



ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

**Higher Secondary School
Certificate (HSC)**

**Examination syllabus
&
Model Paper**

**Botany
XII**

Based on Provincial revised curriculum (Sindh)

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PREFACE

Ziauddin University Examination Board (ZUEB) was established by the Sindh ACT XLI 2018, with the aim of improving the quality of education. The Board administers examinations for the Secondary School Certificate (SSC) and Higher Secondary School Certificate (HSSC) based on the latest Reviewed National Curriculum by Directorate Curriculum Assessment and Research (DCAR) Sindh. ZUEB has a mandate by Ordinance to offer such examination services to English /Urdu and Sindhi medium candidates for SSC and HSSC from private schools in Sindh. This examination syllabus exemplifies ZUEB's commitment to provincial educational goals

The Examination Board has prepared with the help of subject professors, subject wise syllabus. It is important to make the difference between syllabus and curriculum. The syllabus of a subject is considered as a guide for the subject teacher as well as the students. It helps the students understand the subject in detail. It also helps students to anticipate what is expected from them while preparing for the exams.

This examination syllabus brings together all those cognitive outcomes of the Provincial Curriculum statement which can be reliably and validly assessed. While the focus is on the cognitive domain, particular emphasis is given to the application of knowledge and understanding.

The examination syllabus is uploaded on the ZUEB website. This is done to help affiliated schools in planning their teaching. It is the syllabus, not the prescribed textbook which is the basis of the ZUEB examinations. In addition, the ZUEB examination syllabus is used to develop learning support materials for students and teachers. The examination board stand committed to all students who have embarked upon the SSC, and HSSC courses in facilitating their learning outcomes. Our examination syllabus document ensures all possible support.

On the Ziauddin University Examination Board website a tab e –resource is made available which provides resource material in all subjects both in text form in line with the curriculum and also videos on topics to give students access to learn at their own pace and own time. These 15 to 20 minutes videos are prepared around subject concept / topics. These videos are available to the students for revisiting a lesson taught by their teacher or watch it prior to the lesson and as a reinforcement strategy. The work on videos is in progress and new titles will be uploaded.

Please look out for the videos on the given website



Humbly Yours;

Shahbaz Nasim
Curriculum Coordinator

Rationale For the Reviewed Provincial Curriculum

The process of revising the National Curriculum 2006 was initiated in August 2004 when newly elected government of Pakistan decided to introduce education reform in the country. The education reform process included the announcement of new National Education Policy. National Education Census and changing the curricula (Ministry of Education, 2009)

In reality, change in secondary school curriculum was initiated in 2006 and as result, scheme of studies for classes I to XII was reviewed and curriculum of 25 compulsory subjects.

The 18th Amendment to the constitution of Pakistan has reconfigured the federal and provincial relationship by abolishing the “concurrent legislative list”. The Act (2010) provides the provinces with strong legislative and financial autonomy in education, health, and other social sectors. Major implication of the 18th Amendment for education is that the curriculum, syllabus, planning, policy, centres of excellence and standards of education will fall under the purview of the provinces. This was a big step forward for education.

In Sindh the Curriculum review team was assigned a task by the School Education Department, Government of Sindh to review the National Curriculum 2006 for all subjects and prepare a revised version that best suits the needs of the students teachers and meets the spirit of the 18th amendment.

Subject wise curriculum review committees were formed. Curriculum review team critically examined the contextual and textual parts and aligned the different sections horizontally and vertically of the Curriculum. The Bureau of Curriculum (BOC) played vital role in organizing the workshops and meetings at Hyderabad for the completion of task. The positive support from a number of educationists, researchers and teachers helped in completing the mammoth task of curriculum revision.

On the DCAR website http://dcar.gos.pk/BoC_Other_Pages/curriculum_dev.html the national curriculum as well as the revised curriculums are all placed for easy reference.

The Ziauddin University Examination Board Examination syllabi for SSC and HSSC are prepared with the Sindh Revised curriculum. Up till now following subject text books have been developed as per the revised curriculum.

