

MINE ENVIRONMENT AND VENTILATION ENGINEERING [As per Choice Based Credit System (CBCS) scheme] SEMESTER – V (Mining Engineering)			
Sub Code	15MN51	IA Marks	20
Number of LectureHours/week	03(L)+02(T)	Exam Hours	03
Total Number of Lecture Hours	50	Exam Marks	80
Credit = 04			
Course objectives: This course will enable students to: <ol style="list-style-type: none"> 1. To gain insights of mine air, mine climate and mine ventilation 2. To comprehend the ventilation requirements of an underground mine. 3. Analysis of mine air, mine climate, natural ventilation, mechanical ventilation and to conduct ventilation survey 			
Modules			Teaching Hours
MODULE- 1: Mine Air and Study of Fire Damps			
<p>1. Mine Air: Atmospheric air and composition of mine air, Mine Gases: - Occurrence, properties, detection, measurements and physiological effects. Problems.</p> <p>Study on Fire Damps: Methane content, emission of methane, degree of gassiness of a coal mine, gas blowers, gas outbursts, dealing of firedamp in mines. Methane streaming and layering, methane drainage, testing of firedamp. Problems.</p>			10 Hours
MODULE- 2: Mine Climate			
Mine Climate: Physiological effects of mine climate, objective of mine ventilation, air quantity requirement, pressure, barometric pressure, temperature, sources of heat in mines, moisture content of mine air, effects of heat and humidity on the miner, cooling power of mine air, psychometry and air conditioning. Problems.			10 Hours
MODULE- 3: Air Flow Through Mine Openings			
Air flow through mine openings: Fundamentals of air flow, Reynolds number, laminar and turbulent flow, pressure losses due to friction and shock resistance, resistance of airways:- laws of mine air friction, co- efficient of friction, resistance of roadways in series and parallel, resistance of leaky airways, characteristic of an airway (or) mine, equivalent orifice, Economic design of an airway. Distribution of air and flow control devices. Problems.			10 Hours
MODULE- 4: Natural and Mechanical Ventilation			
<p>Natural Ventilation: Mechanism, causes, calculation of Natural Ventilation Pressure from air densities, other methods of determining Natural Ventilation Pressure, motive column. Problems.</p> <p>Mechanical Ventilation: Types of fans, theory, efficiencies, characteristic curves and suitability of fans, selection, testing and output control of a mine fan. Fans in series and parallel, forcing and exhaust ventilation, reversal of air currents, diffusers, evasees, ventury, booster and auxiliary fans. Problems.</p>			10 Hours
MODULE- 5: Ventilation Survey and Elements of Ventilation Planning			
<p>Ventilation survey: Importance of ventilation survey, types: - qualitative surveying, pressure survey and quantity survey. Problems.</p> <p>Elements of Ventilation Planning: Objective, steps in ventilation planning, desirable features of a ventilation system, types of ventilation system, quantity requirement, analysis of ventilation cost. Problems.</p>			10 Hours
Course outcomes:			

At the end of the course students will be able to:

1. To be familiar with the mine air composition, climate and physiological effects
2. An ability to estimate the requirements of ventilation in an underground mine
3. An ability to analyze the components of mine air sample, design natural and mechanical ventilation and conduct ventilation survey.
4. An ability to decide and design ventilation system for underground mine.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module. Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

TEXT BOOKS:

1. Elements of Mining Technology Vol II- D.J. Deshmukh, 9 th Edition, Central Techno Publication, Nagpur, 1998.
2. Mine Environment and Ventilation – G.B. Mishra, Oxford University Press, 1994.

REFERENCE BOOKS:

1. Mine ventilation and air conditioning – Howard L. Hartman. Wiley International, 1976.
2. Environmental Engineering in Mines – Vutukuri& Lama, Cambridge University Press, Cambridge, 1992.
3. Legislation in Indian mines a critical appraisal Vol. I and Vol. II – Prasad and Rakesh. Vivek Publications, Varanasi 1999.
4. Mine Ventilation Vol. – II, S. Ghatak, Coalfield Publishers, 1993.
5. Numerical Problems on Mine Ventilation, L.C. Kaku, Lovely Prakashan, Dhanbad.
6. Basics of Mine Ventilation, P.C. Shyam, Lovely Prakashan, Dhanbad.

