VI Semester B. E. (Mining Engineering)

VI SEMESTER B.E. (MINING ENGINEERING)

Course Code: **MN601**
Title of the Course: **Mineral Processing**

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

Text / Reference Book/s:

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

VI Semester B. E. (Mining Engineering)

Course Code: **MN602**
Title of the Course: **Mine Rescue 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	Hours
I	Mine Fires: Causes of mine fires; spontaneous combustion – mechanism, susceptibility indices, factor affecting spontaneous combustion; detection and prevention of spontaneous heating; accidental fires- causes and prevention; dealing with mine fires, direct and indirect methods, fire stoppings:; fires in quarries, coal stacks and waste dumps.	9
II	Mine Explosions: Firedamp and coal dust explosions-mechanisms, causes and prevention; stone dust and water barriers; investigations after an explosion.	9
III	Inundation: Causes and prevention, precautions and techniques of approaching old workings; safety boring apparatus, pattern of holes; design and construction of water dams. Shaft dams, emergency bulk heads, strengthening of dams.	9
IV	Rescue and Recovery: Rescue equipment and their uses, rescue stations and rescue rooms; organization of rescue and recovery areas, re-opening of sealed off working.	9
V	Illumination in mines- it's effect on safety, units in lighting, efficiency and health; construction and working of cap lamp, lamp room design and organization; different types of illumination devices; standards of illumination in underground and opencast mines, special service lamps in mines, illumination survey, Glare and its control, face lighting. Mine Dust: Airborne respirable dust in underground mines- generation, dispersion, measurement and control; classification, physiological effects, dust measurement, sampling of air-bone dust.	9
	Total	45

Text / Reference Book/s:

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

VI Semester B. E. (Mining Engineering)

Course Code: **MN603**
Title of the Course: **Underground Coal Mining**

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

Text / Reference Book/s:

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

VI Semester B. E. (Mining Engineering)

Course Code: MN604
Title of the Course: Underground Metalliferous Mining

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

Text / Reference Book/s:

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

VI Semester B. E. (Mining Engineering)

Course Code: **MN605**
Title of the Course: **Surface Mining**

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

Text / Reference Book/s:

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

VI Semester B. E. (Mining Engineering)

Course Code: **MN606**
Title of the Course: **Mineral Processing Laboratory**

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

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

VI Semester B. E. (Mining Engineering)

Course Code: **MN607**
Title of the Course: **Mine Rescue Engineering Laboratory**

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

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