ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

Secondary School Certificate

(SSC)

Examination syllabus

Mathematics

X

Based on Provincial revised curriculum (Sindh)

You can approach us:

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PREFACE

The Ziauddin University Examination Board (ZUEB) was established under **Sindh ACT XLI 2018**, with the primary objective of enhancing the quality of education in Sindh. ZUEB is responsible for administering examinations for the **Secondary School Certificate (SSC)** and **Higher Secondary School Certificate (HSSC)** in alignment with the most recent revisions to the **National Curriculum**, as outlined by the **Directorate of Curriculum Assessment and Research (DCAR), Sindh**. Through its ordinance, ZUEB is mandated to provide examination services for both English, Urdu, and Sindhi medium candidates from private schools across Sindh. This examination syllabus reflects ZUEB's dedication to achieving the educational goals set by the provincial authorities.

In collaboration with subject professors, ZUEB has developed a comprehensive syllabus for each subject. It is important to distinguish between the syllabus and the curriculum. The syllabus serves as a guide for both teachers and students, outlining the key areas of focus within the subject. It provides students with a clear understanding of what is expected of them in their studies and helps them prepare effectively for their exams.

This examination syllabus incorporates all cognitive outcomes derived from the **Provincial Curriculum Statement**, ensuring that assessments are both valid and reliable. While the focus is primarily on the cognitive domain, significant emphasis is placed on the application of knowledge and understanding.

The syllabus is made available to all stakeholders via the ZUEB website to assist affiliated schools in planning their teaching. It is crucial to note that the syllabus, rather than the prescribed textbook, forms the foundation of ZUEB examinations. Additionally, this syllabus supports the development of learning materials for both students and teachers. ZUEB remains committed to supporting students undertaking the SSC and HSSC courses by facilitating their learning outcomes through this detailed syllabus document.

To further assist in the learning process, ZUEB provides a dedicated **e-resource tab** on its website, offering both text-based and video content on various subjects. These 15-20 minute instructional videos, created around key subject concepts, allow students to learn at their own pace and convenience. The videos can be used as a reinforcement tool to revisit lessons already taught or as pre-lesson material. This initiative is an ongoing effort, and new videos will continue to be uploaded.

We encourage all students and educators to make the most of these resources for a more enriched and flexible learning experience.

Sincerely,

Shahbaz Nasim
Head – Measurement & Testing
Ziauddin University Examination Board

Reviewed by Beena Kohati-Bilal
Head - Curriculum & Assessment
Ziauddin University Examination Board
29.01.2025

Rationale For The Reviewed Provincial Curriculum

The process of revising the National Curriculum 2006 began in August 2004, when the newly elected government of Pakistan initiated education reforms across the country. These reforms included the introduction of a new National Education Policy, a National Education Census, and a revision of curricula (Ministry of Education, 2009).

In practice, the overhaul of the secondary school curriculum began in 2006, leading to a review of the scheme of studies for classes I to XII and the revision of curricula for 25 compulsory subjects.

The 18th Amendment to the Constitution of Pakistan, enacted in 2010, significantly altered the federal-provincial relationship by abolishing the "concurrent legislative list." This amendment granted provinces greater legislative and financial autonomy in sectors such as education and health. The most notable implication of the 18th Amendment for education was the transfer of responsibility for curriculum development, syllabus planning, policy formation, and educational standards to the provinces, marking a significant step forward for education.

In Sindh, the School Education Department tasked a Curriculum Review Team with revising the National Curriculum 2006 for all subjects. The goal was to create a curriculum better suited to the needs of students and teachers while aligning with the principles of the 18th Amendment. Subject-specific curriculum review committees were established to critically examine and align the curriculum's content, both contextually and textually, ensuring coherence across various subjects. The Bureau of Curriculum (BoC) played a crucial role in organizing workshops and meetings in Hyderabad to facilitate the completion of this task. The support of numerous educationists, researchers, and teachers was invaluable in successfully revising the curriculum.

The revised National Curriculum, along with the original version, is available on the DCAR website at http://dcar.gos.pk/BoC_Other_Pages/curriculum_dev.html for easy access.

The Ziauddin University Examination Board (ZUEB) SSC and HSSC syllabi are developed in accordance with the Sindh Revised Curriculum. To date, textbooks for various subjects have been developed based on the revised curriculum.

DOMAIN A: NUMBERS & ALGEBRA

Complex Number

[SLO:M-10-A-01]: Identify a complex number (z), complex conjugate ($\bar{z}$), absolute value or modulus ($|z|$) of a complex number.

[SLO:M-10-A -02]: Apply algebraic properties and perform basic operations on complex numbers z.

[SLO:M-10-A-03]: Demonstrate additive identity and multiplicative identity for the set of complex numbers z.