AIMS AND OBJECTIVES:

AIMS:

- The curriculum of Biology at grade XI-XII aims to help individual students develop:
- A scientific understanding of the living world
- Mental and motor abilities appropriate to the acquisition and use of biological Understanding
- An appreciation of the products and influences of science and technology, balanced by a concern for their wise application
- An understanding of the nature and limitations of scientific activity
- An ability to apply biological understanding to appropriate problems (including those of everyday life) and to approach those problems in rational ways
- Respect for evidence, rationality and intellectual honesty
- Capacities to express themselves coherently and logically, both orally and in writing, and to use appropriately modes of communication characteristic of Scientific work
- An ability to work effectively with others.

OBJECTIVES:

- A statement of objectives relevant to each of the general aims is listed below. The sequence of Objectives used here should not be taken as indicating relative weightings.

Understanding the Living World:

- Students should understand the scientific concepts inherent in the theme for each chapter to be covered well enough to be able to:
- state, exemplify and interpret the concept
- use appropriately, fundamental terms and classifications related to the concept cite, and explain or interpret, scientific evidence in support of the concept.

Appropriate Mental and Motor Abilities:

Students should show some ability to:

- formulate questions that can be investigated by gathering first or second-hand data
- find relevant published background information
- formulate hypotheses and make predictions from them
- plan an investigation and carry out the planned procedures
- use the motor skills required to carry out investigations
- observe phenomena, and describe, measure and record these as data
- classify, collate and display data
- Interpret and construct visual representations of phenomena and relationships (diagrams, Graphs, flow charts, physical models etc.)
- Analyze data and draw conclusions
- Evaluate investigative procedures and the conclusions drawn from investigations.

Understanding the Nature and Limitations of Scientific Activity:

For each of the facets of scientific activity selected for study, students should:

- Describe and exemplify it

- Use appropriately any fundamental terms and classifications related to it.
- Recognize that the problem-solving nature of science has limitations
- Acknowledge that people engaged in science, a particularly human enterprise, have the
- Characteristics of people in general.

Appreciation of the Influences of Science and Technology:

Students should:

- Recognize that the technology resulting from scientific activity influences the quality of Lifestyle and economic development through or by improvements in medical/health care,
- Nutrition, agricultural techniques
- understand that these influences may be the result of unforeseen consequences, rapid Exploitation or rapid cultural change.

Realize that advances in technology require judicious application.

Ability to apply Understanding to Problems:

Students should:

- Recognize that biological knowledge and scientific approaches have relevance to many Situations in everyday life
- Recognize when biological knowledge is relevant to a problem
- Recognize when a scientific approach is relevant to a problem
- Select and apply appropriate biological knowledge and skills to clarify and help produce solutions to problems, especially the personal and social problems of everyday life to
- Which such knowledge and skills can apply
- Use thoughtful, rational strategies for decision-making in those everyday situations to which both biological knowledge and value positions are relevant.

Respect for Evidence, Rationality and Intellectual Honesty:

- Given the number of emotive issues in the area of biology, students should display
- Respect for evidence, rationality and intellectual honesty.

Capacities to Communicate:

Students should:

- Comprehend the intention of a scientific communication, the relationships between its
- Parts and its relationship to what they already know
- Select the relevant parts from a communication
- Translate information from communications in particular modes (e.g. Spoken word, written Word, tables, graphs, flow sheets, diagrams) to other modes
- Structure information and use appropriate modes (including the spoken word, writing And diagrams) to communicate it.

Ability to work with Others:

Students should participate in group work in such a way that he or she:

- Shares the responsibility for achieving a group task
- shows concern for the fullest possible participation of each group member.

