Program : **Diploma inMechanical Engineering/Tool and Die Engineering/Manufacturing Technology**	
Course Code :**3026**	Course Title: **Material Testing and Metallography Lab**
Semester : **3/4/3**	Credits: **1.5**
Course Category: **Program Core**	
Periods per week: **3 (L:0, T:0, P:3)**	Periods per semester:**45**

Course Objectives:

- To provide knowledge in fundamentals of various engineering materials and apply it in different fields of engineering applications.
- To familiarize with various applications of metallurgical microscope
- To identify the microstructure of ferrous metals (low carbon, medium carbon, high carbon, grey cast iron and spheroidal cast iron etc.
- To familiarizewith the non-destructive testing methods.

Course Prerequisites:

Topic	Course code	Course name	Semester
Basic mathematics		Mathematics I&II	1&2
Properties of materials, stress, strain concepts etc.		Strength of materials	4

Course Outcomes:

On completion of the course, the student will be able to:

COn	Description	Duration (Hours)	Cognitive Level
CO1	Apply theoretical knowledge of material testing to conduct tension test on UTM for ductile and brittle material	10	Applying
CO 2	Apply theoretical knowledge of material testing to find out the hardness of various treated and untreated steels using Vickers hardness tester &Brinell hardness tester	10	Applying

CO 3	Apply theoretical knowledge of material testingto conduct Impact test and torsion test	10	Applying
CO 4	To study the Microstructure of Low, Medium & High carbon steels by sample preparation using Disc polishing (fine polishing) and to find cracks in casting by conducting visual inspection, die penetrant test and magnetic particle test (NDT).	11	Applying
	Lab Exam	4	

CO – PO Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3					
CO2	3	3					
CO3	3	3					
CO4	3	3					

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline:

Module outcomes	Description	Duration (Hours)	Cognitive Level
CO1	**Apply theoretical knowledge of material testing to conduct tension test on UTM for ductile and brittle material**		
M1.01	Study UTM & and its various uses	3	Understanding
M1.02	Conduct Tension test on M.S. bar	3	Applying
M1.03	Determine the compressive strength of brittle material using UTM	4	Applying
CO2	**Apply theoretical knowledge of material testing to find out the hardness of various treated and untreated steels using Vickers hardness tester &Brinell hardness tester**		
M2.01	Study of Impact Testing Machine	1	Understanding
M2.02	Conduct Charpy test of MS bar specimen. Compute the values	2	Applying
M2.03	Conduct Impact test: To find out impact values (Izod) of M.S bar specimen. Compute the values	2	Applying
M2.04	Study the Brinell testing Machine and its use:	1	Understanding
M2.05	To find Brinell hardness values of M.S. bars and aluminum	1	Applying

M2.06	Study Rock well hardness testing Machine	1	Understanding
M2.07	Find out Rockwell hardness values of M.S. bars and Find out Rockwell hardness values of Aluminum	2	Applying
	Lab ExamI	2	
CO3	**Apply theoretical knowledge of material testingto conduct Impact test and torsion test**		
M3.01	Study Torsion testing Machine and its use	2	Understanding
M3.02	Find modulus of rigidity, angle of twist and torque	2	Applying
M3.03	Plot graph- angle of twist Vs torque	2	Applying
M3.04	Find modulus of rigidity of steel wire from number of oscillation and torque	2	Applying
M3.05	Find out modulus of rigidity of the material of the spring (both compression and tension),Draw deflection Vs load graph	2	Applying
CO4	**To study the Microstructure of Low, Medium & High carbon steels by sample preparation using Disc polishing (fine polishing) and to find cracks in casting by conducting visual inspection, die penetrant test and magnetic particle test (NDT).**		
M4.01	Preparation of specimen for Metallographic examination of ferrous materials	2	Applying
M4.02	Conduct visual inspection testing	3	Applying
M4.03	Conduct die penetrant testing	3	Applying
M4.04	Conduct magnetic particle testing	3	Applying
	Lab Exam – II	2	

Text / Reference:

T/R	Book Title/Author
T1	BediD.S. , Strength of Materials, Khanna Publishing House, Delhi, Ed. 2018
T2	Khurmi, R.S., Strength of Materials, S Chand and Co. Ltd. New Delhi.
T3	Ramamurtham, S, Strength of Materials, Dhanpat Rai and sons, New Delhi.
R3	Punmia B C, Strength of Materials, Laxmi Publications (p) Ltd. New Delhi.
R4	Meriam, J. L., Kraige, L.G. , Engineering Mechanics- Statics, Vol. I, Wiley
R5	Rattan S.S., Strength of Materials, McGraw Hill Education; New Delhi.
R6	Bansal R K, Strength of Materials, Laxmi Publications.
R7	Subramaniam R, Strength of Materials, Oxford University Press.

Online Resources:

Sl.No	Website Link
1	https://www.nptel.ac.in/courses/122104015/
2	https://nptel.ac.in/courses/112103109/
3	http://vlab.co.in/