

Shri Rawatpura Sarkar University, Raipur



Examination Scheme & Syllabus for B. Tech in Mining Engineering Semester-VII

(Effective from the session: 2019-20)



Faculty of Engineering, Shri Rawatpura Sarkar University, Raipur

**B.Tech in Mining Engineering
Semester-VII**

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

S. No	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	BENMN701	Th	Mine Environment-II	Core	3	1	-	4	70	30	-	-	100
2	BENMN702	Th	Rock Mechanics	Core	3	1	-	4	70	30	-	-	100
3	BENMN703	Th	Mine Economics	Core	3	1	-	4	70	30	-	-	100
4	BENMN704	Th	Mine Planning	Core	3	1	-	4	70	30	-	-	100
5	BENMN705	Th	Professional Elective- I	Core	3	1	-	4	70	30	-	-	100
6	BENMN701P	Pr	Mine Environment-II Lab	Core	-	-	4	2	-	-	35	15	50
7	BENMN702P	Pr	Rock Mechanics Lab	Core	-	-	4	2	-	-	35	15	50
8	BENMN706P	Pr	Vocational & Industrial Training Evaluation & Presentation	Core	-	-	4	2	-	-	35	15	50
9	BENMN707P	Pr	Minor Project	Core	-	-	4	2	-	-	100	50	150
Total Contact hr per week: 40				Total Credit: 32				Grand Total Marks:				800	

Elective- I

Subject Code	Subject Name
BENMN705A	Coal & Non-Coal Mineral Processing
BENMN705B	Fire & Safety Engineering
BENMN705C	Mine power Systems
BENMN705D	Advance Mine Machinery



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Course Title	MINE ENVIRONMENT-II				
Course Code	BENMN701				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Mine Environment-I				
Course objectives	<p>This course will enable students to:</p> <ol style="list-style-type: none"> 1. Learn the sampling of dust and physiological effect of the dust to the miner. 2. Learn about the various miner occupational diseases and its preventive measures 3. Prepare the enquiry report of a mine accident. 4. Know the major accident occurred in Indian mines and their causes. 				
Course Contents	<p>UNIT I MINE FIRES Mine fires, fires in quarries and surface storage systems, control of fires and fires extinguishers, study of atmosphere behind sealed off areas, conditions and procedure of reopening a sealed off area, firefighting organization's.</p> <p>UNIT II SPONTANEOUS HEATING Causes, detection and preventive measures in underground and surface coal mines, stacks and dumps, control of spontaneous heating, fire stopping and sealing off an area.</p> <p>UNIT III EXPLOSION Fire damp and coal dust explosions, their causes and prevention, stone dust and waterbarriers, investigations after explosion.</p> <p>UNIT IV RESCUE AND RECOVERY Types of rescue equipment and their use, rescue stations, first aid appliances, training of personnel, and organization of rescue and recovery work during mine fires, explosion, inundation.</p> <p>UNIT V MINE INNUNDATION Causes and precautionary measures, bulk head doors, barriers, dams, precautions to be taken while approaching old workings, recovery of flooded mines and de watering of old workings.</p>				
Course Outcome	<p>At the end of the course student will be able to:-</p> <ol style="list-style-type: none"> 1. Apply knowledge of Health, Safety and Environmental Engg. to the miners for keeping them safe and improving their efficiency and productivity. 				



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	<ol style="list-style-type: none">2. Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mining engineering in particular.3. Make awareness among the miner to avoid any accident and health hazard
Text Books	<ol style="list-style-type: none">1. Mine Env. By G.B. Mishra2. Elements of Mining Tech. Vol.2 by D. J. Deshmukh
Reference Books	<ol style="list-style-type: none">1. U/G Mine Env. by Mcpherson2. Mine fires by Dr. Ramlu



