

Department of Mechanical Engineering  
Indian Institute of Technology Madras  
**Finite Element Analysis (ME5204)**  
**A2 - Numerical Integration**

Date: 23-Aug-2024

Maximum Marks: 10

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**General instructions:**

- Typeset the assignment in  $\text{\LaTeX}$  2 $\epsilon$  or MS word
- Handwritten document will NOT be accepted unless the assignment specifies
- Upload the code and the report to Google classroom
- Do NOT upload zip files. If zip files are uploaded, the assignments will **NOT** be graded
- Report file name: Rollnumber.pdf
- Other supporting files should be appropriately named
- Reports/codes found copied, will be assigned '0' marks

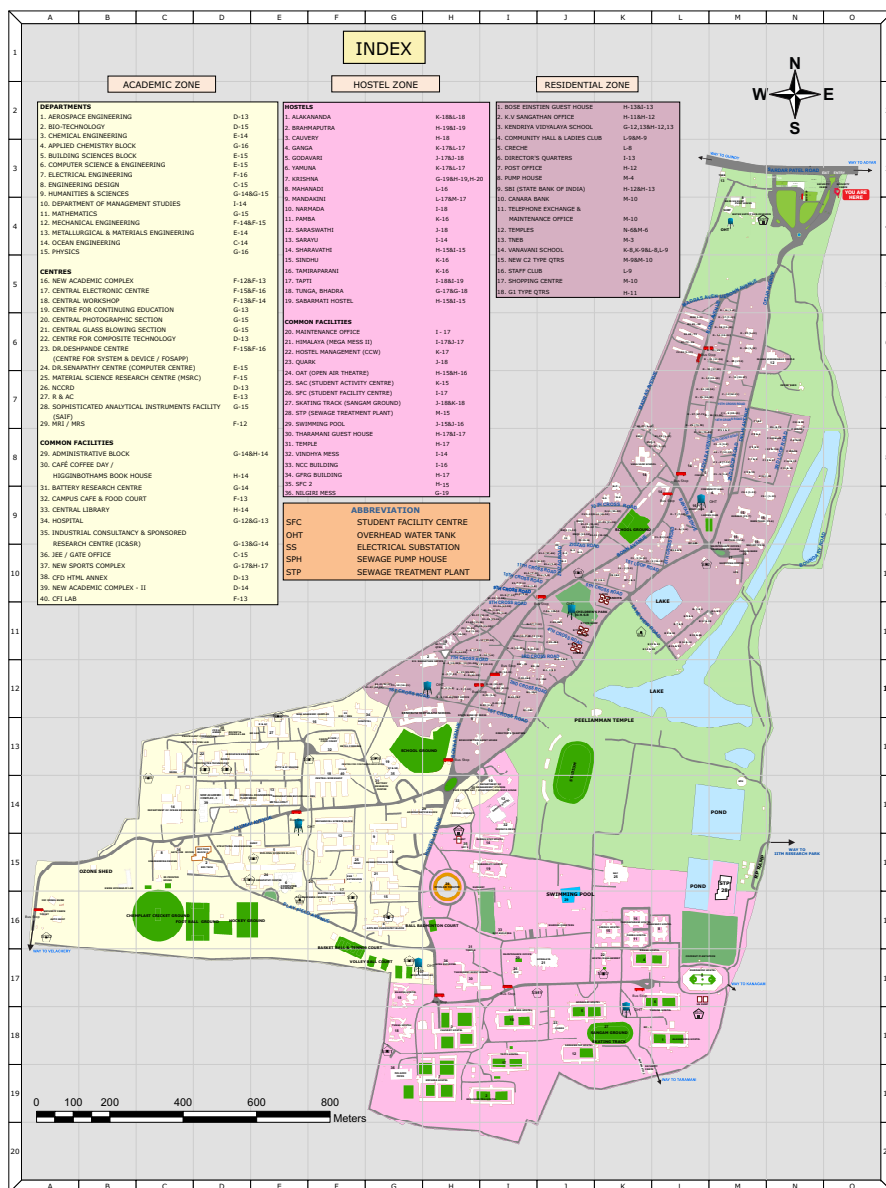
1. Figure (1) shows the map of IIT Madras. Find the

1. area of IITM
2. area moment of inertia of IITM region with respect to the centroid of the geometry
3. area moment of inertia of IITM with respect to Gajendra circle. Note, that if Gajendra circle is not the centroid, you need to use the parallel axis theorem.

Using numerical integration. For the area compare your values with that obtained from the academic building.

(Hint: Digitize the image, get the coordinates of the boundary. Using the coordinates, create an outline in GMSH. Use GMSH to partition the region into triangles and export the triangle information: coordinates and vertices. Use numerical integration to get the area of the regions).

PS: if the image is not clear, get the IITM map from the internet and cite its source in your report.



**LAYOUT OF BUILDINGS - INDIAN INSTITUTE OF TECHNOLOGY MADRAS  
AS ON 07-07-2021**

Figure 1: IIT Map