

GONDWANA UNIVERSITY, GADCHIROLI

Four Year Degree Course in the Faculty of Science & Technology Course and Examination Scheme with Choice Based Credit System (CBCS) from 2019-20 onwards V Semester B.E. (Mining Engineering)

Course Code	Course Title	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory						Laboratory			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
MSE	IE														
5BEMN01	Mine Climate Engineering	4	0	0	4			3	80						
5BEMN02	Drilling & Blasting Engineering	4	0	0	4	3	80	10	10	100	40	--	--	--	--
5BEMN03	Mine Surveying - II	4	0	0	4	3	80	10	10	100	40	--	--	--	--
5BEMN04	Mining Machinery - II	4	0	0	4	3	80	10	10	100	40	--	--	--	--
5BEMN05	Rock Mechanics	3	1	0	4	3	80	10	10	100	40	--	--	--	--
5BEMN06	Elective-I	4	0	0	3	3	80	10	10	100	40	--	--	--	--
	Laboratory														
5BEMN07	Mine Climate Engineering	0	0	2	1	--	--	--	--	--	--	25	25	50	25
5BEMN08	Mine Surveying - II	0	0	2	1	--	--	--	--	--	--	25	25	50	25
5BEMN09	Mining Machinery - II	0	0	2	1	--	--	--	--	--	--	25	25	50	25
5BEMN10	Rock Mechanics	0	0	2	1	--	--	--	--	--	--	25	25	50	25
Total		23	1	8	--	--	--			600	--	--	--	200	--
Semester Total		32			27	800									
<p><i>Note</i> : 1) Elective I :- 1) Mine Supports 2) Advanced Mining Geology 3) Object Oriented Programming using C++ (Select any one). Student has to undergo Practical Training at mines for four week (one month) duration during winter vacation.</p>															

GONDWANA UNIVERSITY, GADCHIROLI
Four Year Degree Course in the Faculty of Science & Technology
Course and Examination Scheme with Choice Based Credit System (CBCS) from 2019-20 onwards
VI Semester B.E. (Mining Engineering)

Course Code	Course Title	Teaching Scheme				Examination Scheme											
		Hours per week			No. of Credits	Theory						Laboratory					
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks		
Sessional																	
		MSE	IE														
6BEMN01	Mine Rescue Engineering	4	0	0	4	3	80	10	10	100	40	--	--	--	--		
6BEMN02	Underground Coal Mining	4	0	0	4	3	80	10	10	100	40	--	--	--	--		
6BEMN03	Surface Mining	4	0	0	4	3	80	10	10	100	40	--	--	--	--		
6BEMN04	Mineral Processing Technology	4	0	0	4	3	80	10	10	100	40	--	--	--	--		
6BEMN05	Elective -II	4	0	0	4	3	80	10	10	100	40	--	--	--	--		
	Laboratory																
6BEMN06	Mine Rescue Engineering	0	0	2	1	--	--	--	--	--	--	25	25	50	25		
6BEMN07	Mineral Processing Technology	0	0	2	1	--	--	--	--	--	--	25	25	50	25		
6BEMN08	Training in Mines	0	0	0	2	--	--	--	--	--	--	50	--	50	25		
	Total	20	0	4	--	--	--			500	--	--	--	150	--		
	Semester Total	24			24	650											

Note : 1) Elective-II – 1) Underground Metalliferous Mining 2) Advanced Mine Surveying 3) Industrial Engineering (Select any one).
2) Student has to undergo Practical Training at mines for four week (one month) duration during summer vacation.

V Semester B. E. (Mining Engineering)

