

**SAMPLE QUESTION PAPER**

# **BIOLOGY**

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**Class - XII**



**Government of Kerala  
Department of Education**

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**Prepared by  
State Council of Educational Research and Training (SCERT), Kerala**

**2014**

# ***Guidelines for the Preparation of Question Paper for HIGHER SECONDARY EDUCATION 2014-15***

## **Introduction**

Term evaluation is an important aspect of Continuous and Comprehensive Evaluation (CCE). It covers the **assessment of learning** aspect of the CCE. The Kerala School Curriculum 2013 postulated that the examination system should be recast so as to ensure a method of assessment that is a valid, reliable and objective measure of student development and a powerful instrument for improving the learning process. The outcome focused written tests are being used as tools for terminal assessment. Practical assessment is also considered for some subjects. The syllabus, scheme of work, textual materials, teacher texts and learning experiences may be considered while developing tools for term evaluation.

In order to make the examination system effective and objective, quality of the question paper needs to be ensured. Questions of different types considering various learning outcomes, thinking skills and of varying difficulty levels are to be included in the question paper. This makes question paper setting a significant task that has to be undertaken with the support of proper guidelines.

The guidelines for the preparation of the question paper have been divided into four heads for its effective implementation and monitoring. The areas are **i) preparatory stage, ii) nature of questions, iii) question paper setting and iv) structure of the question paper.**

### **I. Preparatory stage**

Before starting the process of question paper setting, the question paper setter should ensure that she/he has:

- Familiarised the current syllabus and textbook of the concerned subject.
- secured the list of Los (Learning Outcomes) relating to the subject.
- acquired the list of thinking skills applicable to the subject.
- prepared a pool of questions from each unit of the subject.
- verified the scheme of work and weight of score for each unit/lesson.
- gone through guidelines for the preparation of question paper for higher secondary education 2014-15.

### **II Nature of questions**

Questions selected from the pool to be included in the question paper should reflect the following features:

- stem of the question text should be relevant to the question posed.
- multiple choice questions should be provided with four competitive distracters.
- the possibilities of higher order thinking skills should be considered while setting MCQs
- time allotted for each question should be justified according to the thinking skills involved.
- the scope and length of the answer should be clearly indicated.

- questions should be prepared by considering the learning level of the learner.
- the question should focus on the learning outcomes.
- a wide range of thinking skills and learning outcomes from each unit/lesson should be considered.
- varied forms of questions should be covered.
- there should be a balance between the time allotted and the level of question.
- question should be very specific and free from ambiguity.
- question text should not be too lengthy and complicated.
- questions can be prepared based on a single or a cluster of learning outcomes which is scattered over one particular unit or units.
- cluster of learning outcomes from different units can be considered only for graded questions (questions with sub-divisions).
- the possibilities of graded questions reflecting different thinking skills can be explored.
- while preparing questions for language papers importance should be given to the language elements, language skills, discourses, textual content and elements of creativity.
- while preparing questions for subjects other than languages, importance should be given to content, concepts and skills.
- questions should cater the needs of differently abled learners and CWSEN (Children With Special Education Needs)
- the questions should contain varied forms such as objective type with specific focus to multiple choice test items and descriptive types (short answer and essay types).
- directions regarding the minimum word limit for essay type questions should be given.
- sufficient hints can be provided for essay type questions, if necessary.
- maximum usage of supporting items like pictures, graphs, tables and collage may be used while preparing questions.
- questions which hurt the feelings of caste, religion, gender, etc. must be completely avoided.

### III. Question paper setting

During the process of question paper setting the question setter should:

- prepare a design of the question paper with due weight to content, learning outcomes, different forms of questions and thinking skills.
- prepare a blue print based on the design.
- prepare scoring key indicating value points and question based analysis along with the question paper.
- while preparing scoring key, thinking skills should also be integrated.
- 60% weight should be given to thinking skills for conceptual attainment and 40% to thinking skills for conceptual generation.

- 15 to 20% weight of total scores must be given to objective type questions and up to 20% weight of total score must be given to essay type questions.
- the highest score that can be given to a question in the question paper is limited to 10% of the total score.
- while fixing the time for answering a question, time for reading, comprehending and writing the answer must be considered.
- The total time limit of the question paper - two hours for 60 scores and 2.30 hours for 80 scores question papers with an extra cool-off time of 15 minutes.

#### IV. Structure of the question paper

The question paper should reflect the following features in general:

- general instructions for the question paper should be given on the top.
- instructions for specific questions can be given before the question text.
- monotony of set patterns (objective or descriptive) should be avoided.
- questions should be prepared in bilingual form.
- there should not be any mismatch between the bilingual versions of the questions.
- choice can be given for questions up to 20% of the total score.
- while giving choice, alternative questions should be from the same unit with the same level of thinking skills.
- in the case of languages, language of the questions and answers should be in the particular language concerned. Necessary directions in this regard must be given in the question paper.

### THINKING SKILLS

Category/ processes	Alternative terms
<b>1. Remember</b>	<b>Retrieve relevant knowledge from long-term memory</b>
1.1. <i>Recognising</i>	identifying- (e.g. Recognize the dates of important events in Indian history)
1.2. <i>Recalling</i>	retrieving - (e.g. Recall the major exports of India)
<b>2. Understand</b>	<b>Construct meaning from instructional messages, including oral, written and graphic information</b>
2.1. <i>Interpreting</i>	clarifying, paraphrasing, representing, translating (e.g. Write an equation [using B for the number of boys and G for the number of girls] that corresponds to the statement 'There are twice as many boys as girls in this class')
2.2. <i>Exemplifying</i>	illustrating, instantiating (e.g. Locate an inorganic compound and tell why it is inorganic)
2.3. <i>Classifying</i>	categorizing, subsuming (e.g. Classify the given transactions to be recorded in Purchase returns book and Sales returns book)
2.4. <i>Summarising</i>	abstracting, generalizing (e.g. Students are asked to read an untitled passage and then write an appropriate title.)

2.5. <i>Inferring</i>	concluding, extrapolating, interpolating, predicting (e.g. a student may be given three physics problems, two involving one principle and another involving a different principle and ask to state the underlying principle or concept the student is using to arrive at the correct answer.)
2.6. <i>Comparing</i>	contrasting, mapping, matching (e.g. Compare historical events to contemporary situations)
2.7. <i>Explaining</i>	constructing models (e.g. the students who have studied Ohm's law are asked to explain what happens to the rate of the current when a second battery is added to a circuit.)
<b>3. Apply</b>	<b>Carry out or use a procedure in a given situation</b>
3.1. <i>Executing</i>	Carrying out (e.g. Prepare Trading and Profit and loss Account from the Trial Balance given and find out the net profit.)
3.2. <i>Implementing</i>	using (e.g. Select the appropriate given situation where Newton's Second Law can be used)
<b>4. Analyse</b>	<b>Break material into its constituent parts and determines how the parts relate to one another and to an overall structure or purpose</b>
4.1. <i>Differentiating</i>	discriminating, distinguishing, focusing, selecting (e.g. distinguish between relevant and irrelevant numbers in a mathematical word problem)
4.2. <i>Organising</i>	finding coherence, integrating, outlining, parsing, structuring (e.g. the students are asked to write graphic hierarchies best corresponds to the organisation of a presented passage.)
4.3. <i>Attributing</i>	deconstructing (e.g. determine the point of view of the author of an essay in terms of his or her ethical perspective)
<b>5. Evaluate</b>	<b>Make judgements based on criteria and standards</b>
5.1. <i>Checking</i>	coordinating, detecting, monitoring, testing (e.g. after reading a report of a chemistry experiment, determine whether or not the conclusion follows from the results of the experiment.)
5.2. <i>Critiquing</i>	judging (e.g. Judge which of the two methods is the best way to solve a given problem)
<b>6. Create</b>	<b>Put elements together to form a coherent or functional whole; reorganize elements into a new pattern or structure</b>
6.1. <i>Generating</i>	hypothesizing (e.g. suggest as many ways as you can to assure that everyone has adequate medical insurance)
6.2. <i>Planning</i>	designing (e.g. design social intervention programmes for overcoming excessive consumerism)
6.3. <i>Producing</i>	constructing (e.g. the students are asked to write a short story based on some specifications)

Considering the intellectual level of learners, while setting the question paper;

- 1. 60% weight may be given to thinking skills used for factual and conceptual attainment and**
- 2. 40% weight may be given to thinking skills for conceptual generation** (higher thinking skills has to be ensured in this category). Thinking skills for conceptual generation means thinking skills needed for elaborating the concepts.

