

**Shri Rawatpura Sarkar University,
Raipur**



**Examination Scheme & Syllabus
for
Diploma in Mining Engineering
Semester-VI**

(Effective from the session: 2019-20)



**Faculty of Engineering,
Shri Rawatpura Sarkar University, Raipur**

**Diploma in Mining Engineering
Semester-VI**

**Examination Scheme
(Effective from the session: 2019-20)**

S.N	Course Code	Th /Pr	Subject	Type of Course	Teaching hours per week			TC	Examination Scheme				Total Marks
					L	T	P		Theory		Practical		
									EX	IN	EX	IN	
1	DENMN601	Th	Mine Economics and Beneficiation	Core	3	1	-	4	70	30	-	-	100
2	DENMN602	Th	Opencast Mining and Land Reclamation	Core	3	1	-	4	70	30	-	-	100
3	DENMN603	Th	Mine Management Legislation and General Safety	Core	3	1	-	4	70	30	-	-	100
4	DENMN604	Th	Mine Machinery-II	Core	3	1	-	4	70	30	-	-	100
5	DENMN605	Th	Entrepreneurship Development	Core	3	1	-	4	70	30	-	-	100
6	DENMN602P	Pr	Opencast Mining and Land Reclamation Lab	Core	-	-	4	2			35	15	50
7	DENMN604P	Pr	Mine Machinery-II Lab	Core	-	-	4	2	-	-	35	15	50
8	DENMN606P	Pr	Project	Core	-	-	4	2	-	-	35	15	50
9	DENMN607P	Pr	Industrial Training/Vocational Training	Core	-	-	-	2	-	-	35	15	50
Total Contact hr per week: 32				Total Credit: 28				Grand Total Marks:				700	



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Course Title	MINE ECONOMICS AND BENEFICIATION				
Course Code	DENMN601				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Mine Development				
Course objectives	<ul style="list-style-type: none"> • To choose proper method of sampling for different ore bodies and mineral heaps. • To estimate grade and reserves. • To choose proper method of mine valuation for valuation of any mine. • To determine the NPV of any mine. • To perform various financial management aspects related with the mine. 				
Course Contents	<p>UNIT I GENERAL ECONOMICS</p> <p>Economics terms- a) Wealth, b) Value: (i) value in use and. (ii) value in exchange, c) Goods, d) Price, e) Income, f) Investment, g) Saving,</p> <p>Consumption and its importance - a) Consumption-satisfaction-needs, b) Types of consumption, c) Importance of Consumption,</p> <p>Wants- Wants and Economic activities, Classification of wants- a) Law of diminishing utility, b) Law of equi-marginal utility.</p> <p>Utility- Meaning measurement, Marginal and Total utility</p> <p>Demand- Definition, Demand schedule and demand curve- a) Law of Demand, b) Extension and contraction in demand, c) Increase and decrease in demand, d) Elasticity of demand.</p> <p>Supply- a) Supply of price, b) Supply schedule, c) Supply curve, d) Supply function, e) Law of supply, f) Elasticity of supply.</p> <p>Capital- Meaning, Definition- a) Characteristics of capital, b) Wealth and Capital, c) Capital and labour, d) Capital and lands, e) Importance and function of Capital.</p> <p>Money- a) Definition of money, b) Function of money, c) Classification of money.</p> <p>UNIT II MINE ECONOMICS</p> <p>Mineral industry - Its role in national economy: a) Indian mineral resources and their statistics, b) Mineral policies, c) Conservation of minerals including coal company.</p> <p>Constitution of companies under companies act: a) Types of companies, b) Private and public sector, Merits and Demerits, i) Govt. Undertakings, c) Nationalization</p>				