Course Code: 5BEMN01
Course Title: Mine Climate Engineering

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
4	0	0	4	4	3	10	10	80	100

Unit	Contents	Hours
I	Composition of Mine Atmosphere: Mine gases – sources, properties, effects and detection; sampling and analysis of mine air, methane content; methane drainage; methane layering; flame safety lamp and its uses; methanometers; radon gas and its daughter products; continuous monitoring of gases.	9
II	Heat and humidity: Source of heat in mines; effects of heat and humidity; psychrometry, kata thermometer; heat stress, air-conditioning. Natural ventilation: Seasonal variations, calculation of NVP from air densities and thermodynamic principles.	9
III	Air Flow through Mine Openings: Laws of flow, resistance of air ways, equivalent orifice, distribution of air, flow control devices,; ventilation surveys, permissible air velocities in different types of workings, standard of ventilation.	9
IV	Mechanical Ventilation: Types of mine fans; theory; characteristics and suitability of fans; selection; fans in series and parallel; forcing and exhaust configurations, reversal of flow; fan drifts, diffusers, evasees, booster fan, Auxiliary ventilation.	9
V	Ventilation planning: Planning of ventilation system and economic consideration; ventilation layout for mining of coal and ore deposits; calculation of air quantity of air required for ventilating a mine; calculation of total mine head; network analysis principles and computer applications, ventilation of deep mines-U/G & open pit, Ventilation cost calculation.	9
Total		45

Text and Reference Book/s:

1. Mine Environment and Ventilation by G B Mishra
2. Mine Ventilation by Prof S P Banerjee
3. Numericals on Mine Ventilation by L C Kaku

V Semester B. E. (Mining Engineering)

Course Code: 5BEMN02
Course Title: Drilling & Blasting Engineering

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
4	0	0	4	4	3	10	10	80	100

Unit	Contents	Hrs
I	Drilling: Definition, need, classification, drillability and selection of drilling system, Percussive drilling - mechanics, required vertical thrust and RPM, Indexing, penetration rate etc. Rotary drilling - Mechanics, torque required and estimation of applied thrust, Rotary-percussive drilling - mechanics, torque required, applied axial thrust. Thermal drilling and other types of novel drilling methods with concepts. Factors affecting performance of drilling system, operating parameters etc. Bits: types of bits, construction and application, bit wear, Economics of drilling system.	9
II	Explosives: Definition, classification, composition, properties and various Tests on explosives Detonator: Need, classification, construction, Delay element, firing sequence, fuse, detonating cord, relay, nonel, shocktube, electronic detonators, Blasting accessories, exploders, circuit tester, etc.	9
III	Blasting: Mechanism of blasting- solid blasting, cut blasting and bench blasting, blasting pattern and design of blast round in underground coal mines, opencast, drifts, stopes, raise, winze, shaft, tunnel, etc. Secondary blasting methods.	9
IV	Bulk transportation of explosive, storage and explosives (magazine), blasting in fiery seam, blasting under special conditions, deep hole blasting, environmental effects of blasting and their preventive measures.	9
V	Characteristics of good blast, blast performance, evaluation technique, controlled blasting techniques, cast blasting, blast simulation studies, misfire, dealing with misfire, blownout shot, blowthrough shot.	9
Total		45

Text and Reference Book/s:

- Principles and Practices of Modern Coal Mining by R D Singh, New Age Int. (P) Ltd., New Delhi
- Surface Blast Design by C.J.Konya & E.J.Walter, Prentice Hall Publications
- Explosives and Blasting Practices in Mines by Dr S K Das, Lovely Prakashan, Dhanbad
- Principles of Rock Drilling by U.M.Rao Karanam and B.Misra, Oxford & IBH Co Pub. Ltd., New Delhi
- Surface Mining by G B Mishra, Dhanbad Publishers
- SME Mining Engineering Handbook by H.L.Hartman (Editor), Soc. For Mining, Metallurgy and Exploration Inc., Co.
- Rock Breakage by Blasting by M.I. Petrosyan, Overseas Books Syndicate, Dhanbad

V Semester B. E. (Mining Engineering)

Course Code: 5BEMN03
Course Title: Mine Surveying - II

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
4	0	0	4	4	3	10	10	80	100

Unit	Contents	Hours
I	Control Surveys: Triangulation; classification; reconnaissance, measurement, procedure for angles and base-line; trilateration; introduction to GPS and its application in mine surveying.	9
II	Correlation: Methods of correlation-direct traversing in inclined shaft, correlation in vertical, single and two shafts	9
III	Development surveys: Setting a point of known coordinate, control of direction and gradients in drifts, tunnels, raises and winzes; application of lasers Problems of underground traversing Stope surveying: Purpose, methods of survey in moderately and steeply inclined ore bodies, flat and vertical ore bodies/seams.	9
IV	Photogrammetry: Principles of photogrammetry and its elements, orientation of photographs, finding height and distance of ground points from photographs, scale of vertical photographs, photographs versus maps, application of photogrammetry in mining.	9
V	Introduction of errors and its theory, identifications of errors, their prevention and elimination; method of least squares and its applications; probable error of single observation; most probable value, weights, weighted observation and their probable errors, adjustment of observations. General legislative requirements as to mine plans in India, preparation and preservation of plans and sections.	9
Total		45

