

# GONDWANA UNIVERSITY, GADCHIROLI

## Four Year Degree Course in the Faculty of Science & Technology

### Course and Examination Scheme with Choice Based Credit System (CBCS) from 2020-21 onwards

#### VII 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												
7BEMN01	Ground Control in Mines	4	0	0	4	3	80	10	10	100	40	--	--	--	--
7BEMN02	Surface Mine Environment	4	0	0	4	3	80	10	10	100	40	--	--	--	--
7BEMN03	Computer Applications in Mining	4	0	0	4	3	80	10	10	100	40	--	--	--	--
7BEMN04	Mine Planning	4	0	0	4	3	80	10	10	100	40	--	--	--	--
7BEMN05	Open Elective	3	1	0	3	3	80	10	10	100	40	--	--	--	--
	<b>Laboratory</b>														
7BEMN06	Ground Control in Mines	0	0	2	1	--	--	--	--	--	--	25	25	50	25
7BEMN07	Surface Mine Environment	0	0	2	1	--	--	--	--	--	--	25	25	50	25
7BEMN08	Computer Applications in Mining	0	0	2	1	--	--	--	--	--	--	25	25	50	25
7BEMN09	Project	0	0	4	2							50	--	50	25
<b>Total</b>		<b>19</b>	<b>1</b>	<b>10</b>	<b>--</b>	<b>--</b>	<b>--</b>			<b>500</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>200</b>	<b>--</b>
<b>Semester Total</b>		<b>30</b>			<b>24</b>	<b>700</b>									
<i>Note</i> : 1) Open Elective : 1) Systems Engineering 2) Advanced Surveying (Open to all Branches of Engineering) Student has to undergo Practical Training at mines for four week (one month) duration during winter vacation.															

# GONDWANA UNIVERSITY, GADCHIROLI

## Four Year Degree Course in the Faculty of Science & Technology

### Course and Examination Scheme with Choice Based Credit System (CBCS) from 2020-21 onwards

#### VIII 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													
8BEMN01	Mine Management	4	0	0	4	3	80	10	10	100	40	--	--	--	--
8BEMN02	Mine Legislation & Safety	4	0	0	4	3	80	10	10	100	40	--	--	--	--
8BEMN03	Mineral Economics	4	0	0	4	3	80	10	10	100	40	--	--	--	--
8BEMN04	Program Elective - I	3	0	0	3	3	80	10	10	100	40	--	--	--	--
8BEMN05	Open Elective - II	3	0	0	3	3	80	10	10	100	40	--	--	--	--
	<b>Laboratory</b>														
8BEMN06	Project	0	0	4	4	--	--	--	--	--	--	50	50	100	50
8BEMN07	Vocational Training	0	0	2	2	--	--	--	--	--	--	50	--	50	25
8BEMN08	Survey Camp	0	0	2	2	--	--	--	--	--	--	50	--	50	25
<b>Total</b>		<b>18</b>	<b>0</b>	<b>0</b>	<b>--</b>	<b>--</b>	<b>--</b>			<b>500</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>200</b>	<b>--</b>
<b>Semester Total</b>		<b>26</b>			<b>26</b>	<b>700</b>									
<p><i>Note</i> : 1) Program Elective- – 1) Clean Coal Technologies 2) Geo Statistics (Select any one).  <b>Open Elective</b> - 1) Management Information System, 2) Safety Engineering 3) Tunneling &amp; Underground Space Technology (Select Any One)                      2) Student has to undergo Practical Training at mines for four week (one month) duration during summer vacation.</p>															

## VII Semester B. E. (Mining Engineering)

**Course Code:** 7BEMN01  
**Title of the Course:** Ground Control in Mines

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MS E	I E	ES E	Total
4	0	0	4	3	3	10	10	80	100