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	<p>of coal industry formation of CIL and its subsidiaries, d) Elementary introduction of the following companies: i)HCL, ii)CIL iii) BALCO, iv) MOIL, etc., e) Labor:</p> <p>i) Efficiency of labor, ii) Labor welfare, iii) Social security's, iv) Trade unions.</p> <p>UNIT III SAMPLING Sampling- Methods of sampling, errors in sampling, analysis of samples, estimation grade and reserves, salting and precautions against salting. Different types of reserves.</p> <p>UNIT IV MINE VALUATION Methods of valuation, Cases requiring valuation risk in calculation of mines, Calculation of life of a mine, Valuation reports, Mine as a wasting assets, Redemption of capital depreciation, Valuation of mineral property and preparation of report.</p> <p>UNIT V INVESTMENT DECISIONS Discounted cash flow methods, Non-discounted cash flow methods, Advantages and Disadvantages of them, Internal rate of return, Net Present Value, Book Keeping, Preparation of Balance sheet, Profit and Loss Account.</p>
<p>Course Outcome</p>	<p>At the end of the course student will be able to:-</p> <ol style="list-style-type: none"> 1. Apply knowledge of mine economics for understanding, formulating and solving problems related with the mine economics. 2. Identify analyze and solve financial management problems. 3. Acquire knowledge and hands-on competence in applying the concepts of management in the development of mine economics
<p>Text Books</p>	<ol style="list-style-type: none"> 1. Industrial economics by V.C.Sinha and Pushpa Sinha 2. Mineral Economics by Sinha and Sharma
<p>Reference Books</p>	<ol style="list-style-type: none"> 1. Mineral Economics by R.T. Deshmukh 2. SME Handbook Vol. I



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Course Title	OPENCAST MINING AND LAND RECLAMATION				
Course Code	DENMN602				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Winning and working coal				
Course objectives	<ul style="list-style-type: none"> • To choose proper surface mining methods to different mineral deposits depending on their geo mining conditions. • To design and analyze basic elements of surface mine. • To learn various methods of surface mining. • To choose various methods of transportation in any opencast mine. • To learn the construction & working of various machineries used in open cast mine. 				
Course Contents	<p>UNIT-I OPEN CAST MINING Classification of O.C. mine, Manual, Semi mechanized & Mechanized, Scope and limitation of O/C mines, Advantages and disadvantage of O/C mining, Factors deciding the O/C mining, Machineries used in O/C mines.</p> <p>UNIT-II OPENING OF O/C MINE Box cut and Access trenches, Layout and design – Bench, Dimensions, Height and Width, Overall pit slope stability, General layout of O/C mine, Drainage in pit and slope, Suitability & limitations of O/C Machineries.</p> <p>UNIT-III REMOVAL OF STRATA By scrapers, Dozers, Graders, Draglines for soft strata. shovels and haul packs surface miners and bucket wheel excavators, By drilling and blasting for hard strata, primary & secondary blasting, Blast hole pattern, Burden, Spacing, Diameter and depth of blast holes, Drilling blast holes and drill machines, Blast hole geometry, Toe formation, Sub grade drilling, Creator theory, Different types of explosive used in O/C mines liquid oxygen, ANFO, OCG, Slurries, Side mixed slurry (SMS), Emulsion explosive, Deck charging & column loading, Calculation of powder factor/ charge factor, Calculation of charge /hole, Control blasting technique, Special blasting technique- Detonators, Blasting fuses, Detonating fuses, Electric detonators, Nonel & Raydets detonators, Secondary blasting – Pop shooting and plaster shooting, Snake holing, Ground vibration measurement, Its limitations.</p>				



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	<p>UNIT-IV LOADING & TRANSPORTATION MACHINARIES</p> <p>Different machines used for loading- Shovels, Dragline, Multi bucket excavators, front end loader, pay loader and cranes- their application, Scope & Capacity, Time study and calculation of out-put with shovel, Dumper & Dragline.</p> <p>Different machines used for transportation - Rail transport, Trackless transport, Dumpers, Conveyors, Spreaders, Transport haul road, Gradient width and slope. Dumps-site, Slope and prevention of double handling.</p> <p>UNIT-V LAND RECLAMATION</p> <p>Physical restoration of mined out areas, Slope stabilization, Various methods for land reclamation, A forestation crop cultivation etc.</p>
<p>Course Outcome</p>	<p>At the end of the course student will be able to:-</p> <ol style="list-style-type: none"> 1. Apply knowledge of surface mining for understanding, formulating and solving problems related with the opencast mine. 2. Acquire knowledge and hands-on competence in applying the concepts in the design and development of opencast mine. 3. Work effectively with other engineering and science teams. 4. Work effectively as an individual and as a member of multidisciplinary team.
<p>Text Books</p>	<ol style="list-style-type: none"> 1. Surface Mining: G.B. Misra 2. Surface mining equipment: Martin 3. Surface Mining: Pfleider
<p>Reference Books</p>	<ol style="list-style-type: none"> 1. Mining: Boki 2. SME handbook: Hartman 3. Explosive & Blasting practice in mines: Sameer Das



