SECOND SEMESTER, 2015-2016

COURSE HANDOUT (PART-II)

Date: 14/01/2016

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 Code: ME F342, MF F342

Name of the Course: Computer Aided Design

Instructor-In-Charge: Amol Marathe

Tutorial Instructors: Jitendra Rathod, Sandeep Dhar, Murali Palla & Amol Marathe

I. Textbook

1. Thomas W. Sederberg, "Computer Aided Geometric Design", Course Notes.
2. Slides by IC

II. References

1. Mortenson, M.E., 'Mathematics for Computer Graphics Applications'', Industrial Press Inc, Second Edition, 1999.
2. Hughes T. J. R., "The finite element method: Linear, static and dynamic analyses", Prentice-Hall-New Jersey, 1987.

III. Course Contents

Topic	Number of Lectures	Source
1. Computer Aided Geometric Design: 1.1 Properties of blending functions – Affine invariance, Convex hull property, Linear independence, Symmetry, End point interpolation, Be'zier curves - subdivision, convex hull marching, intersection, B-Spline curves - knot vector, polar form, Bohm's algorithm, de Boor algorithm, basis functions 1.2 Algebraic geometry for CAGD – Implicitization, inversion, parametrization 1.3 Differential geometry of curves and surfaces – Curvature, torsion, Frenet-Serret formulae, First and second fundamental forms, principal	17 = 7+4+6	TB1: Ch 2,5,6,7,10,15,16 and SLIDES by IC

curvatures, Gauss map & Gauss curvature, Gauss-Bonnet theorem		
2. Solid modeling: 2.1 Topological transformations and topological invariants – dimension, orientability, Euler charac., polygonal representation for sphere and disk with and without punctures, Klein's bottle etc., Euler's formula for solids 2.2 Wireframe mmodeling, set-theoretic and regularized Boolean operation in CSG, hands-on OpenSCAD s/w, CSG tree, upward & downward propagation algorithm, Boundary rep – Winged edge data structure & Euler operators 2.3 Introduction to OpenSCAD (http://www.openscad.org/)	10 = 3+4+3	SLIDES by IC
3. Geometric transformations: Rigid body transformations- translation, rotation – axis-angle formula, Euler angles, reflection, isometry, similarity, dilation, shear, glide reflection, affine and projective transformations	7	SLIDES by IC
3. Finite Element Method Strong and weak forms of a BVP, Essential and natural BCs, methods of weighted residual, Bubnov-Galerkin method, Assembly of global stiffness matrix, Euler-Bernoulli beam problem	8	RB2: Ch 1
Total	42	

IV. Evaluation Scheme and Schedule

Component	%Weightage	Date	Type	Remarks
Midsem Examination	25	17/3 2:00 -3:30 PM	Partially closed book	
Assignments	10	-	-	

Tutorials	15	08/02, 22/02, 22/03, 19/04/2016	Closed book	
Project	20		Open book	
Endsem Examination	30	16/5 FN	Partially closed book	

V. Chamber Consultation Hour: Will be announced in the class.

VI. Notices concerning the course: Nalanda

VII. Make-up Policy: Make up for any component of evaluation will be permitted only in genuinely serious cases only after production of necessary medical certificates and/or with prior permission.

Instructor-In-Charge

ME/F F342