Project title	Optimized column location in flat slab system
Problem statement	One of the key architectural advantages of a concrete flat slab system is its flexibility in design. The absence of beams and columns allows for larger, open spaces with minimal obstructions, giving architects the freedom to create unique and innovative layouts. However, the location of the middle columns (one of the main factors affecting the construction cost) is commonly aligned based on experience which may entails an uneconomic design alternative.
Project objectives	To develop an optimizing code for the location of the intermediate columns for a given flat slab plan considering the deflection as the objective function.
Deliverables	Submit your work on GitHub using the template.

Project title	Optimized slab thickness in flat slab system
Problem statement	Optimizing flat slab thickness is a crucial aspect in structural design as it directly affects the overall efficiency and cost-effectiveness of a building. By carefully analyzing the load distribution and considering factors such as span length, column spacing, and desired deflection limits, engineers can determine the most appropriate slab thickness. A thicker slab may be required for longer spans or heavier loads to ensure adequate strength and stiffness. However, excessive thickness can lead to unnecessary material usage and increased construction costs. Conversely, reducing the slab thickness too much may compromise structural integrity. Therefore, optimizing flat slab thickness involves finding a balance between structural requirements and economic considerations to achieve an optimal solution that meets both safety standards and cost-efficiency goals.
Project objectives	To develop an optimizing code for the slab thickness of a concrete flat slab plan to minimize the cost of the system.
Deliverables	Submit your work on GitHub using the template.

Project title	Grouping of concrete columns in a multi storey building
Problem statement	Optimizing flat slab thickness is a crucial aspect in structural design as it directly affects the overall efficiency and cost-effectiveness of a building. By carefully analyzing the load distribution and considering factors such as span length, column spacing, and desired deflection limits, engineers can determine the most appropriate slab thickness. A thicker slab may be required for longer spans or heavier loads to ensure adequate strength and stiffness. However, excessive thickness can lead to unnecessary material usage and increased construction costs. Conversely, reducing the slab thickness too much may compromise structural integrity. Therefore, optimizing flat slab thickness involves finding a balance between structural requirements and economic considerations to achieve an optimal solution that meets both safety standards and cost-efficiency goals.
Project objectives	To group the columns in a 3D concrete model for a 10-storey building based on the columns axial capacities.
Deliverables	Submit your work on GitHub using the template.

Project title	Steel truss bridge optimization
Problem statement	Optimizing truss elements is a crucial step in structural engineering to ensure the efficiency and effectiveness of a truss system. The main goal of optimization is to minimize the weight or cost of the truss while maintaining its strength and stability. This can be achieved by carefully selecting the material properties, such as the type and grade of steel and optimizing the cross-sectional dimensions of the truss members. Additionally, optimizing the configuration and arrangement of truss elements can also enhance their performance. Advanced computational tools and algorithms are often employed to analyze various design alternatives and identify the most optimal solution. By optimizing truss elements, engineers can achieve a balance between structural integrity, cost-effectiveness, and sustainability in construction projects.
Project objectives	To design effectively a 2-lane (8m wide) 30m Pratt truss steel bridge subjected to uniform load of 1ton/m^2.
Deliverables	Submit your work on GitHub using the template.

Project title	ML application in concrete mix design
Problem statement	Machine learning has been increasingly used in the field of civil engineering, including the design of concrete mixtures. Concrete is a complex material with various ingredients and properties that interact with each other in a nonlinear way. Machine learning algorithms can analyze large data sets of concrete mixtures and their properties to identify patterns and relationships that can be used to optimize the mix design. By training models on data from past concrete mixtures, machine learning can predict the properties of new mixtures and suggest adjustments to achieve desired outcomes such as strength, durability, and workability. This can help engineers design more efficient and cost-effective concrete mixtures, and ultimately improve the quality and durability of concrete structures.
Project objectives	To develop a robust and reliable tool to predict the concrete mix compressive strength.
Deliverables	Submit your work on GitHub using the template.

Project title	ML application in optimizing concrete mix design
Problem statement	Machine learning has been increasingly used in the field of civil engineering, including the design of concrete mixtures. Concrete is a complex material with various ingredients and properties that interact with each other in a nonlinear way. Machine learning algorithms can analyze large data sets of concrete mixtures and their properties to identify patterns and relationships that can be used to optimize the mix design. By training models on data from past concrete mixtures, machine learning can predict the properties of new mixtures and suggest adjustments to achieve desired outcomes such as strength, durability, and workability. This can help engineers design more efficient and cost-effective concrete mixtures, and ultimately improve the quality and durability of concrete structures.
Project objectives	To develop a robust and reliable tool to design concrete mixture with target strength while minimizing its cost.
Deliverables	Submit your work on GitHub using the template.