MIDDLE EAST TECHNICAL UNIVERSITY
Department of Civil Engineering
CE 600 "Preliminary Exam" Guidelines

The "Preliminary Exam" is held within the scope of CE 600 course and is organized by Civil Engineering Doctorate Proficiency Committee consisting of five faculty member. This exam is taken by PhD students who have just started their Ph.D. program. A doctoral student who successfully receives a "P" grade from this exam is directed to the laboratory for the appointment of his / her advisor. Those who fail in this exam are given a "U" grade and are allowed to take the exam in the following semester. The doctorate student who fails this examination twice will be dismissed from the doctorate program.

The "Preliminary Exam", which is prepared and conducted under the leadership of the committee members, is held on the last day of the classes in that semester's academic calendar. The exam consists of two parts; "Part I: Mathematics" and "Part II: Mechanics and Special Topics of Civil Engineering". The exam consists of questions that can qualitatively measure at the synthesis level of solving basic mathematics and engineering concepts. The exam questions are selected from the topics listed below, regardless of the courses that the students have already taken in their undergraduate or graduate education. Students select and answer ten out of a total of thirteen questions. The exam result is declared as successful (P) for students who score above 60 over 100 full grade points.

Compensation examinations are not given to students under any circumstances (including medical report) and they are deemed to have exercised their right of examination for that term.

	TOPICS	**Number of Questions**	**Total Points**
PART I. Mathematics **6 Questions 60 Points**	Uncertainty and Data Analysis	2	20
	Mathematics for Engineers	2	20
	Numerical Methods for Engineers	2	20
PART II Mechanics and Special Topics of Civil Engineering **7 Questions 70 Points**	Engineering Mechanics	1	10
	Mechanics of Materials	1	10
	Soil Mechanics	1	10
	Fluid Mechanics	1	10
	Transportation Engineering	1	10
	Construction Management	1	10
	Construction Materials	1	10

TOPICS

FIRST PART: Mathematics

- **Mathematics for Engineers (2 questions – 20 points):** *Matrices, systems of linear equations, linear transformations, change of basis, eigenvalue problems, quadratic forms and diagonalization. Vector calculus, line, surface, and volume integrals. Gradient, divergence, curl. Green, Gauss and Stokes theorems.*
- **Uncertainty and Data Analysis (2 questions – 20 points):** *Descriptive statistics, histograms, central tendency, dispersion and correlation measures. Basic probability concepts, random variables, probability density and mass function. Regression analysis.*
- **Numerical Methods for Engineers (2 questions – 20 points):** *Numerical solution of linear and nonlinear systems of equations. Interpolating polynomials. Numerical differentiation and integration. Numerical solution of ordinary differential equations*

SECOND PART: Mechanics and Special Topics of Civil Engineering

- **Engineering Mechanics (1 question – 10 points):** *Rigid body mechanics. Equivalent force systems: Concepts of moment, couple, resultant. Equilibrium: Free-body diagram; equations of equilibrium. Properties of surfaces: Area moment and centroid; moments and product of inertia; principal directions.*
- **Mechanics of Materials (1 question – 10 points):** *Simple stress and strain. Equilibrium, compatibility and constitutive relations. State of stress and state of strain.*
- **Fluid Mechanics (1 question – 10 points):** *Hydrostatics, Integral equations: conservation of mass, momentum and energy. Pipe flow: pipeline systems and networks.*
- **Soil Mechanics (1 question – 10 points):** *Basic characteristics of soils, classification and compaction of soils. Principle of effective stress. Permeability and flow of water (seepage) in soils. Shear strength of soils. Lateral earth pressure theories. Consolidation theory.*
- **Construction Engineering and Management (1 question – 10 points):** *Effective and nominal interest, compound interest, methods of comparison of alternatives by using present worth, annual equivalent and rate of return techniques, depreciation and replacement analysis, economic life problems, cost-benefit analysis, break-even analysis, payback period. Construction planning and scheduling.*
- **Construction Materials (1 question – 10 points):** *Mechanical properties of materials. Elastic, plastic and viscoelastic material behaviour.*
- **Transportation Engineering (1 question – 10 points):** *Road-vehicle performance, stopping and passing sight distance, horizontal and vertical curves, earthwork, traffic stream flow variables and modelling, signalized intersections.*