***Refer the range of thinking skills given above. We can include the thinking skills no.1.1 to 3.2 (11 processes) under first category and 4.1 to 6.3 (8 processes) under second category.***

## **Guidelines for setting question paper - Biology**

1. The total time limit of the question paper is two hours. One hour each for Botany and Zoology with an extra cool of time of ten minutes each.
2. The weight of objective questions should be between 15%-20% of total score and it should carry one score.
3. Possibility of including different types of objective questions along with MCQs should be explored keeping due weight of the objective type questions.
4. MCQs can also be included along with multilevel questions.
5. The weight of essay type questions should be between 15%-20% of total score and it should carry three scores.
6. The short answer type question should carry two scores.
7. Graph, diagrams and pictures should be included in the questions wherever necessary.
8. Diagrams should be included only from the SCERT textbook.
9. Specific hints should be included in the questions if needed.

## LEARNING OUTCOMES (Botany)

### **1. Reproduction in Organisms**

*The learner*

- 1.1 compares the asexual reproductive methods in lower organisms.
- 1.2 identifies different kinds of vegetative propagules and explains vegetative propagation.
- 1.3 explains the features of sexually reproducing organisms and evaluates the merit of sexual reproduction.
- 1.4 explains the pre-fertilisation events.
- 1.5 identifies the significance of fertilization and differentiates external and internal fertilisation.
- 1.6 explains the post-fertilisation events and evaluates its merits.

### **2. Sexual Reproduction in Flowering Plants**

- 2.1 identifies the different parts of a flower.
- 2.2 explains microsporogenesis and evaluates the role of each parts.
- 2.3 compares the structure and function of pollen grain.
- 2.4 differentiates the various parts of carpel.
- 2.5 locates the parts of ovule.
- 2.6 analyses the various stages of megasporogenesis and explains it.
- 2.7 identifies the different pollinating agents and lists the floral peculiarities.
- 2.8 explains outbreeding devices and pollen - pistil interaction.
- 2.9 states the processes involved in double fertilisation and their significance.
- 2.10 explains endosperm development.
- 2.11 explains seed formation and compares different types of fruits.
- 2.12 differentiates special types of reproduction.

### **3. Strategies for Enhancement in Food Production**

- 3.1 identifies the importance of animal husbandry with special reference to dairy farm and poultry farm management.
- 3.2 lists the importance of animal breeding and classifies animal breeding methods.
- 3.3 analyses the importance of bee-keeping, fisheries and aquaculture.
- 3.4 compares blue revolution and green revolution.
- 3.5 explains the steps in plant breeding and the methods of production of plants with desirable quantities and qualities.

- 3.6 examines the application of plant breeding in the production of disease resistant and insect/pest resistant plants.
- 3.7 evaluates the application of plant breeding in biofortification and analyses the significance of SCP.
- 3.8 explains tissue culture and somatic hybridisation.

#### **4. Biotechnology: Principles and Processes**

- 4.1 identifies the development of biotechnology and the major terminologies used in it.
- 4.2 analyses the nature of restriction enzymes and DNA ligases and compares them.
- 4.3 identifies the principle of separation of DNA fragments during agarose gel electrophoresis.
- 4.4 analyses the types of cloning vectors and the uses of plasmid vector in rDNA technology and identifies the vectors for cloning genes in plants and animals.
- 4.5 evaluates competency and explains various methods of gene transfer.
- 4.6 identifies and compares the methods to extract DNA from different groups of organisms.
- 4.7 identifies the method and process of gene amplification.
- 4.8 recommends the use of bioreactors and identifies the importance of downstream processing.

#### **5. Biotechnology and its Applications**

- 5.1 analyses the application of biotechnology in agriculture.
- 5.2 evaluates the development of Bt cotton by genetic engineering .
- 5.3 analyses the application of RNAi in the production of pest resistant plants.
- 5.4 identifies the production of genetically engineered insulin and sketches the structure of insulin molecule.
- 5.5 identifies gene therapy and compares it with other types of treatment methods.
- 5.6 compares and recommends various types of molecular diagnostic methods.
- 5.7 analyses and categorises the various uses of transgenic animals.
- 5.8 evaluates the ethical issues of genetic engineering and judges the various aspects of patent and biopiracy.

#### **6. Organisms and Populations**

- 6.1 identifies the levels of organisation and major biomes.
- 6.2 lists various abiotic factors of habitats.
- 6.3 identifies the response of organisms to abiotic factors.
- 6.4 identifies and differentiates various types of adaptations shown by plants and animals.
- 6.5 lists various attributes of population and population growth.
- 6.6 differentiates the population growth models and identifies their characteristics.
- 6.7 analyses the significances of population interaction and classifies them.



- 6.8 identifies predation and evaluates the significance of predation.
- 6.9 explains competition and evaluates its merits and demerits .
- 6.10 lists the importance of parasitism and identifies different types of parasites.
- 6.11 explains commensalism with examples.
- 6.12 evaluates the significance of mutualism and co-evolution with suitable examples.

## **7. Ecosystem**

- 7.1 recognises the structure and functions of ecosystem and identifies the different components of the ecosystem.
- 7.2 differentiates primary and secondary productivity.
- 7.3 compares and explains the different stages of decomposition.
- 7.4 analyses the energy flow through various trophic levels.
- 7.5 differentiates and constructs different types of ecological pyramids .
- 7.6 analyses ecological succession and identifies different stages of xerarch.
- 7.7 identifies different stages of hydrarch succession.
- 7.8 analyses nutrient cycling and differentiates gaseous and sedimentary cycles.
- 7.9 evaluates the services provided by ecosystems.

## **8. Environmental Issues**

- 8.1 evaluates the various causes of air and noise pollution and their control measures.
- 8.2 classifies and compares various causes of water pollution and suggests remedies for control.
- 8.3 predicts the ill effects of solid wastes and e-wastes and recommends their control.
- 8.4 identifies the problems of agrochemical wastes, radioactive wastes and their control.
- 8.5 analyses the effect of greenhouse gases and global warming and suggests its control measures.
- 8.6 analyses the effect of ozone depletion in the stratosphere.
- 8.7 evaluates the degradation of natural resources and predicts the effect of deforestation.

## LEARNING OUTCOMES (Zoology)

### **1. HUMAN REPRODUCTION**

- 1.1 identifies and explains the structure of male reproductive system.
- 1.2 compares the functions of various cells in the process of spermatogenesis.
- 1.3 identifies and explains the structure of female gonads and their associated parts.
- 1.4 compares the functions of various structures of female reproductive system.
- 1.5 explains and compares the process of spermiogenesis and oogenesis .
- 1.6 identifies and compares structure of sperm and ovum.
- 1.7 appraises the role of hormones in gametogenesis.
- 1.8 identifies and explains major phases of menstrual cycle.
- 1.9 compares the role of hormones in different phases of oogenesis.
- 1.10 appraises the natural phenomenon of menstrual cycle.
- 1.11 identifies and explains the importance of gametes in fertilization.
- 1.12 infers the future of fertilized ovum.
- 1.13 appraises the natural phenomenon of fertilisation and implantation.
- 1.14 identifies explains and analyse the events during pregnancy and embryonic development.
- 1.15 compares the role of hormones during pregnancy.
- 1.16 identifies the importance of colostrum.
- 1.17 explains the process of parturition.

### **2. REPRODUCTIVE HEALTH**

- 2.1 identifies and explains the importance of sex education and reproductive health.
- 2.2 identifies the importance of amniocentesis as a pre-natal diagnosis.
- 2.3 evaluates the effects of maternal and infant mortality.
- 2.4 identifies, compares and explains different types of contraceptive devices.
- 2.5 evaluates the rate of reliability in birth control by natural, temporary and permanent methods.
- 2.6 judges the medical necessity and social consequences of MTP.
- 2.7 identifies various STDs.
- 2.8 explains the reasons of transmission and prevention of STDs.
- 2.9 identifies the reasons of infertility.
- 2.10 compares , assesses and recommends the importance of Assisted Reproductive Technologies ( ART) to overcome infertility.

### **3. PRINCIPLES OF HERIDITY AND VARIATION**

- 3.1 explains the hybridisation experiments in pea plants.
- 3.2 explains law of dominance and law of segregation.

