Shri Rawatpura Sarkar University, Raipur

Examination Scheme & Syllabus

for

Diploma in Mining Engineering

Semester-V

(Effective from the session: 2019-20)

Faculty of Engineering,
Shri Rawatpura Sarkar University, Raipur

Diploma in Mining Engineering

Semester-V

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	DENMN501	Th	Mine Machinery-I	Core	3	1	-	4	70	30	-	-	100
2	DENMN502	Th	Advance Mining Geology	Core	3	1	-	4	70	30	-	-	100
3	DENMN503	Th	Mine Fires, Explosion, Inundation, Rescue and Recovery	Core	3	1	-	4	70	30	-	-	100
4	DENMN504	Th	Winning and Working Metal	Core	3	1	-	4	70	30	-	-	100
5	DENMN505	Th	Mine Surveying-II	Core	3	1	-	4	70	30	-	-	100
6	DENMN501P	Pr	Mine Machinery-I Lab	Core	-	-	4	2			35	15	50
7	DENMN502P	Pr	Advance Mining Geology Lab	Core	-	-	4	2	-	-	35	15	50
8	DENMN505P	Pr	Mine Surveying-II Lab	Core	-	-	4	2	-	-	35	15	50
9	DENMN506P	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 MACHINERY-I**				
Course Code	**DENMN501**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	Mine legislation				
Course objectives	• To choose proper transportation system for shaft, incline and roadways in under- • ground 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. • To learn the construction and working of various pumps.				
Course Contents	**UNIT I** **WIRE ROPES** Types of wire ropes- winding, haulage and guide ropes, Constructional details of wire ropes; rope laying, Testing of wire ropes: calculation of size of ropes: factor of safety: rope troubles, capping and recapping of ropes, splicing of haulage ropes: factor of safety, Care and maintenance of wire ropes in use and its storage. **UNIT II** **WINDING** Different type of winders, **Head gear:** head gear sheave, different type of rope capples, suspension gear, rope capples, safety hooks, Breaks-post brake, cage and its fitting kep gears, rigid & flexible rope guides: suspension of rope guides, Over wind & over speed prevention, Factors governing height of the head-gear: dead load: live load and wind pressure. **UNIT III** **COAL FACE MECHANISATION** Face mechanisation (B & P) classification, Electric coal drill, Loaders-Powers loaders, operation and use, L.H.D. and S.D.L, operation and uses, Longwall face mechanisation, stage loads, AFC, Crush. **UNIT IV** **ARIAL ROPEWAYS** Different types, their constructions & installation, operation & maintenance, design calculation, their layout including rope-tensioning arrangements. **UNIT V** **CONVEYORS** Different types of belt conveyors, their construction, installation, maintenance & design calculations, Shaker conveyor, scraper chain conveyor and armored chain conveyor, their installation & construction maintenance, Safety Devices; Pit top and pit bottom arrangements.				

Board of Studies

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Course Outcome	**At the end of the course student will be able to:-** 1. Apply knowledge of mine machinery for understanding, formulating and solving transportation problems in underground 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.
Text Books	1. Elements of Mining Tech. Vol I &Vol III by D. J. Deshmukh 2. Mining Machinery by S. C. Walker
Reference Books	1. Mining Digest: CMPDI Pub. 2. Mining Transport: Karelin 3. Elements of Mining Tech. Vol I &Vol III by D. J. Deshmukh

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Course Title	**ADVANCE MINING GEOLOGY**				
Course Code	**DENMN502**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	Applied geology				
Course objectives	• Mining Engineering is the application of the knowledge of science and other branches of engineering for the extraction of minerals and ores from the surface of the earth or from the underground. • Geology becomes the first step of mining education. • It is essential to know and identify mineral and ore, their modes of occurrences in the earth crust and the formation and deposition of various rocks.				
Course Contents	**UNIT-I** **STRATIGRAPHY** Geological Time scale, Principles of stratigraphy, Principle of correlation, Stratigraphic classification of Indian rock formations, Physiographic division India, peninsular India, Indo-gangetic plan and extra peninsular India,**Archaean system** – A brief account of the Dharwar system, Sausor group, Iron-ore group, Archaean rocks of Rajasthan, economic minerals of Archaean rocks, **Cuddapah system –**Cuddapah rocks of cuddapah basin Andhra pradesh, Delhi system, economic minerals of cuddapah rocks,**Vindhyan system** - A brief account of the vindhyan rocks of North India, economic minerals of vindhyan rocks,**Gondwana system** - A brief account of the gondwana rocks of India, economic minerals of gondwana rocks, **Deccan traps** - A brief account of the deccan traps of India, economic importance of deccan traps,**Fossils –** Definition, mode of occurrence, use of fossils. **UNIT-II** **INDIAN GEOLOGY** Major Geomorphic Divisions of India; General Review of Indian Stratigraphy; Descriptions of important Indian Geological formations–Archeans ,Cuddapahs, Vindhyans , Gondwanas and teriaries **UNIT-III** **ECONOMIC GEOLOGY-I** Introduction and Scope of the subject; Fundamental Terms and Their Definitions; Distribution and Morphology of Minerals Deposits; Brief Review of the Processes of Mineral Formation and the Genetic classification of mineral deposits.				