[SLO:M-10-A-04]: Find additive inverse and multiplicative inverse of a complex number z.

[SLO:M-10-A-05]: Demonstrate the following properties of a complex number z.

- $|z|=|-z|=|\bar{z}|=|\text{-}\bar{z}\,|$
- $z.\bar{z} = |z|^2$
- $\overline{|z_1.z_2|} = \bar{z}_1.\bar{z}_2$
- $\overline{\left(\frac{z_1}{z_2}\right)} = \frac{\bar{z}_1}{\bar{z}_2},\ z_2 \neq 0$

[SLO:M-10-A-06]: Find real and imaginary parts of complex numbers of the type,

$(x + iy)^n$,

$[\frac{x_1+iy_1}{x_2+iy_2}]^n$, $x_2 + iy_2 \neq 0$

Where n = $\pm 1\ and\ \pm 2$

[SLO:M-10-A-07]: Solve the simultaneous linear equations with complex coefficients.

[SLO:M-10-A-08]: Apply the geometric interpretation of a complex number.

[SLO:M-10-A-09]: Apply the geometric interpretation of the modulus of a complex number.

[SLO:M-10-A-10]: Apply the geometric interpretation of algebraic operations.

Matrices and determinants

[SLO:M-10-A-11]: Introduce the concept of matrix and its type (row, column, rectangular, square, zero/null, diagonal, scalar and identity/unit matrix) of order 2x2.

[SLO:M-10-A-12]: Solve situations involving sum, difference, and product of two matrices.

[SLO:M-10-A-13]: Calculate the product of the scalar quantity and a matrix.

[SLO:M-10-A-14]: Evaluate the determinant and inverse of a matrix of order 2x2.

[SLO:M-10-A-15]: Solve the simultaneous linear equations in two variables using matrix inversion method and Cramer's rule

[SLO:M-10-A-16]: Apply concepts of matrices to solve real-life problems (such as engineering, economics, and physics).

Functions and Graphs

[SLO:M-10-A-17]: Recognize notation and determine the value of a function.

[SLO:M-10-A-18]: Identify types of functions (into, onto/ surjective, one-to-one/ injective, and bijective) by using diagrams.

[SLO:M-10-A-19]: Explain algebraic operations on functions.

[SLO:M-10-A-20]: Explain and formulate composite functions as defined by $fog(x) = f(g(x))$ and $gof(x) = g(f(x))$

[SLO:M-10-A-21]: Find the inverse of a given function.

[SLO:M-10-A-22]: Apply concepts from functions to real world problems (such as finance, transportation, and sales).

[SLO:M-10-A-23]: Plot graphs of constant function, identity function, linear function and absolute-valued functions.

[SLO:M-10-A-24]: Solve absolute-valued equations and inequalities in one variable and express the solution as a range of values on a number line.

[SLO:M-10-A-25]: Apply concepts of absolute-valued functions to solve real-life problems (including physics and engineering).

Algebraic Fractions

[SLO:M-10-A-26]: Describe polynomials, rational and irrational expressions with examples.

[SLO:M-10-A-27]: Factorize and simplify rational expressions.

[SLO:M-10-A-28]: Demonstrate manipulation of algebraic fractions.

[SLO:M-10-A-29]: Perform operations on rational expressions (limited to numerators and denominators that are monomials, binomials, or trinomials).

[SLO:M-10-A-30]: Apply the concept of rational expressions

(limited to numerators and denominators that are monomials, binomials, or trinomials) to solve real life problems (such as amount and rate of work).

[SLO:M-10-A-31]: Recognise the surds and perform their rationalisation.

Linear Inequalities in two variables

[SLO:M-10-A-32]: Solve two linear inequalities with two unknowns simultaneously.

[SLO:M-10-A-33]: Interpret and Identify regions in plane bounded by two linear inequalities in two unknowns.

Quadratic Equations

[SLO:M-10-A-34]: Define and write quadratic equation in standard form.

[SLO:M-10-A-35]: Solve quadratic equations by using the methods of factorization, completing squares, and quadratic formula.

[SLO:M-10-A-36]: Establish relationship between roots and coefficients of quadratic equations.

[SLO:M-10-A-37]: Form a quadratic equation when roots are given.

[SLO:M-10-A-38]: Find discriminant of a given quadratic equation and identify the nature of its roots.

[SLO:M-10-A-39]: Solve a pair of linear and quadratic equations simultaneously.

[SLO:M-10-A-40]: Solve equations involving fractional exponent that can be reduced to quadratic equations e.g.

$$(x^{\frac{2}{m}} - x^{\frac{1}{m}} - 12 = 0)$$

[SLO:M-10-A-41]: Solve real-life situations by formulating a quadratic equation. (such as projectile motion and distance equation)

[SLO:M-10-A-42]: Solve quadratic inequalities in one unknown.