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Course Title	MINE MANAGEMENT LEGISLATION AND GENERAL SAFETY				
Course Code	DENMN603				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Mine Legislation, Economics				
Course objectives	<ul style="list-style-type: none"> • To perform various financial management aspects related with the mine • To improve knowledge about accidents, cost analysis, Safety in Operation and Maintenance Operational activities and hazards • To know the various rules & regulations applicable in different conditions to the mine workers, managers and mine owner. • To know the responsibility and duties of the various employee of the mine and owner of the mine accidents. 				
Course Contents	<p>UNIT-I MINE MANAGEMENT General principles of scientific management, Managerial function of the following in brief- a) Planning. b) Organizing c) Staffing d) Direction and control. e) Motivation, Work study in brief- a) Motion study b) Time study</p> <p>UNIT-II SAFETY Accidents, Classification, Causes of major mining accidents those have occurred in India, Remedial measures and Provisions in regulation, Cost of accident, Report writing.</p> <p>UNIT -III LEGISLATION Principal Provisions of Mines & Minerals (Regulation & Development) Act , Coal Mines Conservation & Development Rule, Mineral Concession Rules, Indian Electricity Rules related to mining activity.</p> <p>UNIT - IV EVOLUTION OF MANAGEMENT Theory - Principle of Scientific management, Elements of management functions, Planning, Organizing and Control, Levels of Management. Structure and design of organization for mining enterprises.</p> <p>UNIT-V TOTAL QUALITY AND MANAGEMENT Concepts of Quality and its use in mine production, Scheduling and control, Queuing theory, short and long term planning, Quality control.</p>				



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Course Outcome	At the end of the course student will be able to:- <ol style="list-style-type: none">1. Learn about all safety knowledge use in mining work.2. Apply knowledge of legislation in mines for the implementation of rules and regulations during their job.3. Identify analyze and solve management problems.4. Acquire knowledge and hands-on competence in applying the concepts of management in the development of mine5. Work effectively with other engineering and science teams for suggesting any measures against any mine.
Text Books	<ol style="list-style-type: none">1. Mine Management: V. N. Singh , Print Press Dhanbad2. Indian dispute Act.3. Mine Management, Legislation and Ground safety by S. Ghatak
Reference Books	<ol style="list-style-type: none">1. Legislation in Indian Mines (A critical Appraisal) Vol. II & I By- S. D. Prasad & Prof. Rakesh2. Management & Administration: S.K.Gupta



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Course Title	MINE MACHINERY-II				
Course Code	DENMN604				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Mine Machinery-I				
Course objectives	<ul style="list-style-type: none"> • To choose proper transportation system for mines depending on the geo-mining conditions of the mineral deposit. • To calculate and analyze basic element of haulage system and winding system. • To learn the construction and working of various haulage system and winding system. 				
Course Contents	<p>UNIT I HAULAGE</p> <p>Different systems of rope haulage, rope haulage calculations, Rope cattles and changing the Ropes, safety devices, tubs, haulage road and manholes, Locomotive haulage and Calculations based on it, track laying, mine cars.</p> <p>UNIT II PUMPING</p> <p>Sources of mine water, Types of pumps, Design calculations, Characteristics, operation, and maintenance and selection, Pump fittings, Special types of pumps used in mines.</p> <p>UNIT III COMPRESSED AIR MACHINES</p> <p>Compressed air power, Comparison, and Compressors, Different kind of compression and compressors, Calculation of work done and H.P. for given pressure and quantity of free air, Efficiency of compressors, Advantage and limitation of compressed air power over electrical power, Compressed air machines used in mines drills: Air leg, Pneumatic picks etc.</p> <p>UNIT IV INTRODUCTION TO COAL PROCESSING/BENEFICIATION MACHINERY</p> <p>Why beneficiation, Methods of beneficiation, Quality control, Material handling while beneficiation, Crushing, Screening, Stacking, Washing, Tailings dam, Disposal of tailings, Coal washery & washing of coal etc.</p> <p>UNIT V LOADER AND TRANSPORTING MACHINE</p> <p>Rocker shovel, gathering arms loaders, LHD and SDL machines- their construction and operation and maintenance, Cavo loader, Shuttle car and Underground trucks, Its construction, Operation and application, Different types of cutter loaders suitable for long wall and short wall faces, their constructions,</p>				



