Shri Rawatpura Sarkar University, Raipur

Examination Scheme & Syllabus

for

B.Tech in Mining Engineering

Semester-VI

(Effective from the session: 2019-20)

Faculty of Engineering,
Shri Rawatpura Sarkar University, Raipur

B.Tech in Mining Engineering

Semester-VI

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	BENMN601	Th	Blasting Engineering	Core	3	1	-	4	70	30	-	-	100
2	BENMN602	Th	Mine Machinery - II	Core	3	1	-	4	70	30	-	-	100
3	BENMN603	Th	Mineral Dressing	Core	3	1	-	4	70	30	-	-	100
4	BENMN604	Th	Surface Mining-II	Core	3	1	-	4	70	30	-	-	100
5	BENMN605	Th	Mine Management	Core	3	1	-	4	70	30	-	-	100
6	BENMN606	Th	Mine Legislation - II	Core	3	1	-	4	70	30	-	-	100
7	BENMN601P	Pr	Blasting Engineering Lab	Core	-	-	4	2	-	-	35	15	50
8	BENMN602P	Pr	Mine Machinery - II Lab	Core	-	-	4	2	-	-	35	15	50
9	BENMN603P	Pr	Mineral Dressing Lab	Core	-	-	4	2	-	-	35	15	50
10	BENMN604P	Pr	Surface Mining-II Lab	Core	-	-	4	2			35	15	50
	Total Contact hr per week: 40			**Total Credit: 32**					**Grand Total Marks:**				**800**

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Course Title	**BLASTING ENGINEERING**				
Course Code	**BENMN601**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	Chemistry				
Course objectives	**This course will enable students to:** • Choose proper explosives to different rock beds. • Design and analyze basic element of blast holes in open cast mine and underground mine. • Learn various blasting accessories. • Learn various blasting nuisances.				
Course Contents	**UNIT I** **COMMERCIAL EXPLOSIVES** Commercial Explosives and their properties, Bulk Explosive Systems, Selection of explosive, Transportation and Handling of explosives & Related regulations. **UNIT II** **INITIATION SYSTEM & BLASTING ACCESSORIES** Detonators of various types, Detonating cord, Safety fuse, Detonating relays, Non electric initiation and Blasting accessories. **UNIT III** **SURFACE BLAST DESIGN** Factors affecting blast design, Selection of various blast parameters Burden, Spacing, Stemming distance, Sub-grade drilling, Depth of hole, Bench height, Diameter of hole, Safe charge calculation, Deck Charging, Drilling patterns, Inclined hole drilling, Secondary blasting. **UNIT IV** **UNDERGROUND BLAST DESIGN** Various cut patterns, U/G blast design, Series & Parallel connection of detonators, Precautions during blasting **UNIT V** **ROCK BREAKAGE MECHANISM** Breakage mechanism, rock fragmentation, Factors affecting rock fragmentation, Back break, Over break, Fly rock, Ground Vibration, Noise, Control Blasting Techniques.				
Course Outcome	**At the end of the course student will be able to:-** 1. Apply knowledge of blasting engineering for understanding, formulating and solving blast hole design problems. 2. Acquire knowledge and hands-on competence in applying the concepts in the design and development of blast hole.				

	3. Work effectively with other engineering and science teams as well as with multidisciplinary designs.
Text Books	1. Explosives and Blasting Technology: G.K.Pradhan 2. Surface Blast Design: C.J.Konya
Reference Books	1. Rock Blasting: Sushil Bhandari 2. Indian Explosive Act 1884 3. Legislation in Indian Mines – A Critical Appraisal: Rakesh and Prasad

