Four Year Degree Course in the Faculty of Engineering & Technology
Course and Examination Scheme with Credit Grade System
III Semester B.E. (Mining Engineering)

Course Code	Subject	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory						Laboratory			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
Theory Courses								MSE	IE						
MN301	Mining Geology - I	3	1	0	3	3	80	10	10	100	40	--	--	--	--
MN302	Introduction to Mining Technology	3	1	0	4	3	80	10	10	100	40	--	--	--	--
MN303	Fluid Mechanics	3	1	0	3	3	80	10	10	100	40	--	--	--	--
MN304	Mine Electrical Engineering	3	1	0	3	3	80	10	10	100	40	--	--	--	--
MN305	Mechanical Engineering	3	1	0	3	3	80	10	10	100	40	--	--	--	--
Laboratories															
MN306	Mining Geology - I	0	0	3	2	--	--	--	--	--	--	25	25	50	25
MN307	Fluid Mechanics	0	0	3	2	--	--	--	--	--	--	25	25	50	25
	Mine Visits	0	0	2	0	Audit Course									
Total		15	5	8	--	--	--			500	--	--	--	100	--
Semester Total		28		20		600									

Note : Student has to undergo Practical Training at mines for four weeks (one month) duration during winter vacation.

Four Year Degree Course in the Faculty of Engineering & Technology
Course and Examination Scheme with Credit Grade System
IV Semester B.E. (Mining Engineering)

Course Code	Subject	Teaching Scheme — Hours per week — L	T	P	No. of Credits	Theory — Duration of Paper (Hrs.)	Theory — Max. Marks ESE	Theory — Max. Marks Sessional MSE	Theory — Max. Marks Sessional IE	Theory — Total	Theory — Min. Passing Marks	Laboratory — Max. Marks TW	Laboratory — Max. Marks POE	Laboratory — Total	Laboratory — Min. Passing Marks
Theory Courses															
MN401	Mining Geology-II	3	1	0	3	3	80	10	10	100	40	--	--	--	--
MN402	Mine Surveying-I	3	1	0	3	3	80	10	10	100	40	--	--	--	--
MN403	Mining Machinery-I	3	1	0	3	3	80	10	10	100	40	--	--	--	--
MN404	Programming in C Language	3	1	0	3	3	80	10	10	100	40	--	--	--	--
MN405	Strength of Material	3	1	0	3	3	80	10	10	100	40	--	--	--	--
MN406	Statistical & Numerical Methods	3	1	0	4	3	80	10	10	100	40	--	--	--	--
Laboratories															
MN407	Mining Geology-II	0	0	3	2	--	--	--	--	--	--	25	25	50	25
MN408	Mine Surveying-I	0	0	3	2	--	--	--	--	--	--	25	25	50	25
MN409	Mining Machinery-I	0	0	3	2	--	--	--	--	--	--	25	25	50	25
MN410	Programming in C Language	0	0	3	2	--	--	--	--	--	--	25	25	50	25
	Mine Visits	0	0	2	0	**Audit Course**									
Total		18	6	14	--	--	--			600	--	--	--	200	--
Semester Total		38		27	800										

Note : Student has to undergo Practical Training at mines for four weeks (one month) duration during summer vacation.

Four Year Degree Course in the Faculty of Engineering & Technology
Course and Examination Scheme with Credit Grade System
V Semester B.E. (Mining Engineering)

Course Code	Subject	Teaching Scheme			No. of Credits	Examination Scheme									
		Hours per week				Theory						Laboratory			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
								MSE	IE						
	Theory														
MN501	Rock Mechanics	3	1	0	3	3	80	10	10	100	40	--	--	--	--
MN502	Mine Climate Engineering	3	1	0	3	3	80	10	10	100	40	--	--	--	--
MN503	Drilling & Blasting Engineering	3	1	0	4	3	80	10	10	100	40	--	--	--	--
MN504	Mine Surveying - II	3	1	0	3	3	80	10	10	100	40	--	--	--	--
MN505	Mining Machinery - II	3	1	0	3	3	80	10	10	100	40	--	--	--	--
MN506	Mine Supports	3	1	0	4	3	80	10	10	100	40	--	--	--	--
	Laboratories														
MN507	Rock Mechanics	0	0	3	2	--	--	--	--	--	--	25	25	50	25
MN508	Mine Climate Engg	0	0	3	2	--	--	--	--	--	--	25	25	50	25
MN509	Mine Surveying - II	0	0	3	2	--	--	--	--	--	--	25	25	50	25
MN510	Mining Machinery - II	0	0	3	2	--	--	--	--	--	--	25	25	50	25
	Mine Visits	0	0	2	0	**Audit Course**									
	Total	18	6	14	--	--	--			600	--	--	--	200	--
	Semester Total		38		28	800									

Note : Student has to undergo Practical Training at mines for four weeks (one month) duration during winter vacation.

