14
II	Genetics & Evolution	16
III	Biology and Human Welfare	13
IV	Biotechnology and its applications	13
V	Ecology and Environment	14
Total Marks		70

SCHEMATIC DISTRIBUTION OF MARKS

Unit	1 mark questions	2 marks questions	4 mark questions	6 mark questions	Total marks
Unit-I	2	1	1	1	14
Unit-II	2	2	1	1	16
Unit-III	1	2	1+1 or 1	-	13
Unit-IV	1	2	1+1 or 1	-	13
Unit-V	2	1	1	1	14
Total Questions	8	8	7	3	26
Total Marks	8	16	28	18	70

INSTRUCTIONS FOR PAPER SETTER

Note:

1. There will be one theory paper of total 26 questions. The paper setter will set questions according to schematic distributions of marks as given in the table.
2. Questions no.1 to 8 are compulsory and are of one mark each.
3. Question no 9-16 are compulsory and are of two marks each.
4. Questions no. 17-23 are of four marks each. Question no 17 to 21 are compulsory and there should be one question from each unit. Whereas question no 22 and 23 will have 100% internal choice. The paper setter will set question no 22 from unit-III and question no 23 from unit IV. Internal choice questions should be from same units.
5. Question No.24 to 26 are of six marks each and there is 100% internal choice in these questions.
6. Questions in the paper can be asked only from mentioned PSEB syllabus.
7. Questions in all 3 sets must be of equal standard and difficulty level.
8. At the end of each question, paper setter must write detailed distribution of marks of each sub-question.
9. Vague, questions with confusing answers and questions with many possible answers, will not be asked in the paper. In one mark questions, answer should be of one word or one line only.
10. Language used should be clearly understood & specific.
11. Time and length limit of paper should be kept in mind.

SYLLABUS (THEORY)

I. Reproduction

Reproduction in organisms: Reproduction, a characteristic feature of all organism for continuation of species; Modes of reproduction-Asexual and sexual reproduction; Modes –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; Outbreedings 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 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 and Medical Termination of Pregnancy (MTP); Amniocentesis; Infertility and assisted reproductive technologies-IVF, ZIFT, GIFT (Elementary ideas for general awareness).

II. Genetics and Evolution

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- Thalassaemia; 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 finger printing.

Evolution: Origin of life; Biological evolution and evidences for biological evolution (Paleontological, 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.

III. Biology and Human Welfare

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, tissues culture, single cell protein, Biofortification, Apiculture and animal husbandary.

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

IV. Biotechnology and its applications

Principles and process 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-Biopiracy and patents.

V. Ecology and environment

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 decompositions; Energy flow; Pyramids of number, biomass, energy; Nutrients cycling (carbon and phosphorous); Ecological succession; Ecological Services-Carbon fixation, pollination, oxygen release.

Biodiversity and its conservation: Concepts 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.

BIOLOGY

STRUCTURE OF QUESTION PAPER (PRACTICAL)

Time: 3.00 hrs.

Total 20: Marks

1.	Experiment and Spotting	12
2.	Record of one investigatory and Viva based on the project	4
3.	Class record and Viva based on experiments	4
Total		20

SYLLABUS (PRACTICAL)

- Study of pollen grains on a slide.
- Study of flowers adapted to pollination by different agencies (wind, insect)
- Study of pollen germination on a slide.
- Study and identify stages of gamete development i.e. T.S of testis and T.S of ovary through permanent slides.
- Study meiosis in Onion bud cell or grasshopper testis through permanent slides.
- Study of T.S of blastula through permanent slide.
- Study mendelian inheritance using seeds of different colour/size of any plant.
- Study prepared pedigree charts of genetic traits such as rolling of tongue, blood groups, widow's peak, colour blindness.
- Exercise on controlled pollination -Emasculation, tagging and bagging.
- Study analogous and homologous organs in various plants and animals.

11. Collect and study soil from different sites and study them for texture and moisture content.
12. Study the pH and water holding capacity of soil correlate with the kinds of plants found in them.
13. Collect water from different water bodies around you and study them for pH clarity and presence of any living organisms.
14. Study the presence of any suspended particulate matter in air at the two widely different sites.
15. Study of plant population density by quadratic method.
16. Study of plant population frequency by quadrature method.
17. Study of plants and animals found in xerophytes conditions. Comment upon their adaptation ecosystem.
18. Study plants and animals found in aquatic conditions. Comment upon their adaptation ecosystem.
19. To identify common disease causing organisms like Ascaris, Endameba, Plasmodium, ringworm. Comment on symptoms of diseases that they cause through permanent slides or specious.

Information Sources.

Analysis using Bioinformatics, tools.

PRACTICAL

Time: 3 Hours

Marks: 20

List of Experiments

Bacterial transformation using any plasmid.

Multiplication of tobacco by nodal bulb culture.

Data retrieval and database search using internet site NCBI.

Production and estimation of ethanol from microbial culture.

Determination of LCG in Urine (Pregnancy Test).

Isolation of bacterial plasmid DNA and its detection by gel electrophoresis.

Restriction digestion of plasmid DNA and its analysis by gel electrophoresis.

Download a DNA and protein sequence from internal, analysis and comment on it.

Determination of N-terminal of a protein.

Ion-exchange chromatography for proteins.

Reading of DNA sequencing to get and arrive at the sequence.

Project work.

Note:- The subtopics which are printed in the books published by Punjab School Education Board but are not mentioned in syllabus, should be considered as part of syllabus.