COMMON POOL OF DISCIPLINE SPECIFIC ELECTIVES

Discipline Specific Elective (DSE-4): Exploration Geology or Geophysics or Application of Hydrogeology in Industries and Mining
(L3, P1)

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
DSE-4 **Exploration Geology (L3, P1)** or **Research Methods in Geoscience (L3, P1)** or **Application of Hydrogeology in Industries and Mining (L3, P1)**	**4**	**3**	**0**	**1**	**12th pass with science**	**Studied Earth System Science and Structural Geology, Hydrogeology or Equivalent**

DSE-4: Exploration Geology (4 credits)
Theory (45 hours)
Practical (30 hours)

Learning Objectives

The course on exploration geology is intended to provide introductory knowledge of mineral exploration at different stages though geological, geochemical, geophysical, and remote sensing methods. Students will also be provided basic understanding about the estimation of reserves.

Learning outcomes

After going through this course, students will have a clear idea and knowledge about the exploration methods and tools, and their application in mineral resource exploration and exploitation.

SYLLABUS OF DSE-4 (Exploration Geology)
Theory (45 Hours)

UNIT – I (9 Hours)
Detailed content
Introduction to exploration geology: Definitions and different terminologies of exploration components. Basic exploration and exploitation steps or stages. Classification of mineral deposits with respect to exploration strategies. Mineral resources and their uses

UNIT – II (9Hours)

Principles of mineral exploration: Importance of mineralogy, grain size-shape and texture in exploration. Mineral identification and analytical techniques. Sampling techniques, drilling and logging. Estimation of grade in samples.

UNIT – III (9 Hours)
Detailed content
Prospecting and exploration: Surficial survey methods and applications. Geochemical survey methods and applications. Geophysical survey methods and applications. Remote sensing methods and applications

Unit – IV (9 Hours)
Detailed content
Importance of drilling and logging in exploration: Core and non-core drilling. Basic parts of drilling machine. Types of drilling techniques. Planning and location of bore holes on ground.

Unit – V (9 Hours)
Detailed content
Principles of reserve estimation: Reserves estimation methods and models. Critical geological data to be considered. Factors affecting reliability of reserve estimation and types of errors. Evaluation of sampling data: mean, median, mode, standard deviation and variance.

Practical Component- (30 Hours)
Exercises based on Evaluation of data Average grade and reserve estimation techniques. Geological cross-section and borehole problems.

Essential/Recmmended readings
Moon, C.J., Whateley, M.K.G. & Evans, A.M. 2006. Introduction to Mineral Exploration, Blackwell Publishing.
Haldar, S.K., 2013. Mineral Exploration – Principles and Applications. Elsevier Publication.

Recommended readings
Moon, C.J., Whateley, M.K.G. & Evans, A.M. 2006. Introduction to Mineral Exploration, Blackwell Publishing.
Haldar, S.K., 2013. Mineral Exploration – Principles and Applications. Elsevier Publication.
Arogyaswami, R.P.N.(1996. Courses in Mining Geology. 4th Ed. Oxford-IBH.
Clark, G.B. 1967. Elements of Mining. 3rd Ed. John Wiley & Sons.

or

DSE-4: Research Methods in Geoscience (L3, P1)
Credits: 4
Theory: 45 hours
Practical: 30 hours

Learning Objectives
Main objective of this course to provide an introduction to research methods relevant to geoscience through lectures and practical training about literature review, proper referencing and citation, professional ethics, geoscience hypotheses, analytical techniques, data analysis, preparation of scientific reports and proposals.

Learning outcomes
After successful completion of this course, students will have a basic understanding and skill to develop a research plan related to critical issues in geoscience. The students will also be able to develop skills to synthesise scientific ideas and appreciate the scope of research work in geoscience.