



**SECOND SEMESTER 2023-2024**

Course Handout Part II

Date: 09-01-2024

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

**Course No.** : ME F318 (L-T-P-U: 2-1-1-3)

**Course Title** : **Computer Aided Design**

**Instructor-in-Charge** : **Prof. Srinivasa Prakash Regalla**

**Tutorial/Practical Instructors** : Dr. Partha Saradhi G, V. Vamshi, Vicky Lad, Aditya Nema, Suswanth Poluru, Himanshu Shukla

**Scope and Objective of the Course:**

Mathematical modeling of parametric curves, surfaces and solids. Geometric transformations, isometric transformations including translation, scaling, reflection, and rotation using specialized solid modeling packages. CAD/CAM data exchange. Introduction to FEM & FEA practice on a specialized CAE package. Modeling and simulation based practical exercises related to geometric modeling, finite element analysis, and machine drawing such as orthographic drawing, sectional view, assembly drawing & exploded view.

**Textbooks:**

TB1) Zeid , Ibrahim, “Mastering CAD/CAM”, Tata McGraw-Hill, 2007.

TB2) Chandrupatla, T. R., Belegundu, A. D., “Introduction to Finite Elements in Engineering”, 3<sup>rd</sup> Edition, Prentice Hall of India, 2005, New Delhi.

TB3) Narayana K. L., Kannaiah P., Venkata Reddy K., “Machine Drawing”, 3<sup>rd</sup> Edition, New Age International Publishers, New Delhi.

**Reference books:**

RB1) Srinivasa Prakash Regalla, “Computer Aided Analysis and Design”, IK International Publishers, New Delhi, 2010.

**Course Plan:**

Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book
<b>(A) Computer Aided Geometric Modeling (GM) and Design</b>			
1-3	CAD software and CAD hardware	Introduction, 3D modeling and viewing, modeling aids and tools, engineering drawings, CAD programming, Computer simulation tools, Primer on MATLAB	TB1: Ch-1 to 4
4-6	Parametric Curves: Mathematical modeling and computer simulation	Geometric Modeling: Curves, theory and MATLAB modeling	TB1: Ch-6



7-9	Parametric Surfaces: Mathematical modeling and computer simulation	Geometric Modeling: Surfaces and NURBS, theory and MATLAB modeling	TB1: Ch-7 & 8
10-12	Parametric Solids: Mathematical modeling and computer simulation	Geometric Modeling: Solids and Features, theory and Creo modeling	TB1: Ch-9
<b>(B) Integration of GM with Computer Aided Engineering (CAE) and other Applications</b>			
13-14	CAD/CAM/CAE/AM data exchange formats	IGES, STL, STEP, DXF, WRL formats	TB1: Ch-12
15-26	Computer Aided Engineering (CAE) using Finite Element Analysis (FEA)	Fundamental concepts, matrix algebra and Gaussian elimination, one-dimensional problems, two-dimensional problems, beams and frames, 3D problems, scalar field problems, dynamic problems	TB2: Ch-1 to Ch-11
27-28	Introduction to Rapid Prototyping using Additive Manufacturing (AM)/3D- printing	Virtual prototyping versus physical prototyping, polymer AM technologies for prototyping, CAD neutral formats for AM	RB1: Ch-17

**Practicals (Each practical is evaluative): (These are the minimum suggested; actual practical topics to be covered may be more)**

Prac No	Learning Objective	Reference	Sections in Reference
1	Solid Modeling Practice on CREO: Simple models, assembling components into products, Obtaining Machine Drawing from CAD sold models	TB3	3.14, 3.17-3.43
2	Shafts, mechanical springs, screws, fasteners and bolted joints	TB3	8.3 to 8.7, 8.10, 8.11, 6.12 & 6.13 & 6.14 & 6.15, 18.11
3	Spur/helical/bevel gears	TB3	20.2, 19.6, 19.10, 19.23
4	Bearings	TB3	12.14, 12.16, 12.17, 12.2 to 12.9, 18.1 to 18.6
5	clutches, brakes, couplings	TB3	18.12, 18.13
6	belts, sprocket and chain	TB3	9.1 to 9.7
7	FEA of trusses	TB2	Ch-4
8	FEA of beams and frames	TB2	Ch-5
9	FEA 2D structural problems	TB2	Ch-6
10	FEA of 2D heat transfer problem	TB2	Ch-10
11	FEA of 3D structural problem	TB2	Ch-9
12	Comprehensive Practical Examination		



**Evaluation Scheme:**

Component	Duration (min)	Weightage (%)	Date & Time	Nature of Component
Mid-semester Examination	90	25%=50M	14/03 - 9.30 - 11.00AM	Closed Book
Practicals		20%=40M	D208-A & B	Open Book
Tutorials		15%=30M	Sat - 5	Open Book
Classroom Interaction Tests (Quizzes)	10 to 15 min	5% =10M		Closed Book
Comprehensive Examination	180	35%=70M	13/05 FN	Closed Book

**Chamber Consultation Hour:** To be announced in the lecture class.

**Notices:** All notices on CMS. **Students are required to register in the CMS with their full name and full ID No as per the ID Card.**

**Make-up Policy:** Only for genuine illness cases.

**Academic Honesty and Integrity Policy:**

Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**INSTRUCTOR-IN-CHARGE**

