



ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

**Higher Secondary School
Certificate (HSC)**

**Examination Syllabus
&
Model Paper
(For the Year 2024)**

Business Mathematics – XI

Prepared by:

**Mr. Wynberg Leal
Manager Academics - Commerce**

S. No.	Table of Contents	Page No.
1	Preface	3
2	Aims of the subject of specific syllabus	4
3	Detailed Syllabus - Topics, Student Learning Outcomes (SLOs), Cognitive Distribution	5
4	Table of Specification	8
5	Scheme of Assessment	10
6	Definition of Cognitive Levels	11
7	Blooms Taxonomy with examples	14
8	HSC Scheme of Studies	15
9	Model Paper 2024	18

You can Approach us:

Address: Ziauddin University Examination Board

D / 20 Block 1 Clifton Karachi

Phone: 92 21 35148594

E-mail: info@zueb.edu.pk

Website: www.zueb.edu.pk

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
Academic Head

Aims of the Syllabus of Business Mathematics:

The Aims of teaching Business Mathematics at Higher Secondary School Level are to:

- Introduce students to the expertise of collecting, organizing, analyzing, and interpreting data, enabling them to make inferences and estimates from the results obtained.
- To apply mathematical knowledge and skills to business situations and practices.
- To create a sense of appreciation for the role mathematics has on business situations and activities.

ZIAUDDIN UNIVERSITY EXAMINATION BOARD
STUDENT LEARNING OUTCOMES (SLO) CATEGORIZATION
XI- BUSINESS MATHEMATICS

Detailed Syllabus

Topics	Sub-Topics	Student Learning Outcomes	Cognitive Levels		
			K	U	A
Introduction	<ul style="list-style-type: none"> • Real Numbers • Basic Operations on numbers • Inverse • Factors & Exponents • Brackets • Algebraic Expression & basic operations • Expansion 	Define natural, whole, integers, Real numbers. Perform basic operations on number. Find additive & multiplicative inverse. Describe usage of factors, exponents, and brackets. Solve algebraic expressions (Addition, Subtraction, Multiplication, Division, Simplification, Expansion).	*		* * * *
Ratio, Proportion & Percentage	<ul style="list-style-type: none"> • Ratios, • Equal Ratios • Compound Ratio • Dividing Quantity in given ratio • Combined Ratio • Proportion • Direct, Inverse, Compound Proportion • Percentage • Profit & Loss 	Describe Ratios, Equal Ratio, Compound Ratio. Solve related problems. Solve ratios by dividing quantity. Solve combined ratios. Describe Proportions, Direct, Inverse & Compound Proportions. Solve related problems. Describe percentage. Change percentage into fraction and vice versa. Change percentage into decimal and vice versa. Solve problem relating to percentages. Describe Cost Price, Selling Price, Gain, Loss. Solve related problems.		* * * *	* * * * *
Interest & Annuities	<ul style="list-style-type: none"> • Simple & Compound Interest • Effective Rate of Interest • Annuity, Amount of Annuity • Sinking Fund • Present value of Annuity 	Define Simple Interest. Solve problems relating to simple interest. Define Compound Interest. Solve problems relating to Compound interest. Explain effective rate of interest. Calculate effective rate of interest. Explain Annuity, Sinking fund. Solve related problems. Calculate Present value of Annuity. Calculate Future value of Annuity.	* *		* * * * *
Functions & their Graphs	<ul style="list-style-type: none"> • Introduction of function. 	Define Variable, and Function. Explain coordinate system & graph of functions.	*	*	

	<ul style="list-style-type: none"> • Co-ordinate system and Graphs of Functions. • Functions & their Graphs • Distance between Two Points. • Linear Function and graph. • Slope of a Line. • Equation of straight line when two points are given • Equation of straight line when Slope and point are given • Equation of straight line when Slope and y – intercept are given. • Equation of straight line when x – intercept and y – intercept is given. • Quadratic Function, Direction of Parabola, vertex and roots equation. 	<p>Plotting of points on graph. Find distance between two points. Draw graph of linear function. Solve equation of straight line. Find slope of straight line. Find equation of straight line when</p> <ol style="list-style-type: none"> Two points are given Slope and point are given When slope and Y-intercept are given When x-intercept and y-intercept are given <p>Solve quadratic equation and draw parabola. Solve vertex and roots of equation.</p>			* * * * * * * *
Linear & Quadratic Equations	<ul style="list-style-type: none"> • Linear equation in One Variable. • Simultaneous equation. • Quadratic equation. • Methods of solving a Quadratic Equation. • Method of Factorizing. • Method of Completing the Square. • Method of Quadratic formula. 	<p>Explain linear equation in one variable. Solve Linear equation in one variable. Solve Simultaneous equations using:</p> <ol style="list-style-type: none"> Method of Elimination Method of Substitution <p>Explain quadratic equation in one variable. Solve quadratic equation using:</p> <ol style="list-style-type: none"> Method of Factorizing Method of completing the square Method of Quadratic Formula 		*	* * * *
Binary Numbers	<ul style="list-style-type: none"> • Introduction to Number System. • Binary Number System. • Conversion of Decimal to Binary Number System. 	<p>Define Binary and Decimal number system. Compare binary and decimal number system. Convert Decimal to Binary and vice versa. Solve Binary Addition, subtraction, Multiplication, and Division problems</p>	*	*	* *

