GONDWANA UNIVERSITY, GADCHIROLI

Four Year Degree Course in the Faculty of Science & Technology
Course and Examination Scheme with Choice Based Credit System (CBCS) from 2018-19 onwards
III 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						
3BEMN01	Introduction to Mining Technology	4	0	0	4	3	80	10	10	100	40	--	--	--	--
3BEMN02	Fluid Mechanics	3	0	0	3	3	80	10	10	100	40	--	--	--	--
3BEMN03	Mine Electrical Engineering	3	0	0	3	3	80	10	10	100	40	--	--	--	--
3BEMN04	Mechanical Engineering	3	0	0	3	3	80	10	10	100	40	--	--	--	--
3BEMN05	Statistical & Numerical Methods	3	0	0	3	3	80	10	10	100	40	--	--	--	--
Laboratory															
3BEMN06	Fluid Mechanics	0	0	2	1	--	--	--	--	--	--	25	25	50	25
Total		16	0	2	--	--	--			500	--	--	--	50	--
Semester Total		18		17		550									

Note : 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 2018-19 onwards
IV Semester B.E. (Mining Engineering)

Course Code	Course Title	L	T	P	No. of Credits	Duration of Paper (Hrs.)	Max. Marks ESE	MSE	IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
		Teaching Scheme				**Examination Scheme**									
		Hours per week				Theory						Laboratory			
								Max. Marks Sessional							
4BEMN01	Mining Geology	4	0	0	4	3	80	10	10	100	40	--	--	--	--
4BEMN02	Mine Surveying-I	4	0	0	4	3	80	10	10	100	40	--	--	--	--
4BEMN03	Mining Machinery-I	4	0	0	4	3	80	10	10	100	40	--	--	--	--
4BEMN04	Programming in C Language	4	0	0	4	3	80	10	10	100	40	--	--	--	--
4BEMN05	Strength of Material	3	0	0	3	3	80	10	10	100	40	--	--	--	--
Laboratory															
4BEMN06	Mining Geology	0	0	2	1	--	--	--	--	--	--	25	25	50	25
4BEMN07	Mine Surveying-I	0	0	2	1	--	--	--	--	--	--	25	25	50	25
4BEMN08	Mining Machinery-I	0	0	2	1	--	--	--	--	--	--	25	25	50	25
4BEMN09	Programming in C Language	0	0	2	1	--	--	--	--	--	--	25	25	50	25
4BEMN10	Mine Visit	0	0	0	0	**Audit Course**									
Total		19	0	8	--	--	--			500	--	--	--	200	--
Semester Total		27		23		700									

Note : Student has to undergo Practical Training at mines for four week (one month) duration during summer 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 2018-19 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 Sessional		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	10	10	100	40	--	--	--	--
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	Mine Supports	3	1	0	3	3	80	10	10	100	40	--	--	--	--
5BEMN06	IDCS I: Rock Mechanics	4	0	0	4	3	80	10	10	100	40	--	--	--	--
Laboratory															
5BEMN07	Rock Mechanics	0	0	2	1	--	--	--	--	--	--	25	25	50	25
5BEMN08	Mine Climate Engineering	0	0	2	1	--	--	--	--	--	--	25	25	50	25
5BEMN09	Mine Surveying - II	0	0	2	1	--	--	--	--	--	--	25	25	50	25
5BEMN10	Mining Machinery - II	0	0	2	1	--	--	--	--	--	--	25	25	50	25
Total		**23**	**1**	**8**	**--**	**--**	**--**			**600**	**--**	**--**	**--**	**200**	**--**
Semester Total		**32**			**27**	**800**									
Note : 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 2018-19 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 Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
								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	Underground Metalliferous Mining	4	0	0	4	3	80	10	10	100	40	--	--	--	--
6BEMN04	Surface Mining	4	0	0	4	3	80	10	10	100	40	--	--	--	--
6BEMN05	IDCS II: Mineral Processing Technology	4	0	0	4	3	80	10	10	100	40	--	--	--	--
Laboratory															
6BEMN06	Mineral Processing Technology	0	0	2	1	--	--	--	--	--	--	25	25	50	25
6BEMN07	Mine Rescue Engineering	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 : Student has to undergo Practical Training at mines for four week (one month) duration during summer 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 2018-19 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 Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
								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	Core Elective - I: 1. Mine Systems Engineering 2. Geo-statistics 3. Advanced Mine Surveying	3	1	0	3	3	80	10	10	100	40	--	--	--	--
	Laboratory														
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	Minor Project	0	0	4	2							50	--	50	25
	Total	19	1	10	--	--	--			500	--	--	--	200	--
	Semester Total	**30**		**24**						**700**					