Text Books:

1. Surveying Volume II, III by Dr. B. C. Punmia, Laxmi Pub. Pvt. Ltd., New Delhi
2. Surveying Volume II by Dr T. P. Kanetkar and Kulkarni, Vidyarthi Griha Prakashan, Pune
3. Surveying Volume III by P B Shahani
4. Manual on Colliery Survey, Publishers CMPDIL, Ranchi
5. Modern Concepts of Mine Surveying Vol-II by Alam Chand, News Sketch Press, Dhanbad

Reference Book:

1. Metalliferous Mine Surveying by Frederick Winniberg, John Wright & Sons Ltd., UK

V Semester B. E. (Mining Engineering)

Course Code: 5BEMN04
Course Title: Mining Machinery-II

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
4	0	0	4	4	3	10	10	80	100

Unit	Contents	Hours
I	Classification, application & construction features of drilling machines used in underground coal mines, rock drills, jumbo drills, rock bolting machines. Small and large diameter surface blast hole drills, their construction, application, selection and operation.	9
II	Coal cutting machines, shearers, coal plow, lump breakers, road headers, TBMs, raise and shaft borers, continuous miners, stage loaders; their main features and applicability.	9
III	Loading machines – rocker shovel, SDL, LHD, gathering arm loader, shuttle car, LPDTs, scraper; their main features, applicability, selection and estimation of production capacities.	9
IV	Opencast Machinery – Shovels, draglines, dumpers, wheel loaders; their main features, applicability, selection and production capacities; rippers, scrapers, Road graders, Dozers.	9
V	Continuous surface mining equipment – bucket wheel excavators, stacker & reclaimer, continuous surface miners, spreaders, dredging equipment; their main features, applicability, selection and estimation of production capacities Signalling and communication; signalling and communication systems used in underground and surface mines.	9
Total		45

Text and Reference Book/s:

1. Elements of Mining Technology Volume III by D J Deshmukh
2. Coal Mining Technology by Dr S K Das
3. Surface Mining Technology by Dr S K Das
4. Heavy Earth Moving Machinery by Amitosh De

V Semester B. E. (Mining Engineering)

Course Code: 5BEMN05
Course Title: ROCK MECHANICS

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
	0	0	4	4	3	10	10	80	100
Unit	Contents								Hours
I	<p>Rock Mechanics: Definition, significance and status. Rock & Rock Masses: Study of behavior; inherent complexities in Rock Mechanics Stresses & Strains: Fundamentals of stress and strain in two & three- dimensions, sign convention, stress-strain relationships in average types of rocks, types of Moduli 'I' of elasticity, principal stresses, Poisson's Ratio, Mohr's Circle, Types of Strengths of Rock Important Rock Mechanics Terminology: Types of stresses, Joints & joint sets, Hardness, Porosity & Permeability, Isotropy & Anisotropy, Brittleness & Ductility, Linear & Non- Linear Elasticity, Stiffness, Thermal Conductivity etc.</p>								9
II	<p>Laboratory Tests for Static Elastic Properties of Rocks: Determination of various physico-mechanical properties such as different types of strengths (compressive, tensile and shear), Tri-axial Compression Test & its applications, Brittle-Ductile Transition Pressure, Index Tests such as Protodyakonov Strength Index Test, Impact Strength Index Test, Slake Durability Index Test, Point Load Index Test etc., Measurement of porosity and permeability, Study of Post Failure Behaviour & its practical significance, significance of stiffness of Loading System.</p>								9
III	<p>Field or In-situ Measurements: Measurement of Pre-mining or in-situ states of stresses, Difficulties involved, Methods of determination e.g. Flat Jack Method, Over coring method and Hydro-fracturing method. In-situ Deformability & Strength Tests: Rock Deformability & its measurement in field, In-situ tests for determination of different types of strengths of rock masses. Dynamic Elastic Characteristics of Rocks: Dynamic properties and their difference from static properties, preparation of different types of elastic waves through rock bodies, Determination of dynamic elastic constants of rocks in laboratory.</p>								9
IV	<p>Time-Dependent Properties of Rocks: Effect of prolonged loading of rock masses on their deformation behavior, creep, Different stages of Creep, Measurement of creep of rocks, Rheology, Rheological Models, Relevance of study of rheological models to mining engg., study of different types of rheological models. Engineering Classification of Rock Masses: Introductory Concept & relevance of engineering classification of rock masses, some examples of single-criteria classification schemes.</p>								9
V	<p>Rock Failure Criteria & Theories: Concept of Failure, Definition & standard forms of failure criteria for rock masses, Coulomb Criterion, Mohr's Criterion, Griffith's Theory of Failure, other empirical criteria of failure including Hock & Brown's Criterion. Concepts of Soil Mechanics: Physico-mechanical properties of soils, Types of soils, Important index properties including consistency & gradation, engineering properties and classification of soils, soil properties of engineering</p>								9
Total									45