Unit	Contents	Hours
I	<p><b><u>Engineering Rock Mass Classification</u></b>            Practical significance of classification of rock masses, Bieniawski's RMR Classification Scheme &amp; various modifications suggested including Laubscher's modification, Barton's Q- Classification Scheme, Excavation Support Ratio &amp; Average Stand-up Time, Rock Structure Rating, CMRI Classification Scheme and its use in determination of appropriate support system for an underground mine,            Ground Control: Definition, practices, relation to mine layout and subsystems of mining            High horizontal stresses.</p>	9
II	<p><b><u>Stresses Around Underground Openings</u></b>            Types of Openings - single &amp; multiple openings, shapes of openings; Induced stresses around openings using classical closed – form solutions; Design considerations in selection of openings; Elementary introduction to concepts of numerical analysis methods – Finite Element Method (FEM), Boundary Element Method (BEM) and Hybrid Methods.  <b><u>Pillar Design</u></b>            Estimating average pillar stress by Tributary Area Method and its criticism; Factors affecting pillar strength; various important formulae for determination of pillar strength; Factor of Safety of pillars; Steps in design of pillars.</p>	9
III	<p><b><u>Rockbursts</u></b>            Caving characteristics of roof rocks; Definition, types &amp; phenomenology of rock bursts; Factors affecting proneness to rock bursts; Prediction of rock bursts; Monitoring of rock bursts – methods &amp; instrumentation; Prevention &amp; control of rock bursts; Bumps and Gas outbursts.            Overburden Movement &amp; Abutment Pressure in Longwall Mining, including concepts of Immediate Roof and Main Roof.</p>	9
IV	<p><b><u>Subsidence</u></b>            Definition – sub-surface &amp; surface subsidence; Important theories of subsidence; Types of surface subsidence; Factors affecting subsidence; Related terminology; Subsidence profiles (lateral &amp; vertical movement, strain curves); Subsidence prediction; Subsidence survey; Prevention &amp; control of subsidence.</p>	9
V	<p><b><u>Monitoring Ground Movement</u></b>            Purpose; Devices/Instruments to measure deformation, strain, load, stress, bearing capacity, seismic activity, strata movement etc.  <b><u>Photoelasticity</u></b>            Principle &amp; applications  <b><u>Slope Stability of Opencast Benches</u></b>            Effect of pit slope on mine economics; Common modes of slope failure; Factors affecting slope stability; Techniques of slope stability analysis; Measures to enhance stability of and to monitor &amp; protect slopes.</p>	9
<b>Total</b>		45

**Text Book/s:**  
**Reference Book/s:**

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

## VII Semester B. E. (Mining Engineering)

**Course Code:** 7BEMN02  
**Title of the Course:** Surface Mine Environment

Course Scheme				Evaluation Scheme (Theory)				
Lecture	Tutorials	Practicals	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
4	0	0	4	3	10	10	80	100

Unit	Contents	Hours
I	<b><u>Introduction</u></b> The term 'Environment'; Essential elements/ingredients of environment; Environmental issues in industry in general – national & global; Statutory regulatory bodies on monitoring & control of environmental pollution; Impact of mining (underground, surface & associated) activities on environment, National Environment Policy, Environmental Administration and Management in India, Environmental Protection Act and its salient features.	9
II	<b><u>Air Pollution</u></b> Desirable composition of mine air; Sources of ambient air pollution; Monitoring methods (periodic and continuous), environment; Statutory provisions; Control measures.	9
III	<b><u>Water Pollution</u></b> Causes of water pollution, classification of water pollutant, waste water characteristics, Impact of mining on availability and quality of ground water and surface streams; Adverse effect of water pollution on crops and other flora; AMD treatment techniques; treatment and disposal of effluent water; Water management techniques in mines.	9
IV	<b><u>Sound Pollution</u></b> Noise, ground vibration, air blast, fly rocks, damage to surface structures and other related problems due to blasting in mines; Sources of sound pollution and ground vibration; Monitoring of noise produced by machinery & blasting; Control of noise & ground vibration.	9
V	<b><u>Societal Environment</u></b> Socio-economic impacts of mining activities; Issues of resettlement and rehabilitation of displaced population; <b><u>Land Environment</u></b> Visual impacts; Impacts on land use pattern; Subsidence management <b><u>Environmental Administration</u></b> Mine waste management, Environmental Impact & management of OB dump; Environmental Impact Assessment, Environment Management Plan; Environmental audit; ISO 14000.	9
<b>Total</b>		45

**Text Book/s:**

**Reference Book/s:**

**Text cum Reference Book/s:**

1. Air Pollution by M.N. Rao and H.V.N. Rao
2. Environmental Chemistry and Pollution Control by S.S. Dara
3. Environmental Monitoring and Pollution Measures by K.N.Joshi and T.S. Chouhan
4. Practical Methods for Water & Air Pollution Monitoring by S.K. Bhargava

