AT6302 MECHANICS OF MACHINES

DETAILED SYLLABUS

UNIT I KINEMATIC OF MECHANICS

Mechanisms – Terminology and definitions – kinematics inversions of 4 bar and slide crank chain – kinematics analysis in simple mechanisms – velocity and acceleration polygons – Analytical methods – computer approach – cams – classifications – displacement diagrams - layout of plate cam profiles – derivatives of followers motion – circular arc and tangent cams.

UNIT II GEARS and GEAR TRAINS

Spur gear – law of toothed gearing – involute gearing – Interchangeable gears – Gear tooth action interference and undercutting – nonstandard teeth – gear trains – parallel axis gears trains – epicyclic gear trains – automotive transmission gear trains.

UNIT III FRICTION

Sliding and Rolling Friction angle – friction in threads – Friction Drives – Friction clutches – Belt and rope drives – brakes – Tractive resistance.

UNIT IV FORCE ANALYSIS

Applied and Constrained Forces – Free body diagrams – static Equilibrium conditions – Two, Three and four members – Static Force analysis in simple machine members – Dynamic Force Analysis – Inertia Forces and Inertia Torque – D'Alembert's principle – superposition principle – dynamic Force Analysis in simple machine members.

UNIT V BALANCING AND VIBRATION

Static and Dynamic balancing – Balancing of revolving and reciprocating masses – Balancing machines – free vibrations – Equations of motion – natural Frequency – Damped Vibration – bending critical speed of simple shaft – Torsional vibration – Forced vibration – harmonic Forcing – Vibration solation.

TEXT BOOKS

1. Ambekar A.G., “Mechanism and Machine Theory” Prentice Hall of India, New Delhi, 2007.

2. Shigley J.E., Pennock G.R and Uicker J.J., “Theory of Machines and Mechanisms”, Oxford University Press, 2003.

REFERENCES

1. Thomas Bevan, “Theory of Machines”, CBS Publishers and Distributors, 1984.

2. Ghosh.A, and A.K.Mallick, “Theory and Machine”, Affiliated East-West Pvt. Ltd., New Delhi, 1988.

3. Rao.J.S. and Dukkipatti R.V. “Mechanisms and Machines”, Wiley-Eastern Ltd., New Delhi, 1992.

4. Ramamurthi. V, "Mechanisms of Machine", Narosa Publishing House, 2002.

5. Robert L. Norton, "Design of Machinery", McGraw-Hill, 2004.

OBJECTIVES

- To understand the principles in the formation of mechanisms and their kinematics.
- To understand the effect of friction in different machine elements.
- To analyse the forces and toques acting on simple mechanical systems
- To understand the importance of balancing and vibration.