Text and Reference Book/s:

1. Rock Mechanics for Underground Mining – B.H.G. Brady and E.T. Brown, Chapman & Hall
2. Introduction to Rock Mechanics – R.E. Goodman, Wiley International
3. Handbook on Mechanical Properties of Rocks – R.D. Lama and V.S. Vutukuri, Trans Tech Pub.
4. Engineering in Rocks for slopes, Foundations & Tunnels – T. Ramamurthy, PHI
5. Fundamentals of Rock Mechanics – J.C. Jaeger and N.G.W. Cook, Chapman & Hall

V Semester B. E. (Mining Engineering)

Course Code: 5BEMN06 ELECTIVE - I
Course Title: Mine Supports

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	0	4	3	3	10	10	80	100

Unit	Contents	Hours
I	Principle of strata support and strata reinforcement: Need of action of support, terminology, weak strata, strong strata, support reaction curve, classification of mine support, load coming on face support, bord and pillar, Narrow excavation-bord and pillar, longwall, load estimation rock load on face support, bord and pillar.	9
II	Timber support: merits and demerits, various types of prop, crossbar, chock, load bearing capacity of timber supports, steel support, shaft tubbing, steel lining, steel props, and steel chocks, steel arches, friction props, hydraulic props, power support.	9
III	Concrete shaft lining-plain of reinforced, supporting of gate roads in advancing longwall face, short creating of guniting, concrete slab or concrete support, pillar support-factors affecting load on pillar and estimation of pillar stress, stabilization of weak pillar.	9
IV	Requirements of stowing, characteristics of stowing material, various types of stowing with merits and demerits, details of hydraulic stowing, theory of slurry transport, sand water requirements, design of hydraulic stowing system.	9
V	Pre-reinforcement materials and techniques; rock bolts and dowels – different types and uses ; mechanics of bolting Anchored rock bolts – Slot and wedge type, expansion shell type, grouted point anchor type. Full column anchors, wooden and fibre glass dowels, mechanical full column anchors, split sets/friction rock stabilizers, full column grouted rock bolts, installation and testing of rock bolts. Cable bolting – its installation and applications.	9
T o t a l		45

Text and Reference Book/s:

1. Ground Mechanics in Hard Rock Mining by M L Jeremic, Oxford Publishers
2. Design of Supports in Mines by Cemal Biron and Ergin Arioglu, John Wiley and Sons
3. SME Mining Engineering Handbook by H.L.Hartman (Editor), Soc. For Mining, Metallurgy and Exploration Inc., Co.

V Semester B. E. (Mining Engineering)

Course Code: 5BEMN06 Elective II

Course Title: Advanced Mining Geology

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	0	4	3	3	10	10	80	100

Unit	Contents	Hours
I	General Geology, Scope of Mining Geology, Causes and Effects of earthquakes, origin of earthquakes, earthquakes waves, seismographs, classifications of earthquakes, earthquake intensity scale, location of epicenter, distribution of earthquakes, prediction of earthquakes, control of earthquakes, volcanism, product of volcanos	9
II	Environmental Geology: Land use and land planning, pollution of surface and groundwater, waste disposal site location for solid and liquid wastes. Impact of mining activities on surface and underground water quality	9
III	Prospecting: Geophysical Prospecting for metallic deposits, dispersion, pathfinder elements, Anamolies, principles of prospecting, prospecting methods, electrical, seismic, magnetic, gravity methods of prospecting.	9
IV	Coal Geology: Classifications of coal, physical properties of coal, chemical composition of coal, coal petrology, distribution of Indian coal fields, varieties and ranks of coal, formation of coal	9
V	Remote sensing and geographical information system(GIS): Introduction to remote sensing technology, analog and digital data, products Remote sensing satellite, application of remote sensing for mining operations, introduction to GIS and its applications.	9
Total		45