	UNIT-IV **ECONOMIC GEOLOGY-II** Mode Of Occurrence, Origin, Distribution, Association and Industrial Uses of Important Metallic(Au, Al, Cu, Fe, Mn, Sn, Pb And Zn) and Non Metallic (Diamond, Mica, Radioactive Minerals, Gypsum, Dolomites. Fire-Clay, Magnesite, Talc, Asbestos, Graphite, Kyanite, Sillimanite, Corundum, Fluorite, Phosphorite, precious and semi-precious stones, minerals, petroleum deposits of India. **UNIT-V** **PROSPECTING AND EXPLORATION** Prospecting and Exploration -Their Definitions and Classification of Methods; Elementary Methods Of Geological, Geophysical, Geochemical Prospecting; Guides To Ores- Ringed Targets, Intersection Loci, Physiographical, Mineralogical, Strati graphical and Structural Guides To Ores
Course Outcome	**At the end of the course student will be able to:-** 1. Enhance the technical knowledge on stratigraphy of India and important geological formation of India. 2. Identify, formulate and solve the problems of economic minerals 3. Use the techniques, skills, and modern engineering tools necessary for geophysical and geochemical prospecting. 4. Work effectively as an individual and as a member of a multidisciplinary team.
Text Books	1. Fundamentals of Historical Geology and Stratigraphy of India:Ravindra 2. Geology of India and Burma:M.S. Krishnan 3. Economic Mineral Deposits:M.L. Jensen&A.Batman 4. India's Mineral Resources :S. Krishnaswamy
Reference Books	1. Geophysical Prospecting:MDorbin& B. Miller 2. Courses in Mining Geology:Arogya swamy 3. Applied Geology: S. Banger

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Course Title	**MINE FIRES, EXPLOSION, INUNDATION, RESCUE AND RECOVERY**				
Course Code	**DENMN503**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	Mine environment				
Course objectives	• To control hazards associated with mines. student arerequired to be more acquainted with the major problems associated for mine worker in connection with comfortable working conditions and various sources of problem creating agents. • To deals with common causes of accidents arising due to noxious and inflammable gases; dust and water; apart from this the knowledge of rescue and recovery of mine workers • To overcome with the problem knowledgeof the hazards and their prevention will be imparted through the teaching and appreciation.				
Course Contents	**UNIT–I** **MINE FIRES** Factors responsible for mine fire,Causesof mine fire, Accidental fire, spontaneous heating; factors responsible for spontaneous heating, Incubation period, crossing point, ignition point, Precaution against spontaneous heating, Preventive measures against mine fires, Fire stoppings-purpose, constructional details, Opening of a sealed of area. **UNIT-II** **GAS EXPLOSION** Types of gas explosion, Causes of fire damp explosion, Upper and lower limit of fire damp explosion, coward's diagram, Precaution against fire damp explosion, Study of some important gas explosion in Indian coal mines. **CHAPTER –III** **DUST EXPLOSION** Upper and lower limit of inflammability of dust, Index of inflammability, Causesof formation of dust and causes of coal dust explosion, Study of some important dust explosion cases in Indian coal mines, Precaution & preventive measures against dust explosion, Stone dust quality of stone dust; stone dusting; stone dust barriers, Water barriers, handling of stone dust, Use of chemicals and chemical foams against coal dust hazards, health hazards due to coal dust, Measurement of coal dust concentration in general body of air.				

	CHAPTER- IV **INNUNDATION** Sources of dangerous accumulation of water in mines, Factors responsible for innundation in mines, Precautions and preventive measures for innundation., Precaution for approaching water logged areas and working below water logged area, Dams – Purpose, site of dam, types of dam and their constructional details, Study of some important innundation cases inIndian mines, Additional precaution in rainy season in the mines located near by the rivers. **UNIT–V** **MINE RESCUE AND RECOVERY WORK** Rescue apparatus,selfbreathing apparatus, reviving apparatus, Drager BG–4 self contained breathing apparatus, Maxaman- reviving apparatus,selfcontained, selfrescuer – Fenzybiocell, Oxybocks, RZ-25, Universal tester for testing of drager BG-174 and BG-4, QuesterII and Quester-III, Computerized testing machines, Drager power pump, Rescue stations – equipment's used in rescue station, rescue organization and working, training of officials, Method of rescue and recovery work, Emergency organisation and rescue plan, Recovery of mines after explosion, fire and inundation, Sealing of fire area (u/g fire)
Course Outcome	**At the end of the course student will be able to:-** 1. Apply knowledge of legislation in mines for the implementation of rules and regulations during their job. 2. Work effectively with other engineering and science teams for suggesting any measures against any mine.
Text Books	1. Elements of Mining Tech. Vol.1 by D. J. Deshmukh 2. Elements of Mining Tech. Vol.2 by D. J. Deshmukh 3. Mine Environment by G.B. Mishra
Reference Books	1. Wining & working coal – R.T. Deshmukh 2. U/G winning of Coal – T.N. Sing

