Computer Aided Engineering Design - Video course

COURSE OUTLINE

Overview of CAD, CAD Applications, Solid Modeling: Wireframe, B-Rep, CSG approaches, Transformations and Projections, Mathematical representation of curves and surfaces, Ferguson, Bezier and B-spline curves and properties, Ferguson, Bezier and Bspline surfaces and properties, Computations for Geometric Design, Introduction to Finite Element Analysis and Optimization.

COURSE DETAIL

Lecture	Topic
1-3	CAD Applications: Engineering Products, analogy: documentation, Design Representation, FEM, Optimization, Software/AutoCAD/Mechanical Desktop/I-DEAS.
4	Solid Modeling: Representation of Solids.
5-6	Solid Modeling: Topology.
7	Solid Modeling: topology, wireframe modeling.
8	Solid Modeling: Boundary Representation.
9	Solid Modeling: Boundary Representation, CSG, Operations: extrude, revolve, examples.
10-12	Design of Curves: Representation, piecewise continuous, differential geometry of curves.
13-15	Design of Curves: Ferguson

NP-TEL

NPTEL

http://nptel.iitm.ac.in

Mechanical Engineering

Pre-requisites:

- For post graduate and final year students.

Hyperlinks:

- Shene, C. K., CS3621 Introduction to Computing with Geometry Notes: http://www.cs.mtu.edu/~shene/COURSES/cs3621/NOTES/notes.html

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	segments, Bézier segments.
16-17	Design of Curves: Bézier segments.
18-25	Design of Curves: B-Splines.
26-27	Design of Curves: Rational Curves/NURBS.
28	Design of Surfaces: Piecewise continuous, differential geometry.
29-30	Design of Surface patches: Fersugon,16 point form, Bézier, B-spline.
31	Design of Coon's surface patches.
32	Design of Composite Surfaces: Ferguson and Bézier surfaces.
33-34	Computational geometry.
35	Mesh generation.
36-38	FEM: An introduction.
39	Optimization: Single variable methods.
40	Optimization: KKT conditions.
41	Optimization: Stochastic Methods.

References:

1. Saxena, A., and Sahay, B., 2006, "Computer Aided Engineering Design," Anamaya and Springer.
2. Faux I. D. and Pratt M. J., Computational Geometry for Design and Manufacture, Ellis Harwood Limited, West Sussex, England, 1979.
3. Mortenson M. E., Geometric Modeling, John Wiley and Sons, New York., 1985.