Diploma, Anna University-UG, PG., HSC & SSLC

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ED5251 MECHANISMS DESIGN AND SIMULATION

DETAILED SYLLABUS

OBJECTIVE

To develop a thorough understanding of the various mechanisms and its design and simulation with an ability to effectively use the various mechanisms in real life problems.

UNIT I INTRODUCTION

Review of fundamentals of kinematics-classifications of mechanisms-components of mechanisms – mobility analysis – formation of one D.O.F. multi loop kinematic chains, Network formula – Gross motion concepts-Basic kinematic structures of serial and parallel robot manipulators compliant mechanisms-Equivalent mechanisms.

UNIT II KINEMATIC ANALYSIS

Position Analysis – Vector loop equations for four bar, slider crank, inverted slider crank, geared five bar and six bar linkages. Analytical methods for velocity and acceleration Analysis– four bar linkage jerk analysis. Plane complex mechanisms-auxiliary point method. Spatial RSSR mechanism - Denavit - Harten berg Parameters – Forward and inverse kinematics of robot manipulators.

UNIT III PATH CURVATURE THEORY, COUPLER CURVE

Fixed and moving centrodes, inflection points and inflection circle. Euler Savary equation, graphical constructions – cubic of stationary curvature. Four bar coupler curve-cuspcrunode coupler driven six-bar mechanisms-straight line mechanisms

UNIT IV SYNTHESIS OF FOUR BAR MECHANISMS

Type synthesis – Number synthesis – Associated Linkage Concept. Dimensional synthesis – function generation, path generation, motion generation. Graphical methods-Pole technique, inversion technique-point position reduction-two, three and four position synthesis of four- bar mechanisms. Analytical methods- Freudenstein's Equation-Bloch's Synthesis.

UNIT V SYNTHESIS OF COUPLER CURVE BASED MECHANISMS & CAM MECHANISMS

Cognate Lingages-parallel motion Linkages. Design of six bar mechanisms-single dwell-double dwell- double stroke. Geared five bar mechanism-multi-dwell. Cam Mechanisms-determination of optimum size of cams. Mechanism defects. Study and use of Mechanism using Simulation Soft-ware packages. Students should design and fabricate a mechanism model as term project.

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