Note : 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 2018-19 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 Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
								MSE	IE						
8BEMN01	Mine Management	3	0	0	3	3	80	10	10	100	40	--	--	--	--
8BEMN02	Mine Legislation & Safety	3	0	0	3	3	80	10	10	100	40	--	--	--	--
8BEMN03	Mineral Economics	3	0	0	3	3	80	10	10	100	40	--	--	--	--
8BEMN04	Core Elective – II: 1. Clean Coal Technology 2. Underground Space Technology 3. Mine Safety Engineering	3	0	0	3	3	80	10	10	100	40	--	--	--	--
8BEMN05	Open Elective: Management Information System	3	0	0	3	3	80	10	10	100	40	--	--	--	--
Laboratory															
8BEMN06	Major Project	0	0	8	4	--	--	--	--	--	--	50	50	100	50
8BEMN07	Training in Mines	0	0	0	2	--	--	--	--	--	--	50	--	50	25
8BEMN08	Survey Camp	0	0	2	2	--	--	--	--	--	--	50	--	50	25
Total		15	0	10	--	--	--			500	--	--	--	200	--
Semester Total		25		23	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

B.E. (Mining Engineering)
Four Year Degree Program in the Faculty of Science & Technology
Course and Examination Scheme with Choice Based Credit System (CBCS) from 2018-19 onwards

COURSE WISE BOARD OF STUDIES AFFILIATION

Board of Studies	Course Code
Applied Sciences & Humanities	3BEMN05, 4BEMN01
Electrical Engineering	3BEMN03
Mechanical Engineering	3BEMN04
Civil Engineering	3BEMN02, 4BEMN05
Mining Engineering	5BEMN06(IDCS-I), 6BEMN05(IDCS-II), 8BEMN05(OE)

INTER DISCIPLINARY CLUSTER SUBJECTS

V – SEMESTER				VI - SEMESTER			
S.N.	SUBJECT TITLE	CODE	PARENT BOS	S.N.	SUBJECT TITLE	CODE	PARENT BOS
01	Rock Mechanics	5BEMN06	MINING ENGINEERING	02	Mineral Processing Technology	6BEMN05	MINING ENGINEERING

LIST OF AUDIT COURSES / EVENTS

01	Mine Visit	02	Mine-Field Study
03		04	

PROPOSED SUBJECT FOR OPEN ELECTIVE

01	Management Information System (Course Code -8BEMN05)	02	Remote Sensing & Geographic Information System
03		04	

III Semester B. E. (Mining Engineering)

Course Code: 3BEMN01
Title of the Course: Introduction to Mining 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	Hrs.
I	**Introduction to Mining:** Mining contribution to civilization, Main mineral resources of India and world, Occurrences, Distribution and Mining of minerals in India and its contribution to national growth, Mining and its consequences. **Basic Terminology:** Mine, Mining, Mining Engineering, surface mining, underground mining, mineral, rock, ore, mineral deposit, seam, veins, lode, beds, hanging wall, footwall, shaft, cross cut, drift, adit, level, incline, winze, raise, panel, pillar, gallery, roadway, face, strike and dip, sump, bench, haul road, bench slope, overall pit slope, overburden, waste dump, stripping ratio.	6
II	**Exploration & Development:** Phases of mining, Prospecting to reclamation, Brief introduction to various methods of prospecting and exploration. **Mine Opening:** Development of mineral deposits; brief introduction to modes of primary access, choice of mode of entry - adit, shaft, decline, and combined model; their applicability and comparison.	9
III	**Shaft Sinking:** Location, size, shape, site selection, sinking shaft-preparatory arrangements, drilling and blasting, mucking, hosting, ventilation, pumping, lighting, supporting of sides, complete cycle of operations, special method of sinking to be used in difficult ground conditions, deepening and widening of shafts, modern technique of shaft sinking/boring.	6
IV	**Exploitation Techniques:** Elementary idea of methods of mining (both surface and underground) for coal and non-coal deposits; cyclic and continuous methods of mining and their comparison. Unit operations in mining; elementary idea about production cycle, drilling, blasting, supporting, loading, hauling and processing as applicable to underground methods of mining. Brief description of Bord and Pillar (development), and Longwall (advancing and retreating) methods of coal mining. Brief description of elements of an opencast mine; ramp, haul roads, benches, production cycle, dumping of overburden and backfilling. Introduction to underground metalliferous stoping methods; brief descriptions of underhand and overhand stoping methods.	12
V	**Drifting:** Small and medium size tunnelling and drifting; drivage work in varying ground conditions using conventional methods – drilling, blasting, mucking, transportation, supports, services and cycle of operations. Mechanical methods of drivage of roadways and tunnels.	12
	Total	45

