

ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

Secondary School Certificate (SSC)

Examination syllabus

MATHEMATICS

X

**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.

RATIONALE

Mathematics Examination Scheme Part II (Grade X, Science Group)

This examination scheme provides test designers with a framework to design an achievement test in order to gather evidence of students' learning and to ensure that the judgment about their achievement is valid and fair. In the limited time of formal examination setting, teachers and examiners cannot measure students' achievement level for each single topic and/ learning outcomes.

This document provides a roadmap to ensure that the mathematics examination is designed in consideration of the broader concepts and key learning outcomes as mentioned in the national curriculum. The test specification is designed with a review of student learning outcomes and the content weightage given in the national curriculum in order to establish constructive alignment between examination, learning outcomes and teaching.

This framework suggests teachers to share this examination scheme with their students so that they can recognise the broad concepts, key learning outcomes and the relationship between learning outcomes and assessment smoothly and easily. Open discussion and frequent negotiation of these aspects can encourage higher levels of understanding among students, developing study skills as well as reduce any additional fear of being examined. A review of student learning outcomes, indicated in this document, suggests students to develop conceptual understanding of mathematics topics and skills for them to be able to apply these concepts in related situations.

A review of cognitive level addressed in the students' learning outcomes indicates that the greatest emphasis is on students' developing their application skills, which includes applying mathematical concepts to solving problems, verifying and proving related mathematical relationships. Teachers are, therefore, encouraged to use a variety of strategies – such as problem solving, investigation, discussions as well as available and easily accessible electronic materials and other textbooks, in addition to the government prescribed textbook – so as to help students achieve the learning outcomes. This document comprises of the following components:

- Description of Units and SLOs – to derive approximate average of cognitive levels
- Table of Specification

AIMS AND OBJECTIVES:

Curriculum of mathematics is comprised of five standards

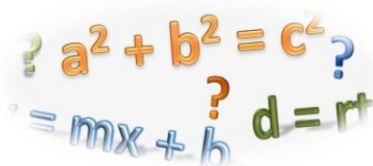
1- Numbers and Operations

The students will be able to:

- Identify numbers, ways of representing numbers and effects of operations in various situations,
- Compute fluently with fractions, decimals and percents,
- Manipulate different types of sequence and apply operations on matrices.



2 - Algebra



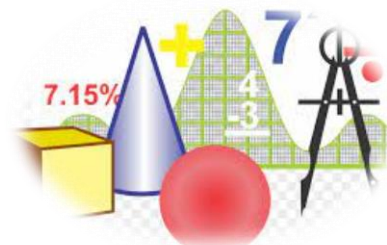
The students will be able to:

- Analyze number patterns and interpret mathematical situations by manipulating algebraic expressions and relations.
- Model and solve contextualized problems, interpret functions, calculate rate of change of functions.
- Integrate analytically and numerically. determine orthogonal trajectories of a family of curves and solve non-linear equations numerically

3 - Measurements and Geometry

The students will be able to:

- Identify measurable attributes of objects, construct angles and two-dimensional figures.
- Analyze characteristics and properties of geometric shapes and develop arguments about their geometric relationships.
- Recognize trigonometric identities, analyze conic sections, draw and interpret graphs of functions.



4 - Information Handling



The students will be able to:

- collect, organize, analyze, display and interpret data/ information

5 - Reasoning and Logical Thinking

The students will be able to:

- Use patterns, known facts, properties and relationships to analyze mathematical situations.
- Examine real life situations by identifying, mathematically valid arguments and drawing conclusion to enhance their mathematical thinking.





EXAMINATION SYLLABUS WITH SCHEME OF ASSESSMENT

UNIT 1: MATRICES AND DETERMINANTS

Topics	SLOs	K	U	Ap	TOS		
					MCQ	CRQ	ERQ
1.1 Introduction to Matrices	<ul style="list-style-type: none"> ▪ Define a matrix with real entries. ▪ Recognize rows and columns of a matrix. 	* *			2	1	1
1.2 Types of matrices	<ul style="list-style-type: none"> ▪ Identify various forms of a matrix, i.e. column matrix, rectangular matrix, square matrix, zero/null matrix, transpose of matrix, symmetric matrix, skew symmetric matrices. 		*				
1.3 Addition and subtraction of matrices	<ul style="list-style-type: none"> ▪ Explain whether the given matrices are conformable for addition/subtraction. ▪ Calculate sum and difference of two matrices. ▪ Multiply a matrix by a real number. ▪ Verify commutative and associative law under addition. ▪ Define additive identity of a matrix. ▪ Find additive inverses of matrix 	*	*	* * *			
1.4 Multiplication of matrices	<ul style="list-style-type: none"> • Describe whether the given matrices are conformable for multiplication. ▪ Find product of (two or three) matrix. ▪ Prove associative law under multiplication. ▪ Prove distributive laws. ▪ Verify with the help of an example that commutative law under multiplication does 		*	*			

