

Specification of the Mathematics Entrance Examination for Admission to the Bachelor's Degree Programs of ToshTech Technical University for the 2026/2027 Academic Year

1. Purpose of the Entrance Examination

The Mathematics Entrance Examination is conducted for the purpose of objectively assessing the level of applicants' mathematical preparation, logical reasoning, and academic potential required for successful study in the bachelor's degree programs of ToshTech Technical University.

The results of the Entrance Examination are used to establish the ranking of applicants and to make decisions regarding recommendations for admission within the approved admission quota.

The Entrance Examination is an integral part of the competitive admissions process and is conducted in accordance with the Regulations on Admission to Bachelor's Degree Programs at ToshTech Technical University for the 2026/2027 academic year.

2. Provisions Determining the Content of the Examination

The content of the Mathematics Entrance Examination is determined by:

- the content of the State Educational Standards of the Republic of Uzbekistan and the mathematics curricula of secondary general education;
- the knowledge, skills, and competencies required for successful study in engineering and technology bachelor's degree programs at ToshTech Technical University.

The examination content covers the main sections of the secondary-school mathematics curriculum and is intended to assess mathematical literacy, analytical thinking, problem-solving skills, mathematical modelling abilities, and applicants' readiness for higher education programs in technical fields.

3. Approaches to Content Selection

For engineering education, both strong general mathematical literacy and the ability to apply existing knowledge are essential. Therefore, the examination consists of two parts, and its content covers a broad range of topics necessary for successful study at the Technical University.

The first part of the examination assesses how confidently an applicant has mastered the fundamental mathematical toolkit. It includes topics from algebra and introductory calculus such as algebraic transformations, functions and graphs, trigonometry, powers and logarithms, derivatives and integrals, elements of mathematical modelling, as well as basic geometry.

The tasks in Part 1 require only short answers. This format makes it possible to cover a wide range of topics and assess applicants' speed, accuracy, and attention to detail.

At the same time, a future engineer must be able to construct models, select effective solution methods, and evaluate the plausibility of results. Therefore, the tasks in Part 2 require extended responses, that is, detailed solutions. This format allows assessment of whether an applicant can build logical chains of reasoning, understands how acquired knowledge works, can justify their actions, and is capable of completing substantial tasks.

Extended-response solutions make it possible to evaluate whether an applicant can confidently solve non-standard problems. In addition, such solutions reveal the applicant's strengths and weaknesses: whether they can formulate a mathematical model, apply knowledge in a non-standard situation; do they perform calculations accurately or frequently make computational errors, etc.

Thus, the two-part examination makes it possible to assess both breadth of knowledge and computational competence, as well as the ability to engage in multi-step mathematical reasoning—two key components of successful study in engineering programs.

4. Structure of the Entrance Examination

The Entrance Examination consists of two parts and includes 14 tasks that differ in content, difficulty, and format:

- Part 1 contains 10 short-answer tasks (Tasks 1–10);
- Part 2 contains 4 extended-response tasks (Tasks 11–14) requiring a complete written solution with justification of the steps taken.

The tasks in Part 1 are intended to assess the fundamental mathematical preparation of graduates of secondary general education institutions. A task is considered completed if the correct answer is recorded on the answer sheet.

The tasks in Part 2 are intended to assess the ability to apply acquired knowledge and require mathematics proficiency at an advanced level. Part 2 tasks are designed to provide more precise differentiation among applicants.

When completing the extended-response tasks in Part 2, applicants must provide a complete, justified solution and a final answer for each problem on the answer sheet.

5. Distribution of Entrance Examination Tasks by Content Areas and Assessed Learning Outcomes

The content of the Entrance Examination provides an opportunity to assess a range of subject-specific competencies:

- ability to apply acquired knowledge and skills in practical activities and everyday life;
- ability to perform calculations and algebraic transformations;
- ability to solve equations and inequalities;
- ability to work with functions and their graphs;
- ability to work with geometric figures, coordinates, and vectors;
- ability to construct and analyse mathematical models.

Table 1. *General blueprint showing the distribution of examination tasks across the content areas of the mathematics curriculum*

Task No.	Mathematics Content Area	Knowledge and Skills Assessed	Maximal raw score	Percentage of the Total Score (%)
Part 1				
1	Geometry	Planimetry: triangles; altitude, median, and angle bisector of a triangle (definitions and properties); right triangles; projections of legs onto the hypotenuse; congruence and similarity of triangles; computational theorems: Pythagorean theorem, sine and cosine theorems. Parallelism and perpendicularity. Parallelograms and trapezoids, properties of these figures. Circle and tangent. Angles and polygons inscribed in a circle. Areas of geometric figures.	1	
2	Geometry	Mutual position of lines and planes in space (including the concepts of angles and distances: plane angle, dihedral angle, angle between lines, angle between a line and a plane, angle between planes, distance from a point to a plane, distance between lines, distance between planes), related definitions and properties. Polyhedra, cylinder, and cone. Volumes of solids.	1	
3	Geometry	Vectors: vector coordinates, vector addition, vector magnitude, scalar multiplication of a vector, dot product of vectors, and projection of a vector onto another vector.	1	
Total Points for Geometry Tasks			3	15%
4	Algebra	The concept of ratio. Fractions and proportions. Percentages.	1	
5	Algebra	Algebraic transformations: algebraic expressions. Polynomials. Arithmetic operations with polynomials. Factorisation of expressions. Special product formulas. Algebraic fractions. Addition, multiplication, and simplification of algebraic fractions. Properties of exponents. Properties of logarithms. Trigonometric identities.	1	