ZIAUDDIN UNIVERSITY EXAMINATION BORD

SLOs CATEGORIZATION

XII-BOTANY

Detailed Syllabus

Chapter	Topics	Student learning outcomes
Ch#1 HOMEOSTASIS:	Homeostasis	<ul style="list-style-type: none">• Define water potential, osmotic pressure, solute potential.• Explain movement of water in and out of the cell with reference to hypertonic, hypotonic and isotonic environment.• Classify plants on the basis of osmoregulation.• Describe osmotic adjustments in Hydrophytes, Halophytes, Mesophytes and Xerophytes.• Explain osmotic adjustments of plants in saline soils.• List adaptations of plants to cope up with low and high temperatures.
Ch#2 SUPPORT AND MOVEMENT:	<ul style="list-style-type: none">• Plant cells:• Secondary growth:• Plant movements:•	<ul style="list-style-type: none">• Classify plant cells according to their functions• Explain parenchyma, collenchyma and sclerenchyma cells.• Describe the role of each type in support• Define secondary growth• Describe the process of developing cambium in plants• Explain vascular cambium and cork cambium• Explain significance of secondary growth• Define plant movements.• Classify plant movements into directional and non-directional movements• Explain Autonomic, spontaneous and Paratonic movements.
Ch#3 COORDINATION AND CONTROL:	<ul style="list-style-type: none">• Response to environmental stress:• Phytohormones	<ul style="list-style-type: none">• State the environmental stress factors by plants.• Describe the response of plants against various environmental stresses (herbivory, cold stress, hot stress, pathogens, drought stress)• Define phytohormones.• Name the phytohormones.

		<ul style="list-style-type: none"> • Explain the role of major phytohormones (Auxin, Gibberellins, Cytokinins, Ethene, Abscissic acid)
Ch#4 REPRODUCTION:	<ul style="list-style-type: none"> • Asexual reproduction in plants: • Sexual reproduction in plants 	<ul style="list-style-type: none"> • Describe various modes of asexual reproduction in plants. • Define different modes of sexual reproduction • State the steps involved in sexual reproduction • Describe inflorescence and its types • Explain life cycle in gymnosperms • Explain life cycle in angiosperms • Describe seed formation • Elaborate the structure of seed (dicot and monocot) • Describe vernalization • Describe Photoperiodism • Explain germination and its types • Explain pollination and its types
Ch#5 DEVELOPMENT AND GROWTH:	<ul style="list-style-type: none"> • Growth and development in plants:: 	<ul style="list-style-type: none"> • Define meristem • Classify meristem in plants • Explain apical, intercalary and lateral meristem. • Describe growth correlation • Explain phases of growth in plants
Ch#6 CHROMOSOMES IN DNA:	<ul style="list-style-type: none"> • Chromosomes: • DNA as a hereditary material: • DNA Replication: • Gene Expression: • Mutation: 	<ul style="list-style-type: none"> • Define chromosome • Define chromonema, chromomere, chromatids, centromere. • Annotate the detailed structure of chromosome. • Describe the concept of gene, allele and gene locus. • Classify chromosome as autosomes, sex chromosomes, homologous chromosome • Briefly explain chromosomal theory of heredity. • Narrate the experiment by Griffith, Hershey and chase to support DNA as a genetic material. • Define DNA replication • Describe the process of DNA Replication • Justify DNA replication as semi conservative by experiment • Explain Watson and crick model of DNA • Define gene expression. • Describe the central dogma of gene expression

		<ul style="list-style-type: none"> • Define gene, codon and genetic code • Describe the mechanism of Protein synthesis • Define mutation • Identify various sources of mutation • Classify mutation • Describe the causes of mutations • Describe the symptoms, causes and treatment of sickle cell anemia and phenylketonuria • Explain chromosomal aberration
Ch#7 CELL CYCLE:	<ul style="list-style-type: none"> • Interphase and Cell division: • Mitosis: • Meiosis: 	<ul style="list-style-type: none"> • Define interphase and cell division. • Explain sub stages of interphase • Draw cell cycle • Categorize cell division process • Explain Amitosis • Explain cell death with reference to necrosis and apoptosis • Define Mitosis • Draw the stages of mitosis • Name the phases of mitosis. • Describe the phases of mitosis (prophase, metaphase, anaphase, telophase) • State the significance of mitosis • Explain cancer as a result of un-controlled cell division • Describe why do cancer cells kill. • Define meiosis. • Explain the events of meiosis (Meiosis I, II) • Draw the phases of Meiosis I, II • State the significance of meiosis • Explain meiotic errors with reference to human chromosomal disorders (Down's syndrome, Turner's syndrome, Klinefelter's syndrome)
Ch#8 VARIATION AND GENETICS:	<ul style="list-style-type: none"> • Genes and alleles: • Review of Mendel's laws of inheritance: • Test cross: • Incomplete dominance, Co-dominance, Multiple alleles: 	<ul style="list-style-type: none"> • Define gene, allele, locus, homozygous, heterozygous, genotype, phenotype. • Explain gene pool. • Explain why Mendel chose pea plants for his experiments. • Associate inheritance with the laws of Mendel. • Explain the Law of segregation using a suitable example. • Solve genetic problems to illustrate law of segregation by monohybrid crosses. • Explain law of independent assortment with a suitable example