MINE MECHANIZATION– II
[As per Choice Based Credit System (CBCS) scheme]
SEMESTER – V (Mining Engineering)

Sub Code	15MN52	IA Marks	20
Number of Lecture Hours/week	03(L)+02(T)	Exam Hours	03
Total Number of Lecture Hours	50	Exam Marks	80
Credit = 04			
Course objectives: This course will enable students to:			
<ol style="list-style-type: none"> 1. Gain knowledge of various types of pumps, inflow of water into mine working, basic principles of drilling, cutting and ploughing. 2. Comprehend the performance and characteristics of the pumps, layouts of underground pumping station, operating parameters of underground mine machinery and maintenance of machinery. 3. Know applications of different types of support and underground mine machinery under given conditions. 4. Select pumps for underground mines under given conditions. 			
Modules			Teaching Hours
MODULE- 1: Drainage and Pumping and Performance and Characteristic of Pumps			
Drainage and Pumping: Methods to prevent inflow of water into mine workings, mine pumps, different types of pumps-centrifugal, turbine, roto pump, mono block pump, drill operated pump, displacement pumps. Performance and Characteristic of Pumps: Performance and characteristic of centrifugal and turbine pumps. Pumps in shafts and roadways and their maintenance. Sumps: location and capacity. Layout of main underground pumping stations.			10 Hours
MODULE- 2: Face Mechanization and Allied Face Machineries			
Face Mechanization: Classification-continuous and intermittent road headers, Shearer, their application, limitation and specification. Allied Face Machineries: Coal Ploughs, coal cutting machines, their application, limitation and specification.			10 Hours
MODULE- 3: Allied Machinery and Development of Face Mechanization			
Allied Machinery: Basic Principles of drilling, cutting and ploughing machines. Different types of hydraulic props, chocks, chock shields, canopies, armoured face conveyors and stage loaders Development of Face Mechanization: Recent developments in face mechanization. L.H.D., S.D.L., L.P.D.T. and Rocker Shovel.			10 Hours
MODULE- 4: Trackless Equipment's			
Trackless equipment's: application and limitation.			10 Hours
MODULE- 5: Machinery Maintenance			
Machinery Maintenance: Maintenance management and safety, CAD, Remote			

monitoring and controlling in mines and automation. Application of Computer for Maintenance.	10Hours
<p>Course outcomes:</p> <p>At the end of the course students will be able to:</p> <ol style="list-style-type: none"> 1. Familiar with the various types of pumps, inflow of water into mine workings, basic principles of drilling, cutting and ploughing. 2. Ability to understand the performance and characteristics of pumps, layouts of underground pumping station, operating parameters of underground mining machinery. 3. Ability to to select different types of supports and mine machinery under given conditions. 4. Capable of choosing pumps for underground mines under given conditions. 	
<p>Question Paper Pattern:</p> <ul style="list-style-type: none"> • The question paper will have ten questions. • Each full Question consisting of 16 marks • There will be 2 full questions (with a maximum of four sub questions) from each module. Each full question will have sub questions covering all the topics under a module. • The students will have to answer 5 full questions, selecting one full question from each module. 	
<p>TEXT BOOKS:</p>	
<ol style="list-style-type: none"> 1. Elements of Mining Technology Vol. III – D.J.Deshmukh, 6th edition Central Techno Publication, Nagpur, 1998. 2. Modern Coal Mining Technology – S. K. Das, 2nd edition, Lovely Prakashan. 	
<p>REFERENCE BOOKS:</p>	
<ol style="list-style-type: none"> 1. Coal Mining – I.C.F. Statham Vol. I and Vol. III The Caxton Publishing Company Ltd. Inc. 1958. 2. Longwall Mining – Syd. S. Peng and H.S. Chang, John Wiley and Sons Inc. 1983. 3. Selection, Installation and maintenance of mine pumps. – rakesh and M.G. Lele. 2 nd edition, Nishkam Press Meerut 1975. 4. Mine Pumps, Haulages and Winding, S. Ghatak, Coal Field Publisher, Asansol, 1995. 5. Mine Hoisting, M.A. Ramulu, Oxford and IBH 1996. 	

