ME286: Theory of Machines

Teaching Scheme			Credits	Marks Distribution				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	CE	ESE	CE	
3	0	2	5	70	30	30	20	150

Course Content:

Sr. No.	Topics	Teaching Hrs.
1	**Brakes and Dynamometers:** Classification of brakes, Braking effect, Analysis of Mechanical Brakes: Block brake, Band brake, Band and block brake, Internal expanding shoe brake; Braking analysis of four wheelers. Classification of Dynamometers, Analysis of Dynamometers: Prony brake, Rope brake, Belt Transmission, Epicyclical-Train and Torsional (Bevis-Gibson) dynamometers.	10
2	**Gyroscope:** Principle of gyroscope, Definition of axes, active and reactive couples; Roll, Yaw and Pitch motions; Gyroscopic effect on: aero planes, Naval ships, Four wheeler and Two wheeler vehicles, Shaft-rotor system and Rigid disc mounted at an angle on a shaft.	08
3	**Balancing:** Balancing of rotating masses: Concept of static and dynamic balancing, Analysis of effect of unbalanced masses in single and multiple planes in rotating systems, Bearing reactions. Balancing of reciprocating masses: Primary and secondary balancing, Balancing of single and multi-cylinder engines (In-line, Radial and Vee engines). **Approaches and equipment for measurement of unbalanced masses.	12

4	**Synthesis of linkages:**	10

Type, number and dimensional synthesis:

Degree of freedom, Application of Grubler's criterion, Function path generation, Spacing of accuracy points, Chebyshev's spacing of accuracy points.

Analytical methods of dimensional synthesis:

Path and Motion generation for four bar and slider-crank mechanisms with three accuracy points, Freundenstein's equation for four bar and slider-crank mechanisms, Method of complex variables.

**Graphical methods of dimensional synthesis:

Poles and relative poles of four bar and slider-crank chain linkage, Synthesis by inversion method for four bar and slider-crank mechanism.

5	****Governors:**	-

Necessity of governor, Classification of Governors, Working principle of centrifugal governors, Concept of control force, Characteristics of governors.

Total Hrs.	**40**

Reference Books:

1. Rattan S. S., "*Theory of Machines*", Tata McGraw-Hill, 3rd Edition.
2. Ambekar, A G, "*Mechanism and Machine Theory*" 2013 Reprint, Prentice Hall.
3. Singh Sadhu, "*Theory of Machines*", Pearson Education.
4. Ballaney P L, "*Theory of Machines and Mechanisms*", Khanna Publication.
5. Singh V P, "*Theory of Machines*", Dhanpat Rai & Co.
6. Uicker J J Jr., Pennock G R and Shigley J E, "*Theory of Machines and Mechanisms*", Oxford Univercity Press.