| Course Type | Course Code | Name of Course | L | T | P | Credit |
|---|---|---|---|---|---|---|
| DC2 | MNC201 | **Rock Breakage** | 3 | 0 | 0 | 9 |

| **Course Objective** |
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| To understand the rock breakage concepts and methods such as drill and blast; mechanical cutting. |
| **Course Outcomes** |
| Understanding of rock drilling and fragmentation, concept of mine-to-mill, physics of rock breakage in drill and blast system and mechanical rock cutting and safety aspects. Proficiency in usage of various modeling and simulation software. |

| Unit No. | Topics to be Covered | Lecture Hours | Learning Outcome |
|---|---|---|---|
| 1 | **Explosives and Initiating Systems:** Types of explosives, their composition and properties, classification; Selection of explosives; Manufacture, transport, storage and handling of explosives; Testing of explosives; Types of initiating systems – Electrical Detonators, Detonating cord, Detonating Relays, NONEL, Electronic Detonators, Blasting accessories, exploders. | 10 | Understanding about the explosives and initiating systems used in rock breakage. |
| 2 | **Drilling in Surface Mines:** Blasthole drills – types, classification, applicability and limitations; Mechanics of drilling, performance parameters, drilling cost, drilling errors, Selection of drilling systems, organization of drilling. | 6 | Blast hole drilling mechanism and selection of a drill for surface excavation. |
| 3 | **Blasting in Surface Mines**: Mechanics of rock fragmentation; Livingston theory of crater formation; factors affecting blast design, Blast design - estimation of burden and spacing, estimation of charge requirement; initiation patterns; secondary blasting techniques; problems associated with blasting and remedies, ground vibration and air over pressure, blast instrumentation; cast blasting. | 9 | Ability to design the surface blast round and predict the outcomes of the blast design. |
| 4 | **Drilling & Blasting in Underground Mines**<br>*Coal mines*: Drilling systems and their applicability, blasting-off-solid, different blasting cuts, calculation of specific charge, specific drilling and detonator factor, initiation patterns.<br>*Metal mines*: Drilling systems and their applicability, blast design for horizontal drivages, different blasting cuts, long hole blasting, vertical crater retreat blasting. | 7 | Ability to design underground blast round and predict the outcomes of the blast design. |
| 5 | **Mechanised Cutting:** Ripping, Cutting using– surface and underground machinery, rock breakers. | 6 | Understanding the basics of mechanized excavation techniques. |
| 6 | Blast design and analysis software | 4 | Skill to model and simulate blasting operations using industry standard software. |
| | **Total** | 42 | |

**Text Book:**

1. Drilling and blasting of rocks – Jimeno, Carcedo, Jimeno, T&F, 1995

**References:**

1. Rock Blasting and Overbreak Control- C.J. Konya, 1991
2. Surface and underground excavations – R. R. Tatiya, 2010