

Course Type	Course Code	Name of Course	L	T	P	Credit
DC9	MNC 301	MINE PLANNING AND ECONOMICS	3	0	0	9

Course Objective

The objective of this course is to impart comprehensive understanding about the mine planning and design process, underlying principles, methodologies including mine economics for Underground and Surface Mining Operations.

Learning Outcomes

Upon successful completion of this course, the students will have a deep and comprehensive understanding of mine planning and design process for surface and underground mining applicable to coal and metalliferous deposits. In the practical associated with this course, the students will be introduced to application of industry standard software for mine planning and design. Students will develop knowledge on estimation and valuation of mineral deposits and also, they will be able to possess about project appraisal and finance.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	General: Mine planning and its importance; Components of mine planning, technical and economic information for planning, exploratory drills and interpretation of bore hole data	1	The students will understand the importance of mine planning and its components.
2.	<u>Planning and Design of Surface Mine</u> Concepts of Stripping Ratios – Types of stripping ratios and their significance. Geometrical Considerations for Design of Surface Mines: Pit geometry, Pit layouts – Mine access, pit expansion and push back operation. Pit Planning and Design: Pit design and reserve estimation, Development of economic block model, cut-off grade and its estimation; Ultimate pit configuration and its determination – hand method, floating cone technique, Lerchs-Grossmann algorithm, and computer assisted hand method. Production Scheduling and Equipment System Selection – Production scheduling concepts, optimum mine size and Taylor's mine life rule, selection of equipment system and scheduling Design of Haul Roads- Geometrical, Structural, Functional and Safety features.	1 3 3 3 2	The students will understand the different concepts of surface mine planning
3.	<u>Underground Mine Planning</u> Stope Planning: Evaluate stope boundaries, selection of a stoping methods, application of computer in stope design, economics of each stope Production Planning: Stope reserve, development, manpower, ore/waste handling,	4 3	The students will understand the underground metal mine planning concepts, stope planning and production planning.

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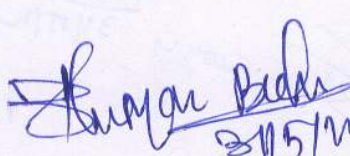
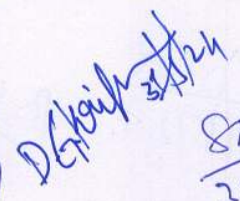
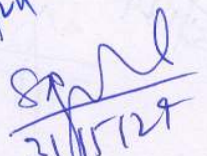
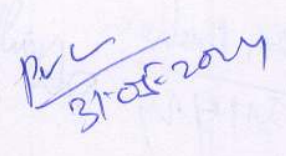

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Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
	equipment, essential services, production scheduling, time and work study for improvement of production, Optimization of mine size (mine production capacity) based on techno-economic considerations; Underground Coal Mine Planning: Sizing of mine; Optimization of mine size (mine production capacity) based on techno-economic considerations; Equipment and face scheduling against targeted production using suitable software.	4	The students will understand the underground coal mine planning concepts, size of mine and production planning.
4.	Mine Closure Planning: Initial, Progressive and Final Mine Closure Planning and its Components; Auditing; Legal and Financial Aspects.	2	The students will understand the mine closure planning
5.	Clearances and Approvals for Mining Projects for Mine Plan – FC, EC, LA and others	2	The students will know the various clearances required in mining project
6.	Mine Economics Introduction: Economic importance of the mineral industry; mining economy, risky nature of the mining industry, Demand and Supply, Elasticity of Demand, national mineral policy. Mineral Price and Pricing: International monetary system, Factors affecting mineral price, kinds of price quotation, Mineral price index, Mineral prices. Evaluation of Mineral Deposits: Mineral resource concept, classification and estimation of ore reserves, applications of Geostatistics and different Kriging methods. Mine Sampling: Mine sampling: Definition, purpose and scope, methods: groove/channel sampling; Chip sampling; grab sampling; Bulk sampling; Application of statistical methods in sampling Conservation of mineral resources and Loss of mineral in mining: Means of conservation and limitations in the scope of Conservation. Classification and incorporation of losses; coefficient of completeness of mineral extraction; dilution and recovery. Cost of mining: Capital and operating costs; Factors affecting operating cost; Methods of estimating future costs; standard cost and forecast. Mine valuation: Basic concept, Earlier	1 1 3 2 1 1 3 2	Students will understand economic analysis required for mining project. This unit will help students to understand the concepts of Mineral price and different types of price quotation. Students will understand the basic concepts of mineral resources. They will be able to calculate variograms and also able to formulate and solve kriging equations. Students will be able to understand the different sampling methods Students will be able to understand the conservation of mineral resources and loss of mineral in mining. This unit will help students to understand the concepts of different costs related to mining Students will understand the time

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	<p>approaches to mine valuation, recent approaches to valuation; Time value of money, Price information – revenue estimates, annuity, Accounting profits and cash flows.</p> <p>Investment Appraisal: Elements of investment appraisal, Static methods of investment appraisal, Dynamic methods of appraisal, discounted cash flow analysis</p>		<p>value of money, rate of interest, and annuity. They will be able to apply the techniques and methods of valuation</p> <p>Students will understand the identify the various types of investment function analysis and understand the elements of cost benefit analysis.</p>
	Total	42	

Text Books

1. Open Pit Mine Planning and Design by W. Hustrulid and M. Kuchta
2. Mineral Economics: Development and Management of Natural Resources by Oded Rudawsky
3. SME Mining Engineering Hand Book by H.L. Hartman

Reference Books

1. Surface and underground excavations by R. R. Tatiya
2. Deshmukh, R.T., Mineral and Mine Economics, Mira Publications, Nagpur, 1986.
3. The Economics of Mining by T. J. Hoover
4. Mineral Deposit Evaluation: A Practical Approach by Alwyn E. Annels

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