DESIGN OF TRANSMISSION ELEMENTS

Course Code	19ME4602B	Year	III	Semester	II
Course Category	Program Elective-III	Branch	ME	Course Type	Theory
Credits	3	L – T – P	3 – 0 – 0	Prerequisites	Nil
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes		Levels
Upon successful completion of the course, the student will be able to		
CO1	Analyze and Design shafts, keys and couplings under loading conditions	L3
CO2	Select suitable belt drives and associated elements from manufacturers catalogues under given loading conditions	L3
CO3	Select suitable bearings and its constituents from manufacturers catalogues under given loading conditions	L4
CO4	Analyze friction clutches and power screws subjected to loading conditions	L3
CO5	Apply the design concepts to estimate the size of the bevel and worm gears	L4

	Contribution of Course Outcomes towards achievement of Program Outcomes Strength of correlations (3: High, 2: Moderate, 1: Low)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1									3	1
CO2	3	3	1	1									3	1
CO3	3	3	1	1									3	1
CO4	3	3	1	1									3	1
CO5	3	3	1	1									3	1

Syllabus		
Unit No	**Contents**	**Mapped CO**
I	**SHAFTS:** Design of solid and hollow shafts for strength – For Bending, Torsion, Combined bending and torsion and combined bending, torsion and axial loads **KEYS & COUPLINGS:** Types of keys, Design of square and flat keys, Rigid couplings – Muff, split muff and Flange couplings, Flexible coupling-Bushed-Pin Flexible coupling.	CO1
II	**BELT AND CHAIN DRIVES:** Belts and their construction. Flat belts versus V- belts. Open and cross belt arrangements. Ratio of tensions, centrifugal tension, effect of centrifugal tension. Design of belts. Chain Drives: Roller chains, geometric relationships, polygonal effect of chain, power rating and design of chain drives.	CO 2
III	**SLIDING CONTACT BEARINGS:** Types of Bearings, bearing materials, Lubrication, types of lubricants, properties of lubricants, Lubrication modes, bearing modulus, McKee's equations, design of journal bearing. Bearing Failures.	CO3

	ROLLING CONTACT BEARINGS: Static and dynamic load capacity, Stribeck's Equation, equivalent bearing load, load-life relationships, load factor, selection of bearings from manufacturer's catalogue.	
IV	**FRICTION CLUTCHES:** Torque transmitting capacity of disc and centrifugal clutches. Uniform wear theory and uniform pressure theory. **POWER SCREWS:** Forms of threads – Torque required to lift and lower the load, self-locking screw, efficiency, collar friction, Design of screw and Nut, Design of Screw Jack.	CO4
V	**BEVEL AND WORM GEARS:** Straight bevel gear - tooth terminology, tooth forces and stresses, equivalent number of teeth. Estimating the dimensions of pair of straight bevel gears. Worm Gear: terminology, Merits and demerits. Design procedure and problems based on strength and wear considerations.	CO5

Learning Recourse(s)
Text Book(s)
1. V.B. Bhandari, Design of Machine Elements, 3/e, Tata McGraw Hill, 2010.
Reference Book(s)
1. J.E. Shigley, Mechanical Engineering Design, 2/e, Tata McGraw Hill, 1986. 2. R.L. Norton, Machine Design an Integrated approach, 2/e, Pearson Education, 2004. 3. M.F.Spotts and T.E.Shoup, Design of Machine Elements, 3/e, Prentice Hall (Pearson education), 2013.
e-Resources & other digital material
1. http://ecoursesonline.iasri.res.in/course/view.php?id=521 2. https://nptel.ac.in/courses/112/105/112105124/ 3. https://nptel.ac.in/courses/112/105/112105125/