

METALLURGY AND MECHANICS OF SOLIDS LABORATORY

III Semester: ME								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AME104	Core	L	T	P	C	CIA	SEE	Total
		-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes: 45			
<p>OBJECTIVES: The course should enable the students to:</p> <ol style="list-style-type: none"> I. Determination of mechanical properties of different materials. II. Establish the constitutive relations in metals using destructive methods. III. Understand the behavior of members during twisting and transverse loading. IV. Familiarize with standard test specimens. V. Prepare samples for investigating micro structure of different materials. <p>COURSE LEARNING OUTCOMES (CLOs): The students should enable to:</p> <ol style="list-style-type: none"> 1. Able to draw the stress strain diagram of ductile materials. 2. Able to draw the stress strain diagram of brittle materials. 3. Calculate the ultimate tensile strength , percentage of elongation ,percentage of reduction of area of ductile materials by using UTM. 4. Calculate the ultimate tensile strength , percentage of elongation ,percentage of reduction of area of brittle materials by using UTM. 5. Analyze the applicability and accuracy of numerical solutions to diverse mechanical engineering problems. 6. Calculate the modulus of rigidity of a given specimen by using torsion testing machine. 7. Able to understand the hardness of copper, mild steel, aluminium and brass materials. 8. Able to draw the relation between T-Θ diagram. 9. Preparation and study of the microstructure of mild steels, low carbon steels, high-C steels. 10. Understand torsion equation of circular shaft which is fixed at one end and free at other end. 11. Calculate compressive strength of a given specimen by using compression testing machine. 12. Able to prepare and study the micro Structure of pure metals like iron, cu and Al. 13. Calculate impact strength of a given specimen. 14. Able to understand hardenability of steels by jominy end quench test. 15. Analyze the micro structures of cast irons 16. Study of the micro structures of non-ferrous alloys 17. Study of the micro structures of heat treated steels. 18. Analyze the micro structures of non-ferrous alloys 19. Able to understand the behavior of spring under gradually applied load. 20. Study the variation of stress along the cross section of the beam under uniformly distributed load. 								
LIST OF EXPERIMENTS								
Week-I	MICROSTRUCTURE OF PURE METALS							
Preparation and study of the micro Structure of pure metals like iron, cu and al.								
Week -II	MICROSTRUCTURE OF STEELS.							
Preparation and study of the microstructure of mild steels, low carbon steels, high-C steels.								
Week -III	MICROSTRUCTURE OF CAST IRON.							
Study of the micro structures of cast irons.								

Week -IV	MICROSTRUCTURE OF NON FERROUS ALLOYS.
Study of the micro structures of non-ferrous alloys.	
Week -V	MICROSTRUCTURE OF HEAT TREATED STEELS.
Study of the micro structures of heat treated steels.	
Week-VI	HARDENABILITY OF STEELS.
Hardenability of steels by Jominy end quench test.	
Week -VII	HARDNESS OF STEELS.
To find out the hardness of various treated and untreated steels.	
Week -VIII	TENSION TEST.
To Find % of elongation and young's modulus of a material.	
Week-IX	TORSION TEST.
To find the torsional rigidity of a material.	
Week -X	HARDNESS TEST.
a) Brinell's hardness test. b) Rockwell hardness test.	
Week -XI	SPRING TEST
Testing on compressive and elongation springs.	
Week -XII	SHEAR TEST AND COMPRESSION TEST
Punch shear test on aluminium sheet. Find out the compression strength of a given specimen.	
Text Books:	
<ol style="list-style-type: none"> 1. Sidney H Avner, "Introduction to Physical Metallurgy", McGraw Hill Education, 2nd Edition, 2008. 2. William, Callister, "Material Science and Engineering", Wiley, 9th Edition, 2014. 3. V Raghavan, "Elements of Material Science", PHI Learning Company Pvt Ltd, 6th Edition, 2015. 	
Reference Books:	
<ol style="list-style-type: none"> 1. Er.Amandeep Singh Wadhva, "Engineering Materials and Metallurgy", Laxmi Publications, 1st Edition, 2008. 2. Traugott Fisher, "Material Science", 1st Edition, Academic Press Elsevier, 2013. 	
Web References:	
<ol style="list-style-type: none"> 1. http://www.tutorialspoint.com /MOS lab 	