COURSE CONTENT

ADVANCED COMPUTER AIDED DESIGN LAB								
I Year I Sem: CAD/CAM								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
2214040	**Advanced**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		0	0	4	2	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 36**				**Total Classes: 36**		
Prerequisites: Knowledge on ANSYS, 3D CAD SOFTWARE								

Course Overview

1. This course introduces the advanced concepts of CAD & CAE software's and their applications in modern product design and manufacturing.
2. Students learn to create and modify 3D models using CAD software such as CATIA.
3. The course covers the application of finite element method (FEM) concepts using CAE software like ANSYS for engineering analysis.
4. Students gain understanding of structural, thermal analysis to evaluate component performance under different operating conditions.
5. The course also focuses on Harmonic, buckling, and dynamic analysis to evaluate Component performance under different operating conditions.

Pre-requisites: Knowledge on ANSYS, 3D CAD SOFTWARE

Course Objectives: The students will try to learn:

1. The systematic design of 3D objects in CATIA software.
2. The advanced features in CATIA part and assembly modules.
3. The strong foundation with Ansys software on various analysis.
4. The ability to develop designs and analysis using CATIA software.
5. The ability to examine the performance of components CAE software.

Course Outcomes:

CO1: Develop 3D parts from 2D profiles using CAD tools.
CO2: Model complex machine components using part and assembly module features.
CO3: Perform FEA analysis on mechanical components in determining deflections and stresses.
CO4: Evaluate the structural behavior and performance of mechanical components.
CO5: Examine the performance of mechanical components through dynamic and thermal

analyses

List of Experiments:

1. Study and Review of CAD Modelling Techniques and Introduction to Rapid Prototyping (RP)
2. Design and preparation of mechanical component using CAD Software
3. Generation and Validation of STL Files for given CAD Models
4. Modelling of Creative and Innovative Design using CAD Software
5. Assemble multiple parts of Creative Designs in CAD Software
6. Pre-Processing of CAD Data using Slicing Software (Selection of Orientation, Supports generation, Slicing, Tool path generation)
7. Fabrication of 3D Components using FDM-based Rapid Prototyping Machine
8. Design a specimen Mechanical Testing of 3D Printed Specimens (Flexural and Tensile Test)
9. Fabrication of simple gear model using FDM Rapid Prototyping
10. Fabrication of crane hook model using FDM Rapid Prototyping
11. Fabrication of worm gear model using FDM Rapid Prototyping
12. Post-Processing and Demonstration of Functional Working Models

Open Ended Experiments:

1. Design a 3D component and perform static analysis to find stress & deformation.
2. Design a 3D component and perform Modal and Harmon analysis.
3. Assemble and animate screw jack using 3D CAD software.
4. Assemble and animate bolt-nut mechanism using 3D CAD software

ELECTRONIC RESOURCES:

1. https://www.youtube.com/watch?v=A-J-tQEuACA
2. https://us.caddi.com/resources/insights/manufacturing-drawings
3. https://www.youtube.com/watch?v=2HbW3aBKtNw
4. https://www.ansys.com/academic/educators/education-resources
5. https://www.ansys.com/en-gb/academic/learning-resources.

6..https://www.youtube.com/watch?v=f3N0yM_Wt7w&list=PLICzjIuc4UqH3hllQc1kEF19YoBfAkEBQ
7. https://www.youtube.com/watch?v=D3Kn-bwNwuM

MATERIALS ONLINE:

1. Course template
2. ACAD Lab Manual
3. Open-ended experiments
4. e-Learning Readiness Videos (ELRV)