- 3.3 formulates ratio of F1 and F2 in Monohybrid cross.
- 3.4 designs different types of hybridisation experiments.
- 3.5 differentiates Mendelian inheritance and other type of inheritance.
- 3.6 explains law of independent assortment.
- 3.7 formulates ratio of F1 and F2 in Dihybrid cross.
- 3.8 designs different types of hybridisation experiments using 2 characters.
- 3.9 differentiates types of linkage and recombination.
- 3.10 explains types of sex determination in human and other animals.
- 3.11 compares and explains types of mutations.
- 3.12 assesses pedigree of human disorders.
- 3.13 explains and differentiates Mendelian and chromosomal disorders.

#### **4. MOLECULAR BASIS OF INHERITANCE**

- 4.1 explains and constructs the structure of Nucleosome and DNA
- 4.2 identifies the importance of DNA as a genetic material.
- 4.3 differentiates DNA and RNA as a genetic material.
- 4.4 identifies and explains the features of RNA.
- 4.5 identifies and explains the mode of replication in DNA.
- 4.6 constructs the models of DNA replication.
- 4.7 identifies and explains transcription unit.
- 4.8 explains the role of enzymes involved in transcription.
- 4.9 constructs models of transcription unit.
- 4.10 identifies and explains the features of genetic code.
- 4.11 differentiates codons in genetic code.
- 4.12 explains translation.
- 4.13 identifies and explains the role of enzymes involved in translation.
- 4.14 constructs model showing process of translation.
- 4.15 explains the process of gene regulation and expression in prokaryotes.
- 4.16 explains Human Genome Project.
- 4.17 evaluates the importance of Human Genome Project.
- 4.18 criticises the ethical aspects of HGP.
- 4.19 explains the importance of DNA finger printing.
- 4.20 appraises the genetic uniqueness and hereditary pattern of organisms.

#### **5. EVOLUTION**

- 5.1 identifies, compares and judges various views on the origin of earth and life.
- 5.2 designs and constructs the experimental setup of chemical origin of life.
- 5.3 analyses and justifies chemical origin as the most favourable view on evolution
- 5.4 analyses and justifies Charles Darwin's and Alfred Wallace's views on evolution of life forms.

- 5.5 identifies, compares and analyses morphological, anatomical and palentological evidences on evolution.
- 5.6 differentiates convergent and divergent evolution.
- 5.7 evaluates and reports effect of anthropogenic action on evolution.
- 5.8 identifies the role of adaptive radiation in evoluion.
- 5.9 analyses and justifies evolution of Darwin's finches , Australian marsupials and certain other placental mammals of Australia.
- 5.10 compares and analyses biological evolution of microbes.
- 5.11 appraises the importance of natural selection in biological evolution.
- 5.12 analyses different views on the origin of variation and speciation.
- 5.13 analyses and justifies Hardy Weinberg principle.
- 5.14 identifies and compares factors affecting Hardy Weinberg equilibrium.
- 5.15 identifies evolutionary history of organisms through geological periods.
- 5.16 evaluates the correlation of geological history and biological origin of life.
- 5.17 identifies stages in the evolution of man.
- 5.18 appraises various components of human evolution.

## **6. HUMAN HEALTH AND DISEASE**

- 6.1 identifies the importance of keeping healthy life style.
- 6.2 differentiates various types of diseases and their pathogens.
- 6.3 judges and concludes the mode of transmission of diseases.
- 6.4 recommends the preventive measures of diseases.
- 6.5 differentiates various types of immunity.
- 6.6 judges and concludes the importance of vaccination and immunisation.
- 6.7 explains different allergens.
- 6.8 recommends various measures to overcome allergies.
- 6.9 identifies and explains the causes and control measures of AIDS.
- 6.10 identifies and explains the causes and symptoms of cancer.
- 6.11 recommends the various diagnostic teqniques and treatment of cancer.
- 6.12 categorizes and compares useful and abusable drugs.
- 6.13 identifies and Judges the negative effects of alcohol, tobacco and drugs.
- 6.14 decides to say 'no' to drugs tobacco and alcohol.

## **7. MICROBES IN HUMAN WELFARE**

- 7.1 identifies and describes the importance of various microbes in household products such as curd, cheese, toddy etc.
- 7.2 identifies and explains the importance of various microbes in industrial products.
- 7.3 appraises the role of microbes in production of antibiotics and bio-active molecules.

- 7.4 explains and appraises the importance of microbes in sewage treatment and waste water management.
- 7.5 constructs an improvised model of sewage treatment plant.
- 7.6 identifies , explains and appraises the importance of microbes in production of biogas.
- 7.7 constructs an improvised model of biogas plant.
- 7.8 describes and concludes the importance of microbes as biocontrol agents.
- 7.9 explains and concludes the importance of microbes as biofertilisers and compares it with chemical fertilisers.

## **8. BIODIVERSITY AND CONSERVATION**

- 8.1 identifies heterogeneity in the organisms of biosphere.
- 8.2 compares and differentiates levels of biodiversity.
- 8.3 estimates and compares global and Indian biodiversity.
- 8.4 judges and appraises India as one of the 12 megadiversity countries of the world.
- 8.5 identifies the role of latitudinal gradients in the patterns of biodiversity.
- 8.6 hypothesizes the reasons for greater biodiversity of tropics.
- 8.7 analyses the graphical representation of species - area relationship.
- 8.8 assesses the significance of “Z” value in species - area relationship.
- 8.9 examines the relation between species diversity, Biomass and Productivity.
- 8.10 assesses and appraises importance of species diversity to ecosystem.
- 8.11 identifies 'Evil Quartets' as the cause of biodiversity loss.
- 8.12 analyses the effects of biodiversity loss.
- 8.13 criticises the uncivilised attitudes which leads to biodiversity loss.
- 8.14 appraises earth's rich biodiversity which is vital for the very survival of mankind.
- 8.15 justifies the need of biodiversity conservation.
- 8.16 identifies and compares various strategies for conserving biodiversity.
- 8.17 appraises various plans, designs and rules for conserving biodiversity.

## Scheme of Work (Botany)

Unit	Chapter	Month	Periods	Score weight
<b>Term - 1</b>				
VI	1. Reproduction in Organisms	June	8	2
VI	2. Reproduction in Flowering Plants	June-July	15	5
VIII	3. Strategies for Enhancement in Food Production	July-August	12	3
IX	4. Biotechnology : Principles and Processes (upto Page 197)	August	4	4
<b>Term - 2</b>				
IX	4. Biotechnology : Principles and Processes-continued	September	9	
IX	5. Biotechnology and its Applications	October	10	4
X	6. Organisms and Populations	October - November	12	4
X	7. Ecosystem	November - December	10	4
<b>Term - 3</b>				
X	8. Environmental Issues	December - January	10	4
			<b>90</b>	<b>30</b>
	<b>Practical</b>		<b>30</b>	<b>20</b>
	<b>Total</b>		<b>120</b>	<b>50</b>

## Scheme of Work (Zoology)

Unit	Chapter	Month	Periods	Score weight
<b>Term - 1</b>				
VI	Human Reproduction	June	10	3
VI	Reproductive Health	June-July	7	3
VII	Principles of Heridity and Variation	July	15	5
<b>Term - 2</b>				
VII	Molecular basis of Inheritance	August September	17	6
VII	Evolution	September	13	4
VIII	Human Health and Diseases	October - November	9	4
<b>Term - 3</b>				
VIII	Microbes in Human Welfare	December	7	2
X	Biodiversity and Conservation	January	10	3
	<b>Practical</b>		<b>90</b>	<b>30</b>
	<b>Total</b>		<b>30</b>	<b>20</b>
			<b>120</b>	<b>50</b>

## DESIGN OF THE QUESTION PAPER - I

### WEIGHT TO CONTENT AND LEARNING OUTCOMES (BOTANY)

No.	Content/Chapters	LO. No.	Score	Percentage
1	Reproduction in Organisms	1.1, 1.4	2	6.7
2	Sexual Reproduction in Flowering Plants	2.2, 2.5	5	16.8
3	Strategies for Enhancement in Food Production	3.6	3	10
4	Biotechnology : Principles and Processes	4.7, 4.4, 4.2	4	13.3
5	Biotechnology and its Applications	5.3, 5.4, 5.7	4	13.3
6	Organisms and Populations	6.4, 6.11	4	13.3
7	Ecosystem	7.3, 7.8	4	13.3
8	Environmental Issues	8.5	4	13.3
	<b>Total</b>		<b>30</b>	<b>100%</b>