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Course Title	**MINE MACHINERY - II**				
Course Code	**BENMN602**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	Geography				
Course objectives	**This course will enable students to:** • 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. • Atmosphere becomes the first step of mining education. • Explain the origin, occurrence, effects, and detection of various mine gases. • Discuss the air conditioning of surface mines and underground mines.				
Course Contents	**UNIT I** Arial ropeways – Different types, their constructions & installation, operation & maintenance, design calculation, their layout including rope-tensioning arrangements. UNIT 2. Conveyors – Different types of belt conveyors, their construction, installation, maintenance & design calculations. UNIT 3. Shaker conveyor, scraper chain conveyor and armored chain conveyor, their installation & construction maintenance. Safety Devices; Pit top and pit bottom arrangements. UNIT 4. Skip& Koepe Winding- Skip types & Construction, pit top & pit bottom arrangements, advantages and disadvantages Types of koepe Winder, Koepe wheel, floating platforms, two winders working in the same shaft, winding with side by side and up and down sheaves, advantages and disadvantages. , Multi rope winding. Calculation of H.P. UNIT 5. HYDRULIC TRANSMISSIONS Fundamental of hydrostatic compression, hydraulic fluids, hydraulic pumps, motors, cylinders and accumulators, different types of valves, hydraulic coupling and torque converters, Application in mines, Advantages of hydraulic transmission.				
Course Outcome	**At the end of the course student will be able to:-** 1. The students are expected to enhance the technical knowledge on origin, occurrence, effects, and detection of various mine gases, air conditioning of				

	surface and underground mining. 2. To enhance the technical knowledge on health & safety. 3. Work effectively as an individual and as a member of multidisciplinary team.
Text Books	1. V.S.Vutukuri and R.D.Lama, Environmental Engineering in Mines, Trans Tech Publishers. 2. M.J.McPherson, Subsurface Ventilation and Environmental Engineering, Chapman & Hall Publication, London. 3. G.B.Mishra, Mine Ventilation and Environment, Oxford University Press.
Reference Books	1. H.L.Hartman, Mine Ventilation and Air Conditioning, Wiley Publication, 1999. 2. D.J.Deshmukh, Elements of Mining Technology Vol II, VidyasewaPrakashan, Nagpur. 3. A.Skochinsky and Komorov V., Mine Ventilation, MIR Pub., Moscow 4. B.B.Dhar and A.K.Ghose, Mining Challenges for 21st Century, Ashish Publications New Delhi. 5. D. Pennman, J.S. Penman, The principles and practice of Mine Ventilation, Charles Griffin 6. H. Rabia, Mine Environmental Engineering, Entrac Software Pub.

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<table>
<tr><td>Course Title</td><td colspan="5">MINERAL DRESSING</td></tr>
<tr><td>Course Code</td><td colspan="5">BENMN603</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>3</td><td>1</td><td>-</td><td>4</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5"></td></tr>
<tr><td>Course objectives</td><td colspan="5">This course will enable students to:
• Choose proper method of size reduction and concentration methods for particular ores
• Design and analyze basic element of machine e.g. crushers, mills jigs, tables etc.
• Design and analyze various special methods of separations like HMS, Magnetic Separator etc.
• Prepare flow sheets for the beneficiation of different ores and coal.</td></tr>
<tr><td>Course Contents</td><td colspan="5">UNIT–I
CRUSHING & GRINDING
Introduction, definition, scope and economic justification, main steps in ore dressing operations,
general preliminary mineralogical investigations, comminuation-crushing-principles of crushing,
reduction jaw crushers, gyratory crushers, cone crushers, rolled crushers, gravity stamps their classifications and applications, grinding-principles of grinding units, application and classification of ball mills, rod mills, tube mills and pebble mills.

UNIT II
SIZING
Object of sizing, scale of sizing, laboratory sizing, screening and classification , different type of screens, their mode of operations and application and limitation, classification-principles of classification, movement of solids through fluids, Stoke’s law, Reynold’s Number, different types of classifiers, hydraulic and pneumatic classifiers, sampling-importance of sampling and methods used.

UNIT III
GRAVITY CONCENTRATION
Jigging, Flowing film concentrators like spirals and shaking tables, heavy media separation theory, applications and limitations of methods.