[SLO:M-10-A-43]: Apply the concept of quadratic equations and quadratic inequalities to solve real life problems.

[SLO:M-10-A-44]: Sketch and differentiate graphs of the Linear and non-linear (quadratic and cubic) functions

[SLO:M-10-A-45]: Solve a system of one linear and one quadratic equation graphically and interpret the solution.

[SLO:M-10-A-45]: Solve a system of one linear and one quadratic equation graphically and interpret the solution.

[SLO:M-10-A-46]: Apply concepts of sketching and interpreting graph to solve real-life problems (such as in tax payment, income and salary problems, cost and profit analysis).

DOMAIN B: GEOMETRY

Co-ordinate Geometry

[SLO:M-10-B-01]: Find the gradient of parallel and perpendicular lines.

[SLO:M-10-B-02]: Drive equation of a straight line in slope-intercept form, point-slope form, two points form, intercepts form, symmetric form, and normal form.

[SLO:M-10-B-03]: Show that a linear equation in two variables represents a straight line and reduce the general form of the equation of a straight line to the other standard forms.

[SLO:M-10-B-04]: Apply concepts form co-ordinate geometry to real world problems (such as aviation and navigation, landscaping, map reading, longitude and latitude).

Angle between Lines

[SLO:M-10-B-05]: Find the angle between two coplanar intersecting straight lines.

[SLO:M-10-B-06]: Find the equation of the family lines passing through the point of intersection of two given lines.

[SLO:M-10-B-07]: Calculate angles of the triangle when the slopes of the sides are given.

Vectors in Plane

[SLO:M-10-B-08]: Explain rectangular coordinate system in a plane.

[SLO:M-10-B-09]: Represent vectors as directed line segment.

[SLO:M-10-B-10]: Express a vector in terms of two non-zero and non-parallel coplanar vectors.

[SLO:M-10-B-11]: Express a vector in terms of position vector.

[SLO:M-10-B-12]: Express translation by a vector.

[SLO:M-10-B-13]: Find the magnitude of a vector.

[SLO:M-10-B-14]: Add and subtract vectors.

[SLO:M-10-B-15]: Multiply a vector by a scalar.

[SLO:M-10-B-16]: Solve geometrical problems involving the use of vectors.

Application of Trignometry

[SLO:M-10-B-17]: Extend sine and cosine functions to angles between 90° and 180°.

[SLO:M-10-B-18]: Solve problems using the laws of sine, cosine and the area formulas for any triangle.

[SLO:M-10-B-19]: Apply concepts of trigonometry to solve real-life problems (such as video games, flight engineering, navigation, sound waves).

Chords and Arcs of a Circle

[SLO:M-10-B-20]: Solve problems by using the property of a circle: One and only one circle can pass through three non collinear points.

[SLO:M-10-B-21]: Solve problems by using the property of circle: A straight line, drawn from the centre of a circle to bisect a chord (which is not a diameter) is perpendicular to the chord.

[SLO:M-10-B-22]: Solve problems by using the property of a circle: Perpendicular from the centre of a circle on a chord bisects it.

[SLO:M-10-B-23]: Solve problems by using the property of circle: If two chords of a circle are congruent then they will be equidistant from the centre.

[SLO:M-10-B-24]: Solve problems by using the property of a circle: Two chords of a circle which are equidistant from the centre are congruent.

[SLO:M-10-B-25]: Solve problems by using the property of circle: If two arcs of a circle (or of congruent circles) are congruent then the corresponding chords are equal.

[SLO:M-10-B-26]: Solve problems by using the property of circle: If two chords of a circle (or of congruent circles) are equal, then their corresponding arcs (minor, major or semi-circular) are congruent.

[SLO:M-10-B-27]: Solve problems by using the property of circle: Equal chords of a circle (or of congruent circles) subtend equal angles at the centre (at the corresponding centres).

[SLO:M-10-B-28]: Solve problems by using the property of circle: If the angles subtended by two chords of a circle (or congruent circles) at the centre (corresponding centres) are equal, the chords are equal.

[SLO:M-10-B-29]: Apply concepts of chords and arcs of a circle to solve real-life problems (such as decorative features, rainbow, bridges, roller coaster track).

Tangent and Angles of a Circle

[SLO:M-10-B-30]: Solve problems by using the property of circle: If a line is drawn perpendicular to a radial segment of a circle at its outer end point, it is tangent to the circle at that point.

[SLO:M-10-B-31]: Solve problems by using the property of a circle: The tangent to a circle and the radial segment joining the point of contact and the centre are perpendicular to each other.