### WEIGHT TO CONTENT & LEARNING OUTCOMES ( ZOOLOGY)

No.	Content/Chapters	L.O. No.	Score	Percentage
1	Human Reproduction	1.3, 1.1	3	10
2	Reproductive health	2.4, 2.11	3	10
3	Principles of Inheritance and Variation	3.13, 3.9 3.10, 3.7	5	16.6
4	Molecular Basis of Inheritance	4.13, 4.7 4.10, 4.16 4.7, 4.5	6	20
5	Evolution	5.18 5.13	4	13.3
6	Common Human Diseases	6.2, 6.9 6.5	4	13.3
7	Microbes in Human Welfare	7.2, 7.2	2	6.7
8	Biodiversity and Conservation	8.16	3	10
	<b>Total</b>		<b>30</b>	<b>100%</b>



### WEIGHT TO THINKING SKILLS (BOTANY)

No.	Thinking Skills	Score	Percentage
1	For Conceptual Attainment	18	60
2	For Conceptual Generation	12	40
	Total	30	100

### WEIGHT TO FORM OF QUESTIONS (BOTANY)

No.	Type	No. of Questions	Score	Percentage
1	Objective	6	6	20
2	Short Answer	9	18	60
3	Essay	2	6	20
	Total	17	30	100

### WEIGHT TO THINKING SKILLS ( ZOOLOGY)

No.	Thinking Skills	Score	Percentage
1	Conceptual Attainment	18	60
2	Conceptual Generation	12	40
	Total	30	100

### WEIGHT TO FORM OF QUESTIONS (ZOOLOGY)

No.	Type	No. of Questions	Score	Percentage
1	Objective	6	6	20
2	Short Answer	7	18	60
3	Essay	2	6	20
	Total	15	30	100

### BLUE PRINT (BOTANY)

Sl. No.	Thinking skills Content	Thinking skills for CA			Thinking skills for CG			Total
		OBJ	SA	Essay	OBJ	SA	Essay	
1.	Reproduction in Organisms	1(1)			1(1)			2(2)
2	Sexual Reproduction in Flowering Plants	1(1)	2(1)			2(1)		5(3)
3	Strategies for Enhancement in Food Production	1(1)	2(1)					3(2)
4	Biotechnology : Principles and Processes			3(1)C	1(1)			4(2)
5	Biotechnology and its Applications		2(1)			2(1)C		4(2)
6	Organisms and Populations		2(1)			2(1)		4(2)
7	Ecosystem		2+2(2)					4(2)
8	Environmental Issues				1(1)		3(1)	4(2)
	<b>Total</b>	<b>3(3)</b>	<b>12(6)</b>	<b>3(1)</b>	<b>3(3)</b>	<b>6(3)</b>	<b>3(1)</b>	<b>30(17)</b>

Note : Number inside the bracket indicates number of questions

C - Indicates choice

### BLUE PRINT (ZOOLOGY)

Unit	Thinking skills Content	Thinking skills for Conceptual Attainment			Thinking skills for Conceptual Generation			Total
		OB	SA	Essay	OB	SA	Essay	
1	Human Reproduction		2(1)		1(1)			3(1)
2	Reproductive health	1(1)	2(1)					3(2)
3	Principles of Inheritance and Variation		2(1)				3(1)C	5(2)
4	Molecular Basis of Inheritance	1(1)	2(1)		1(1)	2(1)		6(4)
5	Evolution		2(1)			2(1)		4(2)
6	Common Human Diseases	1(1)		3(1)C				4(2)
7	Microbes in Human Welfare		1(1)			1(1)		2(1)
8	Bio diversity and Conservation	1(1)				2(1)		3(1)
	<b>Total</b>	<b>4(4)</b>	<b>11(6)</b>	<b>3(1)</b>	<b>2(2)</b>	<b>7(4)</b>	<b>3(1)</b>	<b>30(15)</b>

# Sample Question Paper - I

Reg No: .....

Name : .....

**HSE - II  
March**

## PART - III - BIOLOGY

Maximum : 60 Scores

Time: 2 hrs

Cool off time : 20 Minutes

Preparatory time : 5 Minutes

### General Instructions to candidates:

- There is a 'Cool off time' of 10 minutes each for Botany and Zoology in addition to the writing time of 1 hour each. Further there is 5 minutes 'preparatory time' at the end of Botany examination and before the commencement of Zoology examination.
- You are neither allowed to write your answers nor to discuss anything with others during the 'cool off time' and preparatory time.
- Use the 'cool off time' to get familiar with questions and to plan your answers.
- Read the questions carefully before answering.
- All questions are compulsory and only internal choice is allowed.
- When you select a question, all the sub-questions must be answered from the same question itself.
- Calculations, figures and graphs should be shown in the answer sheet itself.
- Malayalam version of the questions is also provided.
- Give equations wherever necessary.
- Nonprogrammable calculators are allowed in the Examination Hall.

### പൊതുനിർദ്ദേശങ്ങൾ

- നിർദ്ദിഷ്ട സമയത്തിന് പുറമെ ബോട്ടണിക്കും സൂവോളജിക്കും 10 മിനിട്ട് വീതം 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും. കൂടാതെ ബോട്ടണി പരീക്ഷയ്ക്കുശേഷം സൂവോളജി പരീക്ഷ തുടങ്ങുന്നതിനു മുമ്പ് 5 മിനിട്ട് തയ്യാറെടുപ്പുകൾ നടത്തുന്നതിനായി നൽകുന്നതാണ്. ഈ സമയത്ത് ചോദ്യങ്ങൾക്ക് ഉത്തരം എഴുതാനോ, മറ്റുള്ളവരുമായി ആശയവിനിമയമോ പാടില്ല.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- എല്ലാ ചോദ്യങ്ങൾക്കും ഉത്തരം എഴുതണം.
- ഒരു ചോദ്യനമ്പർ ഉത്തരമെഴുതാൻ തെരഞ്ഞെടുത്ത് കഴിഞ്ഞാൽ ഉപചോദ്യങ്ങളും അതേ ചോദ്യനമ്പറിൽ നിന്ന് തന്നെ തെരഞ്ഞെടുക്കേണ്ടതാണ്.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽത്തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നൽകിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ പരീക്ഷാഹാളിൽ ഉപയോഗിക്കാം.

# PART - A

## BOTANY

Maximum : 30 Scores

Time: 1 hour

Cool off time : 10 Minutes

<p>1. Polymerase Chain Reaction helps in .....</p> <p>(A) DNA synthesis (B) DNA amplification (C) Protein synthesis (D) Aminoacid synthesis</p> <p style="text-align: right;">(1)</p> <p>2. Name a unicellular fungus which reproduces asexually by producing small buds.</p> <p style="text-align: right;">(1)</p> <p>3. Which of the following animal is not a hermaphrodite?</p> <p>(A) Tapeworm (B) Leech (C) Earthworm (D) Cockroach</p> <p style="text-align: right;">(1)</p> <p>4. Decomposition is the breakdown of complex organic matter into simple inorganic substances. Which are the important steps in the process of decomposition.</p> <p style="text-align: right;">(2)</p> <p>5. Plants, bacteria, fungi and animals whose genes have been altered by manipulation are called Genetically Modified Organisms. Write any four uses of GMO.</p> <p style="text-align: right;">(2)</p> <p>6.A. A novel strategy was adopted to prevent the infection of nematode worms in tobacco plants. It is known as</p>	<p>1. പോളിമറൈസ് ചെയിൻ റിയാക്ഷൻ ..... ന് സഹായിക്കുന്നു.</p> <p>(A) DNA നിർമ്മിതി (B) DNA ആവർദ്ധനം (C) മാംസ്യനിർമ്മിതി (D) അമിനോഅമ്ലനിർമ്മിതി</p> <p style="text-align: right;">(1)</p> <p>2. ചെറിയ മുകുളങ്ങൾ വഴി അലൈംഗിക പ്രത്യുൽപ്പാദനം നടത്തുന്ന ഒരു ഏകകോശ ഫംഗസിന്റെ പേരെഴുതുക.</p> <p style="text-align: right;">(1)</p> <p>3. താഴെപ്പറയുന്നതിൽ ഉഭയലിംഗജീവി അല്ലാത്തതേത്?</p> <p>(A) നാടവിര (B) കുള്ളയട്ട (C) മണ്ണിര (D) പാറ്റ</p> <p style="text-align: right;">(1)</p> <p>4. സങ്കീർണ്ണ ഘടനയുള്ള ജൈവവസ്തുക്കൾ വിഘടിച്ചു ലഘുഘടനയുള്ള അകാർബണിക തന്മാത്രകളായി മാറുന്ന പ്രക്രിയയാണ് വിഘടനം. വിഘടനത്തിന്റെ വിവിധ ഘട്ടങ്ങൾ ഏവ?</p> <p style="text-align: right;">(2)</p> <p>5. സസ്യങ്ങൾ, ബാക്ടീരിയ, ഫംഗസുകൾ, ജന്തുക്കൾ എന്നിവയുടെ ജനിതകഘടനയിൽ മാറ്റം വരുത്തുമ്പോഴാണ് അവയെ ജനിതകമാറ്റം വരുത്തിയ ജീവികൾ എന്നു പറയുന്നത്. അവയുടെ നാല് ഉപയോഗങ്ങൾ എഴുതുക.</p> <p style="text-align: right;">(2)</p> <p>6.A. പുകയിലച്ചെടിയിലെ നിമറ്റോഡുവീരുകളെ തടയാൻ ഒരു നൂതനമാർഗ്ഗം സ്വീകരിച്ചിരിക്കുന്നു. ഇതിനെ RNA ഇന്റർഫെറൻസ് എന്നുപറയുന്നു.</p>
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RNA interference. How does this strategy operate in tobacco plants? (2)  
(OR)

B. The main challenge for the production of insulin using **rDNA** technique was getting insulin assembled into a mature form. How did **Eli Lilly** company overcome this challenge.

