Semester	**:**	**V**		
Course No.	**:**	**FMPE-355**	**Credit Hrs.** **:**	**2(2+0)**
Course Title	**:**	**Theory of Machines**		

SYLLABUS

Objectives : (i) To enable the students to analyze the relative motion between various parts of machine and forces, which act on them,

(ii) To apply the theories in designing the various parts of the machine.

THEORY

Simple mechanism: Elements, links, pairs, kinematics chain and mechanisms; Classification of pairs and mechanisms; lower and higher pairs, four bar chain, slider crank chain and their inversions, Velocity mechanism: determination of velocity and acceleration using graphical (instantaneous centers) method.

Gears and Gear trains: Types of gears, law of gearing, velocity of sliding between two teeth in mesh, Involute and cycloidal profile for gear teeth, Spur gear, nomenclature, Introduction to helical, spiral, bevel and worm gear; Simple, compound, reverted and epicyclic trains, determining velocity ratio by tabular method.

Turning moment diagram and flywheel: Turning moment diagrams, coefficient of fluctuation of speed and energy, weight of flywheel, flywheel applications.

Belt drives: Types of drives, belt materials, length of belt, transmitted power, velocity ratio, belt size for flat and V belts; effect of centrifugal tension, creep and slip on power transmission; chain drives, classification of chain drive, terms used in chain drive.

Friction and Governor: Types of friction, Laws of dry friction; friction of pivots and collars; single disc, multiple disc and cone clutches, rolling friction; Types of governors, constructional details and analysis of Watt, Porter, Proell governors, effect of friction, controlling force curves. Sensitiveness, stability, hunting, iso-chronism, power and effort of a governor.

Balancing of rotating masses: Static and dynamic balancing, balancing of rotating masses in one and different planes.

TEACHING SCHEDULE

THEORY [FMPE-355]

Lecture No.	Topic	Subtopic /key pints	Weightage (%)
1 - 4	Simple Mechanism	Simple mechanism: Elements, links, pairs, kinematics chain and mechanisms	15
		Classification of pairs and mechanisms; lower and higher pairs	
		Four bar chain, slider crank chain and their inversions	
		Numerical on Crank and slotted lever quick return motion mechanism and Whitworth quick return motion mechanism	
5 - 6	Velocity and Acceleration in Mechanism	Velocity mechanism: determination of velocity and acceleration using graphical (instantaneous centres) method	5
7 - 16	Gears and Gear Trains	Types of gears, Law of gearing	30
		Velocity of sliding between two teeth in mesh; Involute and cycloidal profile for gear teeth;	
		Spur gear, nomenclature, Introduction to helical, spiral, bevel and worm gear,	
		Simple, compound, reverted and epicyclic trains; Determining velocity ratio by tabular method.	
		Numerical on Length of the path of contact, velocity of sliding and velocity ratio contact	
17 - 20	Turning Moment Diagram and Flywheel	Turning moment diagrams, coefficient of fluctuation of speed and energy, weight of flywheel, flywheel applications.	10
		Numerical on flywheel	
21 - 24	Belt Drives	Belt drives: Types of drives, Belt materials, Length of belt, Transmitted power, Velocity ratio, Belt size for Flat and V belts,	10
		Effect of centrifugal tension, creep and slip on power transmission, Chain drives, Classification of chain drive, Terms used in Chain drive.	
25 - 30	Friction and Governor	Types of friction, Laws of dry friction; Friction of pivots and collars	20
		Single disc, multiple disc and cone clutches, Rolling friction	
		Types of Governor, Constructional details and Analysis of Watt, Porter, Proell governors	
		Effect of friction, Controlling force curves, sensitiveness, stability, hunting, isochronism, power and effort of a governor. Numerical on effort of a governor	
31 - 32	Balancing of Rotating Masses	Static and dynamic balancing, balancing of rotating masses in one and different planes and numerical on balancing of rotating masses	10
		Total =	**100**

Suggested Readings [FMPE-355]:

1. Ballaney, P.L., 2016. A Text Book of Theory of Machines. Khanna Publishers, New Delhi.
2. Bansal, R.K., 2009. A Text Book of Theory of Machines. Laxmi Publications (P) Ltd., New Delhi.
3. Khurmi, R.S. and Gupta, J.K., 2010. A Text Book of Theory of Machines. Euresia Publishing House (P) Ltd., New Delhi.
4. Ratan, S.S., 2010. A Text Book of Theory of Machines. Tata McGraw Hill Publishing Company Ltd., New Delhi.