## VII Semester B. E. (Mining Engineering)

**Course Code:** 7BEMN03  
**Title of the Course:** Computer Applications in Mining

Course Scheme				Evaluation Scheme (Theory)				
Lecture	Tutorials	Practicals	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
4	0	0	3	3	10	10	80	100

Unit	Contents	Hours
I	<p><b>Database Management:</b>            Database; DBMS (Database Management System); Desirable characteristics of an ideal DBMS; RDBMS(Relational Database Management System); E-R diagram, DDL, DML, Function of DBA.            Introduction to GIS (Geographical Information System) and GPS (Global Positioning System) and their applications; M.I.S. (Management Information System) – concept &amp; applicability to mining industry, Introduction to different RDBMS Software Systems.</p>	9
II	<p><b>Introduction to a Database Management Software</b>            Microsoft Access, its essential features and use: Forms, query, filters, report, interlinking of tables using keys and other fields, Creating database for mining industries and its related applications.</p>	9
III	<p><b>Newer concepts in problem solving</b>            Elementary Introduction to Artificial Intelligence, Fuzzy Sets, Neural Networks, Neurofuzzy Solutions and Robotics, Numerical analysis methods.</p>	9
IV	<p><b>Applications of Computer Programming</b>            Programming for solving problems of mining - mine ventilation networks, pillar design, blast design, haulage &amp; winding calculations, blast fragment analysis.</p>	9
V	<p><b>Computer Graphics</b>            Computer Aided Design; Graphics in C; Introduction to AUTOCAD, software specific to mining engineering applications, digitisers, scanner and other relevant hardware devices, mine plans, minimize.</p>	9
<b>Total</b>		45

**Text Book/s:**

**Reference Book/s:**

1. C-The Complete Reference by Herbert Schildt, Tata Mcgraw Hills.
2. Graphics in C by Yashwant Kanetkar, BPB, Publications
3. Artificial Intelligence and Expert System by Dan W. Patterson
4. Graphic Programming C by R.T. Stevens
5. Data Base System Concepts, Silberschatz, Korth, Sudarshan, Mcgraw-Hills

## VII Semester B. E. (Mining Engineering)

**Course Code:** 7BEMN04

**Title of the Course:** Mine Planning

Course Scheme				Evaluation Scheme (Theory)				
Lecture	Tutorials	Practicals	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
4	0	0	3	3	10	10	80	100

Unit	Contents	Hours
I	<p><b>Unit 1</b>  <b>Introduction</b>                      Principles of planning; Features of mine planning; planning for new projects and reconstruction planning; Short range and long range planning; Phases of mine planning; Project implementation and monitoring; Geological reports, Feasibility Reports</p>	9
II	<p><b>Unit 2</b>                      Fixing the mine boundary – surface and underground; Size of mine; Limited and unlimited reserves; Optimum designed capacity; Reserve estimation; Planning Panel System of Mining</p>	9
III	<p><b>Unit 3</b>                      Mine entries: types, their application, location, selection, choice of shape and determination of size of opening.                      Infrastructural planning: CHP, workshop, power, water requirement and communication in mines</p>	9
IV	<p><b>Unit 4</b>  <b>Selection of Mining Methods</b>                      Selection; Factors to be considered; Surface v/s underground; Selection of various methods of extraction; Production estimation; Production potential of different panels; Fixing the target of mine</p>	9
V	<p><b>Unit 5</b>  <b>Transportation planning</b>                      Alternatives; Choice of men, material and mineral handling transport systems; Selection                      Ventilation planning: Objectives; Steps; Network solutions; Economic of ventilation.  <b>Drainage planning</b>                      Assessment of make of water; Drainage layout; Design of sumps; Selection of pumps and pumping capacity  <b>Manpower planning</b>  <b>Project Construction Schedule;</b>  <b>Planning for mine closure and post mining land use</b></p>	9
<b>Total</b>		45