Four Year Degree Course in the Faculty of Engineering & Technology
Course and Examination Scheme with Credit Grade System
VI Semester B.E. (Mining Engineering)

Course Code	Subject	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory						Laboratory			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
								MSE	IE						
Theory															
MN601	Mineral Processing	3	1	0	3	3	80	10	10	100	40	--	--	--	--
MN602	Mine Rescue Engineering	3	1	0	3	3	80	10	10	100	40	--	--	--	--
MN603	Underground Coal Mining	4	0	0	4	3	80	10	10	100	40	--	--	--	--
MN604	Underground Metalliferous Mining	4	0	0	4	3	80	10	10	100	40	--	--	--	--
MN605	Surface Mining	4	0	0	4	3	80	10	10	100	40	--	--	--	--
Laboratories															
MN606	Mineral Processing	0	0	3	2	--	--	--	--	--	--	25	25	50	25
MN607	Mine Rescue Engineering	0	0	3	2	--	--	--	--	--	--	25	25	50	25
MN608	Vocational Training	0	0	2	2	--	--	--	--	--	--	50	--	50	25
	Mine Visits	0	0	2	0	**Audit Course**									
Total		18	2	10	--	--	--	--		500	--	--	--	150	--
Semester Total		30		24	650										

Note : Student has to undergo Practical Training at mines for four weeks (one month) duration during summer vacation.

Four Year Degree Course in the Faculty of Engineering & Technology
Course and Examination Scheme with Credit Grade System
VII Semester B.E. (Mining Engineering)

Course Code	Subject	Teaching Scheme Hours per week			No. of Credits	Examination Scheme Theory						Laboratory			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional MSE	IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
Theory															
MN701	Ground Control in Mines	3	1	0	3	3	80	10	10	100	40	--	--	--	--
MN702	Surface Mine Environment	3	0	0	3	3	80	10	10	100	40	--	--	--	--
MN703	Computer Applications in Mining	3	1	0	3	3	80	10	10	100	40	--	--	--	--
MN704	Mine Planning	3	1	0	4	3	80	10	10	100	40	--	--	--	--
MN705	Mine Systems Engineering	3	1	0	4	3	80	10	10	100	40	--	--	--	--
Laboratories															
MN706	Ground Control in Mines	0	0	3	2	--	--	--	--	--	--	25	25	50	25
MN707	Surface Mine Environment	0	0	3	2	--	--	--	--	--	--	25	25	50	25
MN708	Computer Applications in Mining	0	0	3	2	--	--	--	--	--	--	25	25	50	25
MN709	Project Seminar	0	0	2	2							50	--	50	25
	Mine Visits	0	0	2	0	**Audit Course**									
Total		15	4	13	--	--	--			500	--	--	--	200	--
Semester Total			32		25			700							

Note : Student has to undergo Practical Training at mines for four weeks (one month) duration during winter vacation.

Four Year Degree Course in the Faculty of Engineering & Technology
Course and Examination Scheme with Credit Grade System
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 Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
								MSE	IE						
MN801	Mine Management	3	1	0	4	3	80	10	10	100	40	--	--	--	--
MN802	Mine Legislation & Safety	3	1	0	4	3	80	10	10	100	40	--	--	--	--
MN803	Mineral Economics	3	1	0	4	3	80	10	10	100	40	--	--	--	--
MN804	Elective-I: 1. Clean Coal Technologies 2. Geostatistics 3. Advanced Mine Surveying	3	0	0	3	3	80	10	10	100	40	--	--	--	--
MN805	Elective-II 1. Underground Space Technology 2. Mine Safety Engineering 3. Management Information System	3	0	0	3	3	80	10	10	100	40	--	--	--	--
Laboratories															
MN806	Project	0	0	4	4	--	--	--	--	--	--	50	50	100	50
MN807	Vocational Training	0	0	2	2	--	--	--	--	--	--	25	25	50	25
MN808	Survey Camp	0	0	2	2	--	--	--	--	--	--	25	25	50	25
Total		15	3	8	--	--	--			500	--	--	--	200	--
Semester Total		26			26	700									

Note : Total duration of Practical Training during vacations between third to eighth semester should be atleast two months out of which one month practical training should be completed before sixth semester.

GONDWANA UNIVERSITY, GADCHIROLI

Four Year Degree Course in the Faculty of Engineering & Technology
Course and Examination Scheme with Credit Grade System
B.E. (Mining Engineering)

SUBJECT WISE BOARD OF STUDIES AFFILIATION

BOARD OF STUDIES	SUBJECT CODES
Applied Sciences & Humanities	MN301, MN401, MN406
Electrical Engineering	MN304
Mechanical Engineering	MN305
Civil Engineering	MN303, MN405