MINE SURVEYING –II
 [As per Choice Based Credit System (CBCS) scheme]
SEMESTER – V (Mining Engineering)

Sub Code	15MN53	IA Marks	20
Number of Lecture Hours/week	03(L)+02(T)	Exam Hours	03
Total Number of Lecture Hours	50	Exam Marks	80
Credit = 04			
Course objectives:			
This course will enable students to:			
<ol style="list-style-type: none"> 1. Knowledge of distance and elevation using optical means, area and volume of underground and opencast mine, network of triangles, baseline in underground and surface, the duties and responsibilities of surveyor. 2. Application of the network of triangles, setting of curve in mine survey, transfer reduced level from surface to underground. 3. To evaluate the accuracy of the survey. 			
Modules			Teaching Hours
MODULE- 1:Tachometric Survey			
Tachometric Survey: Application and limitation, principles and methods, annalacticlense, reduction of stadia notes, errors. Problems			10 Hours
MODULE- 2:Curve Ranging			
Curve Ranging: Linear and angular methods of setting out of simple curves, requirements and functions of a transition curve. Problems			10 Hours
MODULE- 3: Correlation Survey			
Correlation Survey: Principles, Classification, Methods, Shaft Plumbing, Assumed Bearing, Weisback Triangle, Coplanning, Weisback quadrilateral, Problems on correlation survey etc. and degree of accuracy. Problems.			10 Hours

MODULE- 4: Slope and Subsidence Survey	
<p>Slope Surveying: Definition, purpose, methods: Tape triangulation, Ray, steeply dipping ore bodies, moderately dipping ore bodies, degree of accuracy.</p> <p>Subsidence Survey: Principles, method and degree of accuracy, underground traversing, setting out gradients in tunnels and adits, Mine plans and sections, duties and responsibilities of surveyors care and precaution in storage statutory responsibilities.</p>	10 Hours
MODULE- 5: Photogrammetry and Remote Sensing	
<p>Photogrammetry: Introduction, Basic Principles, Definition, horizontal and vertical angles from terrestrial photograph, horizontal position of a point from photographic measurement: camera axis horizontal, elevation of a point by photographic measurement, determination of focal length of the lens. Computation of length of line between points of different elevations from measurements of vertical photograph.</p> <p>Remote Sensing: Introduction, basic principle, Idealized remote sensing system, electromagnetic energy and spectrum, wavelength regions and their applications in remote sensing, application of remote sensing.</p>	10 Hours
<p>Course outcomes:</p> <p>At the end of the course students will be able to:</p> <ol style="list-style-type: none"> 1. Ability to use optical means determine distance, elevation, area and volume. To set out baseline according to the rules and responsibilities of surveyor. 2. To set out a curve and to locate the underground features through survey. 3. Determination of the reduced level in underground. 4. Ability to determine the accuracy of the surveyed area. 	
Question Paper Pattern:	
<ul style="list-style-type: none"> • The question paper will have ten questions. • Each full Question consisting of 16 marks • There will be 2 full questions (with a maximum of four sub questions) from each module. Each full question will have sub questions covering all the topics under a module. • The students will have to answer 5 full questions, selecting one full question from each module. 	
TEXT BOOKS:	
<ol style="list-style-type: none"> 1. Surveying Vol. II – B.C. Punmia, 12 thedition, Lakshmi Publiscations, 1994. 2. Surveying Vol. III – B.C. Punmia, 12 thedition, Lakshmi Publiscations, 1994. 3. Metalliferous Mine Surveying FedrickWini Berg, 2 nd edition Mining Publications, London, 1935. 	
REFERENCE BOOKS:	
<ol style="list-style-type: none"> 1. Mine Surveying Vol. I, II, III, Ghatak, 5 th edition, Coal Field Publishers, 1996. 2. Mine Surveying by V.Borsheh – Komponiets, Mir-Publishers, 1989. 3. A Text Book of Advanced Surveying JawaharLal Sharma, C.B.S. Publishers and Distributors, 1985. 	