### Text cum Reference Book/s:

1. Coal Mine Planning by S. P. Mathur

2. Coal Mining Methods and Management Vol I,II,III and IV by S. P. Mathur, Khanan Prakashan, Bilaspur.
3. Underground Mining Methods Handbook by W A Hustrulid
4. Introductory Mining Technology by H L Hartman
5. Principles and Practices of Modern Coal Mining by R D Singh, New Age Int. (P) Ltd., New Delhi
6. SME Mining Engineering Handbook by H.L.Hartman (Editor), Soc. For Mining, Metallurgy and Exploration Inc., Co. Principles of Mine Planning by A Bhattacharya, Allied Publishers



## VII Semester B. E. (Mining Engineering)

**Course Code:** 7BEMN05

**Title of the Course:** Elective-I Mine Systems Engineering

Course Scheme				Evaluation Scheme (Theory)				
Lecture	Tutorials	Practicals	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	0	4	3	10	10	80	100

Unit	Contents	Hours
I	<p><b><u>Introduction</u></b> Concept of system, components and system environment; Classification of systems; Systems analysis</p> <p><b><u>Decision Making</u></b> Decision problems; Model formulation; Decision analysis based on expected monetary value and utility value.</p>	9
II	<p><b><u>Linear Programming</u></b> Concepts; Graphical solutions; Simplex Method; Primal-dual models; Sensitivity Analysis; case examples from mining engineering.</p>	9
III	<p><b><u>Network Analysis</u></b> Determination of the shortest path; Critical Path Method (CPM) and Programme Evaluation Review Technique (PERT); case examples from mining engineering</p> <p><b><u>Dynamic Programming</u></b> Dynamic programming and stagecoach problem.</p>	9
IV	<p><b><u>Simulation</u></b> Introduction, concept, scope and limitations; Monte Carlo simulation; Simulation of equipment maintenance and Introduction to inventory systems in mines.</p>	9
V	<p><b><u>Transportation and Assignment Problems</u></b> Mathematical modelling and solution algorithms; applications to mining engineering; Basic queuing models with constant arrival and service rates.</p>	9
<b>Total</b>		45

**Text Book/s:**

**Reference Book/s:**

1. Operations Research by Kanti Swarup, P.K. Gupta, Man Mohan
2. Operations Research by Prem Kumar Gupta, D.S. Hira
3. Operations Research Theory & Applications by J.K. Sharma

## VII Semester B. E. (Mining Engineering)

**Course Code:** 7BEMN05

**Title of the Course:** Elective-II Advanced Surveying

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MS E	I E	ES E	Total
3	1	0	4	4	3	10	10	80	100

Unit	Contents	Hours
I	<p><b>Geodesy</b> Physical and geometric geodesy; Spheroid and ellipsoid; Geocentric, geodetic and astronomical co-ordinates; Orthometric and dynamic heights; Geodetic instrumentation and techniques</p> <p><b>National Grid</b> Map projections; UTM; Different co-ordinate systems; Transformation of co-ordinates</p>	9
II	<p><b>Geographic Information System (GIS)</b> Introduction; Working principle; Database associated with GIS; Application of GIS in surface mining, land development, road construction etc.;</p>	9
III	<p>Global Positioning System (GPS) Introduction; Working principle; Application in surface mining including tracking of important equipments; Application to mine survey and face monitoring</p>	9
IV	<p>Astronomy Introduction and scope; Astronomical triangle; Conversion of time systems; Precise determination of azimuth by astronomical methods Satellite Imagery – Use in cartography</p>	9
V	<p>Remote Sensing – Introduction, working principle and applications in mining engineering Electronic Distance Measurement (EDM) – working principle and application in mine survey, Total Station, Synthetic Aperture Radar (SAR) Interferometry – principle and applications in subsidence survey and resource estimation</p>	9
<b>Total</b>		45

### Text cum Reference Book/s:

1. Surveying & Field Work Volume III by Dr. B. C. Punmia, Laxmi Pub. Pvt. Ltd., New Delhi.
2. Plane and Geodetic Surveying by Aylmer Johnson, 2014, CRC Press.
3. GPS for Geodesy by Peter J.G. Teunissen and Alfred Kleusberg, 1998, Springer Publications.
4. Introduction to Remote Sensing by Arthur P Cracknell, 2007, CRC Press.

