DESIGN OF MACHINE ELEMENTS

Course Code	19ME3602	**Year**	III	**Semester**	II
Course Category:	Program Core	**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	Describe the Design Procedure and understand various design considerations.	L2
CO2	Determine the size of simple mechanical components subjected to static and fluctuating loads	L3
CO3	Design and analyze riveted, bolted and welded joints under various loading conditions	L4
CO4	Design and analyze cotter joints, spur and helical gears	L4
CO5	Design and Analyze springs for the given loading	L4

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (H:High, M: Medium, L:Low)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	1	1						1		2	3	1
CO2	3	3	1	1						1		2	3	1
CO3	3	3	1	1						1		2	3	1
CO4	3	3	1	1						1		2	3	1
CO5	3	3	1	1						1		2	3	1

Syllabus

Unit No	**Contents**	**Mapped CO s**
I	**MECHANICAL ENGINEERING DESIGN:** Basic Procedure of Machine Design, Basic Requirements of Machine Elements, Design of Machine Elements, Traditional Design Methods, Design Synthesis, Use of Standards in Design, Selection of Preferred Sizes, esthetic Considerations in Design, Ergonomic Considerations in Design. **MECHANICAL PROPERTIES OF ENGINEERING MATERIALS,** BIS System of Designation of Steels, Selection of Material, Selection of Manufacturing Method.	CO1
II	**DESIGN FOR STATIC LOADS:** Modes of failure, design of components subjected to axial, bending, torsional loads. Theories of failure for static loads. **DESIGN FOR DYNAMIC LOADS:** Endurance limit, fatigue strength under axial, bending and torsion, stress concentration, notch sensitivity. Types of fluctuating loads, fatigue design for infinite	CO 2

	life. Fatigue theories of failure. Soderberg, Goodman and modified Goodman criterion for fatigue failure.	
III	**RIVETED JOINTS:** Types of riveted joints, Types of Failure, efficiency of riveted joint, eccentrically loaded riveted joints. **BOLTED JOINTS:** Load on bolt due to initial tightening, external loading, combined loading, eccentrically loaded bolted joints in shear, Eccentric load perpendicular to axis of bolt. **WELDED JOINTS:** Types of welded joints, Strength of Parallel Fillet welds, Strength of Transverse Fillet welds, Axially Loaded Unsymmetrical Welded Joints, eccentrically loaded welded joints	CO3
IV	**COTTER JOINTS:** Types of cotter joints, Design of Socket and Spigot Joint, Design of Sleeve and Cotter Joint, Design of Gib and Cotter Joint, knuckle joint **SPUR GEARS AND HELICAL GEARS:** Gear Terminology, Module and Face width-power rating calculations based on strength and wear considerations – Helical Gears – Pressure angle in the normal and transverse plane Equivalent number of teeth-. Estimating the size of the spur and helical gears.	CO4
V	**SPRINGS:** Types of springs, Terminology of Helical Springs, Styles of End, Stress and Deflection Equations, Series and parallel Connections, Design of Helical springs, Design against Fluctuating load, Leaf springs, Design of Leaf spring, nipping of Leaf Spring	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/