

To,  
The Secretary,  
Goa Board of Secondary and Higher Secondary Education,  
Alto Betim, Goa  
21/04/2023

Subject: New assessment scheme 2023 - 24 in Biology for standard XII

Respected Sir,

I hereby submit following documents pertaining to assessment scheme 2023 - 24 in Biology for standard XII.

The documents submitted are as follows:

1. Syllabus of Biology ( Theory & practical )
2. Design of question paper for Final Exam.
3. Portion for First Formative Test
4. Portion for Second Formative Test
5. Design of question paper for First / Second Formative Test.
6. Model paper for final exam.

Thanking You,

Yours faithfully

Mrs. Meeta Bandekar  
(convenor)

**SYLLABUS OF BIOLOGY (THEORY) – CLASS XII****UNIT VI - REPRODUCTION****Chapter-2: Sexual Reproduction in Flowering Plants**

Flower structure; development of male and female gametophytes; pollination - types, agencies and examples; out breeding 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;

**Chapter-3: Human Reproduction**

Male and female reproductive systems; microscopic anatomy of testis and ovary; gametogenesis -spermatogenesis and oogenesis; menstrual cycle; fertilization, embryo development up to blastocyst formation, implantation; pregnancy and placenta formation (elementary idea); parturition (elementary idea); lactation (elementary idea).

**Chapter-4: Reproductive Health**

Need for reproductive health and prevention of Sexually Transmitted Diseases (STDs); 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 VII - GENETICS AND EVOLUTION****Chapter-5: Principles of Inheritance 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.

**Chapter-6: 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; Human genome project; DNA fingerprinting.

**Chapter-7: Evolution**

Origin of life; biological evolution and evidences for biological evolution (paleontology, comparative anatomy); 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 VIII - BIOLOGY AND HUMAN WELFARE

### Chapter-8: Human Health and Diseases

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

### Chapter-10: Microbes in Human Welfare

Microbes in food processing, industrial production, sewage treatment, energy generation and microbes as bio-control agents and bio-fertilizers.

## UNIT IX - BIOTECHNOLOGY AND ITS APPLICATIONS

### Chapter-11: Biotechnology - Principles and Processes

Principles of biotechnology, Tools of Recombinant DNA Technology, Processes of Recombinant DNA Technology.

### Chapter-12: Biotechnology and its Applications

Application of biotechnology in health and agriculture: Human insulin, Molecular Diagnosis, gene therapy; genetically modified organisms - Bt crops; transgenic animals; biosafety issues, bio piracy and patents.

## UNIT X - ECOLOGY

### Chapter-13: Organisms and Populations

Population interactions - mutualism, competition, predation, parasitism; population attributes - growth, birth rate and death rate, age distribution, Organism and its Environment, Major Abiotic Factors, Responses to Abiotic Factors, Adaptations.

### Chapter-14: Ecosystem

Ecosystems: Patterns, components; productivity and decomposition; energy flow; pyramids of number, biomass, energy, Ecological Succession and Nutrient Cycles.

### Chapter-15: Biodiversity and its Conservation

Biodiversity-Concept, patterns, importance; loss of biodiversity; biodiversity conservation; hotspots, endangered organisms, extinction, Sacred Groves, biosphere reserves, national parks, wildlife, sanctuaries.

Mrs. Meeta Bandekar  
(Convenor)

## **SYLLABUS OF BIOLOGY PRACTICAL – CLASS XII**

### **List of Experiments :**

#### **Section A – Physiology Experiment**

1. To determine the pH and water holding capacity of garden or paddy field soil.
2. To detect presence of phosphate, nitrate and sulphate salts in paddy field soil.
3. To study B.O.D. of the given sample of pond water.
4. To study the effect of different temperature on the action of salivary amylase on starch.
5. To study the effect of different pH on the action of salivary amylase on starch.

#### **Section B – Preparation of temporary stained slide**

1. Onion root tip for mitosis
2. Onion/Rheo anther for meiosis.

#### **Section C – Identification/Spotting**

1. Adaptations in insect pollinated flower (Ocimum/Leucas/Salvia)
2. Adaptations in wind pollinated flower (Maize/Grass)
3. Study of T.S. of Testis (Any vertebrate)
4. Study of T.S. of Ovary (Any vertebrate)
5. Study of V.S. of Blastula (Any vertebrate)
6. Prepared pedigree chart of inability to roll the tongue.
7. Prepared pedigree chart of Widow's peak.