UNIT IV
FLOATATION
Physico-chemical principles, function of various floatation reagents, important machines, their principles, and working, floatation of sulphide, oxide and non sulphide ores.</td></tr>
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	UNIT V **ELECTROSTATIC AND MAGNETIC SEPARATION** Principle and operation and field of application, Pelletisation of low-grade iron ore, Drying and dewatering - thickening, filtration and drying. Coal washing- Simplified flow sheets for beneficiation of coal and typical ores of copper, lead, zinc, iron and manganese ores with special reference to Indian deposits.
Course Outcome	**At the end of the course student will be able to: -** 1. Apply knowledge of mineral dressing for understanding, formulating and solving problems related with mineral dressing. 2. Acquire knowledge and hands-on competence in applying the concepts in the design and development of machines for separating the low-grade ore economically. 3. Work effectively with engineering and science teams as well as with multidisciplinary designs.
Text Books	1. Ore Dressing by Gaudin 2. Ore Dressing by B. A. Wills
Reference Books	1. Elements of Mining Tech. Vol I & Vol III by D. J. Deshmukh 2. Coal Mining Practice by Stathum

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Course Title	**SURFACE MINING -II**				
Course Code	**BENMN604**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	Surface Mining -I				
Course objectives	**This course will enable students to:** • To learn various layout of opencast mine and waste dump. • To choose suitable excavators for any deposit extracted by opencast method. • To be able to design an opencast mine and mine waste dump. • To understand the pit slope stability and its impact on mining activity.				
Course Contents	**UNIT I** Layouts of open pit mines, Methods of side casting, Side casting by Stripping Shovel and Dragline, Range Diagram, calculation of operating radius. Explosive casting, Layouts of waste dumps. Design of Haul roads. **UNIT II** Introduction to continuous surface mining equipment, Continuous surface miner, their construction, basic operation and productivity. Bucket wheel excavators, their construction, basic operation and productivity, Face Layouts. **UNIT III** Ultimate pit design, Factors affecting ultimate pit limits; Significance of ultimate pit limits; Manual methods of developing ultimate pit limits. Floating cone technique, Production planning, Some basic mine life and plant size concepts, Mine and Mill plant sizing. **UNIT IV** Introduction to rock slope engineering, Slopes in surface mines and their formation, Pit slopes and their influence on mine economics, Slope stability, Factors influencing slope stability, Various types of slope failure and their conditions. **UNIT V** Determination of factor of safety of a slope under plane and circular failure, Planning of slope stability investigations, Stabilization and protection methods for stability of slopes.				
Course Outcome	**At the end of the course student will be able to: -** 1. Enhance the technical knowledge on surface mining. 2. Identify, formulate, and solve engineering problems in pit design. 3. Use the techniques, skills and modern engineering tools necessary for mine. 4. Work effectively as an individual and as a member of multidisciplinary team				

Text Books	1 Surface Mining: G.B. Misra 2. Surface mining equipment: Martin 3. Surface Mining: Pfleider
Reference Books	1. Rock slope engg.: Hoek& Bray 2. SME handbook: Hartman 3. Surface Mine Planning & Design: Hustralid&Kuchha

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Course Title	**MINE MANAGEMENT**				
Course Code	**BENMN605**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	Elements of Management				
Course objectives	• To choose proper method of sampling for different ore bodies and mineral heaps. • To know the responsibility and duties of the various employee of the mine and owner of the mine • To perform various management aspects related with the mine				
Course Contents	**UNIT I** **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. **UNIT II** Personnel Management Selection, training and development of human resources, Job evaluation, job analysis, incentive and theories of motivation, Productivity, its concept and measurement, Leadership and Communication. **UNIT III** Production Management Determination of norms and standards of operations by work study, work measurements, production planning, Scheduling and control, Queuing theory, short- and long-term planning, Quality control, introduction to MIS, Material Management. **UNIT IV** Industrial Psychology Its relation with other branches of knowledge, studies of physical factors and their effect on man, Industrial relations, Human relations, trade union movements in India. **UNIT V** Industrial Act and Laws Industrial Dispute Act, Industrial Trade Union Act, Analysis of industrial disputes, Prevention and settlement of industrial disputes, Payment of wages act, Workmen's compensation act, Contract labor laws. Payment of wages act, Strike & lockout, Illegal strikes & lock out.				
Course Outcome	**At the end of the course student will be able to:-** 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. Apply knowledge of				

	metal mining for designing a metal mines. 3. Acquire knowledge and hands-on competence in applying the concepts of management in the development of mine economics.
Text Books	1. Mine Management: V. N. Singh , Print Press Dhanbad 2. Management & Administration: S.K.Gupta
Reference Books	1. Introduction to management: O.P. Khanna , Dhanpat Rai Publication 2. Management & Administration: S.K.Gupta