UNDERGROUND COAL MINING [As per Choice Based Credit System (CBCS) scheme] SEMESTER – V (Mining Engineering)			
Sub Code	15MN54	IA Marks	20
Number of Lecture Hours/week	03(L)+02(T)	Exam Hours	03
Total Number of Lecture Hours	50	Exam Marks	80
Credit = 04			
Course objectives: This course will enable students to:			
<ol style="list-style-type: none"> 1. Understand the mode of access to reach coal seams and choice of mine seam 2. Gain knowledge of bord and pillar method of mining 3. Gain knowledge of longwall method of mining 4. Knowledge of extracting of thick coal seams by special methods 			
Modules			Teaching Hours
MODULE- 1: Introduction to Coal Mining			
Introduction: Coal mining in major coal producing countries, Growth of coal mining industry in India, Grading and analysis of coal, Opening of Coal Seams: Access by adits, Opening up of coal seams by surface drifts on incline, vertical shafts, Division of mine into blocks. Choice of Coal Mining Methods: Basic Mining Methods, Board and Pillar, Longwall and Shortwall, Factors influencing choice of mining methods.			10 Hours
MODULE- 2: Board and Pillar Mining			
Board and Pillar Mining: Board and Pillar Mining System. Design of Board and Pillar workings, Mining Processes, Development of Panels, Extraction of Pillars and Examples of Pillar extraction techniques. Room and Pillar Mining: Applicability, Merits and Demerits. Variants of Room and Pillar Mining Method. Simple Problems.			10 Hours
MODULE- 3: Longwall Mining			
Longwall Mining: Elements of a Longwall face, Classification of Modern Longwall faces, Planning of Longwall Mining System, Development of Panel and faces, face support system, Power supply, and material supply and face organization. Strata mechanics around Longwall panel.			10 Hours
MODULE- 4: Thin Seam Mining by Longwall Method and Thick Seam Mining			
Thin seam Mining by Longwall Method: Method of working thin, medium thick and thick seams by Longwall Mining with case studies of Indian and foreign Mines. Simple Problems Thick seam Mining: Problems of Mining Thick Coal Seams, Choice of Method of Mining Thick Coal Seams, Inclined Slicing, Horizontal Slicing, Diagonal Slicing, Transversely Inclined Slicing, Sublevel Caving, Working Steep and Moderately Thick Seams, The Velenjee Method, Descending Shield Method of Mining.			10 Hours
MODULE- 5: Special Methods of Mining			
Special Methods of Mining: Inseam Mining and Horizon Mining, Hydraulic Mining, Blasting Gallery Method, Coal Bed Methane. Goaf Control: Caving, strip packing or solid stowing, Hydraulic Stowing etc. Procurement of stowing materials and its transportation, theoretical aspects and case studies.			10 Hours

Course outcomes:

At the end of the course students will have:

1. Ability to identify mode of access to reach coal seam and choice of mining method
2. Ability to design bord and pillar method of mining
3. Ability to design longwall method of mining
4. Ability to design the extraction of thick coal seams by special methods.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module. Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

TEXT BOOKS:

1. Principles and Practices of Modern Coal Mining – R.D. Singh, New Age International, 1997.
2. Modern Coal Mining Technology – S.K. Das, 2 nd edition, Lovely Prakashan Publishers, 1994

REFERENCE BOOKS:

1. Underground Coal Mining Methods – J.G.Singh, BrajKalpa Publishers, Varnasi, 2000.
2. Coal Mining – I.C.F. Statham, Vol. I, II, III and Vol. III. The Caxton Publishing Company Ltd. Inc. 1958.
3. Longwall Mining – S.Peng&H.S.Chang, John Wiley and Sons Inc. 1983.
4. Winning & Working of Coal, Vol. I, II – D.J.Deshmukh, Asia Publsiing House, Bombay, 1967.
5. Universal Mining School Volumes. Cardiff [GT. Britain], 1931.
6. SME Mining Engg. Hand Book – Hartman, 2 nd edition S.M.M. & Exploration Inc. 1992.
7. Underground Winning of Coal – T.N. Singh, Oxford and IBH. 1992.
8. Advanced Coal Mining, Vol. 1 and 2 – Vorbojev&Deshmukh, Asia Publishing House, Bombay, 1964.
9. Thick Seam Mining – T.N. Singh and B.B.Dhar, Oxford and IBH, 1992.

Professional Elective-I Mineral Economics [As per Choice Based Credit System (CBCS) scheme] SEMESTER – IV (Mining Engineering)			
Sub Code	15MN551	IA Marks	20
Number of Lecture Hours/week	03(L)+02(T)	Exam Hours	03
Total Number of Lecture Hours	50	Exam Marks	80
Credit = 03			
Course objectives: This course will enable students to: <ol style="list-style-type: none"> 1. Gain knowledge on role of mineral industry in national economy, national mineral policy, financial management and cost accounting applicable to mining industry. 2. Comprehend sampling, classification of ore reserves and resources. 3. Learn various methods of ore reserve estimation and mine valuation. 4. Evaluate the economic feasibility of a mining project. 			
Modules			Teaching Hours
MODULE- 1:			
Introduction: Economic importance of mineral industry, special features of mineral industry, demand and supply analysis, National Mineral Policy. Mineral Price and Pricing: International Monetary system, Factors affecting mineral price, Kinds of price quotation, Mineral Price Index, Mineral Price.			10 Hours
MODULE- 2:			
Sampling: Definition, purpose, scope, common methods of sampling, types of samples, errors in sampling. Estimation of reserves: Classification of reserves, tenor, grade. Preparation of assay plans, various methods of ore reserve estimation and problems on ore reserves			10 Hours
MODULE- 3:			
Mine Valuation –1 : Factors affecting mine valuation, life of mine, redemption of capital, project assessment by D.C.F., net present value methods, Hoskold’s two rate formula. Mine valuation – 2 : mining fixed costs, operating costs, feasibility study, project evaluation, depreciation, problems on mine valuation and depreciation.			10 Hours
MODULE- 4:			
Financial Management: Methods of financing industrial enterprises, structure, formation and capitalization. Sources of finance. Principles of book keeping as applied to mining industry and accountancy. Balance sheet, profit and loss accounts.			10 Hours
MODULE- 5:			
Cost Accounting: Introduction, need for cost accounting, elements of cost, overheads, allocation of over heads, breakeven analysis. Budget and Budgetary control: Definition of budget, Principle of budget			10 Hours

and budgetary control, types of budgets.

Course outcomes:

At the end of the course students will have:

1. An overall knowledge of mineral industry and related policy issues, basics of financial and cost accounting aspects.
2. An ability to select proper sampling method and to classify the ore reserve and resources
3. An ability to compute ore reserve and value of a mining project.
4. An ability to evaluate the economic feasibility of a mining project given the geological, mining and financial parameters.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module. Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

TEXT BOOKS:

1. Mineral and Mine Economics by R.T. Deshmukh, Myra Publications, Nagpur, 1986.
2. Mineral Economics by N.L.Sharma and Sinha, Oxford and IBH, 1992.