	<ul style="list-style-type: none"> • ABO and Rh blood group system: • Polygenic inheritance and Epistasis: • Linkage and crossing over: • Sex determination and Sex linkage: • Diabetes Mellitus: 	<ul style="list-style-type: none"> • Solve genetic problems to illustrate law of independent assortment by Dihybrid crosses. • State the significance of test cross. • Explain test cross with a suitable example. • Solve genetic problems to illustrate test cross. • Define co-dominance, incomplete dominance and multiple alleles as exceptions to Mendel's laws of inheritance. • Explain incomplete dominance with the example of flower color in 4 o' clock plants • Differentiate between co dominance and incomplete dominance. • Describe multiple alleles with reference to ABO blood groups • Explain co-dominance where two alleles have equal contribution in the trait as in AB blood group. • Associate blood groups with the concept of multiple alleles. • Investigate the reasons for O negative as the universal donor and AB positive as a universal acceptor. • Associate positive and negative blood groups with Rh antigen. • Explain Erythroblastosis fetalis. • Suggest measures to tackle the erythroblastosis foetalis • Explain polygenic inheritance, pleiotropy and Epistasis • Describe polygenic inheritance with reference to major examples from plants • Relate polygenic inheritance in epistasis • List at least five polygenic inheritance traits in humans. • Solve genetic problems related to the dominant and recessive epistasis • Describe the terms linkage and crossing over • Exemplify the concept of gene linkage with reference to Drosophila • Explain XX-XY mechanism of sex determination in Drosophila and mammals. • Describe XX-XO and ZZ-ZW mechanism of sex determination. • Solve genetic problems related to sex determination
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		<ul style="list-style-type: none"> • Describe the concept of sex linkage in Drosophila eye color. • Describe the concept of sex linkage in mammals. • Solve genetic problems and critically analyze the inheritance of hemophilia and color blindness in humans. • Explain Diabetes mellitus • Differentiate Diabetes Type I and II
Ch#9 BIOTECHNOLOGY:	<ul style="list-style-type: none"> • Cloning of genes: • DNA sequencing: • Genome maps: • Tissue culture: • Gene therapy 	<ul style="list-style-type: none"> • Define gene cloning and state the steps in gene cloning. • Describe the techniques of gene cloning through recombinant DNA technology. • Explain the role of restriction endonucleases and DNA ligases in gene cloning. • Explain the properties and the role of vectors in recombinant DNA technology. • State the steps for the integration of DNA insert into the vector. • Briefly state the technique applied for the selection of the vectors that take up the DNA insert. • Describe the steps involved in gene amplification through polymerase chain reaction. • Describe the principles of Gel Electrophoresis as being used in gene sequencing. • Describe the goals of the human genome project. • Define following terms related to plant tissue culture; callus. • Explain tissue culture and differentiate between the organ culture and cell culture. • Explain the role of successful gene therapy for cystic fibrosis and Huntington's disease.
Ch#11 ECOSYSTEM:	<ul style="list-style-type: none"> • Levels of Organization: • Approaches to Ecology: • Ecosystem: • Biogeochemical cycles: • The flow of energy: 	<ul style="list-style-type: none"> • State the levels of organization. • Explain the individual levels of organization. • Illustrate the levels of organization • State the approaches to ecology. • Explain the approaches to ecology (autecology, synecology, habitat, ecosystem) • Define ecosystem • Explain the components of ecosystem (biotic and abiotic)