Text cum Reference Books:
1. Introduction to Mining Engineering by H.L. Hartman
2. Coal Mining Methods: S K Das
3. SME Mining Engineer's Handbook by Hustrulid

III Semester B. E. (Mining Engineering)

Course Code: **3BEMN02**
Title of the Course: **Fluid Mechanics**

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	Hrs.
I	Introduction and properties of fluids. Viscosity, laws, factors affecting and its measurements. Pressure and its measurements: absolute, gauge, atmospheric and vacuum pressure, manometers and mechanical gauges.	9
II	Hydrostatic force on surfaces: Total pressure and centre of pressure for plane, inclined and curve submerged surfaces, pressure on lock gates. Fluid kinematics: Types of fluid flows, rate of flow, continuity equation in three dimensions, velocity potential and steam function, free and forged vortex flows.	9
III	Equation of motion, Euler's and Bernoulli's equation and their practical applications. Venturimeter, Orificemeter and pitot tube. Momentum equation and moment of momentum. Flow through orifices: Introduction, classification of orifices, coefficient of contraction, velocity and discharges. Flow through notches: Introduction, classification of notches, rectangular, triangular, trapezoidal notches.	9
IV	Flow through pipes: loss of energy in friction, loss of pressure due to sudden expansion, contraction, bends, entry and exit. Darcy's and Chezy's equation. Hydraulic gradient and total energy line. Flow through pipes connected in series and parallel.	9
V	Mine pumps: Principle of working of reciprocating pumps and turbine pumps. Features of different types of pumps, reciprocating, centrifugal, turbine, mono pump, roto pump, three throw ram pumps, sludge pumps, borehole submersible pumps, air lift pumps, characteristics curves, simple calculations, maintenance of pumps.	9
	Total	45

Text Books:
1. Fluid Mechanics & Hydraulic Machines by Dr. R.K. Bansal
2. Fluid Mechanics & Machines by Mody & Seth
3. Fluid Mechanics by R.K. Rajput
4. Hydraulic Machines by R.K. Rajput
5. Fluid Mechanics & Fluid Power Engineering by Dr. D.S. Kumar

III Semester B. E. (Mining Engineering)

Course Code: 3BEMN03
Title of the Course: **Mine Electrical Engineering**

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	Hrs.
I	**Mine Power Supply System:** Performance of short transmission lines, radial & ring-main distribution system, sub station arrangements for opencast & underground mines (OC&UG), voltage selection & power distribution in OC&UG mines. Mining cables, their construction, ratings, selection & application, fault detection & cable joint. Importance & significance of insulation resistance & its testing.	
II	**Power Economics:** Understanding standard energy bills, importance of parameters therein & calculation of energy charges, types of power tariffs, importance of power factor & its improvement in mines.	
III	**Electrical Drives and their Control:** Group & individual drive, selection of motors & starters for mining applications like haulage, ventilation fans, pumps, compressors, locomotives, winders. Introduction to power semiconductor devices, thyristor & its applications, basic principle of operation of thyristor controlled variable speed drive, electrical braking.	
IV	**Transformers, Switchgears & Electrical Safety in Mine Applications:** Principle of working, construction & applications of mining type transformers & lighting transformer, ratings & their selection, thermal & overload relays, their applications. Circuit breakers, introduction of working principle, rating calculation & applications of OCB, ACB, & MCCB, gate end boxes, drill panel, field switch, & trans switch. Equipment earthing practice in mines, principle of flameproof enclosures, intrinsic safety, IE rules as applied to mines.	
V	**Basic Electronics, Instrumentation & Communication:** Transistor as amplifier in CE, CB & CC modes, bridge rectifiers & filters, working principle of feedback sinusoidal oscillators. Working principle of electronic voltmeter, digital frequency counter, CRO stroboscope, transducers & sensors used in measurement of strain, flow & displacement. Different types of communication systems in mines, wired telephone system, fibre optics applications in mines, signalling systems in mines, data transmission systems	
	Total	45