	<p>not hold in general i.e. $AB \neq BA$</p> <ul style="list-style-type: none"> Define multiplicative identity of matrix. <ul style="list-style-type: none"> Verify the result $(AB)^{-1} = B^{-1}A^{-1}$ 	*					
1.5 Multiplicative Invers of a Matrix	<ul style="list-style-type: none"> Find the determinant of square matrix. Calculate determinant of a matrix Differentiate singular and non-singular matrices. Find adjunct of a square matrix. Find multiplicative inverse of a no-singular matrix A. Verify that: $AA^{-1} = I = A^{-1}A$ Where I is the multiplicative identity. Prove that $(AB)^{-1} = B^{-1}A^{-1}$ 		*	* * * * *			
1.6 Solution of simultaneous Liner Equation	<p>Solve a system of two linear equations , using</p> <p>Matrix inversion method and Cramer's rule</p>			*			
Total Number of SLOs	24	4	4	10	6		

UNIT 2: LOGARITHMS

Topics	SLOs	K	U	Ap	TOS		
					MCQ	CRQ	ERQ
2.1 Scientific Notation	<ul style="list-style-type: none"> Express a number in standard form of scientific notation and vice versa 		*		1	-	1
2.2 Logarithm	<ul style="list-style-type: none"> Describe logarithm of a number to the base a as the power to which a must be raised to give the number Explain a common logarithm, characteristic and mantissa of log of a number. Find log of a number using log tables. 		* * *	*			

	<ul style="list-style-type: none"> Explain Anti-log, and find Anti-log of a number using log tables. 						
2.3 Common and Natural Logarithm	<ul style="list-style-type: none"> Differentiate between common and natural a logarithm. 		*				
2.4 Log of logarithm	Prove the following laws of logarithm. <ul style="list-style-type: none"> $\log_a (mn) = \log_a m + \log_a n$, $\log_a \left(\frac{m}{n}\right) = \log_a m - \log_a n$, $\log_a m^n = n \log_a m$, $\log_a m \log_m n = \log_a n$. 						
2.5 Application of Logarithm	Apply laws of logarithms to convert lengthy processes of multiplication, division and exponentiation into easier processes of addition and subtraction etc.			*			
Total Numbers of SLOs = 8		-	5	2	1		

UNIT 3: ALGEBRAIC MANIPULATION

Topics	SLOs	K	U	Ap	TOS		
					MCQ	CRQ	ERQ
3.1 Highest Common Factor (HCF)/Greatest Common Divisor (GCD) and Least Common Multiple (LCM)	<ul style="list-style-type: none"> Find Highest Common Factor (HCF) and Least Common Multiple (LCM) of algebraic expressions by factorization method. Use division method to determine highest common factor and least common multiple. Examine the relationship between HCF and LCM. Solve real life problems related to HCF and LCM. 			<ul style="list-style-type: none"> * * * 	1	2	1
3.2 Basic Operations on Algebraic Fractions	<ul style="list-style-type: none"> Use highest common factor and least common multiple to reduce fractional expressions involving 			*			

	addition, subtraction, multiplication and division						
3.3 Square Root of an Algebraic Expression	<ul style="list-style-type: none"> Find square root of an algebraic expression by factorization and division methods 			*			
Total Number of SLOs = 6		-	-	5	1		

UNIT-4: QUADRATIC EQUATIONS

Topics	SLOs	K	U	Ap	TOS		
					MCQ	CRQ	ERQ
4.1 Quadratic Equations.	Define quadratic equation.	*			2	2	2
4.2 Solution of Quadratic Equations.	i) Solve a quadratic equation in one variable by <input type="checkbox"/> Factorization, <input type="checkbox"/> Completing the squares.			*			
4.3 Quadratic Formula	i) Use method of completing the squares to derive the quadratic formula. ii) Use quadratic formula to solve quadratic equations.			*			
4.4 Equations Reducible to Quadratic Form	i) Solve equations, reducible to quadratic form, of the type $ax^4 + bx^2 + C = 0$. ii) Solve the equations of the type $a p(x) + \frac{b}{p(x)} = c$. iii) Solve reciprocal equations of the type $a \left(x^2 + \frac{1}{x^2}\right) + b \left(x + \frac{1}{x}\right) + c = 0$. iv) Solve exponential equations in which the variables occur in exponents. v) Solve equations of the type $(x+a)(x+b)(x+c)(x+d)=k$, where $a+b = c+d$			* * * * *			