REFERENCE BOOKS:

1. Mineral Economics by Truscot, John Wiley and Sons, Inc, 1987.
2. Mining Geology by Arogyaswamy. R.N.P. 4 th edition, Oxford and IBH, 1992.
3. Prospecting for Atomic Minerals by Knoerr, A.W. and Lutgetn. GP. Oxford and IBH, 1992.
4. Industrial Management O.P. Khanna, DhanpatRai and Sons, 1999.

Professional Elective-I Maintenance Management in Mines [As per Choice Based Credit System (CBCS) scheme] SEMESTER – V (Mining Engineering)			
Sub Code	15MN552	IA Marks	20
Number of Lecture Hours/week	03(L)+02(T)	Exam Hours	03
Total Number of Lecture Hours	50	Exam Marks	80
Credit = 03			
Course objectives: This course will enable students to: <ol style="list-style-type: none"> 1.To gain knowledge of various types of maintenance practices 2.Knowledge of maintenance facilities and scheduling for mining. 3.Concept of reliability, availability and maintainability of mining machinery. 4. Knowledge of maintenance management system 			
Modules			Teaching Hours
MODULE- 1: Maintenance of Mining Machinery and Elements of down time of machinery			
Maintenance of Mining Machinery: Objectives and types, corrective, plant, preventive and predictive maintenance: Reliability centered maintenance: upkeep of maintenance record. Elements of down time of machinery: Possible cause for machine delay and production stoppage. Data selection regarding machine delay and their analysis.			10 Hours
MODULE- 2: Maintenance Facilities in Mines for Minor and Major Repairs			
Maintenance Facilities in Mines for Minor and Major Repairs: Maintenance planning and scheduling; long and short-term maintenance plans, determining the optimal maintenance policy.			10 Hours
MODULE- 3: Maintenance Scheduling			
Maintenance Scheduling: Maintenance scheduling by the application of network technique. Application of queuing theory in maintenance of mining equipment.			10 Hours
MODULE- 4: Definitions of Reliability, Availability and Maintainability			
Definitions of Reliability, Availability and Maintainability: Possible measures to increase the availability of mining machinery. Maintenance budgeting: estimation of cost of resources required to meet the excepted maintenance load.			10 Hours
MODULE- 5: Maintenance Management System			
Maintenance Management System: Computerized documentation of plant and equipment management. Advanced Maintenance Procedures and Techniques: Online diagnostic maintenance, tribology techniques vibration and temperature monitoring of machinery. Illustrative examples of maintenance of an operating underground mine and open cast mine.			10 Hours
Course outcomes: At the end of the course students will be able to: <ol style="list-style-type: none"> 1. To be familiar with various types of maintenance practices 2. An ability to prepare maintenance plan and scheduling for mining machineries. 3. An ability to increase the availability of mining machinery by proper maintenance 4. Ability to prepare and implement maintenance management system 			
Question Paper Pattern:			

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module. Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

TEXT BOOKS:

1. Maintenance Planning and control, Anthony Kelley, Affiliated East West Press, New Delhi 1981.
2. Reliability Engineering, Govil A.K., Tata Mc. Graw Hill Company, New Delhi, 1983.

REFERENCE BOOKS:

1. Special Issues of Journals of Mines, Metals and Fuels on Mine Mechanization, Vol. 59, 1992.

Open Elective-I Industrial Safety Engineering [As per Choice Based Credit System (CBCS) scheme] SEMESTER – V (Mining Engineering)			
Sub Code	15MN561	IA Marks	20
Number of Lecture Hours/week	03(L)+02(T)	Exam Hours	03
Total Number of Lecture Hours	50	Exam Marks	80
Credit = 03			
Course objectives: This course will enable students to: <ol style="list-style-type: none"> 1. Gain insights of hazards and accidents of different working conditions in industries. 2. Have knowledge of occupational health and safety in different industries 			
Modules			Teaching Hours
MODULE- 1:HOT WORKING AND COLD WORKING OF METALS			
Introduction, Hot working of metals, Cold working of metals, Foundry operations, Steps in casting process, Different types of furnaces, Process wise hazards and safety measures in casting, Major health hazards and safe methods in foundry, Forging operations, Specific safety measures in different forging operations, Preventive maintenance of forging machines, Safe work practices in forging, Operation in hot and cold rolling mills, Preventive maintenance and periodic check for safe operations, Heat treatment operations, Heat treatment methods, Hazards and safety measures, Control measures, Safety in handling medium_ Disposal methods, Power presses(all types)Shearing, Bending, Rolling, Drawing, Turning, Boring, Milling, Planning, Grinding.			10 Hours