Text and Reference Book/s:
1. Electrical equipments in mines by H. Cotton
2. A course in Electrical Power By Soni, Gupta and Bhatnagar
3. Electrical power by S L Uppal
4. Principles of Power Systems by V K Mehta

5. Principles of electrical engineering by V K Mehta & Rohit Mehta
6. Electric drives by N K Dey & P K Sen
7. Electric drives by Vedam Subramaniam
8. Electronic Principles by Malvino
9. Integrated Electronics by Millman & Halkias
10. Communication systems by B P Lathi
11. A course in Electrical Engineering By B L Thereja
12. Legislation in Indian Mines: A critical Appraisal by Prasad & Rakesh
13. Underground Mining Methods Handbook, SME, 1982
14. SME Mining Engineers Handbook, SME

PREREQUISITE
Course on Basic Electrical Engineering, covered during First/Second Semester B.E.

OBJECTIVES OF THE COURSE is to impart knowledge on
- Electrical power supply system in mines, its distribution, control & fault detection
- Power economics with emphasis on energy conservation
- Electric drives & their solid-state control
- Transformers, circuits breakers, relays & safety measures
- Principles of basic electronics, electronic measurements, communication systems in mines.

III Semester B. E. (Mining Engineering)

Course Code: 3BEMN04
Title of the Course: Mechanical Engineering

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	Hrs.
I	Power Transmission: General Principles; Power transmission by belts [flat and V], ropes, chains and gears. Ratio of tension, centrifugal tension, slip and creep in belts [explanation of terms only]. Power transmitted by belts. [When C.F. tension is neglected] and chain drives; power transmitted by gears, type of gears.	9
II	Brakes and Dynamometers: Band brake, block brake, band and block brake, single and multiple disc clutches, transmission and absorption type dynamometers. Bearing and Couplings: Main types of bearings and couplings, anti friction bearings, Lubrication: Laws of friction for dry and lubricated surfaces, methods of lubrication of bearings.	9
III	Thermodynamics: Laws of thermodynamics, concept of entropy, methods of heating and expansion of gases, internal energy, external work done, total heat of gas, change of entropy during different methods, representation on PV and TQ diagram. Air Standard Cycles: Carnot, Otto, Diesel and Joule's cycles. Air Standard efficiencies, and mean effective pressure, representation of PV and TQ diagram.	9
IV	Internal Combustion Engines: Classification based on types of fuel and working cycles, working of four stroke and two-strokes cycles. IC Engines; Their merits and demerits, study of parts of petrol and diesel Engine viz. fuel pump, injector and carburettor, Brief description of ignition system, cooling	9

	system, and lubrication system of IC Engines. Study of multi-cylinder engines. PV diagram, testing of IC engines, and thermal efficiencies, simple problems.	
V	Air Compressors: Reciprocating and Rotary compressors single and multistage compressors, inter cooler, after cooler, receiver clearance volume and volumetric efficiency. Refrigeration and air conditioning: Bale –Coleman refrigerators, vapour compression and absorption refrigerators, psychometric charts, introduction to comfort air-conditioning.	9
	Total	45

Text Books:
1. Theory of Machines   : Phatakkar
2. Thermal Engineering   : P. K. Nag
3. Thermal Engineering   : Rajput
4. Heat Engine   : V. M. Domkundwar
5. Theory of Machines   : Khurmi & Gupta
6. I. C. Engines   : Ganeshan
7. Refrigeration & Air-conditioning : Khurmi

Reference Book/s:
1. Design of machine elements   : Bhandari
2. Thermal Engineering   : Sengel
3. I. C. Engines   : Webster

III Semester B. E. (Mining Engineering)

Course Code: **3BEMN05**
Title of the Course: **Statistical & Numerical Methods**

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	Hrs.
I	Solution of non-linear algebraic and transcendental equations; Newton-Raphson, iterative, false position and bisection methods; generalized Newton's method for multiple roots. Solution of linear simultaneous equations by Gauss elimination, Gauss-Jordan, Grout's triangularization, Jacobi and Gauss-Seidel methods.	9
II	Numerical solution of first order ordinary, differential equations by Picard's, Taylor's, Euler's, modified Euler's, Runge-Kutta and Milne's methods. Solution of simultaneous first order and second order ordinary differential equations by Runge-Kutta and Milne's methods. Solution of boundary value problems by finite difference methods.	9
III	Random variable, distribution function of continuous and discrete random variables, mathematical expectation, generating function; Moments, Skewness and Kurtosis.	9
IV	Binomial, Poisson, normal Distribution, Correlation and regression, Correlation by rank, regression plane	9

