

Course No.	Course Name	L-T-P-Credits	Year of Introduction
ME 402	Design of Machine Elements-II	3-0-0-3	2016
Prerequisite: ME401 Design of Machine Elements-I			
Course Objectives: <ul style="list-style-type: none"> • To provide basic design methods for clutches, brakes, belt drives, bearings, gears and connecting rod. • To introduce the design modifications to be considered for ease of manufacturing. 			
Syllabus Design of single plate clutches, multiple disc clutches, cone clutch, centrifugal clutch, block brake, band brake, band and block brake, internal expanding shoe brake, rolling contact bearing, sliding contact bearing, spur gear, helical gear , bevel gear, worm and worm wheel, design of flat belt, design of V-belt drives, selection of roller chains, connecting road, design recommendations for forgings, castings, welded products, rolled sections, turned parts, screw machined products, parts produced on milling machines.			
Expected outcome: The students will be able to <ol style="list-style-type: none"> 1. Apply design procedures for industrial requirements. 2. Design machine components to ease the manufacturing limitations. 			
Text Books: <ol style="list-style-type: none"> 1. J. E. Shigley, Mechanical Engineering Design, McGraw Hill, 2003 2. Jalaludeen , Machine Dsign, Anuradha Publications, 2016 3. V.B.Bhandari, Design of Machine elements, McGraw Hill, 2016 			
References Books: <ol style="list-style-type: none"> 1. Juvinal R.C & Marshek K.M., Fundamentals of Machine Component Design, John Wiley, 2011 2. M. F. Spotts, T. E. Shoup, Design of Machine Elements, Pearson Education, 2006 3. Rajendra Karwa, Machine Design , Laxmi Publications (P) LTD, New Delhi, 2006 4. Siegel, Maleev& Hartman, Mechanical Design of Machines, International Book Company, 1983 			
Data books permitted for reference in the examination: <ol style="list-style-type: none"> 1. K. Mahadevan, K.Balaveera Reddy, Design Data Hand Book, CBS Publishers & Distributors, 2013 2. Narayana Iyengar B.R & Lingaiah K, Machine Design Data Handbook, Tata McGraw Hill, 1984 3. PSG Design Data. DPV Printers. Coimbatore. 2012 			

Course Plan			
Module	Contents	Hours	End Sem. Exam Marks
I	Clutches – friction clutches, design considerations, multiple disc clutches, cone clutch, centrifugal clutch	2	15%
	Brakes- Block brake, band brake, band and block brake, internal expanding shoe brake	3	
II	Rolling contact bearing- Design of bearings, Types, Selection of a bearing type, bearing life, static and dynamic load capacity, axial and radial loads, selection of bearings, dynamic equivalent load	4	15%
	Sliding contact bearing- lubrication, lubricants, viscosity, Journal bearings, hydrodynamic theory, Sommerfield number, design considerations, heat balance, bearing housing and mountings	4	
FIRST INTERNAL EXAM			
III	Gears- classification, Gear nomenclature, Tooth profiles, Materials of gears, Law of gearing (review only), virtual or formative number of teeth, gear tooth failures, Beam strength, Lewis equation, Buckingham's equation for dynamic load, wear load, endurance strength of tooth, surface durability, heat dissipation – lubrication of gears – Merits and demerits of each type of gears.	3	15%
	Design of spur gear	3	
IV	Design of helical gear	2	15%
	Design of bevel gear	2	
	Design of worm & worm wheel	3	
SECOND INTERNAL EXAM			
V	Design of flat belt- materials for belts, slip of the belts, creep, centrifugal tension	3	20%
	Design of V-belt drives, Advantages and limitations of V-belt drive	3	
	Selection of roller chains, power rating of roller chains, galling of roller chains, polygonal action, silent chain.	3	
VI	Connecting rod – material, connecting rod shank, small end, big end, connecting rod bolts, inertia bending stress, piston	5	20%
	Pressure vessels, thin cylinders, Thick cylinder equation, open and closed cylinders.	2	
END SEMESTER EXAM			

QUESTION PAPER PATTERN

Note : Use of approved data book is permitted

Maximum marks: 100

Time: 3 hrs

The question paper should consist of three parts

Part A

There should be 3 questions from module I and II and at least 1 question from each module
Each question carries 15 marks
Students will have to answer any 2 questions out of 3 (2X15 marks =30 marks)

Part B

There should be 3 questions from module III and IV and at least 1 question from each module
Each question carries 15 marks
Students will have to answer any 2 questions out of 3 (2X15 marks =30 marks)

Part C

There should be 3 questions from module V and VI and at least 1 question from each module
Each question carries 20 marks
Students will have to answer any 2 questions out of 3 (2X20 marks =40 marks)

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