	<ul style="list-style-type: none"> • Conversion of Decimal to Binary Number System. • Binary Addition, Subtraction, Multiplication, Division. 				
Matrices & Determinants	<ul style="list-style-type: none"> • Matrix. • Types of Matrices. • Equality Matrices. • Transpose of a Matrix. • Addition and subtraction of Matrices. • Multiplication of Two Matrices. • Determination of a Matrix. • Inverse of a Square Matrices. • Solution of simultaneous equations through Matrices and Cramer's Rule. 	<p>Define Matrix and list examples. Describe the types of matrices i.e., square, null, identity, equality, row, column, rectangular, square, scalar, diagonal, symmetrical matrix. Find the transpose of a matrix. Find the Addition and subtraction of matrices. Find the multiplication of a matrix by a number. Find the Multiplication of two matrices. Find the determinant of a Matrix. Find Inverse of square matrices. Solve Simultaneous equations through matrices. Solve two equations in two variables using Cramer's rule.</p>	*	*	<p>* * * * * * *</p>

Table of Specification (TOS)

Table 1: Number of Student Learning outcomes (SLOs) and their cognitive distribution

Topic No.	Topic	Student Learning Outcomes			Total
		K	U	A	
1	Introduction	1	1	3	5
2	Ratio, Proportion & Percentage	-	4	6	10
3	Interest & Annuities	2	2	6	10
4	Functions and their graphs	1	1	8	10
5	Linear and Quadratic equations	-	2	3	5
6	Binary Numbers	1	1	2	4
7	Matrices & determinants	1	1	8	10
	Total	6	12	36	54
	Percentage (%)	11	22	67	100

Note:

1. Table 1 identifies the Student Learning outcomes and their cognitive distribution (Knowledge, Understanding, Application).
2. The table shows that the share of knowledge is 11% with 6 SLOs, Understanding is 22% with 12 SLOs, and Application is 67% with 36 SLOs.
3. Since many topics of mathematics have been covered by students in matriculation at a more basic level, therefore, higher emphasis has been given to Application of the concepts learned.
4. Please note that Table 1 does not translate to marks distribution in the exam paper and weightage of each topic is calculated separately in Table 3

Table 2: No. of SLOs and their % Share per Topic

Topic No	Topic	Total SLOs	% Share of SLOs
1	Introduction	5	9.3%
2	Ratio, Proportion & Percentage	10	18.5%
3	Interest & Annuities	10	18.5%
4	Functions and their graphs	10	18.5%
5	Linear and Quadratic equations	5	9.3%
6	Binary Numbers	4	7.4%
7	Matrices & determinants	10	18.5%
	Total	54	100%

Note:

1. Table 2: shows the % share of SLOs per Topic.
2. The Topics of Ratio, Proportion & Percentage, Interest & Annuities, Function & their graphs, and Matrices all share the highest % share of SLOs at 18.5% each, followed by Introduction, Linear & Quadratic equation respectively.
3. Please note that Table 2 does not translate to marks distribution in the exam paper and weightage of each topic is calculated separately in Table 3

**Table 3: Exam Paper Specification, Topic Difficulty, Types of Questions,
No. of Questions per Topic, Marks Allocation**

Topics	Difficulty Level	Section A	Section B	Section C
		MCQs @ 1 mark each	CRQ/SAQs @ 4 marks each	ERQ/DAQs @ 10 marks each
Introduction	Easy	1	1	1
Ratio, Proportion & Percentage	Easy	1	1	
Interest & Annuities	Moderate	1	1	
Functions and their graphs	Moderate	1	1	1
Linear and Quadratic equations	Moderate Difficult	2	1	
Binary Numbers	Moderate	2	1	
Matrices & determinants	Moderate Difficult	2	2	1
Total Questions to be given		10	8	3
Total Questions to be attempted		10	5	2
Maximum marks obtainable		10	20	20

Note:

1. Table 3 displays Paper specification, Topic difficulty level, 3 types of Questions used, and the number of questions per topic to be used, and their marks distribution per section.
2. The Exam Paper consists of 3 Sections:
 - a. Section A = Multiple Choice Questions (MCQs)
 - b. Section B = Short Answer Questions / Constructive Response Questions (CRQs)
 - c. Section C = Detailed Answer Questions / Extended Response Questions (ERQs); require more detailed answers necessitating a broader understanding of concepts, and complex calculations compared to CRQ

ZIAUDDIN UNIVERSITY EXAMINATION BOARD
GRADE XI – BUSINESS MATHEMATICS
SCHEME OF ASSESSMENT

Maximum Marks: 50

Section ‘A’: Multiple Choice Questions (20%) 10 Marks **(1x10=10)**

Multiple Choice Question will cover the complete Syllabus

- Each MCQ carries 1 mark
- Given MCQs will be = 10 MCQs
- All MCQs to be answered

Section ‘B’: Short Answer Questions (40%) 20 Marks **(4x5=20)**

- Short Answer Question must be given from the prescribed Syllabus all content is to be followed.
- Eight (8) Short Answer Questions may be given. Each Question having (4 Marks). In this Section Student shall attempt (5 Questions).

Section “C” (Detailed Answer Questions) (40%) 20 Marks **(2x10=20)**

- Three (3) Detailed Answer Questions may be given in this section and (2 Questions) are to be answered and each Question having (10 Marks).

DEFINITIONS OF COGNITIVE LEVELS

Remember

Remembering is the act of retrieving knowledge and can be used to produce things like definition or lists. The student must be able to recall or recognize 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 recognize...?
- 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. Her the student must understand the main idea of material heard, viewed, or read and interpret or summarize 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 generalize...?
- 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

	<ul style="list-style-type: none"> • 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 The third level in Bloom's taxonomy, Applying marks a fundamental shift from the pre-Bloom 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 situation. 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 	<p>Analyze Analyzing 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 relationship between these parts. Teachers must give student 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 categorize...? • 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 ...? • What do you see as other possible outcomes? • What does the author assume? • What explanation do you have for ...?

<ul style="list-style-type: none">• How would you explain ...?	<ul style="list-style-type: none">• 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 TAXANOMY WITH EXAMPLES

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 select	compile
locate	predict	relate	convince	categorize	construct
memorize	associate	show	defend	connect	develop
quote	contrast	sketch	estimate	differentiate	generalize
recall	convert	complete	grade	divide	integrate
reproduce	demonstrate	construct	measure	order	modify
tabulate	estimate	dramatize	predict	prioritize	organize
tell Copy	express	interpret	rank	survey	prepare
discover	identify	manipulate	score	calculate	produce
duplicate	indicate	paint	select	conclude	rearrange
enumerate	infer	prepare	test	deduce	rewrite
listen	relate	act	conclude	devise	adapt
observe	restate	collect	consider	diagram	anticipate
omit	select	compute	critique	dissect	arrange
read	translate	explain list	debate	estimate	assemble
recite record	ask	operate	distinguish	evaluate	choose
repeat retell	cite	practice	editorialize	experiment	collaborate
visualize	discover	simulate	justify	focus	facilitate
	generalize	transfer write	persuade	illustrate	imagine
	group		rate	organize	intervene
	illustrate		weigh	outline	make
	judge			plan	manage
	observe			question	originate
	order			test	propose
	report				simulate solve
					support test
					validate

	represent research review rewrite show				
--	--	--	--	--	--

HSC PART I EXAMINATION
MARKS BREAKUP GRID FOR EXAMINATION 2024

GROUP: PRE-MEDICAL-I

Subject	Theory	ATP	Total
English	100	-	100
Urdu Normal/ Sindhi Normal	100	-	100
Islamic Education/ Civics	50	-	50
Physics	85	15	100
Chemistry	85	15	100
Biology	85	15	100
Total	505	45	550

GROUP: PRE-ENGINEERING-I

Subject	Theory	ATP	Total
English	100	-	100
Urdu Normal/ Sindhi Normal	100	-	100
Islamic Education/ Civics	50	-	50
Physics	85	15	100
Chemistry	85	15	100
Mathematics	100	-	100
Total	520	30	550

GROUP: COMPUTER SCIENCE-I

Subject	Theory	ATP	Total
English	100	-	100
Urdu Normal/ Sindhi Normal	100	-	100
Islamic Education/ Civics	50	-	50
Physics	85	15	100

Computer Science	75	25	100
Mathematics	100	-	100
Total	510	40	550

GROUP: COMMERCE-I (PRIVATE/REGULAR)