V	The forward difference operator Δ, Factorial polynomial. Methods of expressing only polynomial in factorial polynomial Shift operator E, Missing terms. Newton's forward interpolation formula, Backward difference operator, Newton's backward interpolation formula. Lagrange's interpolation for unequal intervals, Numerical differentiation, Numerical integration, Difference equation.	9
	Total	45

Text and Reference Books:

1. Engineering Mathematics by C N Tembhekar and P D Shobhane
2. Higher Engineering Mathematics by Dr. B. S. Grewal
3. Numerical methods for scientific and engineering computation by M K Jain, Iyengar and R K Jain
4. A Text book of Engineering Mathematics by N P Bali and Manish Goyal

III Semester B. E. (Mining Engineering)

Course Code: **3BEMN06**
Title of the Course: **Fluid Mechanics 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.	Name of the Practical's to be performed
1	Determination of metacentric height of floating body.
2	To find out type of flow using Reynold's Apparatus.
3	Determination of coefficient of discharge of an external mouth orifice.
4	To determination the coefficient of discharge through venturimeter.
5	To determine the coefficient of discharge through orifice meter.
6	To determine the coefficient of discharge for rectangular notch.
7	To determine the coefficient of discharge for triangular notch.
8	To verify Bernoulli's Theorem.
9	To determine coefficient of velocity (Cv), coefficient of contraction (Cc), coefficient of discharge (Cd) for a given orifice.
10	To determine impact of jet on vanes.

Reference Books:

1. Fluid Mechanics & Hydraulic Machines by Dr. R. K. Bansal
2. Fluid Mechanics & Fluid Power Engineering by Dr. D.S. Kumar

IV Semester B. E. (Mining Engineering)

Course Code: **4BEMN01**
Title of the Course: **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	Hrs.
I	**Stratigraphy:-** Introduction, Definition, Principles of Stratigraphic Co-relation, Units of Stratigraphy, Physiographic divisions of India, Standard Geological Time Scale, Fossils - Elementary idea about their conditions, Modes of preservation and uses, Descriptions of important Indian formations- Archeans, Cuddapahs, Vindhyans, Gondwanas and Deccan traps. **Minerology:** Definitions, Classification of various rock forming minerals, General Physical properties of minerals.	9
II	**Structural Geology:-** Altitude of strata – Dip and Strike, Fold-Element of Folds, Classification of Fold, recognition of folds in the field, Fault – Terminology, Classification of faults, Effects of faults on ourcrops, Geological maps, Unconformity and Joints, Influences of fold and fault in Mining operations, Problems of dip and strike, thickness and depth of strata.	9
III	**Petrology:- Igneous Rocks:-** Elementary knowledge of Magma and its crystallizations, Tabular classification of Igneous rocks, Textures and Structures of Igneous rocks, Description of common rock types. **Sedimenary & Metamorphic Rocks:-** Textures and Structures of Sedimentary rocks, Classification of Sedimentary rocks, Description of common rock types. Agents of metamorphism, Textures and Structures of metamorphism rocks, Description of common rock types.	9
IV	**Economic Geology:-** Fundamental Terms and their definitions, Brief Review of processes of mineral formation and their Genetic classification of mineral deposits: Magmatic ore deposits, Pegmatitic ore deposits, Contact metasomatic ore deposits, Hydrothermal ore deposits, Oxidation and Supergeine enrichment deposits, Metamorphic deposits, Control of ore depositions, Study of important metallic and non metallic deposits of India, Introduction to Geology to Indian Coal Fields.	9
V	**Hydrogeology:-** Hydrological cycle, Occurrence of ground water, Water table, Water table maps and their uses, Aquifer, Aquiclude, Aquifuge, Confined and Unconfined aquifers, Artesion Wells, Springs, Hydrological Properties of Rocks, Porosity and Permeability of rocks. **Prospecting and Exploration:** Introduction, Definitions, Geophysical prospecting methods, Gravity methods, Electrical methods, Seismic methods and radiometric method.	9
	Total	45

