DISCIPLINE SPECIFIC CORE COURSE - DSC – 13: Economic Geology (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)	No. of hours of Lectures	No. of hours of Tutorial	No. of hours of Practical	Total Hours of Teaching
		Lecture	Tutorial	Practical/ Practice						
DSC – 13: Economic Geology (L3, P1)	**4**	**3**	**0**	**1**	**Class XII pass with Science**	**Studied Earth System Science and Mineralogy or Equivalent at the UG level**				

Learning Objectives

Introducing students to morphology, structure, mineralogy, petrology and geochemistry of various ore deposits, and help them to develop a basic idea of different ore forming processes.

Learning outcomes

Basic characteristics and distribution of mineral resources and knowledge of different ore geological systems.

SYLLABUS OF DSC-7

UNIT – I (9 hours)

Detailed content

Introduction to ore geology: Economic and academic definitions/terminologies of ore geological components. Ore minerals and their uses. Morphology and style of ore mineralization. General textures and structures

UNIT – II (9 hours)

Detailed contents

Basic principles of an ore deposit formation: Geochemical behaviour of elements in ore geological systems. Concept of source-transporting agent-driving mechanism-trap

UNIT – III (9 hours)

Detailed contents

Ore forming processes: Magmatic ore forming processes. Hydrothermal ore forming processes. Sedimentary ore forming processes. Surficial and supergene ore forming processes

UNIT – IV (9 hours))
Detailed contents
Basic mineral economics

UNIT – V (9 hours)
Detailed contents
Distribution of major metallic and non-metallic ore deposits in India

Practical Component- (30 Hours)
Identification of common ore minerals by physical and optical properties

Essential/recommended readings
Robb, L., 2020. Introduction to ore-forming processes. John Wiley & Sons.

Evans, A.M., 2009. Ore geology and industrial minerals: an introduction. John Wiley & Sons

Suggestive readings
Robb, L., 2020. Introduction to ore-forming processes. John Wiley & Sons.
Evans, A.M., 2009. Ore geology and industrial minerals: an introduction. John Wiley & Sons.
Bateman, A.M. and Jensen, M.L. 1990. Economic Mineral Deposits. John Wiley & Sons.
Misra, K., 2012. Understanding mineral deposits. Springer Science & Business Media.
Ramdohr, P., 2013. The ore minerals and their intergrowths. Elsevier.
Sarkar, S.C. and Gupta, A., 2012. Crustal evolution and metallogeny in India. Cambridge University Press.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

DISCIPLINE SPECIFIC CORE COURSE – DSC – 14: Engineering Geology ((L3, P1)

Credit distribution, Eligibility and Prerequisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)	No. of hours of Lectures	No. of hours of Tutorial	No. of hours of Practical	Total Hours of Teaching
		Lecture	Tutorial	Practical/ Practice						
DSC – 14: Engineering Geology ((L3, P1)	**4**	**3**	**0**	**1**	**Class XII pass with Science**	**Studied Stratigraphy, Structural Geology or Equivalent at the UG level**				

Learning Objectives

This course provides a basic introduction on the role of geology in slope stability and civil engineering constructions such as dams, tunnels, roads etc. It is aimed to discuss the essential components of topography, lithology and geological structures to ensure the stability and economy of engineering projects. The course also introduces a systematic approach to planning and designing engineering structures.

Learning outcomes

After going through this course, students will have basic understanding the geological and geotechnical aspects of major engineering projects. They will know qualitative and quantitative properties of geological material like rock and soil. They will understand slope failure mechanism and their mitigation measures. They will realize the sSignificance of site investigation, survey methods and assessment of environmental impacts of any engineering project.

SYLLABUS OF DSC- 14

UNIT – I (9 hours)

Detailed contents

Introduction to engineering geology: Principles and scope of engineering geology: material, material fabrics and environmental factors. Geological and geotechnical investigations.

UNIT – II (9 hours)

Detailed contents

Engineering properties of geological material: Rock strength; Rock aggregates; Significance of rock as construction material; Rock mass: discontinuities, Rock mass classification; Soil: strength, standard penetration test and engineering bedrock.

UNIT – III (9 hours)

Detailed contents

Engineering structures: dams, tunnels and roads: Engineering structures: Dams, tunnels, road, their types, acting forces, ground conditions; tunnelling methods; geological considerations for site selection.

UNIT – IV (9 hours)

Detailed contents

Slope failure and mitigation measures: Concept of slope failure mechanism; Landslide types and causes, landslide mapping; Engineering treatment of slope and foundations: grouting, retaining walls, rock bolting and other support mechanisms.

