

LESSON PLAN FOR ACADEMIC SESSION: 2026-27 (WINTER)

Discipline: Metallurgical Engineering	Semester : 5th	Name of the Teaching Faculty : Rueigved Mahanand
Subject : Heat Treatment Laboratory	No. of days / week class allotted : 04	Semester From : 01/07/2026 to 05/11/2026 Nos. of Weeks per semester : 15
Week	Class Day	Theory Topics
1 ST	1 st	Cutting, mounting, grinding, polishing, and etching of metallic samples.
	2 nd	Cutting, mounting, grinding, polishing, and etching of metallic samples.
	3 rd	Microscope usage and metallographic observation.
	4th	Full annealing of steel samples.
2 ND	1 st	Observation of microstructural changes and hardness measurements.
	2 nd	Observation of microstructural changes and hardness measurements.
	3 rd	Observation of microstructural changes and hardness measurements.
	4th	Comparison with as-received condition.
3 RD	1 st	Comparison with as-received condition.
	2 nd	Normalizing of steel samples.
	3 rd	Observation of microstructural changes and hardness measurements.
	4th	Observation of microstructural changes and hardness measurements.
4 TH	1 st	Observation of microstructural changes and hardness measurements.
	2 nd	Comparison with annealed and as-received conditions.
	3 rd	Comparison with annealed and as-received conditions.
	4th	Stress relieving of a pre-stressed component.
5 TH	1 st	Measurement of residual stresses before and after stress relieving (if equipment available).

	2 nd	Measurement of residual stresses before and after stress relieving (if equipment available).
	3 rd	Assessment of changes in mechanical properties.
	4 th	Assessment of changes in mechanical properties.
6 TH	1 st	Hardening of different grades of steel using various quenching media (water, oil, brine).
	2 nd	Hardening of different grades of steel using various quenching media (water, oil, brine).
	3 rd	Effect of quenching rate on hardness.
	4 th	Jominy End Quench Test
7 TH	1 st	Jominy End Quench Test
	2 nd	Tempering of hardened steel samples at different temperatures.
	3 rd	Observation of changes in hardness and microstructure with tempering temperature.
	4 th	Observation of changes in hardness and microstructure with tempering temperature.
8 TH	1 st	Development of tempering curves.
	2 nd	Development of tempering curves.
	3 rd	Demonstration of austempering and mar tempering processes.
	4 th	Demonstration of austempering and mar tempering processes.
9 TH	1 st	Comparison of microstructures and properties with conventionally hardened and tempered samples.
	2 nd	Comparison of microstructures and properties with conventionally hardened and tempered samples.
	3 rd	Demonstration of pack carburizing or gas carburizing.
	4 th	Demonstration of pack carburizing or gas carburizing.
10 TH	1 st	Microstructural examination of the carburized layer
	2 nd	Microstructural examination of the carburized layer

3 rd	Hardness profile measurement.
4th	Demonstration of the nitriding process.
1 st	Microstructural examination of the nitride layer.
2 nd	Microstructural examination of the nitride layer.
3 rd	Hardness profile measurement.
4th	Heat treatment of aluminum or copper alloys.
1 st	Study of precipitation hardening (if applicable).
2 nd	Study of precipitation hardening (if applicable).
3 rd	Virtual Lab on Age Hardening in Aluminium Alloys
4th	Virtual Lab on Age Hardening in Aluminium Alloys
1 st	Micro hardness measurement of various heat treated steel samples.
2 nd	Micro hardness measurement of various heat treated steel samples.
3 rd	Image Analysis of various heat treated steel samples.
4th	Image Analysis of various heat treated steel samples.
1 st	Advanced microscopy techniques (if available).
2 nd	Advanced microscopy techniques (if available).
3 rd	Quantitative metallography using image analysis software.
4th	Quantitative metallography using image analysis software.

15 th	1 st	Compositional Analysis of various materials using spectroscopic method.
	2 nd	Compositional Analysis of various materials using spectroscopic method.
	3 rd	Revision
	4 th	Revision

Rueigved Mahanand
21/07/26

Prepared by
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01/07/26

Head of the Department
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20/07/26

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