Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2021-2022

Course Handout Part II

Date: 15-01-2022

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 : Gaurav Sharma, P. Suswanth, V. Vamshi, G. Deepak Kumar

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:

1. Zeid , Ibrahim, "Mastering CAD/CAM", Tata McGraw-Hill, 2007.
2. Chandrupatla, T. R., Belegundu, A. D., "Introduction to Finite Elements in Engineering", 3rd Edition, Prentice Hall of India, 2005, New Delhi.
3. Narayana K. L., Kannaiah P., Venkata Reddy K., "Machine Drawing", 3rd Edition, New Age International Publishers, New Delhi.

Reference books:

1. 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	TB: Ch-1 to 4
4-6	Parametric Curves: Mathematical modeling and computer simulation	Geometric Modeling: Curves, theory and MATLAB modeling	TB: Ch-6
7-9	Parametric Surfaces: Mathematical modeling	Geometric Modeling: Surfaces and NURBS, theory and MATLAB modeling	TB: Ch-7 & 8

	and computer simulation		
10-12	Parametric Solids: Mathematical modeling and computer simulation	Geometric Modeling: Solids and Features, theory and Pro/E modeling	TB: 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	TB: 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	TB: Ch-17 & RB1: Ch-11 & RB2
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	T3	3.14, 3.17-3.43
2	Shafts, mechanical springs, screws, fasteners and bolted joints	T3	8.3 to 8.7, 8.10, 8.11, 6.12 & 6.13 & 6.14 & 6.15, 18.11
3	Spur/helical/bevel gears	T3	20.2, 19.6, 19.10, 19.23
4	Bearings	T3	12.14, 12.16, 12.17, 12.2 to 12.9, 18.1 to 18.6
5	clutches, brakes, couplings	T3	18.12, 18.13
6	belts, sprocket and chain	T3	9.1 to 9.7
7	FEA of trusses		
8	FEA of beams and frames		
9	FEA 2D structural problems		
10	FEA of 2D heat transfer problem		
11	FEA of 3D structural problem		
12	Comprehensive Practical Examination		

Evaluation Scheme:

Component	Duration (min)	Weightage (%)	Date & Time	Nature of Component

Mid-semester Examination	90	25	15/03 3.30pm to5.00pm	Closed Book
Practicals	-	20	Mon/Wed: D208: 4 & 5 hours	Open Book
Tutorials	-	15	Wed - 1	Open Book
Comprehensive Examination	120	40	18/05 AN	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