[SLO:M-10-B-32]: Solve problems by using the property of circle: The two tangents drawn to a circle from a point outside it, are equal in length.

[SLO:M-10-B-33]: Solve problems by using the property of a circle: If two circles touch externally or internally, the distance between their centres is respectively equal to the sum or difference of their radii.

[SLO:M-10-B-34]: Solve problems by using the property of circle: The measure of a central angle of a minor arc of a circle is double that of the angle subtended by the corresponding major arc.

[SLO:M-10-B-35]: Solve problems by using the property of a circle: Any two angles in the same segment of a circle are equal.

[SLO:M-10-B-36]: Solve problems by using the property of circle: The angle in a semi-circle is a right angle, in a segment greater than a semi-circle is less than a right angle, in a segment less than a semi-circle is greater than a right angle.

[SLO:M-10-B-37]: Solve problems by using the property of circle: The opposite angles of any quadrilateral inscribed in a circle are supplementary.

[SLO:M-10-B-38]: Apply concepts of tangents and angles of a circle to solve real-life problems (such as architecture, monuments, pyramids).

Practical Geometry of Circles

[SLO:M-10-B-39]: Locate the centre of a given circle.

[SLO:M-10-B-40]: Draw a circle passing through three given non-collinear points.

[SLO:M-10-B-41]: Complete the circle:

- by finding the centre,
- without finding the centre, when a part of its circumference is given.

Tangent to the Circle

[SLO:M-10-B-42]: Draw a tangent to a given arc, without using the centre, through a given point P when P is

- the middle point of the arc
- at the end of the arc
- outside the arc

[SLO:M-10-B-43]: Draw a tangent to a given circle from a point P when P lies on the circumference and outside the circle.

[SLO:M-10-B-44]: Draw two tangents to a circle meeting each other at a given angle.

[SLO:M-10-B-45]: Apply concepts of practical geometry of a circle to solve real-life problems (such as athletic tracks, recreational parks, ferry wheel, mechanical machines)

DOMAIN C: INFORMATION HANDLING

Cumulative Frequency Distribution and measures of dispersion:

[SLO:M-10-C-01]: Construct cumulative frequency table, cumulative frequency polygon or Ogive.

[SLO:M-10-C-02]: Interpret the median, quartiles, deciles, percentiles, and inter quartile range from cumulative frequency curve.

[SLO:M-10-C-03]: Calculate the range, mean deviation, standard deviation and variance for grouped data.

[SLO:M-10-C-04]: Use the mean and standard deviation to compare two sets of data.

[SLO:M-10-C-05]: Solve real-life problems involving variance, and standard deviation for grouped data (e.g. checking variability in forecasting, manufacturing, finance, economics etc.).

Probability of Combined Events:

[SLO:M-10-C-06]: Explain permutation and combination

[SLO:M-10-C-07]: Calculate the probability of combined events using, where appropriate: sample space diagrams, possibility diagram, tree diagrams, Venn diagrams.

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?

	• 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 might happen if …? • Which are the facts? • Which statements support …?
Apply 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. **Question Stems** • 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 would you develop …? • How would you change …? • How would you demonstrate…?	**Analyse** 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. **Question Stems** • 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...?

• How would you develop? • How would you explain …? • 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 could the ending have been if ... had taken place? • State the point of view of … • What are some of the problems of …? • 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 ?

BLOOM'S 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
					
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				

SSC PART II EXAMINATION
MARKS BREAKUP GRID FOR EXAMINATION 2025

SCIENCE GROUP:

SUBJECT	THEORY	PBA	TOTAL
ENGLISH	100	-	100
URDU EASY / SINDHI EASY	75	-	75
PAKISTAN STUDIES	75	-	75
PHYSICS	60	15	75
CHEMISTRY	60	15	75
BIOLOGY	60	15	75
MATHEMATICS	75	-	75
TOTAL	505	45	550

COMPUTER SCIENCE GROUP:

SUBJECT	THEORY	PBA	TOTAL
ENGLISH	100	-	100
URDU EASY / SINDHI EASY	75	-	75
PAKISTAN STUDIES	75	-	75
PHYSICS	60	15	75
CHEMISTRY	60	15	75
COMPUTER SCIENCE	60	15	75
MATHEMATICS	75	-	75
TOTAL	505	45	550

GENERAL GROUP:

SUBJECT	THEORY	PBA	TOTAL
ENGLISH	100	-	100
URDU EASY / SINDHI EASY	75	-	75
PAKISTAN STUDIES	75	-	75
GENERAL SCIENCE	75	-	75
GENERAL MATH	75	-	75
EDUCATION	75	-	75
ECONOMICS	75	-	75
CIVICS	75	-	75
ISLAMIC STUDIES	75	-	75
TOTAL	550	-	550