Entrance Examination for 2026 Master's Program
Specialized Engineering Knowledge
(Question Abstract)

[Structural Mechanics]

The first question asks to find the reaction forces, displacement, and rotation angle at a specific point for a structure consisting of truss and beam members under a point load. It also asks for the deformation when the truss member deformation is neglected and when the beam bending deformation is neglected. The second question addresses the same structure as the first question, but with altered support conditions. It asks to find the reaction moment and deformation for this new configuration. Furthermore, to reduce the deformation, it asks to determine the temperature change that should be applied to the truss member.

[Hydraulics]

Question 1 for Bernoulli theorem and Torricelli theorem. Question 2 for normal and critical depths, and outline of water surface profiles under steady open channel flow.

[Soil Mechanics]

[1] is a problem about one-dimensional consolidation of ground, asking about the derivation of Terzaghi's one-dimensional consolidation equation, embankment load, settlement amount and consolidation completion time of sand-clay alternating layer ground, and consolidation countermeasures. [2] is a problem about the shear behavior of soil under undrained conditions, asking about the total stress path, effective stress path, and stress state at failure. [3] is a problem about an infinite slope with seepage flow, asking about the derivation of the sliding safety factor and the influence of groundwater.

[System Analysis for Planning and Management]

Question 1: For a minimization problem involving an objective function with an exponential function consisting of two variables and linear constraints, the questions are to derive a Lagrangian function and find the optimal solution and the optimal value of the function from the Kühn-Tucker condition.

Question 2: Regarding a multiple regression analysis, derive the best linear unbiased estimator (BLUE). In addition, explain using formula or variables the reason why the estimate will become unstable when there is high correlation between the explanatory variables used for a multiple regression analysis.