

Theory of Machines

S.E. Sem. III [PROD]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	4 Hrs.	100
Practical Exam	–	–
Oral Exam	–	25
Term Work	–	25

SYLLABUS

1. Basic Concepts

Links, kinematics pairs, kinematics pairs giving one, two and three degrees of freedom, kinematics chains, degree of freedom and movability criterion. Constrained kinematics chains as mechanism. Inversions of single and double slider crank chains and their applications.

Introduction to simple mechanisms– pantograph, straight line motion mechanism, Engine indicators, vis., Simplex) Cross by, Thomson and Dobbie Mckines indicators, automobile steering gears.

2. Motion Characteristics of Mechanisms

Velocity and acceleration analysis of mechanisms with single degree of freedom system using graphical method. Instantaneous centre, Kennedy's theorem; analysis of velocities of mechanism using instantaneous centre method. Analytical technique applied to only slider crank mechanism. Bennett's construction and Rotterdam's construction.

3. CAMS

Introduction types of cams, types of followers. Follower motions. viz. simple harmonic motions constant velocity, uniform and constant acceleration and retardation and cycloidal motion, layout of cam profile for specified displacement characteristics. Cams with oscillating follower system.

4. Clutches Brakes and Dynamometers

Study and analysis of single plate clutch, multiple plate clutches and cone clutches. Introduction types of brakes. Viz. block and shoe brakes, band brake, band and block brakes, braking of vehicles. Types of dynamometers viz. Prony brake, Rope brake belt transmission dynamometets.

5. GEARS

Introduction: Types of gears and applications, Gear terminology, Condition for constant velocity ratio–conjugate profiles, profiles used in gears. Interference of involute teeth, methods of preventing interferences under cutting length of path of contact and contact ratio. Gear trains Simple compound planetary and epicyclic gear trains.

6. Turning Moment Diagram and Flywheel

Piston effort, crank effort turning moment, coefficient of fluctuation of speed and energy, calculation of flywheel dimensions.

7. Balancing

Introduction rotary masses-several masses in same plane, several masses in different planes, balancing of reciprocating masses, primary balance and secondary balance. Balancing of locomotives–Hammer Blow and variation of tractive efforts, static dynamic balancing machines.

8. Vibrations

Introduction–free vibrations; longitudinal, transverse and torsional vibrations. Dunkerl's empirical equations, critical or whirling speed of shaft. Torsional vibrations of two rotor system-torsionally equivalent shaft–free torsional vibrations of a geared system.

(Damped and forced vibrations are excluded)

9. Gyroscope

Introduction–Gyroscopic couple and precision stabilization of ships and Air crafts only.

References :

1. Theory of Machines (*Thomas Bevan*)
2. Theory of Machines (*Green*)
3. Theory of Machines (*Ballaney*)
4. Theory of Machines (*S.S.Ratan*)
5. Theory of Machines (*Jagdishlal*)
6. Mechanisms of Machines (*J. Hannah & RC Stephen*)