## VII Semester B. E. (Mining Engineering)

**Course Code:** 7BEMN06  
**Title of the Course:** Ground Control in Mines Laboratory

Course Scheme					Evaluation Scheme (Laboratory)	
Lecture	Tutorial	Practical	Credit	Th W	PO E	Total
0	0	2	2	25	25	50

Sr. No.	List of Practical's
1	To determine RMR of rock strata using Bieniawski's Classification Scheme and suggest suitable support system.
2	To determine Tunneling Quality Index of a rock mass using Barton's Classification Scheme.
3	To determine the RMR of rock strata using CMRI-ISM Classification Scheme.
4	To compute induced stresses around underground circular openings using Kirsch's Solution.
5	To Design Pillar Dimensions ensuring adequate Factor of Safety.
6	To Design support system using CMRI-ISM Rock Mass Classification System.
7	Measurement of In-situ stresses by using a Flat Jack Method.
8	To study the displacement measurement using LVDT.
9	To measure strain using strain gauge.
10	To determine Triaxial Compressive Strength.
11	To design roof bolt supporting system for underground workings.
12	To analyse the stress developed in C-clamp by photoelastic method.

## VII Semester B. E. (Mining Engineering)

**Course Code:**

**7BEMN07**

**Title of the Course:**

**Surface Mine Environment Laboratory**

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

Sr. No.	List of Practical's
1	To determine Tspm By High Volume Sampler.
2	To study physical and chemical parameters of waste water.
3	To study various air pollution control devices.
4	To study WETP (Workshop Effluent Treatment Plant) & DETP (Domestic Effluent Treatment Plant) at mines.
5	To determine Noise Levels by Sound Level Meter (Slm).
6	To study Environmental Impact Assessment Techniques.
7	To study different methods of Land Reclamation.

## VII Semester B. E. (Mining Engineering)

**Course Code:** 7BEMN08

**Title of the Course:** Computer Applications in Mining Laboratory

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MS E	I E	ES E	Total
3	1	0	4	3	3	10	10	80	100

Sr. No.	List of Practical's
1	Introduction to MS Access. Exploring its features.
2	Creating a database and a table therein.
3	Display and entering data in table.
4	Creating a form using the form wizard.
5	Creating a filter.
6	Creating a query using the simple query wizard.
7	Creating a report.
8	To programme in 'C' language for pillar design.

## VIII Semester B. E. (Mining Engineering)

**Course Code:** 8BEMN01  
**Title of the Course:** Mine Management

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MS E	I E	ES E	Total
3	1	0	4	3	3	10	10	80	100

Unit	Contents	Hours
I	<b>Introduction</b> Evolution of modern management theory and practice; Principles of scientific management; Elements of management functions – planning, organisation and control; Systems and contingency approach to management; Structure and design of organisation for mining enterprises; Introduction to essential features of M.I.S. (Management Information System).	9
II	<b>Personnel Management</b> Manpower planning and recruitment, selection, training and development of human resource; Performance appraisal and merit rating; Motivation & Incentive; Leadership; Absenteeism; Organisation development.	9
III	<b>Production Management</b> Production forecasting, planning and control – short and long term – in mines; Determination of norms and standards of operations by work study; Analysis of mine capacities and capabilities; Quality control; Productivity – concept and measurement.	9
IV	<b>Industrial Relations</b> Human relations; Trade Union movement in India – its origin & evolution; Industrial Disputes Act; Discipline and enquiries, conflicts in an organization – sources and resolutions, communication .	9
V	<b>Industrial Psychology</b> Psychology and its relation with business, industry and management; Physical factors and their effect on management; Psychological tests – utility and development; Tests for selection and development; Fatigue; Accident proneness.	9
<b>Total</b>		45

**Text Book/s:**

**Reference Book/s:**

1. Human Resource Management, S.S. Khanka
2. Industrial Engineering & Production Management, Telsang Mert T
3. Text book on Human Psychology, Sarda Subrahmanyam, H D Singh, K Madhavankutty
4. Business Organisation & Management, Shukla M.C.
5. Basics of Production & Operations Management, S A Chunawalla
6. Essentials of Business Communication Skills for Engineers, Urmila Rai & S.M. Rai
7. Human Resource Management & Industrial Relations, P.N. Subramani

## VIII Semester B. E. (Mining Engineering)

**Course Code:** 8BEMN02  
**Title of the Course:** Mine Legislation & Safety

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MS E	I E	ES E	Total
3	1	0	4	3	3	10	10	80	100