8. Identification of organisms and symptoms of disease caused.
  - a. Ascaris
  - b. Entamoeba
  - c. Plasmodium
9. Adaptation of plant to dry condition (Suitable specimen to be given)
10. Adaptation of plant to aquatic condition (Suitable specimen to be given)
11. Adaptation of animal to dry condition (Suitable specimen/chart/model to be given)
12. Adaptation of animal to aquatic condition (Suitable specimen to be given)
13. Identification of Homologous organs in plants. (e.g. Thorn of bougainvillea and tendrils of Cucurbita)
14. Identification of Homologous organs in animals. (e.g. Fore limbs of frog and Flipper of turtle/ Wings of bird).
15. Identification of Analogous organs in plants. (e.g. Tuber of potato and sweet potato).
16. Identification of Analogous organs in animals. (e.g. Wings of bird and butterfly).

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(Convenor )

**GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION****ALTO – BETIM 403521****ASSESSMENT SCHEME FOR THE ACADEMIC YEAR 2023-24.****STD: XII****MAXIMUM MARKS : 70****PORTION FOR FINAL EXAM**

<b>Sr No.</b>	<b>Units</b>	<b>Marks</b>
<b>1.</b>	<b>REPRODUCTION</b>	<b>16</b>
	Chapter 2: Sexual Reproduction in Flowering plants	6
	Chapter 3: Human Reproduction	6
	Chapter 4: Reproductive Health	4
<b>2.</b>	<b>GENETICS AND EVOLUTION</b>	<b>18</b>
	Chapter 5: Principles of Inheritance and Variations	6
	Chapter 6: Molecular Basis of Inheritance	7
	Chapter 7 : Evolution	5
<b>3.</b>	<b>BIOLOGY IN HUMAN WELFARE</b>	<b>12</b>
	Chapter 8: Human Health and Diseases	8
	Chapter 10: Microbes in Human Welfare	4
<b>4.</b>	<b>BIOTECHNOLOGY AND ITS APPLICATIONS</b>	<b>11</b>
	Chapter 11: Biotechnology: Principles and Processes	7
	Chapter 12: Biotechnology and its Applications	4
<b>5.</b>	<b>ECOLOGY</b>	<b>13</b>
	Chapter 13: Organisms and populations	5
	Chapter 14 : Ecosystem	4
	Chapter 15: Biodiversity and Conservation	4
	<b>TOTAL</b>	<b>70</b>

**GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION  
ALTO – BETIM 403521**

**DESIGN OF THE QUESTION PAPER FOR FINAL EXAM (2023-24)**

**CLASS: XII**

**TIME: 3 Hours**

**SUBJECT: BIOLOGY**

**Max. Marks: 70**

The weightage of the distribution of marks over different dimensions of the question paper shall be as follows:

**1. WEIGHTAGE TO LEARNING OUTCOMES:**

Sr. No.	Learning Outcomes	Marks	Percentage of Marks
1.	Knowledge	28	40 %
2.	Understanding	21	30 %
3.	Application	14	20 %
4.	Skill	07	10%
	<b>TOTAL</b>	<b>70</b>	<b>100 %</b>

**2. WEIGHTAGE TO CONTENT / SUBJECT UNITS**

Sr No.	Unit	Marks
1.	Reproduction	16
2.	Genetics and Evolution	18
3.	Biology in Human Welfare	12
4.	Biotechnology and its applications	11
5.	Ecology	13
	<b>TOTAL</b>	<b>70</b>

**3. WEIGHTAGE TO FORMS OF QUESTIONS:**

Sr No.	Form of Questions	Marks for each Questions	No. of Questions	Total Marks
1.	Long Answer types - (LA)	05	03	15
2.	Short Answer Type - (SA - I)	03	06	18
3.	Short Answer Type - (SA - II)	02	12	24
4.	Very Short Answer Type (VSA/ MCQ)	01	13 (08MCQ+5VSA)	13
	<b>TOTAL</b>		<b>34</b>	<b>70</b>

**4. THE EXPECTED TIME FOR DIFFERENT TYPES OF QUESTION IS AS FOLLOWS:**

Sr No.	Form of Question	Approx. Time for each Question in mins - (t)	No. of Questions (n)	Approx. Time for each form of Questions in mins (n x t)
1.	Long Answer types - (LA)	14 min	03	03 x 14 min = 42
2.	Short Answer Type - (SA – I)	07min	06	06 x 07 min = 42
3.	Short Answer Type - (SA – II)	05 min	12	12 x 5 min = 60
4.	Very Short Answer Type - (VSA)	02 min	13	13 x 2min = 26
	<b>TOTAL</b>		<b>34</b>	<b>170min</b>

As the total time calculated on the basis of number of questions required to be answered and the length of their anticipated answers, it would therefore, be advisable for the candidates to budget their time properly by cutting out the superfluous words and be within the expected time limits.

