



SECOND SEMESTER 2022-2023

Course Handout Part II

Date: 16-01-2023

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. Prabakaran Saravanan, V. Vamshi, Vicky Lad, Aditya Nema, Mada Rukmini Sai Rupa Sri, Kolla Lakshman Rao

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", 3rd Edition, Prentice Hall of India, 2005, New Delhi.

TB3) Narayana K. L., Kannaiah P., Venkata Reddy K., "Machine Drawing", 3rd 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
(A) Computer Aided Geometric Modeling (GM) and Design			
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:	Geometric Modeling: Surfaces and NURBS,	TB1: Ch-7 & 8



	Mathematical modeling and computer simulation	theory and MATLAB modeling	
10-12	Parametric Solids: Mathematical modeling and computer simulation	Geometric Modeling: Solids and Features, theory and Creo modeling	TB1: Ch-9
(B) Integration of GM with Computer Aided Engineering (CAE) and other Applications			
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	Weightage	Date & Time	Nature of
-----------	----------	-----------	-------------	-----------



	(min)	(%)		Component
Mid-semester Examination	90	25%=50M	18/03, 9.30 - 11.00AM	Closed Book
Practicals	110 min each week	20%=40M	D208-A & B	Open Book
Tutorials	50 min each week	15%=30M	Fri - 1	Open Book
Comprehensive Examination	180	40%=80M	19/05 FN	Closed Book + Open 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 ill-ness 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

