

DESIGN OF MACHINE ELEMENTS

IV Semester: ME																				
Course Code	Course Code	Hours / Week			Credits	Maximum Marks														
AMEB23	Core	L	T	P	C	CIA	SEE	Total												
		2	1	-	3	30	70	100												
Contact Classes: 30		Tutorial Classes: 15		Practical Classes: Nil			Total Classes: 45													
<p>I. COURSE OVERVIEW: Machine design emphasizes for influence the failsafe design in the mechanical systems using different theories of failure modes. The design of machine members focuses mainly on design of machine elements subjected to various types of loads and components include joints; Riveted, Welded, threaded joints, shafts and springs using Design standards, B.I.S codes of steels. The Design philosophy is based on strength, stiffness and material selection for manufacture of machine elements.</p> <p>II. OBJECTIVES: The course should enable the students to:</p> <ul style="list-style-type: none"> I The machine element design process that achieves desired constraints for strength,rigidity and reliability II The nature of loading for the application of theories of failure for mechanical machine elements under different loading conditions. III The various permanent and temporary joints in engineering applications subjected to various loading conditions. IV The design procedure for the various power transmission elements on the basis of strength and rigidity <p>III. COURSE OUTCOMES: After successful completion of the course, students should be able to:</p> <ul style="list-style-type: none"> CO1 Outline the knowledge of design process and design standards, theories of failures, analyses Understand the stresses and strains for various machine elements. CO2 Develop the Design procedure of riveted joints and welded joints for engineering Apply applications like boilers, pressure vessels, ships and trusses. CO3 Classify various types of keys and cotter joints used to employee secure to gears, pulleys, Understand disc applications. CO4 Develop the design procedures of knuckle joint for different loading conditions in propeller Apply applications. CO5 Select appropriate design procedures on the basis of strength, torsional rigidity for shafts Remember And Couplings. CO6 Evaluate the natural frequency, energy storage, stresses and deflections of helical springs Evaluate for static and fatigue loadings. <p>IV. SYLLABUS:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">MODULE-I</td> <td style="width: 60%;">INTRODUCTION TO THEORY OF FAILURES</td> <td style="width: 25%;">Classes : 09</td> </tr> <tr> <td colspan="3"> Introduction: General considerations in the design of engineering materials and their properties, selection, manufacturing consideration in design, tolerances and fits, BIS codes of steels; Theories of failures, factor of safety design for strength and rigidity, preferred number; Fatigue loading : Stress concentration, theoretical stress concentration factor, fatigue stress concentration factor, notch sensitivity, design for fluctuating stresses, endurance limit, estimation of endurance strength, Goodman's life, Soderberg's line. </td> </tr> <tr> <td>MODULE-II</td> <td>DESIGN OF FASTENERS</td> <td>Classes : 09</td> </tr> <tr> <td colspan="3"> Design of fasteners: Riveted joints, methods of failure of riveted joints, strength equations, efficiency of riveted joints, eccentrically loaded riveted joints; Welded Joints: Design of fillet welds, axial loads, circular fillet welds, bending, bolts of uniform strength. </td> </tr> </table>									MODULE-I	INTRODUCTION TO THEORY OF FAILURES	Classes : 09	Introduction: General considerations in the design of engineering materials and their properties, selection, manufacturing consideration in design, tolerances and fits, BIS codes of steels; Theories of failures, factor of safety design for strength and rigidity, preferred number; Fatigue loading : Stress concentration, theoretical stress concentration factor, fatigue stress concentration factor, notch sensitivity, design for fluctuating stresses, endurance limit, estimation of endurance strength, Goodman's life, Soderberg's line.			MODULE-II	DESIGN OF FASTENERS	Classes : 09	Design of fasteners: Riveted joints, methods of failure of riveted joints, strength equations, efficiency of riveted joints, eccentrically loaded riveted joints; Welded Joints: Design of fillet welds, axial loads, circular fillet welds, bending, bolts of uniform strength.		
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MODULE-III	DESIGN OF KEYS AND JOINTS	Classes : 09
Keys, cotters and knuckle joints: Design of keys, stress in keys, cotter joints, spigot and socket. Sleeve and cotter, jib and cotter joints, Knuckle joints.		
MODULE-IV	DESIGN OF SHAFTS	Classes : 09
Design of Shafts: Design of solid and hollow shafts for strength and rigidity, design of shafts for complex loads, Shaft sizes, BIS code, design of shafts for gear and belt drives; Shaft couplings: Rigid couplings, muff, Split muff and flange couplings, flexible couplings, pin, bush coupling.		
MODULE-V	DESIGN OF SPRINGS	Classes : 09
Mechanical Springs: Stresses and deflections of helical springs, extension compression springs, springs for static and fatigue loading, natural frequency of helical springs, energy storage capacity, helical torsion springs, co-axial springs.		
Text Books:		
<ol style="list-style-type: none"> 1. P. Kanniah, "Machine Design", 2nd Edition, Scitech Publications India Pvt. Ltd, New Delhi, 2012. 2. V.B. Bandari, "A Text Book of Design of Machine Elements", 3rd edition, Tata McGraw hill, 2011. 		
Reference Books:		
<ol style="list-style-type: none"> 1. Richard G. Budynas, J. Keith Nisbett, "Shiegly's Mechanical Engineering Design", 10th Edition, 2014. 2. S. Md. Jalaludine, "Machine Design", Anuradha Publishers, 1st Edition, 2004. 3. R.L. Norton, "Machine Design-An Integrated approach", Person Publisher, 2nd Edition, 2006. 4. U.C. Jindal, "Machine Design", Pearson, 1st Edition, 2010. 5. T. Krishna Rao, "Design of Machine Elements", IK International Publishing House, 2nd Edition, 2011. 6. R.S. Khurmi, A. K. Gupta, "Machine Design", S. Chand & Co, New Delhi, 1st Edition, 2014. 7. PSG College, "Design Data: Data Book of Engineers", 1st Edition, 2012. 		
Web References:		
<ol style="list-style-type: none"> 1. http://nptel.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Machine%20design1/New_index1.html 2. http://nptel.ac.in/downloads/112105125/ 3. http://alljntuworld.in/download/design-machine-members-1-dmm-1-materials-notes/ 4. http://scoopworld.in/2015/03/design-of-machine-members-dmm-mech.html 		
E-Text Book:		
<ol style="list-style-type: none"> 1. http://faadooengineers.com/threads/26687-Machine-design-by-shigley-ebook-download-pdf 2. http://freepdfbook.com/design-of-machine-elements-by-v-b-bhandari/ 3. http://only4engineer.com/2014/10/a-textbook-of-machine-design-by.html 4. http://engineering108.com/Data/.../Handbooks/machine_design_databook.pdf 		