Unit	Contents	Hours
I	<b>Introduction</b> General principles of mining laws; Development of mining legislation in India; Sources of legislation; DGMS and its role in monitoring and ensuring safe mining practices including conducting various examinations for working mining personnel.	9
II	<b>Mining Laws</b> The Mines Act, 1952; The Mines Rules, 1955; Mines and Minerals (Regulation & Development) Act, 1957; Relevant provisions of Indian Electricity Rules, 1956; Vocational Training Rules. 1966.	9
III	<b>Mining Laws</b> The Coal Mines Regulations, 1957, Relevant Standing orders and DGMS circulars.	9
IV	<b>Mining Laws</b> The Metalliferrous Mines Regulations, 1961; Mines Rescue Rules, 1985 Relevant standing order & DGMS Circular.	9
V	<b>Mine Accidents</b> Occupational Hazards of mining; Classification of accidents; Statistics – frequency and severity rates; Causes of accidents; Investigations into accidents and reports. <b>Safety Measures</b> Measures for improving safety levels in mines; MAP & ZAP; Emergency Measures; Emergency Organisation.	9
<b>Total</b>		45

### Text Book/s:

### Reference Book/s:

1. Indian Mining Legislation – A Critical Appraisal Vol I and II by Rakesh & Prasad, Publishers Mrs Asha Lata, Varanasi.
2. Classified Mine Circulars issued by DGMS, Dhanbad.
3. Safety in Mines: A survey of accidents, their causes and prevention by Prof. B K Kejriwal
4. CMR, MMR, Rescue Rule, Indian Electricity Rule, DGMS Circulars published by Govt. of India.

## VIII Semester B. E. (Mining Engineering)

**Course Code:** 8BEMN03  
**Title of the Course:** Mineral Economics

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MS E	I E	ES E	Total
3	1	0	4	3	3	10	10	80	100

Unit	Contents	Hours
I	<p><b><u>Introduction</u></b>                      Uniqueness and economic importance of mineral industry; Concept &amp; classification of mineral resource; Geographical distribution of important mineral deposits and mining fields in India; National mineral policy</p> <p><b><u>Computation of Reserves</u></b>                      Computation of tonnage, average assay width, stoping width, clean width, milling width, average length etc.; Reliability of mine sampling.</p>	9
II	<p><b><u>Mine Sampling</u></b>                      Definition, purpose and scope; Size of sample; Classes of sample; Methods of sampling; Errors in sampling; Salting; Safeguards against salting.</p>	9
III	<p><b><u>Valuation of Mineral Property</u></b>                      Examination and valuation of mines/mineral properties; Time value of money; Present value &amp; its computation; Life of a mine; Concepts of redemption of capital, depreciation; Preparation of valuation reports.</p>	9
IV	<p><b><u>Conservation of Mineral Resource</u></b>                      Scope and limitations; Losses of minerals in mining; Dilution and recovery</p> <p><b><u>Costs of Mining</u></b>                      Capital and operating costs; Factors affecting operating costs; Standard cost and forecast; Budget &amp; budgetary control.</p>	9
V	<p><b><u>Economic Feasibility</u></b>                      Need for economic analysis; Sources of finance and the cost of capital; Methods of investment appraisal; Risk Analysis; Royalty, taxes and duties; Small mines and their socio-economic significance; Mineral price and pricing; Price Index.</p>	9
<b>Total</b>		45

**Text Book/s:**

**Reference Book/s:**

1. Mineral economics by Sinha & Sharma
2. Mineral Economics by R.T. Deshmukh
3. Mineral Economics by K. Chatterjee



## VIII Semester B. E. (Mining Engineering)

**Course Code:** 8BEMN04

**Title of the Course:** Program Elective-I Clean Coal Technologies

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MS E	I E	ES E	Total
3	1	0	4	4	3	10	10	80	100

