

Course code	Course Name	L-T-P – Credits	Year of Introduction
ME314	MACHINE DESIGN - II	3-0-0-3	2016
Prerequisite : ME307 Machine design - II			
Course Objectives			
<ul style="list-style-type: none"> To introduce the design considerations needed for different types of machine components and 			
Syllabus			
Introduction to design of different types of bearings, clutches, brakes – IC engine parts design – Design recommendations			
Expected outcome.			
<ul style="list-style-type: none"> The students will become aware of the machine components, forces, stresses affecting them and aspects of designing them. 			
Text Books:			
<ol style="list-style-type: none"> C.S,Sarma, KamleshPurohit, Design of Machine Elements Prentice Hall of India Ltd NewDelhi M. F. Spotts, T. E. Shoup, Design of Machine Elements, Pearson Education, 8e, 2003 T. Krishna Rao, Design of machine Elements volume 2 I K International Publishing House Pvt. Ltd New Delhi, 2011 V.B.Bhandari, Design of Machine Elements McGraw Hill Book Company, 4e, 2016 			
Data book (permitted for reference in the University examination)			
<ol style="list-style-type: none"> K. Lingaiah , Machine Design Data hand book, Suma Publishers, Bangalore/ Tata McGraw Hill 			
References:			
<ol style="list-style-type: none"> Doughtie V.L., &Vallance A.V., Design of Machine Elements, McGraw Hill Book Company, 1964 J. E. Shigley, Mechanical Engineering Design, McGraw Hill Book Company, 5e, 1986 Juvinall R.C & Marshek K.M., Fundamentals of Machine Component Design, John Wiley, 5e, 2011 Siegel, Maleev& Hartman, Mechanical Design of Machines, International Book Company. 			
Course Plan			
Module	Contents	Hours	End Sem. Exam Marks
I	Classification of design - Different phases in design process - design factors and considerations Engineering materials and their physical properties as applied to design - Selection of materials - Factors of safety in design – Endurance limit of materials- theories of failure - Guest’s theory - Rankine’s theory - St. Venant’s theory - Haigh’s theory - Von Mises&Hencky theory - shock and impact loads - fatigue loading - endurance limit stress- Factors affecting endurance limit - Factor of safety - creep and thermal stresses	8	15%
II	Design of shafts on the basis of strength - Design of shaft on the basis of rigidity - Design of hollow shafts -design for static and fatigue loads- repeated loading- reversed bending Design of welded joints- Representation of welds - stresses in fillet and butt welds- design for static loads - bending and torsion in welded	7	15%

	joints- eccentrically loaded welds - design of welds for variable loads.		
FIRST INTERNAL EXAMINATION			
III	Clutches - friction clutches- design considerations-multiple disc clutches-cone clutch- centrifugal clutch Brakes- Classification, internal expanding shoe brake, disc brake Spring- Design of leaf spring, coil spring , torsion bar	6	15%
IV	Design of bearings - Types - Selection of a bearing type - bearing life - Rolling contact bearings – static and dynamic load capacity - axial and radial loads - selection of bearings - dynamic equivalent load - lubrication and lubricants – viscosity Journal bearings - hydrodynamic theory - design considerations - heat balance - bearing characteristic number - hydrostatic bearings.	6	15%
SECOND INTERNAL EXAMINATION			
V	Gears- classification- Gear nomenclature - Tooth profiles - Materials of gears - design of spur, helical, bevel gears and worm & worm wheel - Law of gearing - virtual or formative number of teeth- gear tooth failures- Beam strength - Lewis equation- Buckingham's equation for dynamic load	8	20%
VI	Design of Internal Combustion Engine parts- Piston, Cylinder, Connecting rod, Crank shaft, Flywheel & valves	7	20%
END SEMESTER EXAM			

QUESTION PAPER PATTERN

Maximum Marks : 100

Exam Duration: 3 Hrs

PART A

3 Questions uniformly covering modules 1 and 2. Each question carries 15 marks. Students will have to answer any two questions out of four. (2X15=30 marks)

PART B

3 Questions uniformly covering modules 3 and 4. Each question carries 15 marks. Students will have to answer any two questions out of four. (2X15=30 marks)

PART C

3 Questions uniformly covering modules 5 and 6. Each question carries 20 marks. Students will have to answer any two questions out of four. (2X20=40 marks)

Note: Each question can have maximum of 4 sub questions, if needed.