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	operation and maintenance, Different types of road headers their construction, operation and conditions of applicability, Mechanics of rock cutting, Rock cutting tools and Their performance.
Course Outcome	At the end of the course student will be able to:- <ol style="list-style-type: none">1. Apply knowledge of mine machinery for understanding, formulating and solving transportation problems in mine.2. Acquire knowledge and hands-on competence in applying the concepts in the design and development of transportation systems.3. Work effectively with other engineering and science teams.4. Work effectively as an individual and as a member of a multidisciplinary team.
Text Books	<ol style="list-style-type: none">1. UMS Booklet2. Modern Coal Mining Practices : R. D. Singh3. Longwall Mining : Syd. S. Chaining & Peng
Reference Books	<ol style="list-style-type: none">1. Wining & working coal – R.T. Deshmukh2. U/G winning of Coal – T.N. Singh



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Course Title	ENTREPRENEURSHIP DEVELOPMENT				
Course Code	DENMN605				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Mine economics, Mine Management				
Course objectives	<ul style="list-style-type: none"> • Discuss the self-employment/entrepreneurship as career option. • For creation of gainful employment of masses through entrepreneurship. • Focuses on inputs required for students to undertake entrepreneurial activities as career option. 				
Course Contents	<p>UNIT I ENTREPRENEURIAL DEVELOPMENT Definition of entrepreneurship, Characteristics of entrepreneurs, Factors influencing entrepreneurship, Need for promotion of entrepreneurship and small business Entrepreneurial Environment, Environmental analysis, Government policies for setting up new small enterprises, Opportunities in service industries.</p> <p>UNIT II FORMS OF BUSINESS ORGANIZATION Forms of ownership, Sole Proprietorship, Partnership, Cooperative society, Joint-stock company, Private Limited Companies, Public Limited Companies.</p> <p>UNIT III INSTITUTIONAL SUPPORT & PLANNING TO SSI Institutional support to SSI- Institutional set up, Industries centers, Industrial estates, Institutional support at National level, Institutional support at State level, Commercial banks and financial institutions.</p> <p>Planning a SSI- What is planning, Types of planning, Importance of planning, Steps in planning, Steps in planning a SSI, Technical dimensions for setting up an enterprise.</p> <p>UNIT IV MANAGEMENT OF SMALL BUSINESS FIRM Functional areas of small business firm, Fundamentals of Management, Managerial effectiveness, Essential data for effective control of small business, Resource management, Office management, Employees Welfare & safety, Factory rules and Labour laws related to SSIs, Sales Tax and Income Tax laws related to SSIs.</p> <p>UNIT V PROJECT SELECTION, FORMULATION & APPRAISAL</p>				



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	Project selection & formulation, Scope of project report, Content & Format of Project report, Need of Project Appraisal, Steps of Project Appraisal.
Course Outcome	At the end of the course student will be able to:- 1. Identify analyze and solve management problems. 2. Acquire knowledge and hands-on competence in applying the concepts of management in the development of mine entrepreneurship. 3. Use the techniques, skills and modern engineering tools necessary for mine development. 4. Work effectively as an individual and as a member of multidisciplinary team
Text Books	1. Entrepreneurship : Strategies & Resources Abrams Grant Pass, Oregon: Oasis Press. 2. Harward Business Review on Entrepreneurship Harvard Business School Press 3. The Business Planning Guide David H. Bangs Upstart Publishing Company, In Chicag
Reference Books	1. Critical Appraisal : Rakesh & Prasad 2. Entrepreneurship development in India Dr. C.B. Gupta Dr. N.P. Srinivasan



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Course Title	OPEN CAST MINING AND LAND RECLAMATION LAB				
Course Code	DENMN602P				
Course Credits	L	T	P	TC	
	-	-	4	2	
Prerequisites	Winning and working coal				
Course objectives	<ul style="list-style-type: none"> • To choose proper surface mining methods to different mineral deposits depending on their geo mining conditions. • To design and analyze basic elements of surface mine. • To learn various methods of surface mining. • To choose various methods of transportation in any opencast mine. • To learn the construction & working of various machineries used in open cast mine. 				
Course Contents	<p>LIST OF EXPERIMENTS</p> <ol style="list-style-type: none"> 1. To study and discuss the advantages and disadvantages of open cast mining. 2. To study and describe the factors deciding the open cast mining. 3. To list the machineries used in open cast mining. 4. To study and design different types of mine entries in open cast mines. 5. To study and design layout of open cast mines for <ol style="list-style-type: none"> i. Manual Mines ii. Mechanized Mines for the given production. 6. To study and describe different combinations of loading and transpiration machines 7. To study and calculate the output with given numbers of shovel, dumpers and draglines. 8. To study and describe methods of land reclamation. 9. To Study of Constructional features of Multi bucket Excavators and the machine operation. 10. To Study of Constructional features of Electric Rope Shovel and the machine Operation. 				



