



Total 100 points

Weightage 14%

Read the following instructions carefully.

Midterm	21%
Assignments (I & II)	15 +14 = 29%
Project	25%
Final Exam	25%

- Write your NAME and SR. NUMBER on the first page of the report(only one PDF for all questions in order). Start each question on a new page.
- In coding exercises, also give algorithm/background theory along with code briefly to get full credit for that question.
- LaTeX is recommended for the report (however, Microsoft Word is also acceptable). Provide proper citations if you reference any articles.
- Use Python for coding, create a single '.py' file to store all the required tensor products and a separate '.ipynb' file for each question. Name the code file according to the question number (i.e., q1,q2,q4...).
- Finally, create a folder named **DS285_LastFiveDigitsSRNo_Name**, containing the report and all code files. Then, compress the folder into a zip file and submit it on Teams.
- Strictly follow the submission guidelines; otherwise, a penalty will be imposed.

1. Write a program (Matlab/Python) and algorithm for computing of square root of a symmetric positive definite tensor $\mathcal{A} \in \mathbb{R}^{n \times n \times n}$ using t-product and M-product. Further, compare the results. [25]
2. Write a program (Matlab/Python) and algorithm to hide a color video in another video using tensor-based QR decomposition in the framework of the t-product and M-product. Further, compare the results. [25]
3. Write a program (Matlab/Python) and algorithm to compute the singular value decomposition (SVD) of a tensor using t-product and M-product. Then, apply this inverse to reconstruction/compress a color image. Further, compare the results. [25]

4. Write a program (Matlab/Python) and algorithm to compute the Moore-Penrose inverse of a tensor using t-product and M-product. Then, apply this inverse to the color image deblurring problem. Further, compare the results. [25]