Text Books/Reference:

1. A text book of Geology- P K Mukherjee
2. Introduction to Geology of Coal and Indian Coalfields – N L Sharma & K S V. Ram
3. Courses in Mining Geology – R N P Arogyaswamy
4. Impact of Mining on Environment – R K Trivedi and N P Sinha
5. General and Engineering Geology – Dr. R K Bopche, & Dr. D K Agrawal
6. Principles of Engineering Geology – K M Bangar

V Semester B. E. (Mining Engineering)

Course Code: 5BEMN06 Elective III

**Object- Oriented
Course Title: Programming Using C++**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	0	4	3	3	10	10	80	100

Unit	Contents	Hours
I	Overview of C: C as a structured language, .C and .CPP File extensions, basic data types, variables, Access Modifiers, Storage class specifiers, Operators, C-style console I / O, File I/O Preprocessor. Difference in Programming approach of C & C++	9
II	Overview of C++ Origin of C++, Object- Oriented Programming: Introduction, Need & benefits, OOP Vs Procedural Programming, C++ Vs C, Creating a sample C++ program (source file, editing, compiling, debugging etc) Basic Input / Output, Control statements – if, AND, OR, switch....case, loops using while, for. Declaring Local variables.	9
III	Object - Oriented Programming Concepts: Objects, Classes, Functions, Encapsulation, Abstraction, Inheritance, Polymorphism. Implementation of class in C++. C++ Objects as physical objects and data types, Operator overloading, Constructors & Destructors, C++ Keywords Data types, The bool data type.	9
IV	Functions, Arrays, Structures, Pointers Functions, Importance of functions, Returning values from functions, Reference arguments, In line functions, Virtual functions, function overloading. Arrays: Importance, dimensions and applications, Arrays of objects, string, Pointers, definitions & importance, Addresses & pointers, The address of operator and pointers and arrays, Memory Management, Dynamic allocation operators	9
V	Streams & Files, Templates and Exceptions Stream Classes, Stream errors, Disk file I/O with streams, File pointers, Error handling in files I/O with member functions opening and closing a file, Reading & writing text files, Function template, Unformatted & binary I/O , Detecting EOF, Random Access, The string class; some string member functions, Strings as containers, Putting string into container.	9
Total		45

Text and Reference Book/s:

1. C++: The complete reference – Herbert Schildt, TMH
2. Object Oriented Programming with C++ - E Balaguruswamy
3. The C++ programming language – Bjarne Stroustrup
4. Object Oriented Programming in C++ - Lafore

LABORATORY
V Semester B. E. (Mining Engineering)

Course Code: 5BEMN07
Course Title: Mine Climate Engineering

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
0	0	2	3	1	25	25	50

Sr. No.	List of Practical's
1	Detection of CO by MSA CO-detector pump apparatus.
2	To study MSA Methanometer and Testing of CH ₄ by MSA Methanometer.
3	To Study Flame safety lamp & Testing of CH ₄ by Flame Safety Lamp.
4	Determination of Relative Humidity (R.H.) of mine air by Whirling Hygrometer.
5	Determination of Cooling Power of mine air by Kata Thermometer.
6	To study different Ventilation Devices.
7	Measurement of Air Velocity by Anemometer and determination of Air Quantity.
8	To study operation of Fans in series.
9	To study operation of Fans in parallel.

V Semester B. E. (Mining Engineering)

Course Code: 5BEMN08
Course Title: Mine Surveying-II

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
0	0	2	3	1	25	25	50

Sr. No.	List of Practical's
1	Theodolite traversing by horizontal angle measurement.
2	To determine the most probable value of the included angles of a given triangle by method of least squares.
3	Correlation survey by alignment/co-planning method.
4	Correlation survey by weiss-bach triangle method.
5	Correlation survey by weiss-quadrilateral method.
6	Study of mirror stereoscope.
7	Study of Gyro theodolite.
8	Study of photo theodolite.
9	Study of automatic level.
10	Study of micro-optic theodolite.
11	Study of clinometer compass.
12	Study of Electromagnetic distance measuring equipment.
13	Determination of true north by observing circumpolar star, at equal altitude.