Text cum Reference Books:
1. A Text Book of Geology   :   P.K. Mukherjee
2. Principles of Engineering Geology   :   K.M. Bangar
3. Engineering Geology Manual   :   B.S. Satyanarayana Swami
4. Principles of Petrology   :   G.W. Tyrell
5. Geological Maps   :   G.W. Chiplunkar
6. Physical & Engineering Geology   :   S.K. Garg

IV Semester B. E. (Mining Engineering)

Course Code: **4BEMN02**
Title of the Course: **Mine Surveying-I**

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	Hrs.
I	Surveying: Definition, objective, classification and principles of surveying. Linear measurement: Instruments for measuring distances, ranging and chaining out survey lines, chain surveying- principle, field work, off-sets, booking and plotting, obstacles in chaining, problem solving. Angular measurement: Prismatic compass – principle and construction; bearing of lines; local attraction; magnetic declination.	12
II	Levelling: Definition of levelling terms; levelling instruments; different types of levelling; booking and reduction methods; differential, profile, cross-sectional and reciprocal levelling; underground levelling, shaft depth measurement; temporary and permanent adjustments of levels, problem solving. Contours: Characteristics, methods of contouring and uses of contours.	9
III	Theodolite: Essentials of the transit and modern micro-optic theodolites; measurement of horizontal and vertical angles; theodolite traversing, traverse calculations, adjustment of the traverse; computation of co-ordinates; temporary and permanent adjustments. EDM: Principle of measurement; types; corrections; selection of equipment; total station.	9
IV	Tacheometry: Principles and classification of tacheometry, stadia tacheometry; distance and elevation formulae; tacheometric surveying; self reduction tacheometers. Curve setting: Elements, laying of simple circular curves on surface and belowground. Transition curve and super elevation.	9
V	Plane table survey: Introduction, methods of plane table surveying, micro-optic alidade. Field Astronomy: Definition of various astronomical terms, methods for determination of true north of survey line.	6
	Total	45

Text Books:
1. Surveying Volume I, II, III by Dr. B. C. Punmia
2. Surveying Volume I and II by Dr T. P. Kanetkar and S V Kulkarni

Reference Book:
1. Metalliferous Mine Surveying by Winniberg

IV Semester B. E. (Mining Engineering)

Course Code: 4BEMN03
Title of the Course: Mining Machinery-I

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	Hrs.
I	Pit-Top and Pit-Bottom Circuits: Simple pit-bottom circuits, pit-top circuits, tippers, screening and handling plants, railway sidings. Wire Ropes: Wore ropes of different types and their construction and selection, space factor, fill factor, bending factor and factor of safety. Rope deterioration, estimation of size of rope, rope capping, recapping and rope splicing.	9
II	Rope Haulages: Types of rope haulages, selection, computations, and safety devices, Mine tubs, Mine cars, links, clips and rope capel. Application of rope haulages. Track laying and maintenance. Manriding system in underground mines, Types, construction and safety devices. Locomotives: Different types. Diesel, electric trolley wire, construction and operation, application and maintenance. Locomotive haulage computations, safety devices. Track laying and maintenance.	12
III	Conveyors: Construction and operation of belt, chain and cable belt conveyors. Conveyor computations. High angle conveyors, shiftable conveyors. Aerial Ropeways: Types, construction, application and operation, safety devices.	8
IV	Winding: Drum and friction winding with their variations and limitations, duty cycle, torque time diagrams and computations. Multilevel and deep winding. Drives for winding.	8
V	Head frames; types and fittings. Shaft fittings; signals, guides, Keps, tilting platform, cage receivers, protective roofing. Suspension gear, cages and skips. Safety devices on winders, emergency braking, over speed control, slow banking, depth indicators, automatic contrivances.	8
	Total	45

Text Books:
1. Mine Winding & Transport: Walker
2. Mine Transport by N. T. Karelin
3. Mine Hoisting: M. A. Ramlu, Oxford & IBH, 1996

Reference Books:
1. SME Mining Engineer's Handbook by Hustrulid
2. Underground Mining Methods Handbook by Hustrulid

IV Semester B. E. (Mining Engineering)

