

DESIGN OF MACHINE MEMBERS

V Semester: ME								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AME012	Core	L	T	P	C	CIA	SEE	Total
		3	1	-	4	30	70	100
Contact Classes: 45		Tutorial Classes: 15		Practical Classes: Nil			Total Classes: 60	
<p>COURSE OBJECTIVES: The course should enable the students to:</p> <ol style="list-style-type: none"> I. Develop an ability to apply knowledge of mathematics, science, and engineering Outcomes II. Knowledge of various design standards, safety, reliability, importance of dimensional parameters and manufacturing aspects in mechanical design. III. Understanding the concepts of stresses, theories of failure and material science to analyze, design and/or select commonly used machine components. IV. To develop an ability to identify, formulate, and solve various machine members problems <p>COURSE OUTCOMES (COs):</p> <p>CO 1: Understanding design and analysis of power transmitting elements, selection of suitable materials and manufacturing processes.</p> <p>CO 2: Analyzing the forces acting on various joints and their design.</p> <p>CO 3: To develop an ability to identify, formulate, and solve various machine members problems</p> <p>CO 4: Ability to design and analyze shafts with different geometrical features under various loading conditions.</p> <p>CO 5: Ability to analyze and design of different Springs for required application.</p> <p>COURSE LEARNING OUTCOMES (CLOs):</p> <ol style="list-style-type: none"> 1. Understand various design variables and factors in the study of machine elements. 2. Explain the steps involved in design process, BIS Codes of Steels. 3. Understand the various Theories of failure, Design for Strength and rigidity. 4. Understand theories of failures, stress concentration and fluctuating stresses. 5. Explain estimation of endurance strength. 6. Ability to design lap and butt joints in riveted joints. 7. Explain design of welded joints, effects various stresses. 8. Explain the design procedure of various joints. 9. Understand the applications and comparison of various joints. 10. Explain bolts of uniform strength. 11. Understand various stresses in keys. 12. Ability to design procedure for keys. 13. Ability to design spigot and socket joint. 14. Understand Jib and Cotter joint and design procedure. 15. Ability to design knuckle joints. 16. Explain the design of shafts for complex loads. 17. Explain the design procedures of various shaft couplings. 18. Ability to design shafts for various types of loading. 19. Compare various shaft couplings and applications. 20. Ability to Design of various shaft couplings. 21. Understand of the basic features of springs. 								

<p>22. Explain the design procedure for various springs.</p> <p>23. Ability to design the various springs.</p> <p>24. Ability to design the various springs.</p> <p>25. Explain different types of end styles for helical compression and tension springs.</p>		
Module-I	FUNDAMENTALS OF MACHINE DESIGN	09
<p>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 failure – Factor of safety – Design for strength and rigidity – preferred numbers.</p> <p>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.</p>		
Module-II	DESIGN OF FASTENERS AND WELDED JOINTS	09
<p>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</p>		
Module-III	DESIGN OF KEYS, COTTERS AND KNUCKLE JOINTS	09
<p>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</p>		
Module -IV	DESIGN OF SHAFTS AND SHAFT COUPLINGS	09
<p>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.</p> <p>Shaft couplings: Rigid couplings – Muff, Split muff and Flange couplings. Flexible couplings- PIN-Bush coupling.</p>		
Module-V	DESIGN OF MECHANICAL SPRINGS	09
<p>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.</p>		
<p>Text Books:</p>		
<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 Education (P) Ltd, New Delhi, India. 2011. 		
<p>Reference Books:</p>		
<ol style="list-style-type: none"> 1. Richard G. Budynas, J. Keith Nisbett, “Shiegly’s Mechanical Engineering Design”, 10th Edition, 2014. 2. S. Md. Jalaluddine, “Machine Design”, Anuradha Publishers, 1st Edition, 2004. 3. R.L. Norton, “Machine Design-An Integrated approach”, Person Publisher, 2nd Edition, 2012. 4. U.C. Jindal, “Machine Design”, Pearson, 1st Edition, 2010. 5. T. Krishna Rao, “Design of Machine Members”, I.K 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. 		
<p>Web References:</p>		
<ol style="list-style-type: none"> 1. http://nptel.ac.in/courses/Webcoursecontents/IIT%20Kharagpur/Machine%20design1/New_index1.html 2. http://www.nptel.ac.in/downloads/112105125/ 3. http://www.alljntuworld.in/download/design-machine-members-1-dmm-1-materials-notes/ 		

4. <http://www.scoopworld.in/2015/03/design-of-machine-members-dmm-mech.html>

E-Text Book:

1. <http://www.faadooengineers.com/threads/26687-Machine-design-by-shigley-ebook-download-pdf>
2. <http://www.freepdfbook.com/design-of-machine-elements-by-v-b-bhandari/>
3. <http://www.only4engineer.com/2014/10/a-textbook-of-machine-design-by.html>
4. http://www.engineering108.com/Data/.../Handbooks/machine_design_databook.pdf