V Semester B. E. (Mining Engineering)

Course Code: 5BEMN09
Course Title: Mining Machinery-II

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
0	0	2	3	1	25	25	50

Sr. No.	List of Practical's
01	Study of Coal Drill.
02	Study of Excavators
03	Study of Front End Loader.
04	Study of Scraper
05	Study of Dozer
06	Study of Bucket Wheel Excavator
07	Study of Road Graders
08	Study of Road Headers – Rotary and Milling type.

Course Code: 5BEMN10
Course Title: Rock Mechanics

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
0	0	2	3	1	25	25	50

Sr. No.	List of Practical's
1	Determination of Protodyakonov Strength Index.
2	Determination of Impact Strength Index.
3	Determination of Slake Durability Index.
4	Preparation of Rock Specimen by core-drilling, cutting & polishing for compression & Tension Tests.
5	Determination of Uniaxial Compressive Strength.
6	Brazilian Tensile Test.
7	Determination of Point Load Strength Test.
8	Introduction to Triaxial Compression Test.
9	Determination of Shear strength (Double shear of Punch Shear)

VI Semester B. E. (Mining Engineering)

Course Code: 6BEMNO1
Course Title: Mine Rescue Engineering

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
4	0	0	4	4	3	10	10	80	100

Unit	Contents	Hours
I	Mine Fires: Causes of mine fires; spontaneous combustion – mechanism, susceptibility indices, factor affecting spontaneous combustion; detection and prevention of spontaneous heating; accidental fires- causes and prevention; dealing with mine fires, direct and indirect methods, fire stoppings; fires in quarries, coal stacks and waste dumps.	9
II	Mine Explosions: Firedamp and coal dust explosions-mechanisms, causes and prevention; stone dust and water barriers; investigations after an explosion.	9
III	Inundation: Causes and prevention, precautions and techniques of approaching old workings; safety boring apparatus, pattern of holes; design and construction of water dams. Shaft dams, emergency bulk heads, strengthening of dams.	9
IV	Rescue and Recovery: Rescue equipment and their uses, rescue stations and rescue rooms; organization of rescue and recovery areas, re-opening of sealed off working.	9
V	<p>Illumination in mines- it's effect on safety, units in lighting, efficiency and health; construction and working of cap lamp, lamp room design and organization; different types of illumination devices; standards of illumination in underground and opencast mines, special service lamps in mines, illumination survey, Glare and its control, face lighting.</p> <p>Mine Dust: Airborne respirable dust in underground mines- generation, dispersion, measurement and control; classification, physiological effects, dust measurement, sampling of air-borne dust.</p>	9
Total		45

Text and Reference Book/s:

1. Mine Fires, explosions, Rescue, Recovery and Inundations by M A Ramlu
2. Fires in Coal Mines by L C Kaku
3. Prevention and Combating Mine Fires by S C Banerjee
4. A Manual on Mines Rescue, Safety and Gas Detection by J Strang and P Mackenzie-Wood
5. Mine Environment and Ventilation by G B Mishra
6. The Lighting of Underground Mines by D A Trotter

VI Semester B. E. (Mining Engineering)

Course Code: 6BEMN02
Course Title: Underground Coal Mining

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
4	0	0	4	4	3	10	10	80	100

Unit	Contents	Hours
I	Introduction; status of coal reserves, status of coal mining in India, Classification of mining method. Development: Bord and Pillar, and Room and Pillar mining, design of bord and pillar workings, the panel system, panels and inter-panel barriers, size of pillars and galleries; methods of driving galleries; layouts for different combinations of loading and transport systems, development with continuous miner	9
II	Depillaring: Preparatory arrangements for depillaring; sequence and manner of extraction of pillars; mechanized pillar extraction, setting and withdrawal of supports; airblasts; partial extraction, Depillaring with continuous miner.	9
III	Longwall Mining: Evolutionary development of Longwall mining, its application, layouts, development and extraction by conventional and mechanized methods, design of longwall workings – face length and panel length, salvaging of longwall faces.	9
IV	Thick seam mining: multi-section mining, slicing methods, sublevel caving, integrated sublevel caving, blasting gallery method, hydraulic mining.	9
V	Contiguous seam working; working under surface structures and water bodies, harmonic mining, shaft pillar extraction, horizon mining, special methods-wide stall, extraction with cable bolting, yield pillar technique etc.	9
Total		45