6	Algebra	Evaluation of expressions, including those containing powers and logarithms, as well as sines, cosines, and tangents of angles.	1	
7	Algebra	Equations and inequalities of various types (ability to solve them): linear, quadratic, logarithmic, exponential, trigonometric, irrational, and equations and inequalities involving absolute value.	1	
8	Algebra	Ability to solve systems of equations and problems reducible to systems of equations.	1	
Total Points for Algebra Tasks			5	25%
9	Introductory Calculus	Graphs of elementary functions. Relationship between graph and formula: shifts, stretches (compressions), and reflections.	1	
10	Introductory Calculus	Ability to work with the concepts of: extrema of a function, maximum and minimum values of a function on an interval; ability to find derivatives of elementary functions; ability to use derivatives to analyse functions and find their maximum and minimum values.	1	
Total Points for Introductory Calculus Tasks (Part 1)			2	10%
Total Points for Part 1 Tasks			10	50%
Part 2				
11	Algebra and Introductory Calculus	Ability to work with the concepts of: function, extrema of a function, maximum and minimum values on an interval, derivative of a function, antiderivative; finding the equation of a tangent line to a function graph; ability to find derivatives of elementary functions; ability to use derivatives to analyse functions and find maximum and minimum values; finding areas of figures using the definite integral.	2	
12	Algebra and Introductory Calculus		3	

13	Algebra and Introductory Calculus	Ability to solve equations, inequalities, and systems of equations and inequalities requiring the use of function properties.	3 or 2 points	
14	Algebra and Introductory Calculus	Ability to model real-life situations using mathematics; construct expressions, equations, inequalities, and systems of equations based on problem conditions; analyse constructed models using algebraic methods; interpret solutions and assess the plausibility of results.	2 or 3 points	
Total Points for Part 2 Tasks			10	50%

Table 2. *Distribution of examination tasks according to the assessed learning outcomes of the core educational program and advanced-level programs*

Assessed Subject-Specific Learning Outcomes	Number of tasks
Ability to Perform Calculations and Algebraic Transformations	7
Ability to Solve Equations and Inequalities	8
Ability to Work with Functions and Their Graphs	5
Ability to Work with Geometric Figures, Coordinates, and Vectors	3
Ability to Apply Acquired Knowledge and Skills in Practical Activities and Everyday Life	5
Ability to Construct and Analyse Mathematical Models	4

6. Distribution of Tasks by Difficulty Level

Part 1 contains 7 basic-level tasks and 3 intermediate-level tasks.

Part 2 contains 2 intermediate-level tasks and 2 advanced-level tasks; all tasks in Part 2 require integrated application of mathematical knowledge.

Table 3. *Distribution of tasks by difficulty level*

Difficulty level	Number of tasks	Maximal raw score	Percentage of the Total Score (%)
Basic	7	7	35
Intermediate	5	7	35
Advanced	2	6	30
Overall	14	20	100

7. Examination Duration

The examination duration is 90 minutes.

8. Scoring System for Individual Tasks and the Entrance Examination as a Whole

The Mathematics Entrance Examination is marked by expert assessors using a developed system of scoring criteria.

Each of Tasks 1–10 is worth 1 point. A task is considered correct if the answer is correct and is presented in the format specified in the task instructions (where a response format is specified).

Each of Tasks 11-14 is worth 2 or 3 points. A task is considered correct if the candidate provided a complete, reasoned solution and final answer.

. Partial credit may be awarded for solutions to Tasks 11–14 in accordance with the established scoring criteria.

The maximum raw score for the examination is 20 points.

Based on performance across all examination tasks, raw scores are calculated and then converted into examination scores expressed as percentages. The maximum raw score (20 points) is taken to be 100%.

9. Additional Materials and Equipment

During the Mathematics Entrance Examination, applicants are provided with the following materials:

- an examination booklet containing the tasks;
- an answer sheet;
- additional scratch paper (if necessary, at the discretion of the Partner Organization).

Applicants may use only those materials and equipment permitted by the Admission Regulations and the instructions for administering the Entrance Examination.

The use of communication devices, electronic devices, programmable calculators, reference materials, printed publications, and any other unauthorised items is prohibited.