Module 1

Chapter 1 : Kinetics of Rigid Bodies and Basic Kinematics 1-1 to 1-84

1.1 Kinetics of Rigid Bodies : Concept of mass moment of inertia and its application to standard objects.

Kinetics of rigid bodies : Work and energy

Kinetic energy in translating motion, Rotation about fixed axis and in general plane motion, Work energy principle and Conservation of energy

1.2 Basic Kinematics : Structure, Machine, Mechanism, Kinematic link & its types, Kinematic pairs, Types of constrained motions, Types of Kinematic pairs, Kinematic chains, Types of joints, Degree of freedom (mobility), Kutzbach mobility criterion, Grubler's criterion & its limitations

Four bar chain and its inversions, Grashoff's law, Slider crank chain and its inversions, Double slider crank chain and its inversions

Module 2

2.1 Straight line generating mechanisms : Introduction to Exact straight line generating mechanisms – Peaucillier's and Hart's Mechanisms, Introduction to Approximate Straight line generating mechanisms – Watt's, Grasshopper mechanism, Tchebicheff's mechanisms

2.2 Offset slider crank mechanisms : Pantograph, Hook-joint (single and double).

2.3 Steering Gear Mechanisms : Ackerman, Davis steering gears

Module 3

3.1 Velocity Analysis of Mechanisms (mechanisms up to 6 links) Velocity analysis by instantaneous centre of rotation method (Graphical approach), Velocity analysis by relative velocity method (Graphical approach)

3.2 Acceleration Analysis of Mechanisms (mechanisms up to 6 links) Acceleration analysis by relative method including pairs involving Coriolis acceleration (Graphical approach)

Module 4

4.1 Cam and its Classification based on shape, follower movement, and manner of constraint of follower; Followers and its Classification based on shape, movement, and location of line of movement; Cam and follower terminology

4.2 Motions of the follower : SHM, Constant acceleration and deceleration (parabolic), Constant velocity, Cycloidal; Introduction to cam profiles (No problems on this point)

Module 5

Chapter 5 : Belts, Chains and Breaks 5-1 to 5-54

5.1 Belts : Introduction, Types and all other fundamentals of belting, Dynamic analysis –belt tensions, condition of maximum power transmission

5.2 Chains (No problems) : types of chains, chordal action, variation in velocity ratio, length of chain (No problems)

5.3 Brakes (No problems) : Introduction, types and working principles, Introduction to braking of vehicles

Module 6

6.1 Gears : Introduction, Types, Law of gearing, Forms of teeth, Details of gear terminology, Path of contact, Arc of contact, Contact ratio, Interference in involutes gears, Minimum number of teeth for interference free motion, Methods to control interference in involutes gears, Static force analysis in gears - spur, helical, bevel, worm & worm wheel (No problems on this point)

6.2 Gear Trains : Kinematics and dynamic analysis of simple and compound gear trains, reverted gear trains, epi-cycle gear trains with spur or bevel gear combination.

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