Text and Reference Book/s:

1. Modern Coal Mining Technology by Dr S K Das, Lovely Prakashan, Dhanbad
2. Thick Seam Mining – Problems and Issues by Dr T N Singh and B B Dhar, Oxford and IBH Publishers
3. Coal Mine Planning and Management, Vol I, II, III, IV by S P Mathur, Khanan Prakashan, Bilaspur
4. Underground Winning of Coal by T N Singh
5. Underground Coal Mining Methods by J G Singh
6. Coal Mining Practice by I C F Strathum

VI Semester B. E. (Mining Engineering)

Course Code: 6BEMN03
Course Title: Surface Mining

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
4	0	0	4	4	3	10	10	80	100

Unit	Contents	Hour S
I	Role of surface mining in mineral production in India, elements of surface mine planning-height, width, and slope of benches, overall and ultimate pit slopes, stripping ratio, cut off grade, different mining costs and preliminary evaluation of surface mining prospects. Opening up of Deposits – different system of opening of deposits, site preparation, box cut, formation of benches and haul roads.	9
II	Types of surface mining system – applicability, limitation, advantages, disadvantages, Layouts using different combinations of main excavation, loading and transportation systems.	9
III	Extraction Methods: Extraction of subsurface deposits – bedded deposits, massive deposit, pipe type, cap type and vein type deposits, mining of bench sands, placer mining, dimensional stone mining.	9
IV	Layouts with In-pit crushing and conveying, surface miners Surface mining of coal seams developed by underground methods, surface mining over underground workings, mining in fiery strata, deep mining problems.	9
V	Dump formation: Types of waste dump – internal and external; dump formation methods and equipment, Reclamation methods by using different combination of equipment.	9
Total		45

Text and Reference Book/s:

1. Principles and Practices of Modern Coal Mining by R. D. Singh, New Age Int. (P) Ltd., New Delhi
2. Opencast Mining by R. T. Deshmukh, Myra Publishers, Nagpur
3. Introductory Mining Engineering by H. L. Hartman, John Wiley & Sons
4. Opencast Mining - Unit Operations by V. V. Rzhovsky, Mir Publishers, Moscow
5. Surface Mining by G. B. Misra, Dhanbad, Publishers.
6. Surface Mining Equipment by J. W. Martin et al, Martin Consultants Inc., Colorado
7. SME Mining Engineering Handbook by H. L. Hartman (Editor), Soc. For Mining, Metallurgy and Exploration Inc., Co.
8. Bucket Wheel Excavator by W. Durst & W. Vogt, Trans Tech Pub. Germany

VI Semester B. E. (Mining Engineering)

Course Code: 6BEMN04
MINERAL PROCESSING
Course Title: TECHNOLOGY

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
4	0	0	4	4	3	10	10	80	100

Unit	Contents	Hours
I	INTRODUCTION: Mineral beneficiation and its role in mineral exploration and conservation with special reference to Indian economic minerals. COMMUNITATION AND LIBERATION: Theory and practice of crushing and grinding, conventional units and their performance and choice.	9
II	SIZING: Laboratory techniques, interpretation and plotting of data, industrial screens and classifiers, dry and wet processes SAMPLING: Importance of sampling and methods used in mills.	9
III	PRE-CONCENTRATION: Picking, washing and classification, Leaching- Brief description of techniques. GRAVITY CONCENTRATION: Theory and application of sinks and float, jigging and flowing film concentration-methods and equipments used.	9
IV	FROTH FLOTATION: Physico-chemical principles, flotation reagents, flotation machines and circuits, application to common sulfide, oxide and oxidized minerals. ELECTROSTATIC AND MAGNETIC SEPARATION: Principles, operation and field of application.	9
V	PELLETIZATION OF LOW IRON ORES: Dewatering and drying: thickening, filtration and drying. COAL WASHING: Methods of coal washing, washability curves FLOWSHEETS: Simplified flowsheets for the beneficiation of coal and typical ores of copper, lead, zinc, iron and manganese with special reference to Indian deposits.	9
Total		45

