GOVERNMENT OF INDIA
MINISTRY OF MINES
GEOLOGICAL SURVEY OF INDIA TRAINING INSTITUTE
HYDERABAD

Proposal for Tanzania				
SCHEME: ITEC			PROPOSED YEAR: 2024-25	
Course Name	Duration	Maximum Seats	Minimum Seats	Stream
Geological and Mineral Mapping using Image Processing techniques for Mineral Resource Prospecting	05.09.2024 to 25.09.2024	20	10	Geology, Geography, Geophysics

COURSE DETAILS

Course Name	Geological and Mineral Mapping using Image Processing techniques for Mineral Resource Prospecting
Start Date	05.09.2024
End Date	25.09.2024
Aim & Objective	To enable geoscientists in handling and processing of satellite imagery as an aide for geological mapping and mineral exploration for potential zone demarcation.
Mode of Evaluation	Project Work and Presentations
Education Qualification	Graduate/ Master Degree in Geosciences (Geology, geography, Geophysics, Environmental Science and Mining)
Work & Experience	1 Year
Target Group	Geoscientists

COURSE OVERVIEW

In the field of mineral exploration, remote sensing refers to the use of satellite data to determine surface features that indicate mineral deposits. This technology helps geologists identify opportunities for further exploration, saving time and money. Remotely sensed data are invaluable in mineral exploration in two ways (i) in identifying features directly related to mineralization like specific host rocks and (ii) in delineation of features favourable for localization of minerals such as faults, folds and other structures. Moreover, remote sensing detects alteration zones, where rock composition has been altered by hydrothermal fluids linked to mineralization. These zones frequently hint at nearby valuable mineral deposits. It has become an indispensable instrument in mineral exploration especially inaccessible and large areas. Satellite imagery is useful for geological, lithological, structural and geomorphological mapping useful for mineral investigation. An increased number of spectral channels of hyperspectral data has played a crucial role in identification of individual minerals indicating potential mineralized zones.

This course will cover series of lectures, practical exercises on satellite image processing in ENVI software, identification of lithological, geomorphological & structural features and alteration zones, classification techniques, extraction of valuable information from digital elevation data, map preparation, demarcating potential mineralized zones, project work by individual participants.

Software: ENVI & Arc GIS

COURSE CONTENT

- **Principles of Remote Sensing:** Electromagnetic Radiation, sensors and platforms.
- **Digital Image Processing:** Digital Image, Pixel, Digital number, Radiance, Reflectance.
- **Thermal and Microwave remote sensing**
- **Identification of lithological, geomorphological & structural features using remote sensing data.**
- **Pre-processing of Satellite Imagery:** Radiometric, Geometric Enhancement Techniques.
- **Concept of Band Ratio, Principal Component Analysis and Minimum Noise Fraction (MNF) techniques.**
- **Lithological, Structural and Alteration zone mapping.**
- **Image Classification: Unsupervised and Supervised.**
- **Digital Elevation Model:** Structural and drainage analysis.
- **Thematic map preparation.**
- **Interpretation & Identification of potential zones for mineral exploration.**
- **Project work & Presentation by individual participants.**

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