		<ul style="list-style-type: none"> • Define biogeochemical cycles and locate the primary reservoirs of the chemicals in these cycles. • Describe water cycle and nitrogen cycle in detail. • Define the terms nitrification, ammonification, de-nitrification, nitrogen-fixation. • Explain the flow of energy in successive trophic levels. • Differentiate between Xerarch and hydrarch succession.
Ch#12 SOME MAJOR ECOSYSTEMS:	<ul style="list-style-type: none"> • Aquatic ecosystems: • Terrestrial ecosystems 	<ul style="list-style-type: none"> • Explain life in Pond ecosystem and marine water • Explain life in forest ecosystem • Explain life in Tundra • Explain life in Grassland, Savannah and Desert

Ziauddin University Examination Board
Grade XII
BOTANY

Scheme of assessment

Maximum marks: 40

Section "A" (Multiple Choice questions)

Multiple choice questions (MCQs)

(0.5 x 16 = 8)

- Attempt 16 MCQs: Each carries equal marks

Section "B" (Constructed Response questions)

Constructed Response questions (CRQs)

(2 x 8=16)

Attempt any 8 questions. Each carries equal marks

Section "C" (Extended Response Questions)

Extended response questions (ERQs)

(8 x 2 = 16)

- Attempt any 2 questions out of four questions
- Each consist of eight (08) marks

DEFINITIONS OF COGNITIVE LEVELS

Remember

Remembering is the act of retrieving knowledge and can be used to produce things like definitions or lists. The student must be able to recall or recognise information and concepts. The teacher must present information about a subject to the student, ask questions that require the student to recall that information and provide written or verbal assessment that can be answered by remembering the information learnt.

Question Stems

- Can you name all the ...?
- Describe what happens when ...?
- How is (are) ...?
- How would you define ...?
- How would you identify ...?
- How would you outline ...?
- How would you recognise...?
- List the ... in order.
- What do you remember about ...?
- What does it mean?
- What happened after?
- What is (are) ...?
- What is the best one?
- What would you choose ...?
- When did ...?
- Where is (are) ...?
- Which one ...?
- Who spoke to ...?
- Who was ...?
- Why did ...?

Understand

The next level in the taxonomic structure is Understanding, which is defined as the construction of meaning and relationships. Here the student must understand the main idea of material heard, viewed, or read and interpret or summarise the ideas in their own words. The teacher must ask questions that the student can answer in their own words by identifying the main idea.

Question Stems

- Can you clarify...?
- Can you illustrate ...?
- Condense this paragraph.
- Contrast ...
- Does everyone think in the way that ... does?
- Elaborate on ...
- Explain why ...
- Give an example
- How can you describe
- How would you clarify the meaning
- How would you compare ...?
- How would you differentiate between ...?
- How would you describe...?
- How would you generalise...?
- How would you identify ...?
- Is it valid that ...?
- Is this the same as ...?
- Outline ...
- Select the best definition
- State in your own words
- This represents ...
- What are they saying?
- What can you infer from ...?
- What can you say about ...?
- What could have happened next?
- What did you observe?