MODULE- 2:SAFETY IN OPERATION	
Permit to work-safety in operations, confined spaces, Safety in painting, welding, cutting and soldering operations, Safety in finishing operations like cleaning, polishing and buffing and related hazards, Selection, care and maintenance of associated equipment's and instruments, Maintenance of these machines and selection of equipment w.r.t safety, Shot blasting.	10 Hours
MODULE- 3: SAFETY IN CONSTUCTION INDUSTRY	
WORK AT HEIGHT -High incidence of serious accidents in working at heights, Types of operations, Safety features associated with design, construction and use of stairways, rungs, ramps, gangways, floors, ladders of different types, working on roofs, d).Other safety requirements while working at height, Bootswain's chair-safety harness etc., Prevention of fall of persons at floor level, Potential tripping and slipping hazards, Erection, Inspection and Certification and safe use of various types of scaffolds, Safety of high rise building, Bridges and tunnels Safety in demolition operation, Safety in underground works such as Excavation, Drilling and Blasting, Tunnelling, Pneumatic, Trenching, Safety in working of fragile roof	10 Hours
MODULE- 4: SAFETY IN SPECIFIC INDUSTRIES	
Mining industry, Ceramic industry, Textile industry, Leather industry, Sugar industry, Fertilizer industry, Cement industry, Tanneries	10 Hours
MODULE- 5: EMERGING ISSUES ON OSH	
Safety in Nano Technology, Safety in Robots, Safety in hospital, Safety in film industry	10 Hours
Course outcomes: At the end of the course students will be able to: 3. Be familiar with hazards in different industries2. 4. Decide precautions of safety and health in different occupation.	
Question Paper Pattern:	
<ul style="list-style-type: none"> • The question paper will have ten questions. • Each full Question consisting of 16 marks • There will be 2 full questions (with a maximum of four sub questions) from each module. Each full question will have sub questions covering all the topics under a module. • The students will have to answer 5 full questions, selecting one full question from each module. 	
TEXT BOOKS:	
1. Industrial Safety, Dr. K U Mistry,SiddharthPrakashan; Ahmedhabad-380014 2.Fundamentals of Industrial Safety and Health, Dr. K U Mistry,SiddharthPrakashan; Ahmedhabad-380014 .	
REFERENCE BOOKS:	
1. Industrial Safety Management, L M Deshmukh,Mcgrawhill Education, July 2017	