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Course Title	**MINE LEGISLATION - II**				
Course Code	**BENMN606**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	Mine Legislation-I				
Course objectives	• 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				
Course Contents	**UNIT-I** Principal Provisions of Mines & Minerals (Regulation & Development) Act Coal Mines Conservation & Development Act. **UNIT-II** Mineral Concession Rules, Indian Electricity Rules related to mining activity. **UNIT-III** Byelaws & D.G.M.S. Circulars. Mines Rescue Rules **UNIT-IV** Mine Accident, their classification, and causes & preventive measures, Cost of accident, Preparation of Inquiry report. **UNIT-V** Safety Campaign, causes of major mining accidents those have occurred in India & Suggested remedial measures.				
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	**BLASTING ENGINEERING LAB**				
Course Code	**BENMN601P**				
Course Credits	**L**	**T**	**P**	**TC**	
	-	**-**	**4**	**2**	
Prerequisites	Chemistry				
Course objectives	**This course will enable students to:** • Apply knowledge of blasting engineering for understanding, formulating and solving blast hole design problems. • Acquire knowledge and hands-on competence in applying the concepts in the design and development of blast hole. • Work effectively with other engineering and science teams as well as with multidisciplinary designs.				
Course Contents	**LIST OF EXPERIMENTS** 1. Measurement of ground vibration by seismograph 2. Development of predictor equation from the recorded data 3. Measurement of VOD-by-VOD mate and its analysis 4. Study of various fragmentation assessment techniques 5. Study of WIPFRAG software 6. Design of blast for coal face 7. Design of blast for underground metal mine 8. Design of blast for bench blasting 9. Study of various blasting tools 10. Study of bulk explosive systems				

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Course Title	**MINE MACHINERY-II LAB**				
Course Code	**BENMN602P**				
Course Credits	**L**	**T**	**P**	**TC**	
	-	**-**	**4**	**2**	
Prerequisites	Mine Machinery-I				
Course objectives	**This course will enable students to:** • Explain physical properties of the mineral. • Brief discussion of igneous rock, sedimentary rock and metamorphic rock. • Discuss the folds, faults, joints, geological maps.				
Course Contents	**LIST OF EXPERIMENTS** 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 valves. 10. Study of different types of cutter loaders.				

Course Title	**MINERAL DRESSING LAB**				
Course Code	**BENMN603P**				
Course Credits	**L**	**T**	**P**	**TC**	
	-	**-**	**4**	**2**	
Prerequisites	Knowledge about various survey needed for any type of construction.				
Course objectives	**This course will enable students to:** • Discuss the chain survey for linear measurements • Explain the compass survey • Discuss the plane table surveying and Miner's Dial • Brief discussion on types of leveling instruments, temporary and temporary adjustment of leveling instruments, trigonometric leveling, reciprocal leveling.				
Course Contents	**LIST OF EXPERIMENT** 1. Study of Jaw crusher 2. Study of roll crusher 3. Study of grinding mills 4. Study of Akin's classifier 5. Study of shaking table 6. Study of Mineral jig. 7. Study of spiral concentrator 8. Study of floatation cell 9. Study of thickeners 10. Study of washability curves				

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Course Title	**SURFACE MINING-II LAB**				
Course Code	**BENMN604P**				
Course Credits	**L**	**T**	**P**	**TC**	
	-	-	-	**2**	
Prerequisites	Surface Mining-I				
Course objectives	**This course will enable students to:** • 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. • Surface mining opens avenues of new learning to the students and apply them during their project and industrial training presentations.				
Course Contents	**List of experiments:** 1. Study of Constructional features of Electric Rope Shovel and the machine operation 2. Study of Constructional features of Dragline and the machine operation 3. Determination of Productivity of shovel dumper combination and synchronization of shovel dumper operated face. 4. Study of Dragline side casting operation and drawing of layout of Dragline operated faces 5. Study of Constructional features of Multi bucket Excavators and the machine operation 6. Study of working of Jack Hammer Drilling Machine 7. Study of working of Down the hole Drilling Machine				