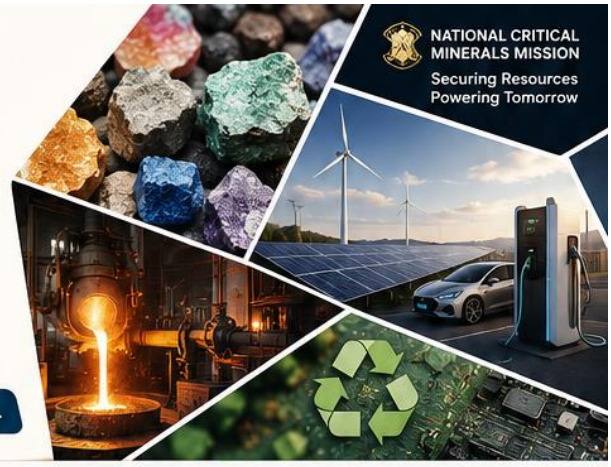
भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

NATIONAL CRITICAL MINERALS MISSION
Securing Resources Powering Tomorrow

M.Tech in CRITICAL MINERALS AND METALS PROCESSING

RESOURCES TODAY • TECHNOLOGY TOMORROW • SUSTAINABILITY FOREVER

Secure Resources. Engineer Solutions. Sustain the Future.



WHY THIS PROGRAM?

- Global transition to clean energy, electric vehicles, and advanced technologies is accelerating demand for critical minerals.
- Majority of critical minerals are centric to China. Hence there is a global shortage.
- India currently faces significant import dependence for several critical minerals and shortage of skilled manpower.
- National initiatives such as Atmanirbhar Bharat and the National Critical Minerals Mission (NCMM) emphasize domestic capability development. IIT Hyderabad is CoE under NCMM.
- Growing need for expertise in beneficiation of low-grade ores and extraction of critical metals.
- Increasing importance of urban mining and recycling of batteries, e-waste, and industrial residues.
- Demand for environmentally sustainable and resource-efficient processing technologies.

PROGRAM OBJECTIVES

- Develop skilled professionals for the critical minerals value chain.
- Train students in mineral beneficiation, extractive metallurgy, recycling, and sustainable processing.
- Support India's goal of achieving resource security and technological self-reliance.

TOTAL PROGRAM CREDITS
52 credits

DURATION
2 Years (4 Semesters)

UNIQUE FEATURES
- Interdisciplinary curriculum
- Industry-aligned learning
- Hands-on labs & live projects
- Global collaboration

COLLABORATION
Joint knowledge collaboration with **Monash University**, Australia

FOCUS AREAS
Mineral Processing • Extractive Metallurgy
Recycling & Circular Economy
Critical Materials for Energy
Sustainability & Innovation

INDUSTRY & R&D PARTNERS

HINDALCO | एनएमडीसी NMDC | TATA STEEL | JSW | LOHUM | AMARA RAJA | GREENKO | L&T Minerals | adani Power | SCCL

IREL | RESCMM | DMRL | AMD-BARC | NFC | NFTDC | ARCI | Midhani | JNARDDC | CIL | Vedanta and more...

COURSE STRUCTURE & CREDITS
(As per IITH M.Tech Structure)

15 CREDITS

Core Courses	6
Elective Courses	6
English Communication	1
Industry Lecture	1
Lab (Characterization)	1

13 CREDITS — SEMESTER 2

Core Courses	6
Elective Courses	6
Lab (MP & EM Lab)	1

24 CREDITS — THESIS EVALUATION

STAGE 1 (May–July)	Option 1 – Industry Internship	6 credits
	Option 2 – Stage-I Thesis	6 credits
STAGE 2 (Aug–Dec)		9 credits
STAGE 3 (Jan–June)		9 credits

SEMESTER 1: ELECTIVES (Any 6 Credits)

CM5040	Sustainability in Pyrometallurgical Processes	1
CM5050	Secondary Resources for CMs	1
SD5020	Semiconductor Extraction, Purification & Growth	2
EW5030	LCA	2
CM5060	Electrochemical Processing for CMs	2
CH6220	Advanced Solid–Liquid Separations	2
CM5020	Introduction to Critical Mineral Processing	1
CM6010	AI & ML for CMs	1

MINERAL PROCESSING | METALLURGY | RECYCLING | SUSTAINABILITY | INNOVATION

SEMESTER 2: ELECTIVES (Any 6 Credits)

CMSXXX	Sustainability in Chemical Processes	2
CM5090	Construction Materials for CMP	1
CM5100	Critical Materials for Optoelectronics	1
CM5110	Bio-processing of CMs	1
SE5290	Sustainability and Recycling of Green Energy Materials	2
CM5120	Critical Materials for Energy Devices (Batteries, Fuel Cells & Capacitors)	1
CM5130	REE Extraction	1

SEMESTER 2: CORE COURSES

CM5070	Separation Science and Engineering	2
CM5080	Urban Mining & Circular Economy	2
EWSXXX	Hydro and Solvo-metallurgy	2
CM5031	Critical Minerals Processing & Extractive Metallurgy Lab	1

FACULTY

Dr. Narasimha Mangadoddy | Dr. Ashok Kamaraj | Dr. Vamsi Vikram G | Dr. Sai Praneeth | Dr. Ambika | Dr. Amit Barnwal | Dr. Suhash Dey | Dr. Sai Ramakrishna | Dr. Mohan Yellishetty | Dr. Raman Singh | Dr. Parama Banerjee

PROGRAM OPERATION

Continuous feedback system | Industry advisory committee | Industrial lecture series | Live projects / paid internships

ELIGIBILITY

B.E./B.Tech in CHE, MSME, CE, Mining, M.Sc (Chemistry & Geology), ME

GATE/NET-CSIR qualified for MoE fellowship / Without GATE for self-sponsored & On-line mode

BE A PART OF INDIA'S MISSION FOR RESOURCE SECURITY AND A SUSTAINABLE FUTURE!

— Learn. Innovate. Impact. —