Unit	Contents	Hours
I	Life cycle of coal, coal characterization, classification system of coal, rank and grade of coal, C-H graph.	
II	Coal beneficiation – Feed grade dry and wet coal beneficiation techniques, chemical and biological methods of coal cleaning. Coal washing: Objectives and Techniques; Washability curve.	
III	Clean coal technology: Definition and Objectives, Technology Options; Pre-combustion, Combustion, Post Combustion and Conversion CCTs. Coal combustion options: FBC, IGCC, co-generation options, CO <sub>2</sub> Sequestration options: Capture and storage of CO <sub>2</sub> (CCS),	
IV	Coal Bed Methane (CBM) - Recovery and utilization, Coal to Liquid Technology (CTL), Coal Mine Methane (CMM).	
V	Coal Gasification (In-situ and surface Gasification Techniques) – Introduction,	
<b>Total</b>		

### Text Book/s:

1. Coal Preparation by J Osborne
2. Mineral Dressing by M A Gaudin / S K Jain.
3. Advanced Coal Mining by Vorobjev and Deshmukh.

### Reference/s:

4. CCT Initiative – Roadmap for future development, CCT DST-BHEL Workshop, Oct'2006.
  5. Carbon capture and storage technologies, International Energy Agency, 2008.
  6. Energy technology perspectives: Conservation, carbon dioxide reduction, and production from alternate sources, N R Neelameggham *et al* (eds), JWS Wiley Publications, 2009.
  7. CO<sub>2</sub> sequestration technologies for clean energy, S Z Qasim and Malti Goel (eds), Daya Publishing House, New Delhi, 2010.
- Integrated energy policy, annual report 2008, Department of Coal, Govt of India

## VIII Semester B. E. (Mining Engineering)

**Course Code:** 8BEMN04

**Title of the Course:** Program Elective-I Geostatistics

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MS E	I E	ES E	Total
3	1	0	4	4	3	10	10	80	100

Unit	Contents	Hours
I	Definition of resource and reserve, Conventional Reserve estimation technique.	9
II	Introduction to geostatistical concept, Review of classical statistics, Regionalised variables, Random Process and Stationarity; Variogram modeling.	9
III	Regularization, linear Kriging methodology and application, Multivariate Geostatistics and Cokriging, Variance volume relationships.	9
IV	Basics of non-parametric geostatistics and indicator Kriging,	9
V	Estimation vs. Simulation, Conditional Simulation, Introduction to GEOEAS/ GEOPACK software.	9
<b>Total</b>		<b>45</b>

### Text cum Reference Book/s:

1. Geostatistical ore reserve estimation by M David, Elsevier Scientific Publishing Co., Amsterdam.
2. An Introduction to Geostatistical methods of mineral evaluation by J M Rendu, SAIMM Monograph, Johannesburg, SA.
3. An introduction to applied Geostatistics by E H Issaks and R M Srivastava, Oxford University Press, Newyork.
4. Practical Geostatistics by I Clark, Elsevier Applied Science Publishers, London.

## VIII Semester B. E. (Mining Engineering)

**Course Code:** 8BEMN05  
**Title of the Course:** Open Elective-II Management Information System

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MS E	I E	ES E	Total
3	1	0	4	4	3	10	10	80	100

Unit	Contents	Hours
I	<b>Unit 1</b> <u>Introduction</u> <u>Information as a Resource</u> Introduction to information management; Concept of management information system; Planning of information resources	9
II	<b>Unit 2</b> <u>Information systems</u> Computer based information management systems; Information methodologies and tools; Systems approach to various operations in mines; Analysis of systems	9
III	<b>Unit 3</b> <u>Computer fundamentals for information system</u> Database and database management systems; Data mining; Data ware house; Data banks; Data storage and handling; Relational and other data bases	9
IV	<b>Unit 4</b> <u>Information storage &amp; retrieval</u> Capturing of information - On-line, off-line, pre-processing, formatting etc; Forms and layout; Data processing systems; Data communication; Data loggers etc.	9
V	<b>Unit 5</b> <u>Mine management information system</u> Production information; Human resource information; Geological information; Geo-technical information; Environmental information; Survey information; Stores and inventory information; Marketing, financial information etc. <u>Decision support systems for mine managers</u> Reporting, models; Expert systems; office automation; Network layout of computer nodes and data communication	9
<b>Total</b>		45

**Text Book/s:**

**Reference Book/s:**

**Text cum Reference Book/s:**

1. Management Information Systems – Effy Oz, Vikash Publishing House
2. Management Information Systems – James A. O'Brien, Galgotia Publications Pvt. Ltd.
3. Management Information Systems – D.P. Goel, MacMillan
4. Information Systems for Modern Management – Murdick, Ross & Claggett, PHI Pvt. Ltd.
5. Management-Oriented Management Information Systems – Jerome Kanter, PHI Pvt. Ltd.

