Osdag®

Open steel design and graphics

Task: PyLatex report generation

Objective

You are required to create a **Python script** that reads a force table from an Excel file and generates a **PDF engineering report** using **PyLaTex**. The report must include an introduction with an embedded beam image, a force table recreated as a LaTeX table (not an image), and **Shear Force Diagram (SFD)** and **Bending Moment Diagram (BMD)** plotted **using TikZ/pgfplots** (no image-based plots allowed).

The beam is **simply supported**, and the loading information will be provided to you in the form of an Excel spreadsheet. [Link_of_excel_data]

Link for the image of the simply supported beam. [Link]

Specific Deliverables:

- The Python script that, when executed, generates the final report.
- The final generated PDF report.

Required Report Structure:

1. **Title Page**
2. **Table of Contents**
3. **Introduction**
    - Beam Description- Embed the provided image of the simply supported beam here
    - Data Source- State that the force details are read from the provided Excel file.
4. **Input data:** Recreate the provided Excel table using LaTeX Tabular (Do not insert as image).

5. **Analysis**
    - Shear Force Diagram (TikZ/pgfplots vector plot)
    - Bending Moment Diagram (TikZ/pgfplots vector plot)

Summary of what shear force and bending moment:

A **Shear Force Diagram (SFD)** is a simple plot that shows how much sideways internal force (shear) exists at each point along a beam under the applied loads.

A **Bending Moment Diagram (BMD)** shows how much internal bending (moment) the beam experiences at each point — in other words, how strongly the beam tends to rotate or bend at different locations.

Refer to the sample shear force and bending moment diagram files from Midas in the [link]. Develop something similar with contour plots and legends on the side. The plots can be scaled to fit better within the image.

Additional Notes:

- The force table must be recreated using LaTeX Tabular. It must be selectable text (no table screenshots or images.)
- Shear Force Diagram and Bending Moment Diagram must be drawn using TikZ/pgfplots, not matplotlib or external plot images.
- The simply supported beam image must be embedded in the introduction using PyLaTeX Figure.
- Use pandas to read the Excel file.
- Coordinates for TikZ plotting must be generated programmatically from your computed arrays.

Mapping Criteria:

Criteria	**Weight**	**Description**
Script correctness	**25**	**Script runs without errors and produces the PDF.**
Proper PyLaTeX usage	**20**	**Sections, subsections, title page, ToC, and structured formatting.**

Force table recreation	**15**	**Table matches Excel data and is LaTeX text (not image).**
TikZ/pgfplots SFD & BMD diagrams	**25**	**Correct computation and clean vector plots with axes labels.**
Clarity & professionalism of final PDF	**10**	**Formatting, spacing, labels, captions, readable layout.**
Bonus (optional)	**5**	**Command-line arguments, clean code style, commenting, unit consistency.**

Submission Requirements:

1. Video Demonstration

- Create a short video showcasing the functionality of your code. A simple screengrab is sufficient; no need for curation. The video can be silent. Upload it as an unlisted video on YouTube. Provide the link.

2. Github Repository Link

- Provide the GitHub repository link and add `osdag-admin` as a collaborator.

3. Report Documentation

- Submit a PDF document explaining the code you have created.
- Submit a ZIP file containing all relevant files and codes for the project.

Additional Notes

- This task is designed to evaluate your technical and creative abilities in animation and structural design. Please feel free to ask for any clarifications or assistance during the task.
- All the screening task submissions are licensed under a Creative Commons Attribution-ShareAlike 4.0 International License by FOSSEE.

- Kindly join the Osdag Discord Server with this [LINK]. If you have any queries related to the screening task, you may ask in the screening task help desk channel.

Good luck!