**5. WEIGHTAGE TO DIFFICULTY LEVEL OF QUESTIONS :**

Sr No.	Estimated Difficulty Level of Questions	Marks	Percentage
1.	Easy	18	25 %
2.	Average	42	60%
3.	Difficult	10	15%
	<b>TOTAL</b>	<b>70</b>	<b>100 %</b>

the question may vary in difficulty level from individual to individual. As such, the assessment in respect of each question will be made by paper setter, on the basis of general anticipation from the group as a whole , taking the examination. This provision is only to make the paper balanced in weightage, rather than to determine the pattern of marking at any stage.

1. The theory paper will be of 70 marks and 3 hours duration.
2. The questions shall be from all the units.
3. The question paper shall have four (4) Sections A, B, C and D
  - Section A has 13 questions of 01 mark each.
  - Section B has 12 questions of 02 marks each.
  - Section C has 06 questions of 03 marks each.
  - Section D has 03 questions of 05 marks each.
4. The total number of questions will be 34.
5. All questions will be compulsory.
6. There is no overall choice, however an internal choice is provided in two questions of Section B, one question of Section C and two questions of Section D.



GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION  
ALTO – BETIM 403521

**ASSESSMENT SCHEME FOR THE ACADEMIC YEAR 2023-24.**

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**PORTION FOR FIRST FORMATIVE TEST**

Sr No.	UNITS	MARKS
	<b>UNIT VI - Reproduction</b>	
1	Chapter 2 :Sexual Reproduction in Flowering Plants	5
2	Chapter 3 : Human Reproduction	5
3	Chapter 4 :Reproductive Health	4
	<b>UNIT VII - Genetics and Evolution</b>	
4	Chapter 5 : Principles of Inheritance and variation	6
	<b>TOTAL</b>	<b>20</b>

**PORTION FOR SECOND FORMATIVE TEST**

Sr No.	UNITS	MARKS
	<b>UNIT VII - Genetics and Evolution</b>	
1	Chapter 6 : Molecular Basis of Inheritance	7
2	Chapter 7 : Evolution	4
	<b>UNIT VIII - Biology In Human Welfare</b>	
3	Chapter 10 : Microbes in Human Welfare	4
	<b>UNIT X - Ecology</b>	
4	Chapter 14 : Ecosystem	5
	<b>TOTAL</b>	<b>20</b>

**GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION  
ALTO – BETIM 403521**

**DESIGN OF THE QUESTION PAPER (2023-24)**

**Class : XII (FIRST / SECOND FORMATIVE TEST)**

**TIME: 1 HOUR**

**SUBJECT: BIOLOGY**

**MAX MARKS: 20**

The weightage of the distribution of marks over different dimensions of the question paper shall be as follows:

**1. WEIGHTAGE TO LEARNING OUTCOMES**

Sr No.	Learning Outcomes	Marks	Percentage of Marks
1	Knowledge	08	40%
2	Understanding	06	30 %
3	Application	04	20 %
4	Skill	02	10 %
	<b>TOTAL</b>	<b>20</b>	<b>100 %</b>

**2. WEIGHTAGE TO FORMS OF QUESTIONS:**

Sr No.	Form of Questions	Marks for each Questions	No. of Questions	Total Marks
1	Long Answer types (LA)	---	---	---
2	Short Answer Type (SA – I)	03	02	06
3	Short Answer Type (SA – II)	02	05	10
4	Very Short Answer Type (VSA)	01	04	04
	<b>TOTAL</b>		<b>11</b>	<b>20</b>

**3. WEIGHTAGE TO CONTENT/ SUBJECT UNITS ( FIRST FORMATIVE TEST)**

Sr No.	UNITS	MARKS
	<b>UNIT VI - Reproduction</b>	
1	Sexual Reproduction in Flowering Plants	5
2	Human Reproduction	5
3	Reproductive Health	4
	<b>UNIT VII - Genetics and Evolution</b>	
4	Principles of Inheritance and variation	6
	<b>TOTAL</b>	<b>20</b>

**4. WEIGHTAGE TO CONTENT/ SUBJECT UNITS (SECOND FORMATIVE TEST)**

Sr No.	Units	Marks
	<b>UNIT VII - Genetics and Evolution</b>	
1	Molecular Basis of Inheritance	7
2	Evolution	4
	<b>UNIT VIII - Biology In Human Welfare</b>	
3	Microbes in Human Welfare	4
	<b>UNIT X - Ecology</b>	
4	Ecosystem	5
	<b>TOTAL</b>	<b>20</b>