UNIT – V (9 hours)

Detailed contents

Site investigation and assessment for engineering structures: Site investigation and characterization; Reconnaissance survey; Environment impact assessment (EIA); Detailed project report (DPR)

Practical Component- (30 Hours)

Merits, demerits & remedial measures based upon geological cross sections of project sites. Computation of Index properties of rocks and soil. Concept, significance and computation of Rock Mass Classification schemes like Rock Structure Rating (RSR), Rock Mass Rating (RMR)/ Tunnelling Quality Index (Q)/Rock Quality Designation (RQD).

Essential/recommended readings

Krynin, D.P. and Judd, W.R. (1957). Principles of Engineering Geology and Geotechnique, McGraw Hill (CBS Publ).

Gangopadhyay, S. (2013). Engineering geology. Oxford University Press.

Suggestive readings (if any)

Krynin, D.P. and Judd, W.R. (1957). Principles of Engineering Geology and Geotechnique, McGraw Hill (CBS Publ).

Gangopadhyay, S. (2013). Engineering geology. Oxford University Press.

Goodman, R.E. (1993). Engineering Geology: Rock in engineering constructions. John Wiley& Sons, N.Y.

Waltham, T. (2009). Foundations of Engineering Geology (3rd Edn.) Taylor & Francis.

Bell, F.G. (2007). Engineering Geology, Butterworth-Heinema.

Anbalagan, R. Singh, B, Chakraborthy, D. and Kohli, A. (2007) “A filed Manual for Landslide investigations”. DST, Government of India, New Delhi.

Duncan C. Wyllie and Christopher W. Mah. (2004). Rock Slope Engineering. CRC Press. London.

David George Price (2009). Engineering Geology: Principles and Practice. Springer-Verlag Berlin Heidelberg

DISCIPLINE SPECIFIC CORE COURSE– DSC – 15: Geological Mapping (L2, P2)

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)	No. of hours of Lectures	No. of hours of Tutorial	No. of hours of Practical	Total Hours of Teaching
		Lecture	Tutorial	Practical/ Practice						
DSC – 15: Geological Mapping (L2, P2)	**4**	**2**	**0**	**2**	**Class XII pass with Science**	**Studied Structural Geology, Igneous/Metamorphic Petrology and Mineralogy or Equivalent at the UG level**				

Learning Objectives: To acquire basic skills of delineating the geological details of a terrain and produce a geological map, which is the starting point for any geological and/or mineral investigation.

Learning Outcomes:

Through this course, the students will learn the following essential knowledge and skills:

i) To identify a rock and broadly define its composition.

ii) To identify and measure lithological and/or structural details of rocks at the outcrop/hand-specimen scale.

iii) To plot the data on a base map/toposheet to create a lithological and/or structural map of the terrain.

iv) To appreciate the possible origin of the rock and their genetic process.

v) To reconstruct the geological history of the terrain.

SYLLABUS OF DSC-15

UNIT – I (6 hours)

- Introduction to toposheets: Concepts of scale, contour density, numbering system.
- Global Positioning Systems, their types and uses.
- Choosing a suitable geological traverse

UNIT – II (6 hours)

- Outcrop pattern of beds in a undulating topography – rule of V
- Identification of rock types, and their classification based on field criteria
- Textural features of different rocks through field study and microscopy

UNIT – III (6 hours)

- Basic concept of structural measurement – strike, dip, trend, plunge, pitch
- Distinguishing characters of planar and linear structures in the outcrop scale
- Overprinting nature of folds/ metamorphic foliations

UNIT – IV (6 hours)

- Identification and structural measurement of a fold in the field
- Geometric classification of a fold based on field data
- Understanding the outcrop pattern of a fold in non-ideal sections

UNIT – V (6 Hours)

- Distinguishing criteria of a fault in the field
- Understanding the slip pattern of faults in an outcrop
- Measuring the orientation of different planar and linear structures associated with a fault.

Practical Component- (60 Hours)

- In the practical class, all the aforesaid techniques of measurement and identification will be demonstrated and practised in the field.
- The practical classes of this course will be conducted at a go through field visit (4-5 days) in a suitable geological terrain

Essential/recommended readings

1) Lahee F. H. (1962): Field Geology. McGraw Hill

2) *Billings, M. P. (1987). Structural Geology, 4th edition, Prentice-Hall.*

Suggestive readings

1) *Davis, G. R. (1984) Structural Geology of Rocks and Region. John Wiley*
2) *Park, R. G. (2004) Foundations of Structural Geology. Chapman & Hall.*