Course Code: **4BEMN04**
Title of the Course: **Programming in C Language**

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	Hrs.
I	Introduction: Algorithms: Definition, Rationale & Desirable Characteristics; Flow charts: different components/symbols, drawing flowcharts as an initial step for programming in C Language – A Brief History; Identifiers and keywords; Data types, their ranges, declaration & initialization; Expressions; Operators: arithmetic, logical, bit-wise, assignment and conditional operators, unary, binary & ternary operators; C Syntax, compiler; IDE; variables & their significance to compiler: writing, editing, compiling & executing a source code in C Control statements: if…else, nested if, while, do…while(), for statements, nested for, switch…case, break, continue, and go to statements.	9
II	Storage types: Automatic, external, register and static variables. Functions: Declaring, defining and accessing/calling, Passing arguments, Calling a Function by Value and by Reference, Recursion, Library functions, User-defined Functions, Static functions. Arrays: Need, Types – Dimension of Arrays, Contiguous Memory Allocation, Bounds Overflow Checking, Passing arrays to a function; Use of arrays for arithmetic operations on matrices.	9
III	Strings: Defining and handling of stings, Operations on strings. Pointers: Declarations, Passing pointers to a function, Operations on pointers, Pointer Arithmetic, Pointers and arrays, Arrays of pointers.	9
IV	Structures: Need and Difference with Arrays, passing to a function, Arrays of Structures, Arrays within Structures, Unions, type def, Pointer to structure. Pre-processor Directives.	9
V	File structures: Definitions, concept of record, file operations: Storing, creating, retrieving, updating Sequential, relative, indexed and random-access modes Elementary Graphics: Drawing a point, line, circle, rectangle, ellipse, outputting text etc. in different colours, sizes & patterns.	9
	Total	45

Text and Reference Book/s:

1. *"Teach Yourself C"* - Herbert Schildt , pub. Tata McGraw Hill
2. **"C : The Complete reference"** - Herbert Schildt, pub. Tata McGraw Hill
3. *"Let Us C"* - Y. Kanetkar, pub. bpb
4. *"C Programming"* - E.Balagurusamy, Tata McGraw Hill

IV Semester B. E. (Mining Engineering)

Course Code: 4BEMN05
Title of the Course: Strength of Materials

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	Hrs.
I	Mechanical Properties: Type of force distribution, concepts of stress and strain, stress-strain behaviour of ductile and brittle material in uniaxial state of stress, Elastic, plastic and strain hardened zones in stress-strain relation, elastic constants, relation between elastic constants, hardness, impact strength, brief description of common testing machines. Uniaxial State of Stress: Uniaxial loading and deformation, simple cases of statistically indeterminate problems under axial loading, temperature change etc. Composite bars in tension and compression, temperature stresses in composite rods. Thin Walled Pressure Vessels: Stress in thin cylinders and thin spherical shells subjected to internal pressure, wire winding of thin cylinders.	9
II	Biaxial State Stress: State of stress in two dimensions, differential equation of equilibrium, transformation of stresses principal stresses, and principal planes, Maximum shear stress, Mohr's circles. Stresses Due to Torsion: Torsion of circular sections assumptions and derivation of relation between torsional moment, shear stress and angle of twist, torsional stress in solid and circular sections. Torsion in thin walled hollow sections, closely coiled helical springs, combined & twisting.	9
III	Axial Force, Shear Force and Bending Moment Diagrams: Concept of free body diagrams, types of load, determinations of axial force, shear force and bending moment at a section, axial force, SF and DM diagrams in beams and simple frames. Differential relation between shear force and bending moment. Relation between load and shear force.	9
IV	Stresses in Beams (Bending and Shear): Bending stresses in simple beams, assumptions and derivation of simple bending theory, relation between bending moment, bending stress and curvature. Homogeneous and composite beams, carriage springs. Cement: Different types, manufacturing and uses; Grouting, Guniting and Shotcreting.	9
V	Deflection of Beams: Derivation of differential equation of moment curvature relation, differential equation relating deflection and moment shear and load deflection of simple beams by integration method. Stability of Columns: Concept of stability derivation of Euler formulae for bars, various conditions, limitations of Euler formula, tangent modulus theory, eccentrically loaded columns and secant formula.	9
	Total	45

Text and Reference Books:
1. Mechanics of Solid (Vol-1 & 2) by Dr. H.J. Shaha And S.B. Junarkar
2. Strength of Material by J.P.Den Hartog
3. Strength of Material by Spriger
4. Strength of Material by Shaha And Kurve
5. Strength of Materials by S. Ramamrutham, Publishers Dhanpat Rai & Co., 2008

6. Strength of Materials by R K Rajput, Publishers S Chand & Company, New Delhi
7. Strength of Materials by Dr R K Bansal, Publishers Laxmi.