MINE MECHANIZATION LABORATORY			
[As per Choice Based Credit System (CBCS) scheme]			
SEMESTER – V (Mining Engineering)			
Laboratory Code	15MNL57	IA Marks	20
Number of Lecture Hours/week	01 Hour Tutorial(Instructions)+02 Laboratory	Exam Hours	03
Total Hours	42	Exam Marks	80
Credit = 02			
Course objectives:			
This course will enable students to:			
<ol style="list-style-type: none"> 1. Gain knowledge of the percussive drilling, track laying and their turnouts and cross overs 2. Comprehend the cage/skip winding, construction and working of pumps. 3. Select the type of rope according to the given conditions 			
Part-A (Any one question 35 marks)			
Experiment No. 01: To study constructional details and functioning of Jack Hammer.			
Experiment No.02: To study constructional details of different wire ropes.			
Experiment No. 03: Sketch and write details of safety hook and its function.			
Experiment No. 04: To determine the amount of apparent dip, when true dip and the direction of apparent dips are given.			
Experiment No. 05: To determine the direction of apparent dip, when true dip and amount of apparent dips are known			
Part-B (Any one question 35 marks)			
Experiment No. 06: To study construction and working of a turbine pump			
Experiment No. 07: To study Lilly controller and automatic contrivances in a winder.			
Experiment No. 08: To study skip loading and unloading arrangement and skip design.			
Experiment No. 09: Write details of good track laying and also details of diamond crossing.			
Experiment N0.10: To study the constructional details of lubricator and air leg.			
Part-C (Viva Voce 10 marks)			
Course outcomes:			
On the completion of this laboratory course, the students will be:			
<ol style="list-style-type: none"> 1. Familiar with the percussive drilling, their turnouts and cross overs 2. Able to understand the cage/skip winding, construction and working of pumps. 3. Capable of choosing the type of rope according to the given conditions. 			
Conduction of Practical Examination:			
<ul style="list-style-type: none"> • All laboratory experiments (Part - A & Part - B) are to be included for practical examination. • Students are allowed to pick one experiment from each of the lot. • Strictly follow the instructions as printed on the cover page of answer script for breakup of marks • PART –A: Procedure + Conduction + Viva: 10 + 25 +05 (40) • PART –B: Procedure + Conduction + Viva: 10 + 25 +05 (40) • Change of experiment is allowed only once and marks allotted to the procedure part to be made zero 			

MINE SURVEYING LABORATORY-II			
[As per Choice Based Credit System (CBCS) scheme]			
SEMESTER – V (Mining Engineering)			
Laboratory Code	15MNL58	IA Marks	20
Number of Lecture Hours/week	01 Hour Tutorial(Instructions)+02 Laboratory	Exam Hours	03
Total Hours	42	Exam Marks	80
Credit = 02			
Course objectives:			
This course will enable students:			
<ol style="list-style-type: none"> 1. To gain insights to measure distance and elevation using optical instruments 2. To set out an curve in underground and surface 3. To connect the baseline from surface to underground 4. To know the location of a point in underground traverse 			
Part-A (Any one question 35 marks)			
I. Demonstration of precise level, digital planimeter EDM and total station.			
II. Tacheometric survey			
<ol style="list-style-type: none"> 1. Determine the constant K and C of the tachometer. 2. Determine the distance and elevation by a) Stadia Method b) Tangential Method 3. Determine the gradient between two points by Tachometric Survey 			
III. Curve Ranging			
<ol style="list-style-type: none"> 1. Simple curve ranging by linear and angular method using Deflection distance Method 2. Simple curve ranging by linear and angular method using Rankines Method. 			
Part-B (Any one question 35 marks)			
IV. Correlation Survey:			
<ol style="list-style-type: none"> 1. Correlation survey by Direct Traversing through Incline 2. Correlation survey by Direct Traversing through Incline and Shaft. 3. Correlation survey by Weisback Co-planning Method. 4. Correlation survey by Weisback Triangle Method 5. Correlation survey by assumed bearing method. 			
V. Underground survey			
<ol style="list-style-type: none"> 1. Underground Traversing 2. Transfer of levels from surface to underground. 3. To control the directions of underground workings. 4. To determine the center of the shaft. 			
Part-C (Viva Voce 10 marks)			
Course outcomes:			
On the completion of this laboratory course, the students will have:			
<ol style="list-style-type: none"> 1. An ability to measure distance and elevation using optical instruments 2. An ability to set out an curve in underground and surface 3. An ability to connect the baseline from surface to underground 			

4. An ability know the location of a point in underground traverse

Conduction of Practical Examination:

- All laboratory experiments (Part - A & Part - B) are to be included for practical examination.
- Students are allowed to pick one experiment from each of the lot.
- Strictly follow the instructions as printed on the cover page of answer script for breakup of marks
- PART –A: Procedure + Conduction + Viva: 10 + 25 +05 (40)
- PART –B: Procedure + Conduction + Viva: 10 + 25 +05 (40)
- Change of experiment is allowed only once and marks allotted to the procedure part to be made zero