(2)

7. Adaptation is any attribute of the organism that enables the organism to survive and reproduce in its habitat. Write any two morphological adaptations shown by desert plants.

(2)

8. A diagrammatic representation of the mature embryo sac is given below. Copy the diagram in your answer sheet and label the parts noted as A, B, C and D.

(2)

പുകയിലച്ചെടിയിൽ ഈ പ്രക്രിയ നടക്കുന്ന തെങ്ങനെയാണ്? (2)  
(അല്ലെങ്കിൽ)

B. **rDNA** ടെക്നോളജി വഴി ഇൻസുലിൻ ഉണ്ടാക്കുന്നതിലെ പ്രധാന തടസ്സം അതിനെ ശരിയായ രൂപത്തിൽ മാറ്റാൻ പ്രയാസമാണ് എന്നതാണ്. എലി ലില്ലി കമ്പനി ഈ പ്രശ്നം പരിഹരിച്ച് ഇൻസുലിൻ നിർമ്മിച്ചത് എങ്ങനെയാണ്?

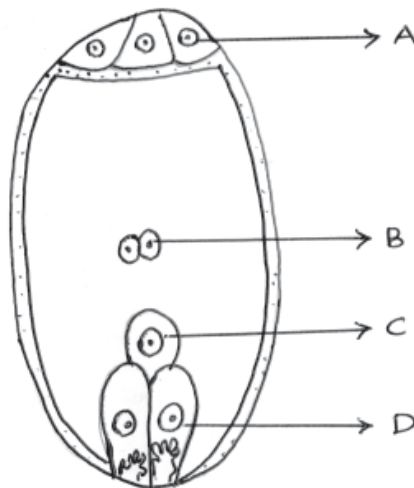
(2)

7. ഒരു ജീവിക്ക് അതിന്റെ ചുറ്റുപാടുമായി പൊരുത്തപ്പെടാനും പ്രത്യുൽപ്പാദനം നടത്താനും സഹായിക്കുന്ന സവിശേഷതകളെയാണ് അനുകൂലനങ്ങൾ എന്നുവിളിക്കുന്നത്. മരുരുഹങ്ങളുടെ രണ്ട് ബാഹ്യ അനുകൂലനങ്ങൾ എഴുതുക.

(2)

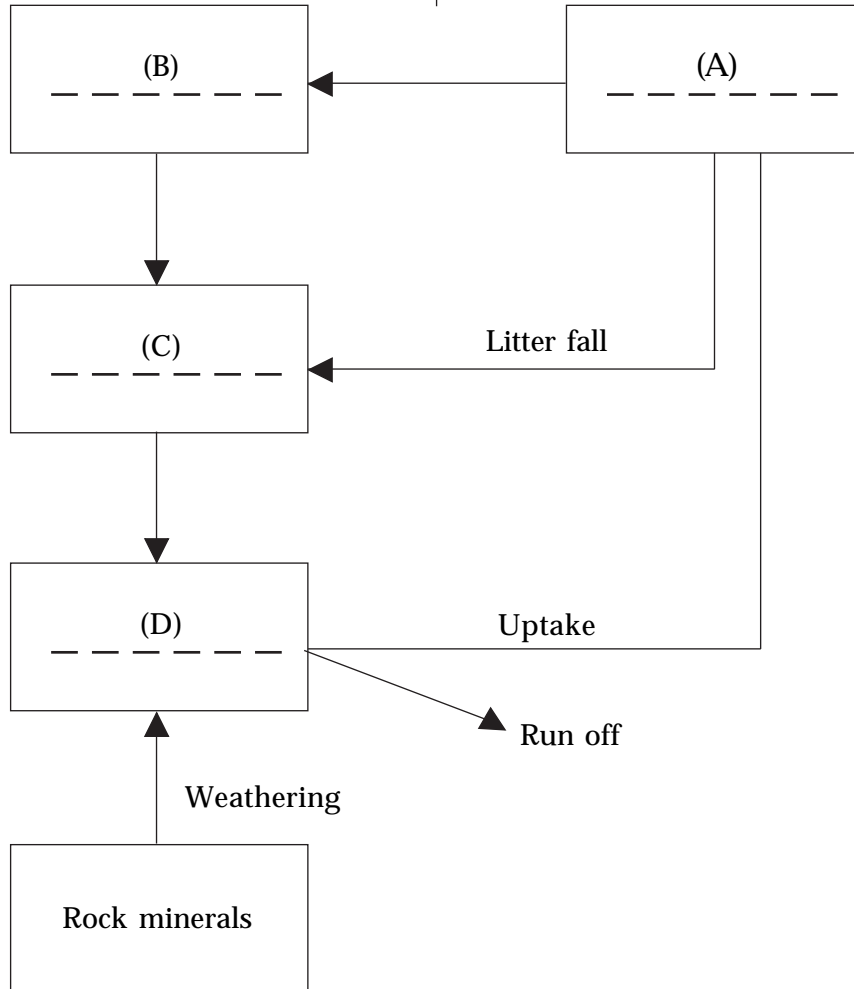
8. ഒരു ഭ്രൂണസഞ്ചിയുടെ ചിത്രമാണ് ചുവടെ കൊടുത്തിരിക്കുന്നത്. ഈ ചിത്രം ഉത്തരക്കടലാസിൽ വരച്ചശേഷം A, B, C, D എന്നീ ഭാഗങ്ങൾ അടയാളപ്പെടുത്തുക.

(2)



9. A simplified model of phosphorus cycling in a terrestrial ecosystem is given below. Fill up the blank columns of this flow chart.

(2)



10. Mutualism is the interaction which confers benefits on both the interacting species. Write two examples for mutualism among organisms.

(2)

11.a. Which cell division results in the production of megaspores from Megaspore Mother Cell?

b. Write down the major difference between microsporogenesis and megasporogenesis in flowering plants.

(3)

9. ഒരു കര ആവാസവ്യവസ്ഥയിലെ ഫോസ്ഫറസ് ചക്രത്തിന്റെ ലഘൂരുപമാണ് താഴെക്കൊടുത്തിരിക്കുന്നത്. ഈ ഫ്ലോ ചാർട്ടിലെ കോളങ്ങൾ അനുയോജ്യമായി പൂരിപ്പിക്കുക.

(2)

10. രണ്ടു ജീവികൾക്കും പ്രയോജനം ഉണ്ടാകുന്ന ഒരു പരസ്പരാശ്രയത്വ രീതിയാണ് മ്യൂച്വലിസം. മ്യൂച്വലിസത്തിന് രണ്ടുദാഹരണങ്ങൾ എഴുതുക.

(2)

11a. മെഗാസ്പോർ മദർസെല്ലിൽ നിന്നും മെഗാസ്പോർ ഉണ്ടാകുന്നത് ഏത് കോശവിഭജന ഫലമായാണ്?

b. സപുഷ്പികളിലെ മൈക്രോസ്പോറോജനസിസും, മെഗാസ്പോറോജനസിസും തമ്മിലുള്ള പ്രധാന വ്യത്യാസം എഴുതുക.

(3)

12.a. Which of the following is a suitable example for semi dwarf variety of wheat.

- (A) IR-8                      (B) Ratna
- (C) Sonalika                (D) Taichung Native I

b. What is biofortification? Suggest any two objectives of biofortification.

(3)

13.A. The following are the major steps of Recombinant DNA technology. Arrange them in correct sequential order.