4.5 Radical Equations	Solve equations of the type: <ul style="list-style-type: none"> ▪ $\sqrt{ax + b} = cx + d.$ ▪ $\sqrt{x + a} + \sqrt{x + b} = \sqrt{x + c},$ ▪ $\sqrt{x^2 + px + m} + \sqrt{x^2 + px + n} = q$ 			*			
Total Number of SLOs = 10	1	-	8	1			

UNIT 5: THEORY OF QUADRATIC EQUATION

Topics	SLOs	K	U	Ap	TOS		
					MCQ	CRQ	ERQ
5.1 Nature of the Square Roots of a Quadratic Equation	<ul style="list-style-type: none"> Define discriminant ($b^2 - 4ac$) of the quadratic expression $ax^2 + bx + c$. Find the discriminant of a given quadratic equation. Discuss the nature of the roots of a quadratic equation through discriminant. Determine the nature of the roots of a given quadratic equation and verify the result by solving the equation. Determine the values of an unknown involved in a given quadratic equation when the nature of its roots is given. 		*		1	1	2
5.2 Cube Roots of Unity and their Properties	<ul style="list-style-type: none"> Find cube roots of unity. Recognize complex cube roots of unity as w and w^2. Verify the properties of cube roots of unity. Use properties of cube roots of unity to solve appropriate problems. 	*		*			
5.3 Roots and Coefficients of a Quadratic Equation	<ol style="list-style-type: none"> Find the relation between the roots and the coefficients of a quadratic equation. Find the sum and the product of the roots of a given quadratic equation without solving it. 			*			

	<p>iii. Find the value(s) of the unknown involved in a given quadratic equation when:</p> <ul style="list-style-type: none"> • sum of roots is equal to a multiple of the product of roots, • sum of the squares of roots is equal to a given number, • roots differ by a given number, • roots satisfy a given relation (e.g. the relation $2\alpha+5\beta=7$ where α and β are the roots of given equation), • both sum and product of roots are equal to a given number. 						
5.5 Simultaneous Equations	<p>i) Solve a system of two equations in two variables when</p> <ul style="list-style-type: none"> ▪ one equation is linear and the other is quadratic, ▪ both the equations are quadratic. <p>ii) Solve the real life problems leading to quadratic equations</p>						
Total Number of SLOs = 14		1	2	7	4		

UNIT 6: PARTIAL FRACTION

Topics	SLOs	K	U	Ap	TOS
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					MCQ	CRQ	ERQ
6.1 Proper, Improper and Rational Fractions	<ul style="list-style-type: none"> Define proper, improper and rational fractions. 	*			1	1	-
6.2 Resolution of Fraction into its Partial Fractions	Resolve an algebraic fraction into its partial fractions when its denominator consist of <ul style="list-style-type: none"> <input type="checkbox"/> Non- repeated linear factors, <input type="checkbox"/> Repeated linear factors, <input type="checkbox"/> Non- repeated quadratic factors, <input type="checkbox"/> Repeated quadratic factors. 			*			
Total Number of SLOs = 2		1	-	1			

UNIT 7: VARIATION

Topics	SLOs	K	U	Ap	TOS		
					MCQ	CRQ	ERQ
7.1 Ratios, Proportions and Variations	<ul style="list-style-type: none"> Define ratios, proportions and variations (direct and inverse). Find 3rd, 4th proportions and mean in a continued proportion. 	*		*	1	-	1
7.2 Theorems on Proportions	<ul style="list-style-type: none"> Apply theorems of: <ul style="list-style-type: none"> <input type="checkbox"/> Invertendo, <input type="checkbox"/> Alternando, <input type="checkbox"/> Componendo, <input type="checkbox"/> Dvidendo And Componendo <input type="checkbox"/> Dividendo to find proportions. 			*			
7.3 Joint Variations	<ul style="list-style-type: none"> Define joint variations. Solve problems related to joint variations. 	*		*			
7.4 k- Method	<ul style="list-style-type: none"> Use k- Method to prove conditional equalities involving proportions. Solve real life problems based on variations. 			*			