	<ul style="list-style-type: none"> • What does this mean? • What expectations are there? • What information can you infer from...? • What is the main idea of ...? • What restrictions would you add? • What seems likely? • What seems to be ...? • What would happen if ...? • What would happen if ...? • Which are the facts? • Which statements support ...?
<p>Apply</p> <p>The third level in Bloom’s taxonomy, Applying, marks a fundamental shift from the pre-Bloom’s learning era because it involves remembering what has been learnt, having a good understanding of the knowledge, and applying it to real-world exercises, challenges or situations. Students must apply an abstract idea in a concrete case to solve a problem or relate it to prior experience. The teacher must provide opportunities for students to use theories and problem-solving techniques in new situations and review and check their work. Assessment questions should be provided that allow students to define and solve problems.</p> <p>Question Stems</p> <ul style="list-style-type: none"> • Can you group by characteristics such as ...? • Choose the best statements that apply • Clarify why ... • Do you know of another instance where ...? • Draw a story map • Explain why a character acted in the way that he did • From the information given, can you develop a set of instructions about ...? • How could you develop ...? • How would you change ...? • How would you demonstrate...? • How would you develop ... to present ? • How would you explain ...? 	<p>Analyse</p> <p>Analysing is the cognitive level where students can take the knowledge they have remembered, understood and applied, then delve into that knowledge to make associations, discernments or comparisons. Students should break down a concept or idea into parts and show relationships between these parts. Teachers must give students time to examine concepts and their requisite elements. Students are required to explain why they chose a solution.</p> <p>Question Stems</p> <ul style="list-style-type: none"> • Can you distinguish between ...? • Can you explain what must have happened when ...? • Determine the point of view, bias, values, or intent underlying the presented material • Discuss the pros and cons of ... • How can you classify ... according to ...? • How can you compare the different parts? • How can you sort the different parts...? • How is ... connected to ...? • How is ... similar to ...? • How would you categorise...? • How would you explain ? • If ... happened, what might the ending have been? • State the point of view of ... • What are some of the problems of ...?

- How would you modify ...?
- How would you present...?
- How would you solve ... ?
- Identify the results of ...
- Illustrate the ...
- Judge the effects of ... What would result ...?
- Predict what would happen if ...
- Tell how much change there would be if ...
- Tell what would happen if ...
- What actions would you take to perform ...?
- What do you think could have happened next?
- What examples can you find that ?
- What other way would you choose to ...?
- What questions would you ask of ...?
- What was the main idea ...?
- What would the result be if ...?
- Which factors would you change if ...?
- Who do you think...?
- Why does this work?
- Write a brief outline ...
- Write in your own words ...

- What assumptions ...?
- What can you infer about...?
- What can you point out about ?
- What conclusions ...?
- What do you see as other possible outcomes?
- What does the author assume?
- What explanation do you have for ...?
- What ideas justify the conclusion?
- What ideas validate...?
- What is the analysis of ...?
- What is the function of ...?
- What is the problem with ...?
- What motive is there?
- What persuasive technique is used?
- What statement is relevant?
- What was the turning point?
- What were some of the motives behind ...?
- What's fact? Opinion?
- What's the main idea?
- What's the relationship between?
- Which events could not have happened?
- Why did ... changes occur?
- Why do you think ?

BLOOMS TAXONOMY WITH EXAMPLES

Conclusion

If you are a teacher looking for ways to engage your students in learning, this LIST of questions might be interesting for your classroom practice. Bloom's Taxonomy question stems can help elicit higher-order thinking skills and promote critical thinking among learners at different taxonomy levels. These question stems can also encourage students to think about their knowledge through reflection before answering questions.

ACTION WORDS FOR COGNITIVE LEVELS

Knowledge	Understand	Apply	Analyze	Evaluate	Create
	 <small>UNDERSTAND</small>				
define	explain	solve	analyze	reframe	design
identify	describe	apply	appraise	criticize	compose
describe	interpret	illustrate	judge	evaluate	create
label	paraphrase	modify	support	order	plan
list	summarize	use	compare	compare	combine
name	classify	calculate	decide	classify	formulate
state	compare	change	discriminate	contrast	invent
match	differentiate	choose	recommend	distinguish	hypothesize
recognize	discuss	demonstrate	summarize	infer	substitute
select	distinguish	discover	assess	separate	write
examine	extend	experiment	choose	explain	compile
locate	predict	relate	convince	select	construct
memorize	associate	show	defend	categorize	develop
quote	contrast	sketch	estimate	connect	generalize
recall	convert	complete	grade	differentiate	integrate
reproduce	demonstrate	construct	measure	divide	modify
tabulate	estimate	dramatize	predict	order	organize
tell	express	interpret	rank	prioritize	prepare
Copy	identify	manipulate	score	survey	produce
discover	indicate	paint	select	calculate	rearrange