1. Obtaining the foreign gene product
2. Amplification of gene of interest using PCR
3. Downstream processing
4. Cutting of DNA at specific locations
5. Insertion of recombinant DNA into the host cell/organism.
6. Isolation of genetic material

(3)

(OR)

B. Genetic Engineering can be accomplished only if we have some key tools. *Restriction Endonuclease* is such a tool. Suggest the method of naming of Restriction Endonucleases with reference to EcoRI.

(3)

14.a. Which of the following is a greenhouse gas?

- (A) Carbon monoxide
- (B) Carbon dioxide
- (C) Nitrogen
- (D) Ozone

b. Increase in the level of greenhouse gases has led to considerable heating of earth leading to global warming. How can we control global warming?

(4)

12.a. താഴെപ്പറയുന്നതിൽ ഗോതമ്പിന്റെ സെമി ഡ്വാർഫ് ഇനം ഏതാണ്?

- (A) ഐ ആർ-8            (B) രത്ന
- (C) സൊണാലിക        (D) തായ്ചുങ് നേറ്റീവ് I

b. ബയോ ഫോർട്ടിഫിക്കേഷൻ എന്നാലെന്ത്? ഇതിന്റെ ഏതെങ്കിലും രണ്ട് ഉദ്ദേശ്യങ്ങൾ എഴുതുക.

(3)

13.A. റീകോമ്പിനന്റ് DNA ടെക്നോളജിയുടെ പ്രധാന ഘട്ടങ്ങളാണ് ചുവടെ ചേർത്തിരിക്കുന്നത്. അവയെ ശരിയായ ക്രമത്തിൽ എഴുതുക.

1. Obtaining the foreign gene product
2. Amplification of gene of interest using PCR
3. Downstream processing
4. Cutting of DNA at specific locations
5. Insertion of recombinant DNA into the host cell/organism.
6. Isolation of genetic material

(3)

(അല്ലെങ്കിൽ)

B. ജനിതക എഞ്ചിനീയറിംഗ് പ്രാവർത്തികമാക്കാൻ കുറേ ടൂളുകൾ ആവശ്യമാണ്. റെസ്‌ട്രിക്‌ഷൻ എൻഡോന്യൂക്ലിയേസ് അത്തരത്തിലൊരു ടൂൾ ആണ്. EcoRI നെ ആധാരമാക്കി റെസ്‌ട്രിക്‌ഷൻ എൻഡോന്യൂക്ലിയേസുകൾക്ക് പേരിടുന്ന രീതി എഴുതുക.

(3)

14.a. താഴെപ്പറയുന്നതിൽ ഒരു ഹരിതഗൃഹ വാതകം ഏത്?

- (A) കാർബൺ മോണോക്സൈഡ്
- (B) കാർബൺ ഡൈഓക്സൈഡ്
- (C) നൈട്രജൻ
- (D) ഓസോൺ

b. ഹരിതഗൃഹ വാതകങ്ങളുടെ ആധിക്യം ആഗോളതാപനത്തിനിടയാക്കുന്നു. ആഗോള താപനം കുറയ്ക്കാനുള്ള മാർഗ്ഗങ്ങൾ നിർദ്ദേശിക്കുക.

(4)

## Part B ZOOLOGY

Maximum : 30 Score

Time: 1 hrs  
Cool off time : 10 Minutes

1.a) Arrange the following terms into two based on the mode of biodiversity conservation.

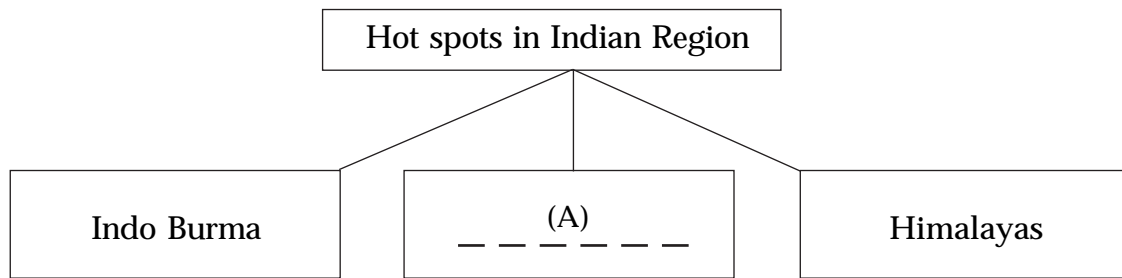
Hot spots, Zoological Park, Sacred groves, Wild life Safari Parks (2)

1. താഴെ കൊടുത്തിരിക്കുന്ന പദങ്ങളെ ജൈവ-വൈവിധ്യ സംരക്ഷണരീതികൾ അനുസരിച്ച് രണ്ടായി തരം തിരിക്കുക.

Hot spots, Zoological Park, Sacred groves, Wild Life Safari Parks (2)

b. Fill the blank box noted as A. (1)

b. A എന്ന് അടയാളപ്പെടുത്തിയ ബോക്സിലെ വിട്ടുപോയ ഭാഗം പൂർത്തീകരിക്കുക. (1)



2. Transferring of Zygote/embryo with more than 8 blastomeres into fallopian tube is .....

(1)

2. എട്ടിലധികം ബ്ലാസ്റ്റോമിയെഴ്സ് ഉള്ള സൈഗോട്ടിനെ ഫാലോപ്പിയൻ ട്യൂബിലേക്ക് മാറ്റി നിക്ഷേപിക്കുന്ന പ്രക്രിയ ആണ്.....

(1)

3. Name the surgical methods of birth control, write the merit and demerit of the above methods.

(2)

3. ജനനനിയന്ത്രണ മാർഗ്ഗങ്ങളിലെ സർജിക്കൽ മെത്തേഡ്സിന്റെ പേര് എഴുതുക. ആ മാർഗ്ഗങ്ങളുടെ മേന്മയും ദോഷവും എഴുതുക.

(2)

4. (a) How many sperms and ova are produced from 50 primary spermatocyte and 50 primary oocyte respectively?

(100 sperms and 100 eggs, 200 sperms and 100 ova, 200 sperms and 50 ova, 50 sperms and 50 ova)

(1)

4. (a) 50 പ്രൈമറി സ്പെർമറ്റോസൈറ്റിൽ നിന്നും 50 പ്രൈമറി ഊസൈറ്റിൽ നിന്നും എത്ര സ്പെർമും ഓവയും ഉണ്ടാകും?

(100 sperms and 100 eggs, 200 sperms and 100 ova, 200 sperms and 50 ova, 50 sperms and 50 ova)

(1)

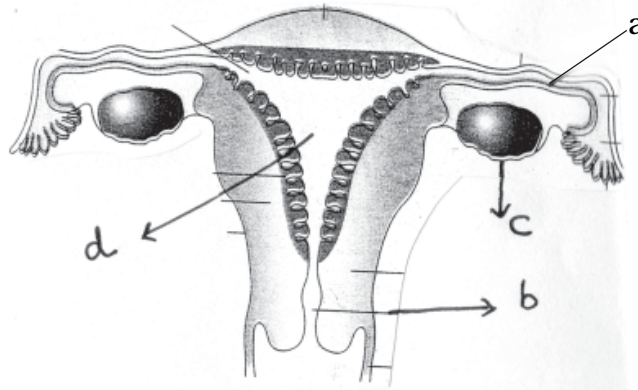


(b) Observe the diagram carefully and identify a, b, c and d.

(2)

(b) താഴെ കൊടുത്തിരിക്കുന്ന ചിത്രം ശ്രദ്ധയോടെ നിരീക്ഷിച്ച് a, b, c, d എന്നിവ തിരിച്ചറിഞ്ഞ് എഴുതുക.

(2)



5. (a) Name the microorganism which produce butyric acid.

(1)

5. (a) ബുട്ട്യറിക് ആസിഡ് ഉൽപ്പാദിപ്പിക്കുന്ന സൂക്ഷ്മജീവിയുടെ പേര് എഴുതുക.

(1)

(b) 'Secondary treatment in sewage water treatment is called biological'. Justify

(1)

(b) 'സീവേജ് വാട്ടർ ട്രീറ്റ്മെന്റിലെ സെക്കണ്ടറി ട്രീറ്റ്മെന്റ് ബയോളജിക്കൽ' എന്നറിയപ്പെടുന്നു. ന്യായീകരിക്കുക.