Total Number of SLOs = 7	2	-	5	-		
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UNIT 8: INTRODUCTION TO COORDINATE GEOMETRY

Topics	SLOs	K	U	Ap	TOS		
					MCQ	CRQ	ERQ
8.1 Distance Formula	i. Explain and define coordinate geometry. ii. Derive distance formula to calculate distance between two points given in Cartesian plane. iii. Use distance formula to find distance between two given points.		*	*	1	1	1
8.2 Collinear Points	i) Define collinear points. Distinguish between collinear and non- collinear points. ii) Use distance formula to show that three (or more) given points are collinear. iii) use distance formula to show that the given three non-collinear points form: <input type="checkbox"/> An equilateral triangle, <input type="checkbox"/> An isosceles triangle, <input type="checkbox"/> A right angled triangle, <input type="checkbox"/> A scalene triangle. iv) Use distance formula to show that four given non- collinear points form: <input type="checkbox"/> A square, <input type="checkbox"/> A rectangle, <input type="checkbox"/> A parallelogram.	*		*			
8.3 Mid- Point Formula	i. Recognize the formula to find the midpoint of the line joining two given points. ii. Apply distance and midpoint formulas to solve/verify different standard results related to geometry.		*	*			
Total Number of SLOs = 9		1	3	5	-		

UNIT 9: INTRODUCTION TO TRIGONOMETRY

Topics	SLOs	K	U	Ap	TOS		
					MCQ	CRQ	ERQ
9.1 Measurement of an Angle	i) Measure an angle in sexagesimal system (degrees, minutes and seconds). ii) Convert an angle given in $D^{\circ} M' S''$ form into decimal form (upto two decimal places) and vice-versa. iii) Define a radian (measure of an angle in circular system) iv) Prove the relationship between radian and degree measures	*		* *	1	2	1
9.2 Sector of a Circle	i) Establish the rule $l = r\theta$, where r is the radius of the circle, l the length of the circular arc and θ is the central angle measured in radians. ii) Prove that the area of the sector of a circle is $\frac{1}{2} r^2 \theta$ or $\frac{1}{2} l r$.		*		*		
9.3 Trigonometric Ratios	i) Define and identify: □ General angle (coterminal angles) □ Angle in standard position. ii) Recognize quadrants and quadrantal angles. iii) Define trigonometric ratios and their reciprocals with the help of a unit circle. iv) Recall the values of the trigonometric ratios for 45° , 30° , 60° . v) Recognize signs of trigonometric ratios in different quadrants. vi) Find the values of remaining trigonometric ratios if one trigonometric ratio is given. vii) Calculate the values of trigonometric ratios for 0° , 90° , 180° , 270° , 360° .	* * *	* *	* * *	*		
9.4 Trigonometric Identities	Prove the trigonometric identities and apply them to show different trigonometric relations.				*		

9.5 Angles of Elevation and Depression.	i) Find angles of elevation and depression. ii) Solve real life problems involving angles of elevation and depression.			*			
Total Number of SLOs = 16		4	3	6	3		

UNIT 10 THEOREMS RELATED WITH AREA

Topics	SLOs	K	U	Ap	TOS		
					MCQ	CRQ	ERQ
10.1 Theorems Related with Area	Understand the following theorems along with their corollaries and apply them to solve allied problems. a) Parallelograms on the same base and lying between the same parallel lines (or of the same altitude) are equal in area. b) Parallelograms on equal bases and having the same altitude are equal in area. c) The triangles on the same base and of the same altitude are equal in area. d) Triangles on equal bases and of the same altitude are equal in area.				1	1	1
Total Number of SLOs = 4		-	-	-	4		

UNIT 11: CHORDS OF A CIRCLE

Topics	SLOs	K	U	Ap	TOS		
					MCQ	CRQ	ERQ

11.1 Chords of a Circle	Understand the following theorems along with their corollaries and apply them to solve allied problems. a) One and only one circle can pass through three non-collinear points. b) A straight line, drawn from the centre of a circle to bisect a chord (which is not a diameter) is perpendicular to the chord. c) Perpendicular from the centre of a circle to the chord bisects it. d) If two chords of a circle are congruent then they will be equidistant from the centre. e) Two chords of a circle which are equidistant from the centre are congruent.				1	1	
Total Number of SLOs = 5		-	-	-	5		