**5. EXPECTED TIME FOR DIFFERENT TYPES OF QUESTION IS AS FOLLOWS :**

Sr No.	Forms of Questions	Approx. Time for each Question in mins (t)	No. of Questions (n)	Approx. Time for each form of Questions in mins (n x t)
1	Long Answer types (LA)	---	---	---
2	Short Answer Type (SA – I)	10 min	02	2 x 10 min = 20
3	Short Answer Type (SA – II)	05 min	05	5 x 5 min = 25
4	Very Short Answer Type (VSA)	02 min	04	4 x 2 min = 8
	<b>TOTAL</b>		<b>11</b>	<b>53 min</b>

As the total time is calculated on the basis of the number of questions required to be answered and the length of their anticipated answers. It would, therefore be advisable for the candidates to budget their time properly by cutting out the superfluous words and be within the expected time limits.

**Scheme of options**

(There will be no overall choice. However, there is an internal choice in 01 sub questions of 02 marks category and 01 sub-questions of 03 marks category)

**6. WEIGHTAGE TO DIFFICULTY LEVEL OF QUESTIONS**

Sr No.	Estimated Difficulty Level of Questions	Percentage
1	Easy	30 %
2	Average	50 %
3	Difficulty	20 %
	<b>TOTAL</b>	<b>100 %</b>

- Question paper will have three sections A, B, C.
- Section A will have 04 questions of 01 mark.
- Section B will have 05 questions of 02 marks.
- Section C will have 02 questions of 03 marks.
- Question shall be from all the chapters specified above.
- Total number of questions will be 11.

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Ms. Meeta Bandekar

(Convenor)

**SECOND TERM****INNOVATIVE TEST (20 MARKS) (As per Circular No 39 dated 02/08/2021)**

**Innovative Test of 20 Marks is bifurcated as follows:**

<b>1.</b>	<b>Practical</b>	<b>10 Marks</b>
• Section A	Physiology Experiment	4 Marks
• Section B	Preparation of temporary stained slide	3 Marks
• Section C	Identification / spotting	3 Marks

<b>2.</b>	<b>Innovative Methods</b>	<b>10 Marks</b>
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Guidelines For Innovative Methods are as Follows:

- Assessment to be conducted on any topic from syllabus.
- Teachers can use methods like quizzes, ppt, videos, concept maps, concept flow charts for assessment.
- Teachers are free to make their own innovative methods for assessment.

Ms. Meeta Bandekar  
(Convenor)

**Biology Model Paper-2023-24****Std : XII****Time : 3 Hours  
marks : 70****Maximum****INSTRUCTIONS:-**

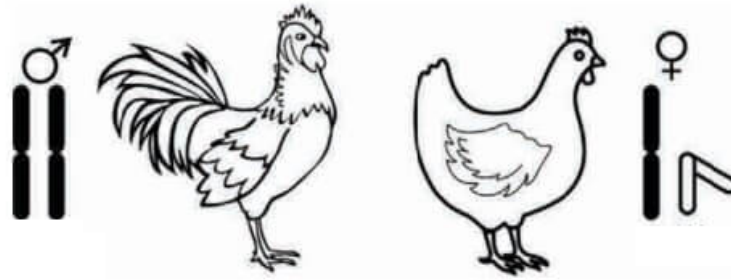
1. All questions are compulsory.
2. Draw diagrams in lead pencil only.
3. The question paper consists of four (4) Sections A, B, C and D.
  - Section A has 13 questions of 01 mark each.
  - Section B has 12 questions of 02 marks each.
  - Section C has 06 questions of 03 marks each.
  - Section D has 03 questions of 05 marks each.
4. The total number of questions is 34.
5. There is no overall choice, however an internal choice is provided in two questions of Section B, one question of Section C and two questions of Section D.
6. Multiple choice questions should be attempted only once, if attempted more than once it will not be evaluated. Choose the correct option and rewrite on the answer sheet.