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Course Title	**WINING AND WORKING METAL**				
Course Code	**DENMN504**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	Elements of mining technology				
Course objectives	• To choose proper extraction methods to different mineral deposits depending on their geo-mining conditions. • To learn how to develop a metal mine. • To choose proper support system for the metal mines. • To learn the various metal mining methods.				
Course Contents	**UNIT I** **IRREGULAR DEPOSITS** (Metalliferous ores) Nature of oredeposits, Mode of ore deposits, Lode, vein etc. **UNIT II** **MODE OF ENTRY** Shaft-shape and size, Circular, rectangular or elliptical, Incline, Inclined shaft, Shaft filling **UNIT III** **PREPARATORY WORK** Formation of stations, Cross cuts, ore bines, Greizzliesetc, Level and raise winz connections, ore blocks, Transportation of Broken ore from stope to surface, Primary crushing underground **UNIT IV** **STOPING** Various methods of stoping, Their suitebilities, Conditions of applicability and methodsof stoping, Open stopes, Under hand, over hand and breast stoping,**Supported stopes** – 1. Cut and fill stoping, 2. Shrinkage stoping, 3. Square set stoping, 4. Sub level stoping 5. Glory holes,**Caving methods ofstoping**- a. Sub level caving, b. Block caving,c.Top slicing **UNIT V** **STUDY OF IMPORTANT METALLEFEROUS U/G MINES** Kolar gold mines- problems of deep mining, Manganese ore mine- Bherveli (Balaghat), Mosabani copper mines,Khetri copper mines.				

Course Outcome	**At the end of the course student will be able to:-** 1. Apply knowledge of metal mining for understanding metal mining problems. 2. Acquire knowledge and hands-on competence in applying the concepts in the design and development of metal mine. 3. Apply knowledge of metal mining for designing a metalmines. 4. Work effectively as an individual and as a member of a multidisciplinary team.
Text Books	1. Principle and practices of modem Coal Mining – R.D. Singh 2. Coal Mining in India – S.P. Mathur 3. Elements of Mining Tech. Vol II by D. J. Deshmukh
Reference Books	1. Wining & working coal – R.T. Deshmukh 2. S M E Handbook

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Course Title	**MINE SURVEYING-II**				
Course Code	**DENMN505**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	Mine surveying-I				
Course objectives	• To choose proper method of surveying for any surveying assignment. • To set out simple curve on surface and in underground. • To determine the distance and elevation of any point on the surface & in underground. • To find out magnitude of error in various surveying.				
Course Contents	**UNIT I** **TACHEOMETRY** Principles of Stadia Methods; Determination of constants; Theory of anallactic lens; Distance and elevation formulae Subtense and Tangential Methods; Reduction of stadia Notes; Beaman stadia bar;Auto-reduction Tacheometer. **UNIT II** **SETTING OUT** Setting out simple curves on surface and in underground; Elementary knowledge of compound and transition curves; joint boundary survey; Equalization of boundaries; Maintenance of direction and gradient of roadways i.e. marking and checking of center line and grade line, transfer of point from roof to floor and floor to roof. **UNIT III** **PLANS & SECTIONS** General requirements of mine plans; types of plans; Symbols used in mine plans; preparation of plans & sections; Plotting of traverse; Checking accuracy of old mine plans; Planimeter and its uses; Enlargement & reduction of plans. Mines Regulations concerning above topics. **UNIT IV** **TRIANGULATION & CORRELATION SURVEY** Principles forming network of triangles; Selection of sites of triangulation stations; Base andCheck base lines; Measurement and adjustment of angles by simple methods; Calculationof Co-ordinates. Methods of correlation of surface and				