UNIT 12: TANGENT TO A CIRCLE

Topics	SLOs	K	U	Ap	TOS		
					MCQ	CRQ	ERQ
12.1 Tangent(s) to a Circle	Understand the following theorems along with their corollaries and apply them to solve allied problems. a) If a line is drawn perpendicular to a radial segment of a circle at its outer end point. b) The tangent to a circle and the radial segment joining the point of contact and the centre are perpendicular to each other. c) The two tangents drawn to a circle from a point outside it are equal in length. d) If two circles touch externally or internally, the distance between their centers is, respectively, equal to the sum or difference of their radii.				1		1
Total Number of SLOs = 4		-	-	-	4		

UNIT 13: CHORDS AND ARCS

Topics	SLOs	K	U	Ap	TOS		
					MCQ	CRQ	ERQ
13.1 Chords and Arcs	Understand the following theorems along with their corollaries and apply them to solve allied problems. a) If two arcs of a circle (or of congruent circles) are congruent, then the corresponding chords are equal. b) If two chords of a circle (or of congruent circles) are equal, then their corresponding arcs (minor, major, semi-circular) are congruent. c) Equal chords of a circle (or of congruent circles) subtend equal angles at the centre. d) If the angles subtended by the two chords of a circle at the centre are equal, the chords are equal.			* * * *	-	-	1
Total Number of SLOs = 4		-	-	-	4		

UNIT 14: ANGLE IN A SEGMENT OF A CIRCLE

Topics	SLOs	K	U	Ap	TOS		
					MCQ	CRQ	ERQ
14.1 Angle in a Segment of a Circle	Understand the following theorems along with their corollaries and apply them to solve allied problems. a) 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. b) Any two angles in the same segments of a circle are equal. c) The angle <input type="checkbox"/> In a semi-circle is a right angle, <input type="checkbox"/> In a segment greater than the semi-circle is less than a right angle, (i.e., an acute angle) In a segment less than a semi-circle is greater than a right angle, (i.e., an obtuse angle) d) The opposite angles of any quadrilateral inscribed in a circle are supplementary.			* * * *	1	1	-
Total Number of SLOs = 4		-	-	-	4		

UNIT 15: PRACTICAL GEOMETRY – CIRCLES

Topics	SLOs	K	U	Ap	TOS		
					MCQ	CRQ	ERQ
15.1 Construction of Circles	i) Locate the centre of a given circle ii) Draw a circle passing through three given non-collinear points. iii) Complete the circle: <input type="checkbox"/> By finding the centre, <input type="checkbox"/> Without finding the centre, when a part of its circumference is given.		*	* *	-	1	-
15.2 Circles attached to Polygons	i) Circumscribe a circle about a given triangle. ii) Inscribe a circle in a given triangle. iii) Escribe a circle to a given triangle. iv) Circumscribe an equilateral triangle about a given circle. v) Inscribe an equilateral triangle in a given triangle. vi) Inscribe an equilateral triangle in a given circle vii) Circumscribe a square about a given circle. viii) Circumscribe a regular hexagon about a given circle. ix) Inscribe a regular hexagon in a given circle.			* * * * * *			
15.3 Tangents to a Circle	i) Draw a tangent to a given arc, without using the centre, through a given point P, when P is : <input type="checkbox"/> The middle point of the arc, <input type="checkbox"/> At the end of the arc, <input type="checkbox"/> Outside the arc. ii) Draw a tangent to a given circle from a point P, when P lies <input type="checkbox"/> On the circumference, <input type="checkbox"/> Outside the circle. iii) Draw two tangents to a circle meeting each other at a given angle. <input type="checkbox"/> Transverse common tangent or internal tangent to two equal circles, v) Draw Direct common tangent or external tangent,			* * * * *			
Total Number of SLOs = 17		-	1	16	-		

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?

	<ul style="list-style-type: none"> • 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 ...? • How would you modify ...? • How would you present...? • How would you solve ... ? • Identify the results of ... 	<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 ...? • What assumptions ...? • What can you infer about...? • What can you point out about ? • What conclusions ...?

<ul style="list-style-type: none"> • 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 ... 	<ul style="list-style-type: none"> • 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 ?
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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				

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

SCIENCE GROUP:

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

GENERAL GROUP:

SUBJECT	THEORY	PRACTICAL	TOTAL
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	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

