

4298 – SURFACE MINING										
Teaching Schedule Per Week			Progressive Assessment		Examination Schedule (Marks)					
Lectures	Practical	Credits			Theory		Practical Ex.		Total	
3	2	5	25	25	3 Hrs	100	50		200	
Pre-requisite		Source	Semester	Theory	Test	Total	TW	PR	Gr Total	
4293		MIN		75	25	100	50	50	200	

Rationale: Surface mining is a specialised branch in Mining Engineering and requires detailed study by those students who choose their career in surface mines.

Objective: Student on completion of this course will be well conversant with surface mining practices for supervising the works independently.

COURSE CONTENTS		Hrs	Mks
1. INTRODUCTION		8	16
Scope of open cast mining in India, applications, advantages, Disadvantages; mineral amenable to surface mining, factors affecting the selection of open cast mining, classification of open cast mining based on unit operations, cycle of operations, calculation of various stripping ratios, pit limits. Pit planning & design – objectives and factors affecting (natural, geological, economical, technical) pit design, types of planning (Short and long range). Preliminary investigation before starting an open pit; bench parameters – height, width, slope; factors affecting the bench height, width, and slope. CMR: - Max permissible bench slopes & bench height.			

2. GROUND PREPARATION

Cleaning of bushes, grubbing, scarification, scraper: Application, types, advantages & disadvantages scrapping operations, output, cycle time, production efficiency, guidelines to be followed for efficient scraping. Dozer: - Application, types, comparison of tyre v/s crawler mounted, operation and method of cutting, output, production efficiency, guide lines to be followed for efficient dozing. Ripper: Application, types, factors considered in ripping - Geometry, cutting force ripping angle, principle of ripping, methods of ripping, production of ripping, guidelines to be followed for efficient ripping.

Drilling and blasting:- Drillability of rocks, types of drilling methods and their application, auxiliary operations, types of drilling, patterns - Horizontal, vertical, inclined; factors affecting performance of drills; blast hole design - Dia of hole, depth, spacing, burden; subgrade drilling, charge per hole stemming, inclination of hole; Empirical rules for blast hole design. Explosives used in open cast mines - SMS, PMS, bulk explosives, selection of explosives, principle of fragmentation, various blasting techniques- deck blasting; inclined hole blasting, muffle blasting, controlled blasting, multirow blasting, chamber blasting, coyote blasting, twin bench blasting, cast blasting, calculation of powder factor, detonator factor.

3. EXCAVATION AND LOADING

Shovel: Suitability conditions, working parameters, swell factor, fill factor, swing factor, cycle time, utilisation factor, capacity and loading methods, overcasting by shovel (with layouts)

Wheel Loader: - Suitability conditions, method of cutting, capacity, advantages and disadvantages compared to shovels, ways to increase production.

Dragline: - Suitability conditions, working parameters capacity, factors affecting the output, extraction methods, overcasting by Dragline (showing layout), comparison of drag line with shovels. Application

Cutting methods, capacity, over casting of B. W. E. (showing layout).

CMR:- Working near mines boundary, steep working, steep working supervision of O/C mining

4. TRANSPORTATION AND EQUIPMENT PLANNING

Dumpers:- Salient features of selection of transport system, application, operation of dumper - O/C loading and at waste dump;

Haul Road & Curves - Haul road, haul road construction, types, haul road geometry & construction material, maintenance, spiral layout for dump trucks.

Belt Conveyor- application, carrying capacity of conveyors, advantages, disadvantages selection of belt.

Calculation of number of drilling machines, number of shovels, number of dumpers / trucks and other auxiliary machinery for a given output of an open cast mine.

5. AUXILIARY OPERATIONS

Dump construction:- Types of dumps, dump layout, method of disposal of waste; dump construction by shovel, Dragline, bulldozer, spreader; selection of dumping site, dump slope stabilisation. Lighting standards; Fences - types, uses; Land reclamation - methods, advantages, process of reclamation, reclamation planning; Drainage - sources of water, requirements, patterns, predrainage through channels & bore holes

Total

48 100

PRACTICALS:

1. Visit to a mine for calculating bench parameters.
2. To calculate the capacity of ripper and Dozer at mine site.
3. To determine the powder factor on mine site