

AMTD10 THEORY OF MACHINES

UNIT-1 INTRODUCTION

- 1.1 Introduction, mechanisms and machines, kinematics and kinetics, types of links, kinematic pairs and their classification, types of constraint, Degrees of freedom of planar mechanism,
- 1.2 Grubler's equation, mechanisms, inversion of four bar chain, slider crank chain and double slider crank chain.
- 1.3 **Velocity analysis:** Introduction, velocity of point in mechanism, relative velocity method, velocities in four bar mechanism, instantaneous center.
- 1.4 **Acceleration analysis:** Introduction, acceleration of a point on a link, acceleration diagram, Corioli's component of acceleration, crank and slotted lever mechanism.

UNIT-2 CAMS

- 2.1 Introduction, classification of cams and followers, cam profiles for knife edge, roller and flat faced followers for uniform velocity, uniform acceleration, Gears and gear trains Introduction, classification of gears, law of gearing,
- 2.2 Tooth forms and their comparisons, systems of gear teeth, length of path of contact, contact ratio, minimum number of teeth on gear and pinion to avoid interference,
- 2.3 Simple, compound, reverted and planetary gear trains, sun and planet gear train.

UNIT-3 FORCE ANALYSIS

- 3.1 Static force analysis of mechanisms, D'Alembert's Principle, dynamics of rigid link in plane motion, dynamic force analysis of planar mechanisms, piston force and crank effort.
- 3.2 Turning moment on crankshaft due to force on piston, Turning moment diagrams for single cylinder double acting steam engine, four stroke IC engine and multi-cylinder engines, Fluctuation of speed, Flywheel.

UNIT-4 BALANCING

- 4.1 Introduction, static balance, dynamic balance, balancing of rotating masses, two plane balancing, graphical and analytical methods, balancing of reciprocating masses,
- 4.2 **Governors:** Introduction, types of governors, characteristics of centrifugal governors, gravity controlled and spring controlled centrifugal governors,
- 4.3 Hunting of centrifugal governors, inertia governors. Effort and Power of governor

UNIT-5 BRAKES AND DYNAMOMETERS

- 5.1 Introduction, Law of friction and types of lubrication, types of brakes, effect of braking on rear and front wheels of a four wheeler, Dynamometers, belt transmission dynamometer, torsion dynamometer, hydraulic dynamometer.

Reference Books:

1. Kinematics and dynamics of machinery: Wilson and Sadler, Third edition, Pearson.
2. Theory of Mechanisms and Machines: Amitabha Ghosh and Ashok kumar Mallik, Third Edition Affiliated East-West Press.