(1)

6.A. Carefully read the following symptoms and identify the genetic disorders.

a) Autosomal linked recessive trait where RBC become sickle shaped.

b) Inborn error of metabolism, where phenyl alanine accumulates in blood.

c) Disorder due to absence of 'X' chromosome. (3)

OR

B. Write the contribution of the following biologists in connection with genetics.

- 1) Henking
- 2) T.H. Morgan
- 3) Sutton and Boveri (3)

6.A. താഴെ കൊടുത്തിരിക്കുന്നത് ജനിതക രോഗങ്ങളുടെ ലക്ഷണങ്ങളാണ്. ശ്രദ്ധയോടെ വായിച്ച് അവ ഏതെന്ന് തിരിച്ചറിയുക.

(a) ഓട്ടോസോമൽ ലിങ്ക്ഡ് റിസസീവ് ട്രൈറ്റ്, അവരിൽ RBC അരിവാൾ രൂപത്തിലായിരിക്കും.

(b) ഇൻബോൺ എൻ ഓഫ് മെറ്റബോളിസം, അവരിൽ രക്തത്തിൽ ഫിനൈൽ അലാനിന്റെ അളവ് വളരെ കൂടുതൽ ആയിരിക്കും.

(c) 'X' ക്രോമസോമിന്റെ അഭാവം മൂലം ഉണ്ടാകുന്ന രോഗം. (3)

OR

B. താഴെ കൊടുത്തിരിക്കുന്ന ബയോളജിസ്റ്റുകൾ ജനിറ്റിക്സുമായി ബന്ധമുള്ളവരാണ്. അവരുടെ ശാസ്ത്ര സംഭാവനകൾ എഴുതുക.

- 1) ഹെൻകിംഗ്
- 2) ടി.എച്ച്. മോർഗൻ
- 3) സട്ടൺ ആൻഡ് ബോവേറി (3)

7. Write the gametes produced from self crossing of genotype RrYy.

(2)

7. RrYy എന്നതിനെ സ്വപരാഗണം നടത്തുമ്പോൾ ലഭിക്കുന്ന ഗാമീറ്റുകൾ ഏതെല്ലാമെന്ന് എഴുതുക. (2)

8. Arrange the following primates in correct sequence of evolution to man.
- Dryopethicus
  - Homo erectus
  - Homo habilis
  - Neanderthal man
- (2)

9. Carefully read the following statement and answer the questions.
- "A population remain constant and stable in its allele frequency from generation to generation. Such population shows genetic equilibrium".
- Name the underlying principle in the above statement. (1)
  - Name any two factors which affect genetic equilibrium. (1)

- 10.A. Complete the table by using hints from brackets.
- (Haemophilus influenzae, Common cold, Salmonella typhi, Running nose & Nasal congestion, Pneumonia, Ascariasis, Sustained fever 39°C - 40°C, Malaria)
- (3)

Disease	Pathogen	Symptoms
Typhoid	(A) .....	(B) .....
(C) .....	Rhino virus	(D) .....
(E) .....	(F) .....	Fever, headache, finger and nails become grey to blue colour

OR

- B. Categorise the following organs into two, with appropriate headings.
- Thymus, Spleen, Bone marrow, Peyer's Patches
- (3)

11. In AIDS, HIV attacks on

8. താഴെ കൊടുത്തിരിക്കുന്ന പ്രൈമേറ്റുകളെ മനുഷ്യ പരിണാമത്തിന്റെ ശരിയായ ശൃംഖലയായി ക്രമീകരിക്കുക.
- ഡ്രയോപെത്തിക്കസ്
  - ഹോമോ ഇറക്റ്റസ്
  - ഹോമോ ഹാബിലിസ്
  - നിയോന്ഡെർതൽ മാൻ
- (2)

9. താഴെ കൊടുത്തിരിക്കുന്ന പ്രസ്താവന ശ്രദ്ധയോടെ വായിച്ച് ചോദ്യങ്ങൾക്ക് ഉത്തരം എഴുതുക.
- "A population remain constant and stable in its allele frequency from generation to generation. Such population shows genetic equilibrium".
- മുകളിൽ തന്നിരിക്കുന്ന പ്രസ്താവനയിൽ അടങ്ങിയിരിക്കുന്ന തത്വം ഏതെന്ന് എഴുതുക. (1)
  - ജനറ്റിക് ഇക്വിലിബ്രിയം ബാധിക്കുന്ന ഏതെങ്കിലും രണ്ട് ഘടകങ്ങളുടെ പേരെഴുതുക. (1)

- 10.A. ബ്രാക്കറ്റിൽ നൽകിയിരിക്കുന്ന സൂചകങ്ങൾ ഉപയോഗിച്ച് പട്ടിക പൂർത്തീകരിക്കുക.
- (Haemophilus influenzae, Common cold, Salmonella typhi, Running nose & Nasal congestion, Pneumoniae, Ascariasis, Sustained fever 39°C - 40°C, Malaria)
- (3)

OR

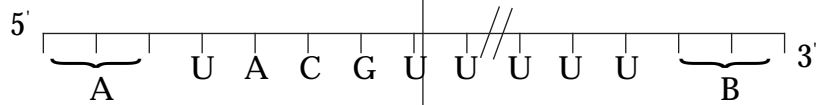
- B. താഴെ കൊടുത്തിരിക്കുന്ന അവയവങ്ങളെ ഉചിതമായ തലക്കെട്ടോടെ രണ്ടായി തരംതിരിക്കുക.
- Thymus, Spleen, Bone marrow, Peyer's Patches
- (3)

(Helper-T cells, B-Lymphocytes, Monocytes, RBC) (1)

12. Read the following and select the correct statement/statements

- a) 23 s RNA act as a enzyme in prokaryotes.
  - b) In prokaryotes DNA is monocistronic
  - c) Francis Crick proposed the Central Dogma of Molecular biology
  - d) In Eukaryotes three types of RNA polymerases are present.
- (a only, a and b, a and c, a and d) (1)

13. Study the mRNA segment given below which is ready to be translated into a polypeptide chain and answer the following questions.



- a) What is A and B denotes? (1)
- b) Write the triplet codon for A and B (1)

14. Carefully read the statement given below and correct the digits in the brackets a and b, if it is wrong.

"In man, chromosome 1 has most genes (a) (1968) and the Y chromosome has the fewest (b) (231)" (1)

15. Write the functions of the following

- a) 5-methyl Guanosine triphosphate (5<sup>m</sup> G PPP)
- b) DNA Ligase (2)

11. AIDS ൽ HIV ആക്രമിക്കുന്നത് (Helper-T cells, B-Lymphocytes, Monocytes, RBC) (1)

12. താഴെ കൊടുത്തിരിക്കുന്നവ വായിച്ച് അതിൽ നിന്നും ശരിയായ പ്രസ്താവന/പ്രസ്താവനകൾ തിരഞ്ഞെടുക്കുക.

- a) 23 s RNA act as a enzyme in Prokaryotes.
  - b) In prokaryotes DNA is monocistronic
  - c) Francis Crick proposed the Central Dogma of Molecular biology
  - d) In Eukaryotes three types of RNA polymerases are present.
- (a only, a and b, a and c, a and d) (1)

13. താഴെ കൊടുത്തിരിക്കുന്ന mRNA സെഗ്മെന്റ് ഒരു പോളിപെപ്റ്റൈഡ് ചെയ്നായി ട്രാൻസ്ലേറ്റ് ചെയ്യാൻ തയ്യാറായി നിൽക്കുന്നതാണ്. അതിനെ പഠന വിധേയമാക്കി ചോദ്യങ്ങൾക്ക് ഉത്തരം എഴുതുക.

- a) A, B എന്നിവ എന്തിനെയാണ് സൂചിപ്പിക്കുന്നത്? (1)
- b) A കും B കും ആവശ്യമായ ട്രിപ്ലറ്റ് കോഡോൺ എഴുതുക. (1)

14. താഴെ കൊടുത്തിരിക്കുന്ന പ്രസ്താവന വായിച്ച് ബ്രാക്കറ്റിൽ നൽകിയ അക്കങ്ങളിൽ (a) (b) തെറ്റുകൾ ഉണ്ടെങ്കിൽ തിരുത്തുക.

"In man, chromosome 1 has most genes (a) (1968) and the Y chromosome has the fewest (b) (231)" (1)

15. താഴെ കൊടുത്തിരിക്കുന്നവയുടെ ധർമ്മങ്ങൾ എഴുതുക.