Text and Reference Book/s:

1. Mineral Processing by S K Jain
2. Mineral Processing by Proyar
3. Mineral Processing by Vijayendra

VI Semester B. E. (Mining Engineering)

Course Code: ELECTIVE II-1
Course Title: Underground Metalliferous Mining

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
4	0	0	4	4	3	10	10	80	100

Unit	Contents	Hours
I	Introduction: Present status of Indian metal mining industry, scope and limitations of underground mining; classification and choice of stoping methods. Development: Choice of level interval and block length - shape, size, position. Cross-cuts, drifts, and declines – their shapes, size and position.	9
II	Excavation and equipping of shaft station, grizzly, ore/waste bin, main orepass system, underground crushing and loading stations, underground chambers, sump and other subsidiary excavations, arrangements for dumping into main orepass. Raises and winzes - their shape, size and position, excavation process-ground breaking, mucking, ventilation and support, modern methods of raising – Alimak and Jora-lift raising, longhole method including vertical crater retreat method of raising, raise boring – systems and their details; modern methods of winzing; Secondary breaking at grizzly- Conventional and mechanized methods.	9
III	Open stoping-room and pillar, sublevel, large diameter blast hole/DTH, shrinkage and vertical crater retreat methods - their applicability, stope layouts, stope preparation, ground breaking, mucking, ventilation and supporting, haulage and dumping Supported stoping – post and pillar, square set, longwall, cut and fill – their applicability, stope layouts, stope preparation, ground breaking, mucking, ventilation and supporting, haulage and dumping.	9
IV	Caving stoping – top slicing, sublevel caving, and block caving, their applicability, stope layouts, stope preparation, ground breaking, mucking, ventilation and supporting, haulage and dumping Mining of parallel and superimposed veins Pillar recovery Dilution, loss and recovery in stoping.	9
V	Solution mining, in-situ leaching, borehole mining, underground retorting, Problems of deep mining and their remedial measures, design and layout of stopes in rock burst prone areas	9
Total		45

Text and Reference Book/s:

1. Mining Methods & Equipment by Koehler S. Stout, McGraw-Hill
2. Rudiments of Mining Practice by C.E.Gregory, Trans Tech Pub.
3. Introductory Mining Engineering by H. L. Hartman, John Wiley & Sons
4. Metalliferous Mining by Higham, Charles Griffin & Co. Ltd., London
5. Metalliferous Mine Surveying by Frederick Winiberg, John Wright & Sons Ltd., UK
6. SME Mining Engineering Handbook by H.L.Hartman (Editor), Soc. For Mining, Metallurgy and Exploration Inc., Co.
7. Underground Mining Methods Handbook by Hustrulid, Soc. For Mining, Metallurgy and Exploration Inc., Co.

LABORATORY

VI Semester B. E. (Mining Engineering)

Course Code: 6BEMN06
Course Title: Mine Rescue Engineering

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
0	0	2	3	1	25	25	50

Sr. No.	List of Practical's
1	To determine Crossing Point Temperature of coal.
2	To study the construction of Isolation stopping in the area to be sealed off.
3	To study different types of fire extinguishers.
4	To study stone dust barrier
5	To study stage method of reopening sealed off area.
6	To study MRE-113 A type Gravimetric Dust Sampler.
7	To study self contained breathing apparatus (BG-174 A MODEL)
8	To study Filter Self Rescuer.

VI Semester B. E. (Mining Engineering)

Course Code: 6BEMN07
Course Title: Mineral Processing Technology

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
0	0	2	3	1	25	25	50

Sr. No.	List of Practical's
1	To study crushing phenomenon.
2	To study Jaw crusher.
3	To study Gyratory crusher.
4	To study grinding operation in a Ball mill.
5	To study a Pulveriser.
6	To study a Cone crusher.
7	To study Sieve shaker device.
8	To study a Cyclone separator.

VI Semester B. E. (Mining Engineering)

Course Code: 6BEMN08
Course Title : Training in Mines

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
0	0	0	0	2	50	--	50