LESSON PLAN				
Discipline: **Metallurgical Engineering**			Semester: **4th Semester**	Name of the Teaching Faculty: **Ms. Sitanjali Khuntia**
Subject: Material Characterization Sub code: **MTPE202 (Th-5)**			No of days /week class allotted:03	Semester from Date: 22.12.2025 to 18.04.2026 No of weeks: 19
Month	*week*	*No of periods available*	*Class Day*	***Theory topics***
Dec	4th	02	22-12-2026	Introduction to Material Characterization: Fundamentals of Material Characterization: Importance of material characterization in metallurgy
			26-12-2026	Classification of characterization techniques: Structural, chemical, mechanical, and thermal analysis,
	5th	01	29-12-2026	Selection criteria for characterization methods
Jan	1st	02	01-01-2026	Specimen Preparation Techniques: Cutting, grinding, polishing, and etching, Sample preparation for different characterization methods
			02-01-2026	Specimen Preparation Techniques: Cutting, grinding, polishing, and etching, Sample preparation for different characterization methods
	2nd	03	05-01-2026	Optical Microscopy (OM): Principles of optical microscopy
			08-01-2026	Bright-field and dark-field imaging, Grain size analysis using ASTM standards
			09-01-2026	Bright-field and dark-field imaging, Grain size analysis using ASTM standards
	3rd	02	12-01-2026	Scanning Electron Microscopy (SEM) & Energy Dispersive Spectroscopy (EDS)
			15-01-2026	Working principle and components of SEM
			16-01-2026	Quiz Test
	4th	02	19-01-2026	Image contrast mechanisms and resolution, EDS for elemental composition analysis
			22-01-2026	Image contrast mechanisms and resolution, EDS for elemental composition analysis
	5th	02	29-01-2026	Class Test
			30-01-2026	Transmission Electron Microscopy (TEM): Principles and applications of TEM
Feb	1st	04	02-02-2026	Diffraction contrast and phase identification
			05-02-2026	Atomic Force Microscopy (AFM): Principles of AFM, different modes of operation
			06-02-2026	Surface topography, roughness measurement
	2nd	03	09-02-2026	X-ray Diffraction (XRD): Bragg's law and diffraction principles
			12-02-2026	X-ray Diffraction (XRD): Bragg's law and diffraction principles
			13-02-2026	Phase identification and crystallite size determination
	3rd	04	16-02-2026	Applications of XRD in metallurgy and materials science
			19-02-2026	Internal Assessment
			20-02-2026	Internal Assessment
	4th	03	23-02-2026	Spectroscopy Techniques: UV-Visible Spectroscopy: Absorption and bandgap analysis,
			26-02-2026	Spectroscopy Techniques: UV-Visible Spectroscopy: Absorption and bandgap analysis,
			27-02-2026	Infrared (IR) Spectroscopy: Functional group identification

Mar	1st	03	02-03-2026	Infrared (IR) Spectroscopy: Functional group identification
			05-03-2026	Raman Spectroscopy: Vibrational analysis of materials
			06-03-2026	Raman Spectroscopy: Vibrational analysis of materials & applications.
	2nd	03	09-03-2026	Thermal Analysis Methods: Differential Scanning Calorimetry (DSC)
			12-03-2026	Class test
			13-03-2026	Thermal Analysis Methods: Differential Scanning Calorimetry (DSC)
	3rd	03	16-03-2026	Phase transformation studies, Thermogravimetric Analysis
			19-03-2026	Phase transformation studies, Thermogravimetric Analysis
			20-03-2026	Applications of TGA
	4th	02	23-03-2026	Internal Assessment
			26-03-2026	Thermal stability and decomposition analysis
	5th	01	30-03-2026	Thermal stability and decomposition analysis
April	1st	01	02-04-2026	Application of Thermal stability and decomposition analysis
	2nd	03	06-04-2026	Quiz test
			09-04-2026	Dilatometry: Thermal expansion studies
			10-04-2026	Dilatometry: Thermal expansion studies
	3rd	03	13-04-2026	Doubt clearing
			16-04-2026	Doubt Clearing
			17-04-2026	Mock test

22.12.25

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