Course Code: MN701
Title of the Course: **Ground Control in Mines**

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	**Engineering Rock Mass Classification** Practical significance of classification of rock masses, Bieniawski's RMR Classification Scheme & various modifications suggested including Laubscher's modification, Barton's Q- Classification Scheme, Excavation Support Ratio & 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.	9
II	**Stresses Around Underground Openings** Types of Openings - single & 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. **Pillar Design** 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.	9
III	**Rockbursts** Caving characteristics of roof rocks; Definition, types & phenomenology of rock bursts; Factors affecting proneness to rock bursts; Prediction of rock bursts; Monitoring of rock bursts – methods & instrumentation; Prevention & control of rock bursts; Bumps and Gas outbursts. Overburden Movement & Abutment Pressure in Longwall Mining, including concepts of Immediate Roof and Main Roof.	9
IV	**Subsidence** Definition – sub-surface & surface subsidence; Important theories of subsidence; Types of surface subsidence; Factors affecting subsidence; Related terminology; Subsidence profiles (lateral & vertical movement, strain curves); Subsidence prediction; Subsidence survey; Prevention & control of subsidence.	9
V	**Monotoring Ground Movement** Purpose; Devices/Instruments to measure deformation, strain, load, stress, bearing capacity, seismic activity, strata movement etc. **Photoelasticity** Principle & applications **Slope Stability of Opencast Benches** 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 & protect slopes.	9
	Total	45

Text cum 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 Publications.
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

Course Code: **MN702**
Title of the Course: **Surface Mine Environment**

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	Hours
I	**Introduction** 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	**Air Pollution** Desirable composition of mine air; Sources of ambient air pollution; Monitoring methods (periodic and continuous), environment; Statutory provisions; Control measures.	9
III	**Water Pollution** 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	**Sound Pollution** 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	**Societal Environment** Socio-economic impacts of mining activities; Issues of resettlement and rehabilitation of displaced population; **Land Environment** Visual impacts; Impacts on land use pattern; Subsidence management **Environmental Administration** Mine waste management, Environmental Impact Assessment (EIA), Environment Management Plan (EMP); Environmental audit, ISO 14000.	9
	Total	45

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

Course Code: MN703
Title of the Course: **Computer Applications in Mining**

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	80

Unit	Contents	Hours
I	**Database Management:** 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 & applicability to mining industry, Introduction to different RDBMS Software Systems.	9
II	**Introduction to a Database Management Software** 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.	9
III	**Newer concepts in problem solving** Elementary Introduction to Artificial Intelligence, Fuzzy Sets, Neural Networks, Neurofuzzy Solutions and Robotics, Numerical analysis methods.	9
IV	**Applications of Computer Programming** Programming for solving problems of mining - mine ventilation networks, pillar design, blast design, haulage & winding calculations, blast fragment analysis.	9
V	**Computer Graphics** Computer Aided Design; Graphics in C; Introduction to AUTOCAD, software specific to mining engineering applications, digitisers, scanner and other relevant hardware devices, mine plans, minimate.	9
	Total	45

Text cum Reference Book/s:

1. C-The Complete Reference by Herbert Schildt, Tata Mcgraw Hills.
2. Graphics in C by Yashwant Kanetkar, BPB, Pulblications
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: MN704
Title of the Course: Mine Planning

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	**Introduction** 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 Report and Detailed Project Report - Contents, preparation and economic evaluation.	9
II	**Surface Mine Planning** Mine planning components and planning steps; Bench geometry and mine layouts; Fixing the mine boundary; Ultimate pit configuration; determination of optimum mine size, Optimum designed capacity; introduction to Production planning, production scheduling; Production estimation; Selection of mining system vis-à-vis equipment system.	9
III	**Underground Mine Planning** Mine planning components and planning steps; Fixing the mine boundary; Determination of size of the mine; Limited and unlimited reserves; Optimum designed capacity; Reserve estimation; Planning Panel System of Mining; Production estimation; Production potential of different panels; Fixing the target of mine.	9
IV	**Infrastructural planning** CHP, workshop, power, water requirement and communication in mines. **Transportation planning** Alternatives; Choice of men, material and mineral handling transport systems; Selection of mine transport systems.	9
V	**Drainage planning** Assessment of make of water; Drainage layout; Design of sumps; Selection of pumps and pumping capacity. **Manpower Planning** **Project Construction Schedule** **Planning for mine closure and post mining land use**.	9
	Total	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.
7. Principles of Mine Planning by A Bhattacharya, Allied Publishers.

VII Semester B. E. (Mining Engineering)

Course Code:　　　　　　**MN705**
Title of the Course:　　　**Mine Systems Engineering**

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

Text cum 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: MN706
Title of the Course: Ground Control in Mines 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 Practicals
1	a) Study of various engineering rock mass classification systems. b) Design of support system using CMRI-ISM Rock Mass Classification system under various geo-mining conditions.
2	a) Design of support system for a depillaring panel. b) Framing of systematic support rule for depillaring panel under different types of mechanization.
3	Design of stable pillars under different geo-mining conditions.
4	Design of hydraulic stowing system.
5	Slope stability analysis and design of stable bench slope for an opencast mine.
6	Subsidence survey including calculation of maximum subsidence and ground strain.

VII Semester B. E. (Mining Engineering)

Course Code: MN707
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 Practicals
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: **MN708**
Title of the Course: **Computer Applications in Mining Laboratory**

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

Sr. No.	List of Practicals
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.
9	To draw various underground mine openings.
10	To determine equivalent resistance and equivalent orifice for an underground mine.
11	To determine torque of friction winder during different stages of winding.

****