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Course Title	ROCK MECHANICS				
Course Code	BENMN702				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Mine Geology-I & II				
Course objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Learn various physico mechanical & rheological properties of rock and the rock mass classification. • Determine the RMR of any mine. • Measure the insitu stress in the underground mines. 				
Course Contents	<p>UNIT I Application of rock mechanics in mining, Definition of important terms used in Rockmechanics, Classification of rock mass, Parameters of rock mass classification, Importance of rock mass classification, RQD, Q –system and C-factor ,Bieniskiwi’s Geomechanics classification of rock mass.</p> <p>UNIT II Physico-mechanical properties of rock as per ISRM standard testing procedures, Preparation and testing of specimen in the laboratory, ISRM standards, Determination of , Strength indices and their importance. Point load,ProtodyaknovImpact and Cone Indenter strength Index.</p> <p>UNIT III Rock as an elastic medium, Principle of elastic analysis, Rheological properties of rock, Importance of rheological models, Different types of rheological models, Dynamic properties of rocks, Anisotropy and Creep.</p> <p>UNIT IV Principal stress and Principal plane, Analytical method of determining the magnitudes and directions of normal and shear stress on failure plane, Mohr’s circle, Theories of failure of rock, Coulomb-Navier theory, Mohr’s theory, Griffith’s theory, Empirical theories of failure of rock, Different modes of failure of rock.</p> <p>UNIT V Earth stresses, Importance of measurements of in situ stress, measurements of insitu stress by Flat jack, Overcoring and Hydraulic fracturing technique. Design of circular and elliptical openings. Determination of safe span of roof.</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. Apply knowledge of rock mechanics for understanding, formulating and solving strata control problem in any underground mine.2. Identify, analyze and solve rock mechanics problems.3. Acquire knowledge and hands-on competence in applying the concepts in the development of rock mechanics.
Text Books	<ol style="list-style-type: none">1. Rock Mechanics By Obertabd Duvall2. Rock Mechanics By Goodman
Reference Books	<ol style="list-style-type: none">1. Rock Mechanics By Jager& Cook2. Rock Mechanics by B.S. Verma



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Course Title	MINE ECONOMICS				
Course Code	BENMN703				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites					
Course objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Choose proper method of sampling for different ore bodies and mineral heaps. • Estimate grade and reserves. • Choose proper method of mine valuation for valuation of any mine and also able to determine the NPV of any mine. • Perform various financial management aspects related with the mine. 				
Course Contents	<p>UNIT I 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 II Mine Valuation - Different methods, depreciation, amortization and redemption of capital, life and present value of a mine.</p> <p>UNIT III Financial Management - Methods of framing and financing industrial enterprises , memorandum and articles of association, shares, debentures, dividends and interest .Break even chart and inventory control.</p> <p>UNIT IV Investment Decisions - discounted cash flow methods, non-discounted cash flow methods, advantages and disadvantages of them, Internal rate of return, Net Present Value.</p> <p>UNIT V Book Keeping, Preparation of Balance sheet, Profit and Loss Account.</p>				
Course Outcome	<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. 				



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	<ol style="list-style-type: none">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
Text Books	<ol style="list-style-type: none">1 Mineral Economics by R.T. Deshmukh2. SME Handbook Vol. I
Reference Books	<ol style="list-style-type: none">1. Mineral Economics by Sinha and Sharma



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Course Title	MINE PLANNING				
Course Code	BENMN704				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Applied geology				
Course objectives	<ul style="list-style-type: none"> • 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	<p>UNIT I Coal reserves and their estimation, Geological and technological data needed for mineplanning, Preparation of project and feasibility reports, Planning and scheduling of various mining operations.</p> <p>UNIT II Planning and scheduling of various mining operations, linear programming, Simplex methods and transportation problem. Operation Research - Scope of application in mining, Linear programming, formulation and solution, Network planning with special reference to CPM/PERT, System approach for project scheduling.</p> <p>UNIT III Division of mine area into units and sub units, Area, Reserve, Life and Capacity of mine, Panel size, Design of long wall face.</p> <p>UNIT IV Cost of various mining operations, Optimum size of mines, Mode of opening up of deposits, Choice of opening, Location and size of Development openings.</p> <p>UNIT V Mine Services Design of haulage, hoisting and drainage systems, Design of pit top and pit bottom, Coalhandling plants, Railway siding etc.</p>				
Course Outcome	<p>At the end of the course student will be able to:-</p> <ol style="list-style-type: none"> 1. Apply knowledge of mine planning for understanding, formulating and solving mine planning & scheduling problems. 2. Identify, analyze and solve mining problems. 3. Acquire knowledge and hands-on competence in applying the concepts in the 				



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	development of mine planning
Text Books	1. Advance Coal Mining by R.T. desh mukh and V.S. Vorobjev 2. Mine Planning by S.P. Mathur
Reference Books	1. Mine Planning by J. Bhattacharya



