Entrance Examination for 2025 Master's Program Specialized Engineering Knowledge (Question Abstract)

[Structural Mechanics]

Question 1 asks to determine types and locations of applied loads, reaction forces, deflection, stress distribution in a cross section for a given Gerber beam when shear force and bending moment diagrams of the Gerber beam are provided. In Question 2, a statically indeterminate structure where the Gerber beam of Question 1 and a cantilever beam are connected at a hinge of the Gerber beam is given. Question 2 asks to find the deflection at the hinge of the structure when a concentrated load is applied at the hinge and the deflection at the hinge when the cantilever part is subjected to a temperature change.

[Hydraulics]

Question 1 for velocities and forces around a cylinder under conditions of potential flow. Question 2 for steady open channel flow over flat bed with hump.

[Soil Mechanics]

Question 1 is about soil permeability tests. It requires calculating of the distribution of total head, elevation head, and pressure head under steadystate, followed by determining the hydraulic conductivity (or coefficient of permeability) and effective stress. Question 2 focuses on the shear behavior of soil under undrained conditions, requiring identification of the stress state and stress path at failure. Question 3 examines the bearing capacity equation derived using the limit equilibrium method for saturated clay ground.

[System Analysis for Planning and Management]

The first question relates to regression analysis. It is required the basic knowledge about regression analysis, including the method to estimate, derivation and statistical significance of the regression coefficients.

The second question relates to the problem to find the optimal location to construct a shopping mall, which is composed of the minimization of construction cost complying with the land use regulation as the constraint. It is required to answer about the basic knowledge on non-linear programming.