ROCK MECHANICS ADVANCED

Code	Credit Hours
MinE-811	3-0

Course Description.

Rock as a structure, Strength, and deformation of rock, In-situ stresses and Stresses around excavation, Methods of excavation analysis, Stability evaluation of rock structures, Rock and cable bolt systems, Empirical, Analytic and Numerical Methods in Rock Mechanics, Water Jet Cutting, Application of Rock Mechanics in Tunnelling, Blasting in Open Pits and Instrumentation Planning, Brittle Rock Fracture and Seismicity, Synthetic Rock Mass Models (Simulating Rock Masses), Design of an Underground Mine, Ground Support for Civil and Mining Applications, Rock Mass Structure Characterization Using Photogrammetry and Other Technologies, Caving in Geomechanics, Hydraulic yielding roof support systems, Laboratory Testing of Rocks, Their Applications, Limitations, and Interpretation, Case studies

Textbooks:

1. Brady, B.H.G and Brown, E.T. (2004).Rock Mechanics for Underground Mining. Kluwer Academic Publishers, The Netherlands.
2. Hoek, E. and Bray, J.W. (1981). Rock Slope Engineering. The Institution of Mining and Metallurgy, London.
3. Hoek, E. and Brown, E.T. (1982). Underground Excavations in Rock. The Institution of Mining and Metallurgy, London.
4. ISRM. (1981).Rock Characterization Testing and Monitoring, ISRM Suggested Methods. Ed. E.T. Brown. Pergamon Press.

References Book:

1. ISRM. (2007). The Complete ISRM Suggested Methods for Rock Characterization, Testing and Monitoring: 1974-2006. Eds. Resat Ulusay and John A. Hudson. ISRM, Ankara, Turkey.
2. Read, J., Stacey, P. (2009) Open Pit Slope Design. CSIRO Publishing, Collingwood VIC, Australia

Pre-Requisites:

Nil

ASSESSMENT SYSTEM FOR THEORY

Quizzes	15%
Assignment	5%
Mid Terms	30%
ESE	50%

Teaching Plan

Week No	Topics	Learning Outcomes
1	Introduction	CourseOutline,objectives,teachingplan,assessmentmethod, conceptsreviewIntroduction to various rock properties.Introduction to rock deformation.Rock strength concept
2	Stresses	Description of in-situ stresses. The influence of excavation on in-situ stresses
3	Excavation Methods	Introduction to various methods of excavation and its stability analysis
4	Stability evaluation	Brief description of various empirical and numerical modeling techniques for stability evaluation of rock structure
5	Rock and cable bolt systems	Description of rocks and rock bolting technique
6	Methods in Rock Mechanics	Introduction to various empirical and numerical methods for stability assessment of rock mass stability
7	Rock Cutting	A detail description of water jet cutting techniques for rocks
8	Rock Mechanics in Tunneling	Introduction to the application of rock mechanics in tunnel excavation
9	**MID TERM EXAM**	
10	Blasting	Various blasting techniques applicable in open pit mining
11	Rock Fracture and Seismicity	Brittle rock fracture and influence of seismicity on rock deformation
12	Simulating Rock Masses	Various simulation techniques for rock mass modeling and various laboratory testing involved in rock mass characterization
14	Design of an Underground Mine	A detail introduction to various consideration during designing of underground mine
15	Ground Support in Mining	Importance of ground support study in various civil and mining excavations
16	Photogrammetry in rock mechanics	Application of aerial photogrammetry in rock mass structure characterization
17	Case studies	Study of hydraulic yielding of roof support in underground mine excavation
18	**END SEMESTER EXAM**	