KINEMATICS OF MECHANISMS AND MACHINES

PROF. ANIRVAN DASGUPTA

Department of Mechanical Engineering

IIT Kharagpur

PRE-REQUISITES : Engineering Mechanics,Undergraduate Mathematics

INTENDED AUDIENCE : Mechanical, Electrical, Aerospace and Bio-Medical Engineering students

INDUSTRIES APPLICABLE TO : Automobile and Aerospace industries, Automation and robotic device manufacturers, Bio-Medical device manufacturers

COURSE OUTLINE :

This course will deal with kinematic analysis of mechanisms and machines. It will include motion and force transmission analysis of linkage mechanisms, open and closed-chain planar robots, and geared transmission. The discussion will start with an introduction to the subject matter and nomenclature, and will cover direct and inverse kinematics, velocity and acceleration analysis, kinematic path generation for robots, singularities in kinematic chains, principle of virtual work and force analysis, and kinematic analysis of gear transmission.The course will demonstrate various concepts by working out problems relevant to real life applications of mechanisms. The course is expected to help students in their basic understanding and use of kinematic analysis.

ABOUT INSTRUCTOR :

Prof. Anirvan DasGupta is a faculty in Mechanical Engineering at IIT Kharagpur since 1999. His interests are in the mechanics of discrete and continuous systems.He has extensively taught courses at undergraduate and postgraduate levels like Mechanics, Kinematics of Machines, Dynamics, Dynamics of Machines, VibrationAnalysis, Wave Propagation in Continuous Media, and Rail Vehicle Dynamics.

COURSE PLAN :

Week 1 : Introduction to Mechanisms (1.5 hr), Mobility Analysis (1.5 hr)

Week 2 : Mobility Analysis (1.5 hr), Displacement Analysis (1 hr)

Week 3 : Displacement Analysis (2.5 hr)

Week 4 : Velocity Analysis (2.5 hr)

Week 5 : Velocity Analysis (2.5 hr)

Week 6 : Velocity Analysis (1.0 hr), Acceleration Analysis (1.5 hr)

Week 7 : Force Analysis (1.5 hr), Introduction to geared transmission (1.0 hr)

Week 8 : Analysis of gear trains (2.0 hr).