- a) 5-methyl Guanosine triphosphate (5<sup>m</sup> G PPP)
- b) DNA Ligase (2)

**Sample Question Paper - I (Botany)**  
**Answer Key**

Qn. No.	Sub Qn. No.	Value points/Scoring indicators	Score splitted	Total score
1		(B) DNA Amplification	1	1
2		Yeast	1	1
3		(D) Cockroach	1	1
4		Fragmentation, leaching, catabolism, humification and mineralisation. (Any four points give full score)	2	2
5		Any four uses of Genetically Modified Organisms	$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$	2
6	A.	Using Agrobacterium vectors, nematode specific genes were introduced into the host plant. So both sense and antisense RNA are formed. These two RNA form a double stranded RNA that initiate RNAi, and thus silence the mRNA of nematode.	$\frac{1}{2} \times 4 = 2$	2
		OR	OR	
	B.	Eli Lilly company prepared two DNA sequences corresponding to A & B and introduced in the plasmids of E.coli to produce insulin chains. Chains A & B combined to get insulin.	1	2
			1	
7		Thick cuticle on their leaf surface/ Stomata are arranged in deep pits to minimise water loss/CAM pathway/No leaves, which are reduced to spines / Photosynthesis by stem (Any two adaptations give full score)	1 1	2
8		A = Antipodals B = Secondary nucleus / Polar nuclei C = Egg D = Synergid	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2
9		A = Producers B = Consumers C = Detritus D = Soil solution	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2
10		Any two examples for mutualism give full score	1+1	2
11	(i)	Meiosis / Reduction division	1	3
	(ii)	Microsporogenesis : All microspores become functional pollen grains	1	
		Megasporogenesis : After meiosis, only one megaspore becomes functional while others degenerate or Any other correct responses.	1	

Qn. No.	Sub Qns	Value points/Scoring indicators	Score splitted	Total score
12	(a) (b)	(C) Sonalika Breeding crops with higher levels of vitamins and minerals or protein and healthier fats Protein content and quality / oil content & quality / vitamin content / mineral content Any two objectives	1 1 1	3
13		1. Isolation of genetic material 2. Cutting of DNA at specific locations 3. Amplification of gene of interest using PCR 4. Insertion of recombinant DNA into the host cell 5. Obtaining the foreign gene product 6. Downstream processing  OR 1. First letter from the name of the genus of bacterium 2. Second two letters from species 3. Next letter from the name of strain 4. Roman number is the order of discovery Any three points give full score	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$  1 1 1	3       3
14	(i) (ii)	(B) Carbon dioxide Any three points regarding the control of global warming	1 3	4
		<b>TOTAL</b>	<b>30</b>	<b>30</b>

**Sample Question Paper - I (Zoology)**  
**Answer Key**

Qn. No.	Sub Qns	Value points	Score	Total
1	a.	Hotspots and sacred grove Zoological Park and Wild Life Safari Park	$\frac{1}{2} \times 2 = 1$ $\frac{1}{2} \times 2 = 1$	2
	b.	A. Western ghats	1	1
2		ZIFT	1	1
3		Vasectomy & Tubectomy Merit - highly effective Demerit - Reversibility is poor	$\frac{1}{2} \times 2 = 1$ $\frac{1}{2} + \frac{1}{2} = 1$	2
4		a - 200 sperms & 50 ova	1	1
	b -	a. Fallopian tube b. Vagina c. Ovary d. Uterus	$\frac{1}{2} \times 4 = 2$	2
5		a. Clostridium butylicum b. Carried with the help of aerobic bacteria	1 1	2
6	A	a - Sickle cell anaemia b - Phenyl Ketonuria c - Turners' Syndrome	1 1 1	3
		OR		
	B	1 - Henking - X - body 2 - T.H. Morgan - Linkage in Drosophila 3 - Sutton & Boveri - Chromosomal Theory of inheritance	1 1 1	3
7		RY, Ry, rY, ry	$\frac{1}{2} \times 4$	2
8		Dryopithecus - Homo habilis Homo erectus - Neanderthal man	$\frac{1}{2} \times 4$	2
9		a - Hardey - Weinberg Principle b - Mutation, Natural Selection Migration, Genetic drift (Any two)	1 $\frac{1}{2} \times 2 = 1$	2
10	A	A - Salmonella typhi B - Sustained fever 39-40°C C - Common cold D - Running Nose and Nasal congestion E - Pneumonia F - Haemophilus influenzae	$\frac{1}{2} \times 6$	3
		OR		
	B	Primary Lymphoid Organs → Thymus, Bone marrow Secondary Lymphoid Organs → Spleen, Peyer's Patches	$\frac{1}{2} \times 3$ $\frac{1}{2} \times 3$	3

### Answer Key

Qn. No.	Sub Qns	Value points	Score	Total
11		Helper T - Cells	1	1
12		a and d	1	1
13		(a) A - start codon B - stop codon (b) A - AUG B - UAA, UGA, UAG (any one)	$\frac{1}{2} \times 2 = 1$  $\frac{1}{2} \times 2 = 1$	2
14		a - 2968 instead of 1968 b - No change	1	1
15		a - act as cap b - Joins DNA fragments during replication	1 1	2
		<b>TOTAL</b>		<b>30</b>

## QUESTION BASED ANALYSIS - BOTANY

Qn. No.	Content/ Chapter	LO. No.	Specific thinking skills (no.)	Form of Questions	Score	Time
1.	Biotechnology : Principles and Processes	4.7	1.1	OBJ	1	1 min.
2.	Reproduction in Organisms	1.1	4.1, 2.3	OBJ	1	1 min.
3.	Reproduction in Organisms	1.4	1.1, 2.3	OBJ	1	1 min.
4.	Ecosystem	7.3	2.3, 4.1	SA	2	3 min.
5.	Biotechnology and its Applications	5.7	1.1, 4.3 5.1	SA	2	3 min.
6.	Biotechnology and its Applications (A) OR (B)	5.3 5.4	2.7, 5.1 2.7, 5.1	SA SA	2 OR 2	3 min.
7.	Organisms and Populations	6.4	2.6, 4.1	SA	2	4 min.
8.	Sexual Reproduction in Flowering Plants	2.5	2.3, 2.1	SA	2	4 min.
9.	Ecosystem	7.8	4.2, 4.1	SA	2	4 min.
10.	Organisms and Populations	6.11	1.1, 2.3 4.1	SA	2	4 min.
11.	Sexual Reproduction in Flowering Plants	2.2 2.5	1.1, 2.1 2.6, 2.7	OBJ SA	1 2	8 min.
12.	Strategies for Enhancement in Food Production	3.6	4.1, 4.2 2.5, 2.7	OBJ SA	1 2	8 min.
13.	Biotechnology : Principles and Processes (A) OR (B)	4.4 4.2	4.1, 4.2 4.1, 4.2	Essay	3 3 <sup>OR</sup>	8 min.
14.	Environmental Issues	8.5	2.6, 4.1 2.3, 2.5	OBJ Essay	1 3	8 min.
	<b>Total</b>				<b>30</b>	<b>60min.</b>



## QUESTION BASED ANALYSIS - ZOOLOGY

Qn. No.	Content/ Chapters	LO. No.	Specific thinking skills (no.)	Form of Questions	Score	Time
1.	Biodiversity & Conservation	8.16	4.1	SA	2	2min.
		8.16	1.1	OBJ	1	1min.
2.	Reproductive health	2.11	1.1	OBJ	1	1min.
3.	Reproductive health	2.4	2.7	SA	2	5min.
4.	Human Reproduction	1.3	5.1	OBJ	1	1min.
		1.1	4.2	SA	2	3min.
5.	Microbes in human welfare	7.2	1.1	SA	1	3min.
		7.5	2.7	SA	1	3min.
6.	Principles of Inheritance & Variation	3.13	4.1	E	3	10min.
		3.9, 3.10	4.1	E	3(C)	
7.	Principles of Inheritance & Variation	3.7	2.1	SA	2	3min.
8.	Evolution	5.18	5.1	SA	2	2min.
9.	Evolution	5.13	1.1	SA	2	3min.
10.	Common human diseases	6.2	2.6	E	3	10min.
		6.5	2.3	E	3(C)	
11.	Common human diseases	6.9	1.1	OBJ	1	1min.
12.	Molecular basis of Inheritance	4.13	4.1	OBJ	1	1min.
13.	Molecular basis of Inheritance	4.7, 4.10	5.1	SA	2	5min.
14.	Molecular basis of Inheritance	4.16	1.1	OBJ	1	1min.
15.	Molecular basis of Inheritance	4.5, 4.7	2.7	SA	2	5min.
				<b>Total</b>	<b>30</b>	<b>60 min</b>