Subject	Theory	ATP	Total
English	100	-	100
Urdu Normal/ Sindhi Normal	100	-	100
Islamic Education/ Civics	50	-	50
Economics	75	-	75
POC	75	-	75
Accounting	100	-	100
Business Mathematics	50	-	50
Total	510	40	550

GROUP: HUMANITIES-I (PRIVATE/REGULAR)

Subject	Theory	ATP	Total
English	100	-	100
Urdu Normal/ Sindhi Normal	100	-	100
Islamic Education/ Civics	50	-	50
Computer Studies	75	25	100
Islamic Studies	100	-	100
Mathematics	100	-	100
Sociology	100	-	100
Economics	100		100
Education	100		100
Civics	100		100
Total	550	40	550



Total Time : 2 hours
Total Marks: 50

Class XI HIGHER SECONDARY SCHOOL CERTIFICATE EXAMINATION 2024
Time Allowed: 15 minutes SUBJECT: BUSINESS MATHEMATICS

Q1: SECTION "A"

Marks 10

Note: Attempt all questions from this section. Each question carries one mark

- $2 - b^2 = ?$
a. $(a - b)(a - b)$ b. $(a + b)(a + b)$ c. $(a - b)(a + b)$ d. $(b + a)(b + a)$
- The ratio of 5 feet to 30 inches is:
a. 2: 1 b. 1: 2 c. 1: 6 d. 6: 1
- A fixed amount of money that is paid or received at equal intervals of time is called
a. Multiple compounding b. Compound amount c. Annuity d. Proceed
- Graph of linear equation is also called graph of a;
a. Parabola b. Slope c. Straight line d. Distance
- $2x + 5 = 13$, then $x =$
a. 2 b. 5 c. 4 d. 13
- For the quadratic equation $2x^2 - 4x + 3 = 0$, the value of $a = ?$
a. 4 b. 3 c. 2 d. 4
- The number system we use in our daily life is based on
a. Seven digits b. Eight digits c. Two digits d. Ten digits
- Binary system is also called;
a. Base – zero system b. Base – one system c. Base – two system d. Base – three system
- Cramer's Rule is also known as?
a. Inverse Matrix Method b. Matrix Method c. Determinant Method d. Inverse Method
- The matrix $\begin{vmatrix} 0 & 0 \\ 0 & 0 \end{vmatrix}$ is called
a. Complete matrix b. Identity matrix c. Null matrix d. Determinant.

Class XI HIGHER SECONDARY SCHOOL CERTIFICATE EXAMINATION 2024
Time Allowed: 15 minutes SUBJECT: BUSINESS MATHEMATICS SECTION "B" AND SECTION "C"
Q2: SECTION "B" SHORT ANSWER QUESTION

Total Marks 40
Marks 20

Note: Attempt any 5 questions from this section.

- (i) Simplify $(5x + 7y)(x + 3y)$
(ii) Expand $(4x + 6y)^2$
- A man buys a mobile phone for Rs. 15,000/- and sells it at a loss of 25%. Find the selling price.
- Find the present value of Rs. 125,000 due at the end of 5 years if money is worth 8% compounded quarterly?
- For the following quadratic function: $Y = x^2 + 5x + 1$, find the roots of the equation.

5. Solve the equations using method of elimination:

$$25x + 10y = 15$$

$$10x + 15y = -5$$

6. (i) $(10101)_2 = (\underline{\hspace{2cm}})_{10}$

(ii) $(25)_{10} = (\underline{\hspace{2cm}})_2$

7. Multiply matrix A by matrix B, where:

$$A = \begin{bmatrix} 3 & 5 \\ 2 & 1 \end{bmatrix} \text{ and } B = \begin{bmatrix} 7 & 2 \\ 5 & 4 \end{bmatrix}$$

8. Find the determinant of the following matrices.

(i) $A = \begin{bmatrix} -4 & 3 \\ 5 & 2 \end{bmatrix}$

(ii) $B = \begin{bmatrix} 3 & 1 \\ 5 & 6 \end{bmatrix}$

SECTION "C" DETAILED ANSWER QUESTIONS

Marks 20

Q3:

Note: Attempt any 2 questions from this section. Each question carries equal marks.

3. Determine the quarterly payment necessary to repay a Rs. 50,000 personal loan, if interest is computed at 15% per year compounded quarterly. Assume the period of the loan is 5 years.

4. For the quadratic function: $y = -2x^2 + 5x - 1$

Determine

(i) which way the parabola opens

(ii) The coordinates of the vertex

(iii) The roots of the equation

(iv) Sketch the graph

5. Find the inverse of A, where:

$$A = \begin{bmatrix} -1 & 3 & 2 \\ 1 & 0 & -1 \\ 1 & 2 & 0 \end{bmatrix}$$