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Course Title	ADVANCE MINE MACHINERY				
Course Code	BENMN705				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Mine Machinery				
Course objectives	<ul style="list-style-type: none"> • 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	<p>UNIT I Surface and Underground Layout Pit top and pit bottom circuits. Surface structures. Surface handling systems coaland ore handling plants. Storage bunkers. Railway siding. Pit bottom layouts.</p> <p>UNIT II Winding Drum and friction winding, headgears, headgear pulleys, cages and skips, suspension gear, keps and guides. Steam and electric winders, safety devices in winders, duty cycle. Automatic winding.Multilevel winding.</p> <p>UNIT III Trackless Haulage Types of conveyors and their sequence control. High angle conveyor. Free steered vehicles - shuttle cars, LHD, SDL and low-profile dump trucks (LPDT).</p> <p>UNIT IV Aerial Ropeways Types, construction and installation. Loading, unloading and angle stations.</p> <p>UNIT V Man-riding Systems, Statutory Provisions.</p>				
Course Outcome	<p>At the end of the course student will be able to:-</p> <ol style="list-style-type: none"> 4. Apply knowledge of mine planning for understanding, formulating and solving mine machinery problems and numerical 5. Identify, analyze and solve mine machinery problems. 				



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	6. Acquire knowledge and hands-on competence in applying the concepts in the development of minemachineries.
Text Books	1. De, A. (2015). Latest Development of Heavy Earth Moving Machineries, Lovely Prakashan. Mine Planning by S.P. Mathur
Reference Books	1. Nichols, H. L. (1976). Moving the earth-the workbook of excavation. 2. Chugh, C. P. (1977). Drilling technology handbook. Oxford & IBH Publishing Company



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Course Title	MINE ENVIRONMENT-II LAB				
Course Code	BENMN701P				
Course Credits	L	T	P	TC	
	-	-	4	2	
Prerequisites	Mine environment-I lab				
Course objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Learn the sampling of dust and physiological effect of the dust to the miner. • Learn about the various miner occupational diseases and its preventive measures • Prepare the enquiry report of a mine accident. • Know the major accident occurred in Indian mines and their causes. 				
Course Contents	<p>LIST OF EXPERIMENTS</p> <ol style="list-style-type: none"> 1. Determination of moisture content of rock sample by ISRM standard method 2. Determination of density and porosity of rock samples using saturation and caliper techniques. 3. Determination of slake durability strength index of rock sample by ISRM standard method 4. Determination of point load strength index of rock sample 5. Determination of Proto-dyakonov strength index of rock sample 6. Determination of Uni-axial Compressive strength of rock sample by ISRM standard method 7. Determination of Tensile strength of rock sample by Brazilian method 8. Determination of Single Shear and Double Shear strength of rock sample 9. Determination of Tri-axial Compressive strength of rock sample by ISRM standard method 10. Determination of Young' Modulus of rock sample by ISRM standard method 				



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Course Title	ROCK MECHANICS LAB				
Course Code	BENMN702P				
Course Credits	L	T	P	TC	
	-	-	4	2	
Prerequisites	Geography				
Course objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Learn various physico mechanical & rheological properties of rock and the rock mass classification. • Determine the RMR of any mine. • Measure the insitu stress in the underground mines. 				
Course Contents	<p>LIST OF EXPERIMENTS</p> <ol style="list-style-type: none"> 1. Determination of moisture content of rock sample by ISRM standard method 2. Determination of density and porosity of rock samples using saturation and caliper techniques. 3. Determination of slake durability strength index of rock sample by ISRM standard method 4. Determination of point load strength index of rock sample 5. Determination of Proto-dyakonov strength index of rock sample 6. Determination of Uni-axial Compressive strength of rock sample by ISRM standard method 7. Determination of Tensile strength of rock sample by Brazilian method 8. Determination of Single Shear and Double Shear strength of rock sample 9. Determination of Tri-axial Compressive strength of rock sample by ISRM standard method 10. Determination of Young' Modulus of rock sample by ISRM standard method 				



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Course Title	VOCATIONAL & PRESENTATION				& INDUSTRIAL TRAINING				EVALUATION			
Course Code	BENMN706P											
Course Credits	L	T	P	TC								
	-	-	-	2								
Prerequisites	Industrial Training/ Mine Visiting											
Course objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Industrial Training is one of the most essential components for a B.Tech 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 B.Tech 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. 											



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