IV Semester B. E. (Mining Engineering)

Course Code: **4BEMN06**
Title of the Course: **Mining Geology 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.	Name of the Practical's to be performed
1	Megascopic identification of economic minerals.
2	Megascopic identification of fossils.
3	Three points bore hole problem and Thickness of rock formation problem.
4	On the basis of the given well data, to prepare the water table map of the area. Mark the direction of ground water flow and ground water conditions.
5	Discuss the hydrogeological condition of the area and mark a suitable site for a well.
6	Demarcate the area in which we can get flowing water wells. What type of ground water well will come across the well shown in the figure? Discuss the ground water condition at well site.
7	Location of major coal fields in India and outline map of physiographic division.
8	Location of important metallic and non-metallic mineral deposits on outline map of India.
9	Coal seam problem no. 1 on map. Coal seam problem no. 2 on map.
10	Draw ground water surface contours of 10 m interval, discuss the hydrogeological conditions of the area and give the most suitable site for well.

Reference Book/s:
1. A Text Book of Geology   :   P.K. Mukherjee
2. Principles of Engineering Geology   :   K.M. Bangar
3. Engineering Geology Manual   :   B.S. Satyanarayana Swami
4. Principles of Petrology   :   G.W. Tyrell
5. Geological Maps   :   G.W. Chiplunkar
6. Physical & Engineering Geology   :   S.K. Garg

IV Semester B. E. (Mining Engineering)

Course Code: 4BEMN07
Title of the Course: Mine Surveying- I 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.	Name of the Practical's to be performed
1	A) To measure distance between station A and B by direct ranging. B) To measure distance between station A and B by indirect ranging.
2	A) To determine distance between station A and B when vision is free and obstructed. B) To determine distance between station P and R when vision and chaining both obstructed.
3	To observe the magnetic bearing of a close traverse by prismatic compass.
4	Building traversing by prismatic compass.
5	To determine elevation of given points by simple levelling.
6	A) Longitudinal and cross-sectional levelling. B) Contouring.
7	Plane table survey by radiation method.
8	Study of theodolite and to measure a horizontal angle by repetition method.
9	To find out multiplying constant (f/i) and additive constant (f + d) of the instrument.
10	To determine reduce level of a given object at higher elevation by measuring vertical angle.

Reference Book/s:
1. Surveying Volume I, II, III by Dr. B. C. Punmia
2. Surveying Volume I and II by Dr T. P. Kanetkar and S V Kulkarni

IV Semester B. E. (Mining Engineering)

Course Code: 4BEMN08
Title of the Course: Mining Machinery- I 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.	Name of the Practical's to be performed
1	Study of pit-bottom layout.
2	Study of pit-top layout.
3	To study different types of safety devices used on rope haulages.
4	To study cage suspension gear arrangement.
5	Study of aerial ropeway system.

6	To study armoured face chain conveyor.
7	To study torque time diagram for friction winder.
8	To study torque time diagram for drum winder.
9	Study of electrical braking on winder.
10	To study ward Leonard system of speed control.

Reference Book/s:
1. Mine Transport by N. T. Karelin
2. Mine Hoisting by M. A. Ramlu, Oxford & IBH, 1996
3. Underground Mining Methods Handbook by Hustrulid

IV Semester B. E. (Mining Engineering)

Course Code: **4BEMN09**
Title of the Course: **Programming in C Language 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.	Suggestive List of Practicals
1	Tracing a few typical flow charts for problem-solving
2	Elementary Codes demonstrating basic arithmetic operations.
3	Use of Control Statements: a. if, if...else, nested if b. for, nested for c. while, do...while d. switch...case
4	Codes showing use of one-, two- & three-dimensional arrays
5	Use of pointers & pointer arithmetic
6	Use of string handling functions
7	Structures, arrays of structures & arrays within structures
8	Use of various important pre-processor directives including macros, #define, #include directives
9	Creating, storing & retrieving binary & text files
10	Drawing elementary geometric shapes

Recommended Books:

1. *"Teach Yourself C"* - Herbert Schildt , Pub. Tata McGraw Hill
2. **"C : The Complete reference"** -   Herbert Schildt, Pub. Tata McGraw Hill
3. *"Let Us C"* - Y. Kanetkar, BPB publishers.
4. *"C Programming"* - E. Balagurusamy, Tata McGraw Hill.