**Section A ( 1 mark each )**

1. *Thermus aquaticus* is used to isolate an enzyme used to make billion copies of a gene. Identify the enzyme.
  - DNAase
  - DNA polymerase
  - RNA ligase
  - RNA polymerase
2. *E. coli* cells with a mutated Z gene of the lac operon cannot grow in medium containing only lactose as the source of energy because -----
  - They cannot absorb lactose
  - They cannot produce functional beta galactosidase
  - Lactose is not a good energy source
  - Mutated *E. coli* die if lactose enters their cytoplasm.
3. In Indian culture, tracts of forest are set aside, and the trees and wildlife within are venerated and given total protection. The term used for these tracts of forest is-----
  - National parks
  - Biosphere reserves
  - Sacred groves
  - Hot spots

4. A wolf feeding on a deer is a -----
  - Primary consumer and herbivore
  - Secondary consumer and primary carnivore
  - Primary consumer and primary carnivore
  - Secondary consumer and secondary carnivore
  
5. An example of an ecological succession that leads from xeric to mesic condition is seen when -----
  - Pioneer species are Phytoplankton
  - A pond is newly created
  - Rocks start weathering to form soil
  - A forest fire destroys all the plants
  
6. A drawback for natural methods of contraception can be-----
  - Hospitalization
  - Hormonal imbalance
  - Surgery
  - Side effects
  
7. Pistillate flowers of maize are known to exhibit -----
  - Autogamy and geitonogamy
  - Autogamy only
  - Xenogamy only
  - Geitonogamy and xenogamy
  
8. Formation of corpus luteum occurs during-----
  - Ovulation
  - Luteal phase
  - Follicular phase
  - Menstrual phase
  
9. Draw a neat diagram of L.S. of Apple.
  
10. Your classmate complains of cough and headache. The Doctor confirms that he is suffering from common cold and not pneumonia on the basis of certain symptoms. Deduce any 2 of these symptoms.
  
11. In case of a venomous snake bite, an injection is given to the patient. What does the injection contain?
  
12. Vedant and his friends rescued an injured Deer from a nearby forest and after medical treatment handed it over to the forest officials for conserving it in a Zoological park. Give the term used for this approach of biodiversity conservation.

13. Name the type of sex determination pattern seen in the picture.



**Section B (2 marks each)**

14. Draw a neat diagram of the structure of a typical anatropous ovule.

15. Describe in brief the adaptations seen in flowers pollinated by insects.

**OR**

15. Describe in brief the structure of microsporangium.

16. Differentiate between the process of Spermatogenesis and Oogenesis in humans. (2 points)

17. The small standing crop of phytoplankton feeds a large standing crop of zooplanktons. Describe the shape of pyramid of biomass and pyramid of energy in this example giving reasons.

18. Define adaptive radiation. Give an example that Darwin studied on Galapagos Island.

19. DNA is better genetic material than RNA. Justify the statement.

20. In order to resolve a paternity dispute, the High Court directed Pinto family to undergo a DNA test. The VNTRs patterns of DNA samples of the parents and the child were matched by Southern blot hybridisation technique. List the major steps involved in the process.

21. Draw a neat diagram of DNA double helix.

22. Invasion by alien species causes biodiversity loss. Explain with an example.

23. Which enzymes will have to be used to break open cells of the mango tree and that of mushroom respectively by research students of Biotechnology Institute in order to release their DNA?

24. Describe the role of Light as an abiotic factor in the environment.

**OR**

24. Describe the behavioural responses shown by desert lizard to cope with



variations in their environment.

25. A cancer patient was advised to go for immunotherapy treatment. What is administered in his body and how will it work?

**Section C (3 marks each )**

26. Draw a neat diagram of the structure of the Human sperm. Name and label the part that secretes enzymes for fertilization.

27. Explain the different types of IUDs and their mode of action.

**OR**

27. Explain the surgical methods of contraception.

28. In a population of 1000 parakeets in a given area the number of individuals with long tail feathers (Allele L is dominant) were 800 and those with short tail feathers (allele l is recessive) were 200. What would be the frequencies of dominant allele L and recessive allele l in this population? Also find out the number of heterozygous dominant individuals using Hardy Weinberg equation. Show your calculations.

29. Gene therapy can be used as a cure for ADA deficiency. Explain.

30. What are 'flocs'? State their role in effluent treatment and their ultimate fate in the sewage treatment tank.

31. Write a note on Suspend as a response to abiotic factors.

**Section D (5 marks each )**

32. Discuss in detail Haemophilia and Sickle cell anaemia as Mendelian disorders.

**OR**

32. Discuss in detail Colour blindness and Thalassemia as Mendelian disorders.

33. What are Restriction enzymes? Describe in detail the role of restriction enzymes as a tool in recombinant DNA technology.

**OR**

33. What are cloning vectors? Describe in detail the features that are required to facilitate cloning into a vector.

34. Drug and alcohol abuse is common among some youngsters. Explain measures useful for its prevention and control.