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Course Title	MINE MACHINERY-II LAB				
Course Code	DENMN604P				
Course Credits	L	T	P	TC	
	-	-	4	2	
Prerequisites	Mine machinery-II				
Course objectives	<ul style="list-style-type: none"> • To choose proper transportation system for mines depending on the geo-mining conditions of the mineral deposit. • To calculate and analyze basic element of haulage system and winding system. • To learn the construction and working of various haulage system and winding system. 				
Course Contents	<p>LIST OF EXPERIMENTS</p> <ol style="list-style-type: none"> 1. Study of Various Koepe Arrangements 2. Study of various types of skips. 3. Study of pit top and pit bottom arrangements for a Skip. 4. Study of hydraulic Couplings and Torque Converters. 5. Study of construction and working of coal cutting Machine. 6. Study of construction and working of SDL. 7. Study of construction and working of LHD. 8. Study of construction and working of Drill jumbo. 9. Study of different types of valve. 10. Study of different types of cutter loaders. 				



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Course Title	PROJECT				
Course Code	DENMN606P				
Course Credits	L	T	P	TC	
	-	-	4	2	
Prerequisites	Project				
Course objectives	<ul style="list-style-type: none"> • Identify different works to be carried out in the project. • Collect data relevant to the project. • Arrive at efficient method from the available choices based on preliminary investigation. • Design the required elements of the project as per standard practices. • Prepare working drawing for the project. • Prepare schedule of time and sequence of operations. • Prepare charts or models for each project. • Prepare project report. 				
Course Contents	<p>The students should follow the following procedures:-</p> <ol style="list-style-type: none"> 1. Identification of the Project. 2. Collection of data. 3. Organisation of the data. 4. Design of Project elements. 5. Preparation of drawings. 6. Schedules and sequence of operations. 7. Preparation of charts and models. 8. Preparation of report. <p>Students shall be divided into several groups and each group shall be assigned a problem that calls for application of the knowledge. Project work will be allotted by the concerned Head of Section and assign a staff member as guide at the beginning of VI semester. The students are exposed to the U/G workings or Industries for collecting information or relevant data from respective areas during the entire VI semester, to collect information after the institutional working hours or during holidays – second Saturdays / Sundays/ Winter/ holidays and prepares project report under the supervision of guide. Project report will be assessed at the end of VI Semester for final examination. Project may be selected from among the following suggested topics –</p> <p>Underground mining(coal):</p> <ol style="list-style-type: none"> i. Bord and pillar mining method ii. Longwall mining method. iii. Blasting gallery method. iv. Stopping methods for non-coal mining v. Mechanised stopping methods for non-coal mining 				



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	<p>Opencast mining:</p> <ul style="list-style-type: none">i. Pillars extracting by open cast method(coal)ii. Mechanised opencast mining.iii. In Pit crushing technologyiv. Surface mining technologyv. Blasting technology
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Course Title	INDUSTRIAL TRAINING/VOCATIONAL TRAINING				
Course Code	DENMN607P				
Course Credits	L	T	P	TC	
	-	-	-	2	
Prerequisites	Industrial Training/ Mine Visiting				
Course objectives	<ul style="list-style-type: none"> • Industrial Training is one of the most essential components for a diploma graduate in Mining. • The sole purpose of industrial training is to expose the students to “real life” situations. Different aspect of mining such as geology, exploration, selection of method of working. • Students will cover different coal and metal mines both underground and opencast in such a way that at the end of the completion of diploma programme, they are conversant with different mining conditions. • Industrial training also opens avenues of new learning to the students and apply them during their project and industrial training presentations. 				
Course Contents	<p>The students should follow the following procedures:-</p> <ol style="list-style-type: none"> 1. Before going for training, the students will prepare various formats for data collection based on the topic of training assigned to them. 2. The students will be given specific assignments for the period of training. 3. During the course of training students will complete weekly report, assignments and keep weekly attendance updated. 4. On completion of training each student will submit a report of training and make a presentation before the group of students. Teacher assessment will be done during the training, on presentation of training and at the end of semester examination. 5. A seminar will be organized on specific topics identified by the teacher and the students will present their experiences earned during the training on the specific tasks. 6. Prepare the one training project file. 				