[File upload] <u>ftp://cdl.hanyang.ac.kr</u> → cdl/cdl → 차제구조 → 실습_final_exam [analysis_result_file] (학번)_(문제번호) ex) 2000100100_1 [report_file] (학번) upload only one file for all problems.

1. For the alloy steel cantilever with boundary conditions shown, perform the frequency response analysis and answer the following questions. Use 1-D beam element. (30 pts)



2. The following figure shows the crush can under the enforced displacement d. Cross-section of the crush can is a 10 mm perfect square and its length is 30 mm. Obtain the deformed shape of crush can when the enforced displacement is 15 mm. Use the following material properties and 2-D shell element (length: 2 mm). Friction coefficient for surface-to-surface contact is 0.2. (35 pts)



3. The following figure shows the design domain and the loading conditions for the structural design. Obtain a conceptual design using topology optimization method. The optimization problem is formulated to minimize the mean compliance with 0.4 volume fraction. Use 2-D shell elements (length: 5 mm).



Explain why the topology results of two loading cases are different. (35 pts)