## VIII Semester B. E. (Mining Engineering)

**Course Code:**

**8BEMN05**

**Title of the Course:**

**Open Elective-II Mine Safety Engineering**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MS E	I E	ES E	Total
3	1	0	4	4	3	10	10	80	100

Unit	Contents	Hours
I	<b>Unit 1</b> <b>Introduction</b> Safety management systems in Indian mining industry; Engineering aspects of safety management; Recent trends of development of safety engineering approaches	9
II	<b>Unit 2</b> <b>Risk Assessment</b> Basic concept of risk, reliability and hazard potential; Elements of risk assessment; Statistical methods; Control charts	9
III	<b>Unit 3</b> <b>Risk Assessment</b> Appraisal of advanced techniques – fault tree analysis; Failure mode and effect analysis; Quantitative structure – activity relationship analysis; Fuzzy model for risk assessment	9
IV	<b>Unit 4</b> <b>Safety Audit and Control</b> Measurement of safety efficiency; Safety audit methods; Safety records management	9
V	<b>Unit 5</b> <b>Enacting Safety Measures</b> Safety legislation; Safety meetings; Constitution of safety committees including pit safety committee. <b>Safe Practices</b> Ergonomics; Safe operational practices; Safety codes; Implementation and monitoring of safety program	9
<b>Total</b>		<b>45</b>

**Text Book/s:**

1. Mine Safety - A Modern Approach by Dr B S Dhillon, 2010, Springer Publications.
2. Safety in Mines: A survey of accidents, their causes and prevention by Prof. B K Kejriwal

**References:**

3. Risk Management Handbook for the Mining Industry, MGD 1010, Minerals industry safety and health risk management guideline, NSW - Department of Primary Industries, 1997.
4. Safety and Health Commission for the Mining and other Extractive Industries, 1998, Guidance for Carrying out Risk Assessment at Surface Mining Operations, Doc. No 5995/2/98-EN.
5. Hazard, Risk and Vulnerability Analysis Tool Kit, January 2004, Ministry of Public Safety, British Columbia.
6. Improving Safety Culture – A Practical Guide by Doominic Cooper, 2001, Applied Behavioral Science, John Wiley and Sons.

## VIII Semester B. E. (Mining Engineering)

**Course Code: 8BEMN05**

**Title of the Course: Elective-II Tunneling and Underground Space Technology**

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

Unit	Contents	Hour
I	Rock mass classification, RMR and Q-system.	9
II	Stability analysis of tunnels, elastic and plastic deformation, stress conditions etc.	9
III	Estimation of support requirement of a tunnel under various types of rocks.	9
IV	Tunnel boring machine, types, selection criteria, tunneling under massive structures.	9
V	Numerical modeling of tunnels, Tunnel ventilation.	9
<b>Total</b>		<b>45</b>

### Text cum Reference Book/s:

1. Rock Mechanics for Underground Mining – B.H.G. Brady and E.T. Brown, Pub. Chapman & Hall.
2. Engineering in Rocks for slopes, Foundations & Tunnels – T. Ramamurthy, PHI Publishers.
3. Fundamentals of Rock Mechanics – J.C. Jaeger and N.G.W. Cook, Chapman & Hall
4. Ground Mechanics in Hard Rock Mining by M L Jeremic, Oxford Publishers
5. Design of Supports in Mines by Cemal Biron and Ergin Arioglu, John Wiley and Sons
6. Rock Mechanics and design of structures in rock by Obert & Duall, Pub: John Willey & Sons
7. Experimental stress analysis by Railey & Dalley, Pub: McGraw Hill Book Company
8. Rock Mechanics Design in Mining and Tunneling by Z.T. Bieniawski, Pub: A.A. Balkema, BR Rotterdam, Netherlands.

9. Underground excavations in Rock by Hoek E. and Brown, E.T., Institutions of Mining and Metallurgy, London
10. Rock characterization, testing and monitoring by Brown, E.T., – ISRM suggested method, Pergamon Press, Oxford.

A handwritten signature in black ink, appearing to be 'K. B.', written over a horizontal line.

Signature  
HOD