duplicate	infer	prepare	test	conclude	rewrite
enumerate	relate	teach	argue	correlate	adapt
listen	restate	act	conclude	deduce	anticipate
observe	select	collect	consider	devise	arrange
omit	translate	compute	critique	diagram	assemble
read	ask	explain	debate	dissect	choose
recite	cite	list	distinguish	estimate	collaborate
record	discover	operate	editorialize	evaluate	facilitate
repeat	generalize	practice	justify	experiment	imagine
retell	group	simulate	persuade	focus	intervene
visualize	illustrate	transfer	rate	illustrate	make
	judge	write	weigh	organize	manage
	observe			outline	originate
	order			plan	propose
	report			question	simulate
	represent			test	solve
	research				support
	review				test
	rewrite				validate
	show				



MODEL PAPER 2023

SUBJECT: BOTANY

GRADE: XII

MAX. MARKS: 40

TIME: 2 HOURS

SECTION 'A' (COMPULSORY) MULTIPLE CHOICE QUESTIONS (MCQ'S)

Time: 20 minutes

Marks: 16

Note: (i). Attempt all Questions from this section.

(ii) Shade **ONE** letter for each question. Make sure you put your answer in line with the correct question number.

(iii). Write the code of your question paper in **bold letters** in the beginning of the answer script.

Choose the correct answer for each from the given options:

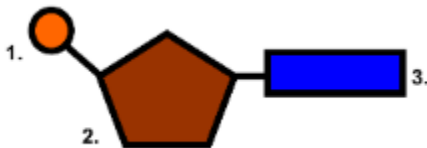
i. Alleles of different genes that are present on the same chromosome may occasionally get separated by a phenomenon called:

- a) Linkage b) Crossing over c) Segregation d) Pleiotropy

ii. Perma frost is the characteristic feature of:

- a) Arctic tundra b) Antarctic tundra c) Pond ecosystem d) Savannah

iii. Identify phosphate group in the following diagram:



- a) 1 b) 2 c) 3 d) 1 and 2

iv. If test cross give all the dominant characters, it means the parent is:

- a) Homozygous dominant b) Heterozygous dominant c) Homozygous recessive d) Heterozygous recessive

v. One complete turn of DNA contains _____ nucleotides

- a) 2 b) 5 c) 10 d) 20

vi. Which triple base codes for methionine?

- a) AUU b) AUC c) AUG d) AUA

vii. Leaves grow due to the activity of:

- a) Lateral meristem b) Apical meristem c) Intercalary meristem d) Phelloderm meristem

viii. Deeper staining reions in chromosomes are called:

- a) Chromonema b) Centromere c) Chromomere d) Chromatids

ix. It is a non-directional movement of plant:

- a) Tropic b) Tactic c) Nastic d) Nyctinasty

x. The kind of germination during which cotyledon are carried out above the soil is called _____

- a) Hypogeal b) Epigeal c) hypocotyl d) Epicotyls

xi. Plants avoid overheating by all the following measures except:

- a) Shiny cuticle b) Single xylem vessel c) Small surface area of leaf d) wilting

xii. The type of inflorescence in coriander is:

- a) Corymb b) Umbel c) Uniparous cyme d) Catkin

xiii. The non-dividing phase between two division is called

- a) Prophase b) Interphase c) Metaphase d) Anaphase

xiv. The tendency of genes in a chromosome to remain together is called _____.

- a) Crossing Over b) Gene linkage c) Duplication d) Co-Dominance

xv. The scientific study of earth surface is called _____

- a) Topography b) Pedology c) Histology d) None f these

xvi. In what phase of meiosis are there two cells, each with sister chromatids align at the equator?

- a) Anaphase I b) Metaphase I c) Metaphase II d) Anaphase II



MODEL PAPER 2023

SUBJECT: BOTANY

GRADE: XII

MAX. MARKS: 40

TIME: 2 HOURS

Time: 2 ½ hrs.