	underground surveys through adits, inclines, andshafts; Use of magnetic needle and Gyro theodolites; Different methods of Stope surveyin land open pit surveying; **UNIT V** **ASTRONOMICAL SURVEY, PHOTOGRAPHIC SURVEYING & MODERN SURVEYING TECHNIQUES** Definitions of important terms; Determination of azimuth by astronomical observations. General Principles; Phototheodolite; Stereo photographic Surveying; Aerial Surveying -Field of application; Vertical and oblique photographs; Aerial photography; Preparation ofphotographical maps by simple methods; EDM equipment; Geodimeter, Tellurometer, Total Station,Distomat, Softwares.
Course Outcome	**At the end of the course student will be able to:-** 1. Apply knowledge of surveying for understanding, formulating and solving surveying problems. 2. Identify, formulate, and solve engineering problems in setting out. 3. Use the techniques, skills and modern engineering tools necessary for minesurveying. 4. Identify, analyze and solve surveying problems. 5. Work effectively as an individual and as a member of multidisciplinary team
Text Books	1. Surveying Vol. I by B.C. Punmia& Ashok Jain 2. Suverying Vol. II by B.C.Punmia& Ashok Jain 3. Surveying Vol. I by S.K.Duggal 4. Surveying Vol II by S.K.Duggal 5. Mine Surveying Vol I by Ghatak 6. Mine Surveying Vol II by Ghatak
Reference Books	1. Metalliferous Mine Surveying : Frederick Winniberg 2. Surveying and levelling :Kanetkar and Deshpande

Course Title	**MINE MACHINERY-I LAB**				
Course Code	**DENMN501P**				
Course Credits	**L**	**T**	**P**	**TC**	
	-	**-**	**4**	**2**	
Prerequisites	Mine machinery-I				
Course objectives	• To choose proper transportation system for shaft, incline and roadways in under-ground 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. • To learn the construction and working of various pumps.				
Course Contents	**LIST OF EXPERIMENTS** 1. Study of different types of Rope cable. 2. Study of Clifton pulley. 3. Study of various safety devices on rope haulages. 4. Study of Exhaust conditioner on a diesel locomotive. 5. Study of cage suspension gear. 6. Study of Detaching safety hook. 7. Study of Lilly controller. 8. Study of Turbine Pump. 9. Study of Mono-cable aerial Ropeway & Bi-cable aerial Ropeway 10. Study of Loop take-up and tensioning arrangement of a belt conveyor. 11. Study of pit top and pit bottom arrangements for a belt conveyor. 12. Study of an Armoured face Conveyor				

Course Title	**APPLIED GEOLOGY LAB**				
Course Code	**DENMN502P**				
Course Credits	**L**	**T**	**P**	**TC**	
	-	**-**	**4**	**2**	
Prerequisites	Applied Geology				
Course objectives	• Explain physical properties of the mineral. • Brief discussion of geological Maps. • Describe the various geomorphological and structural models. • Discuss and draw the sketch of folds, faults, joints, geological maps.				
Course Contents	**LIST OF EXPERIMENTS** 1. Megascopic Description and Distribution of Ore Forming Minerals and Industrial Minerals. 2. Study of Plant Fossils. 3. Study of Advance Geological Maps and Preparation of Cross Sections. 4. Sketching and describing the various geomorphological and structural models. 5. Constructing the geological cross section from geological maps i) Maps showing unconformity ii) Maps showing Folds iii) Maps showing Faults iv) Maps showing Igneous intrusions 6. At least three exercises on maps of completion of outcrops. 7. Study of common ore minerals in hand specimen – Al, Fe, Cr, Mg, Mn, Zn, Pb, Sn, Sb, Cu, and Arsenic				

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<table>
<tr><td>Course Title</td><td colspan="5">MINE SURVEYING-II LAB</td></tr>
<tr><td>Course Code</td><td colspan="5">DENMN505P</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>-</td><td>-</td><td>4</td><td>2</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">Mine surveying-II</td></tr>
<tr><td>Course objectives</td><td colspan="5">• To choose proper method of surveying for any surveying assignment.
• To set out simple curve on surface and in underground.
• To determine the distance and elevation of any point on the surface & in underground.
• To find out magnitude of error in various surveying.</td></tr>
<tr><td>Course Contents</td><td colspan="5">LIST OF EXPERIMENT
1. Measurement of height of accessible and inaccessible point by trigonometric surveying.
2. Determination of stadia constant.
3. Distance and elevation determination by tachometric surveying.
4. Setting out of circular curve by chord and offset method.
5. Setting out of circular curve by Rankine’s method.
6. Study of planimeter.
7. Study of Pantagraph /Eidograph.
8. Baseline measurement
9. Baseline extension
10. To connect the baseline to main triangulation network
11. Reduction to centre
12. Angle adjustments in triangulation network
13. Plotting the survey by co-ordinate methods
14. Correlation survey by Weisbach triangle method
15. Study of EDM
16. Study of Total station</td></tr>
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Course Title	**INDUSTRIAL TRAINING/VOCATIONAL TRAINING**				
Course Code	**DENMN506P**				
Course Credits	**L**	**T**	**P**	**TC**	
	-	**-**	**-**	**2**	
Prerequisites	Industrial Training/ Mine Visiting				
Course objectives	• 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	**The students should follow the following procedures:-** 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.				