Marks: 32

SECTION 'B' CONSTRUCTED RESPONSE QUESTIONS (CRQ'S) (8x2=16)

Q.2 Answer any EIGHT (08) questions from this section. All questions carry equal marks.

1. Differentiate between: (**Any one**)
 - i. Mitosis and Meiosis
 - ii. Co-Dominance and In-complete Dominance
2. How do plants respond to drought stress?
3. How girth of plant increases from year to year?
4. Define Auxin. Write down its major functions.
5. Write a note on Vernalization **OR** Seed dormancy.
6. Describe any two phases of Growth in plants.
7. What is syndrome. Describe the effects of XXY?
8. Briefly describe one gene one enzyme hypothesis.
9. Explain Apical meristem.
10. Describe the types of RNA. **OR** How is Apoptosis different from Necrosis?
11. Give the effects of red light and far-red light in phytochrome system.
12. Give the Cross between Red-eyed female and white eyed male in drosophila.
13. A color-blind woman carrier is married with a normal man. How many children of this couple are likely to be color blind in F2 generation?
14. Pen down the chromosomal theory of heredity.
15. Write a note on various Ecological Levels of Organization
16. Write a note on biotic components of pond ecosystem.

SECTION 'C' EXTENDED RESPONSE QUESTIONS (ERQ'S) (8x2=16)

Note: Answer any TWO (02) questions from this section. All questions carry equal marks.

- Q.3** Describe the Law of Independent Assortment with the help of checker board method.
- Q.4** Define movement in Plants? Describe various types of Paratonic movements in plants **OR** Define Sex-linked inheritance. Explain with reference to Haemophilia in man
- Q.5** What is Osmoregulation? Classify various type of plants on the basis of Osmoregulation. **OR** Define Ecosystem. Name the various abiotic components of an ecosystem. Describe climatic factors only.
- Q.6** Describe Watson and Crick model of DNA **OR** Describe Protein synthesis in detail

**HSC PART II EXAMINATION
MARKS BREAKUP GRID FOR EXAMINATION 2023**

GROUP: PRE-MEDICAL-II

SUBJECT	THEORY	PRACTICAL	TOTAL
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	100	-	100
PAKISTAN STUDIES	50	-	50
PHYSICS	85	15	100
CHEMISTRY	85	15	100
BOTANY	45	7	52
ZOOLOGY	40	8	48
TOTAL	505	45	550

GROUP: PRE-ENGINEERING-II

SUBJECT	THEORY	PRACTICAL	TOTAL
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	100	-	100
PAKISTAN STUDIES	50	-	50
PHYSICS	85	15	100
CHEMISTRY	85	15	100
MATHEMATICS	100	--	100
TOTAL	520	30	550

GROUP: COMPUTER SCIENCE/ GENERAL SCIENCE

SUBJECT	THEORY	PRACTICAL	TOTAL
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	100	-	100
PAKISTAN STUDIES	50	-	50
PHYSICS	85	15	100
COMPUTER SCIENCE	75	25	100
MATHEMATICS	100	--	100
TOTAL	510	40	550

GROUP: COMMERCE-II (Private/Regular)

SUBJECT	THEORY	PRACTICAL	TOTAL
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	100	-	100
PAKISTAN STUDIES	50	-	50
BANKING	75	-	75
COMMERCIAL GEOGRAPHY	75	-	75
ACCOUNTING	100	--	100
STATISTICS	50		50
TOTAL	550	---	550

GROUP: HUMANITIES-II (Private/Regular)

(Any Three Elective)

SUBJECT	THEORY	PRACTICAL	TOTAL
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	100	-	100
PAKISTAN STUDIES	50	-	50
COMPUTER STUDIES	75	25	100
CIVICS	100		100
MATHEMATICS	100	-	100
SOCIOLOGY	100	--	100
ECONOMICS	100		100
EDUCATION	100		100
TOTAL	550	---	550