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SRI SATYA SAI UNIVERSITY
OF TECHNOLOGY AND MEDICAL SCIENCES

SYLLABUS REVISION

Name of School-School of Engineering

Department-Mining Engineering

2017-18 TO 2021-22

www.sssutms.co.in

Opp.Oilfed Plant, Bhopal-Indore Road,Sehore (M.P), Pin - 466001

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SRI SATYA SAI

UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite PachamaOilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Mining Engineering

Minutes of Board of Studies Committee Meeting Dated : 05.06.2017

The Board of Studies Committee Meeting was held in the room of Department of Mining Engineering at 02:30 PM on 05.6.2017. Following members were present.

1. Mr. Anil Verma, Asstt. Prof.(Mechanical Engineering), Chairman
2. Mrs. Priyanka Jhavar, Asstt. Prof.(Mechanical Engineering), Member
3. Mr. Prashant Singh, Asstt. Prof.(Aeronautical Engineering), Member
4. Mr. Dhananjay Yadav, Asstt. Prof.(Mechanical Engineering), Member

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda 1.

Approval of MI-3rd and 4th Semester Scheme and Syllabus (CBCS)

Discussion (If any):

Scheme and Syllabus should be prepared as per current demand in industry.

Resolution of the Discussion :

Scheme and Syllabus should be prepared as per current demand in industries and was approved for coming 3rd and 4th semester.

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Mr. Anil Verma, Asstt. Prof.(Mechanical Engineering), Chairman
2. Mrs. Priyanka Jhavar, Asstt. Prof.(Mechanical Engineering), Member
3. Mr. Prashant Singh, Asstt. Prof.(Aeronautical Engineering), Member
4. Mr. Dhananjay Yadav, Asstt. Prof.(Mechanical Engineering), Member

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MTH-301 COMPUTATIONAL TECHNIQUES

UNIT I

MATRICES:- Eigenvalues and Eigenvectors of a real matrix , Characteristic equation , Properties of Eigenvalues and eigenvectors, Cayley-Hamilton Theorem , Diagonalization of matrices , Reduction of a quadratic form to canonical form by orthogonal transformation

UNIT II

INFINITE SERIES:- Sequences , Convergence of series , General properties , Series of positive terms , Tests of convergence (Comparison test, Integral test, Comparison of ratios and D'Alembert's ratio test) , Alternating series , Series of positive and negative terms , Absolute and conditional convergence , Power Series , Convergence of exponential, logarithmic and Binomial Series.

UNIT III

FUNCTIONS OF SEVERAL VARIABLES:- Limits and Continuity , Partial derivatives , Homogeneous functions and Euler's theorem ,Total derivative ,Differentiation of implicit functions , Change of variables , Partial differentiation of implicit functions , Taylor's series for functions of two variables . Errors and approximations, Maxima and minima of functions of two variables

UNIT IV

IMPROPER INTEGRALS:-Improper integrals of the first and second kind and their convergence, Evaluation of integrals involving a parameter by Leibnitz rule – Beta and Gamma functions, Properties, Evaluation of integrals using Beta and Gamma functions , Error functions.

UNIT V

MULTIPLE INTEGRALS:- Double integrals , Change of order of integration ,Area enclosed by plane curves, Triple integrals, Volume of Solids, Change of variables in double and triple integrals, Area of a curved surface.

TEXT BOOKS :

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 40th Edition, 2007.
2. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd.,

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Introduction to Mining : (MIC-302)

UNIT 1: Exploratory Drilling

Drilling machines used for exploratory drilling viz. Rotary & Percussive, their attachments; Core Barrels; Conditions of applicability of drilling methods; Borehole Survey, Directional drilling, Underground methods of exploratory drilling.

UNIT 2: Drivage of Inclines/Drifts/Adits

Types of Openings; Choice of Openings; Location of Openings; Drilling, blasting, loading and transportation of muck during drivage of inclines/adits/drifts, Ventilation, lighting and drainage, Extension of center line; Organization and cycle of operations; Mechanized methods of drivages of inclines/adits/drifts.

UNIT 3: Shaft Sinking

Drilling, blasting, loading and transportation of muck, Ventilation, lighting and drainage, Extension of center line; Shaft lining and its design; Special methods of shaft sinking; Shaft boring; Deepening and widening of shafts. Upward drivage; Organization and cycle of operations.

UNIT 4: Introduction to Underground Mining

Definition of important terms, Mine development, Activities involved in development of a mine, Stages in the life of a mine, Introduction to unit operations in underground mining. Choice of method of mining, Introduction to various Underground Mining methods. Introduction to various types of machineries used in Underground mining.

UNIT 5: Introduction to Surface Mining

Definition of important terms, Advantages and disadvantages of surface mining, mineral deposits amenable to surface mining, Various surface mining methods, Introduction to unit operations in surface mining. Introduction to various types of machineries used in surface mining.

Text Books:

1. Surface Mining : G.B. Mishra
2. Mining Engineer's Handbook Vol. 1&2, 2 Edition: Edited b y Harold Hartman
3. Introduction to mining : Hartman

Reference Books:

1. U.M.S. Notes
2. Elements of Mining Technology Vol. 1&3 : D.J.Deshmukh
3. Mining of Mineral Deposits : Shevyakov
4. Modern Coal Mining : Samir Kumar Das
5. Coal Mining : R.D.Singh
6. Mining : Boki

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Geology-I *(MIC-303)*

UNIT 1: The Earth in Space and Time

Solar System: - Size, Shape, Mass and Density of Earth; A Brief idea of the origin and the age of the Earth; Interior of the Earth:- seismic data, Density and Pressure within the Earth; The internal structure and composition of Earth; Elementary knowledge of Diastrophism, Earthquakes and volcanism:-Volcanic and Earthquake belts, their relationship with Plate Tectonics.

UNIT 2: Mineralogy

Physical Properties of Minerals; Classification of various Rock forming Minerals; Introduction and preliminary study of principle Rock-Forming Mineral groups:- Garnet, Pyroxene, Amphibole, Mica, Feldspar and Felspethoid, Megascopic Properties of economically important Non-Silicate Minerals.

UNIT 3: Igneous and Metamorphic Petrology

Elementary knowledge of Magma and its Crystallization; Classification of Igneous Rocks; Textures and Structures of Igneous Rocks; Petrographic Description of Common Igneous Rocks; Agents and Types of Metamorphism; Depth zones, Facies and Grades of Metamorphism and Petrographic Description of Common Metamorphic Rocks.

UNIT 4: Sedimentary Petrology

Textures and Structures of Sedimentary Rocks; Sedimentary Processes- Weathering, Transportation and Deposition; Classification and Petrographic Description of Common Sedimentary Rocks.

UNIT 5: Structural Geology

Concept of Deformation; Primary and Secondary Planer & Linear Structure of Rocks; Topography and its Representation. Altitude of strata- Dip and strike; Outcrop patterns; Width of Outcrop and Thickness of beds; Structural Contours; Geological Maps; Study of Unconformity; Folds, Joints, Faults and their influence in Mining Operations.

Text Books:

1. Engineering And General Geology : Parbin Singh
2. Physical And Engineering Geology : S.K. Garg
3. Rutley's Elements of Mineralogy : H.H. Read
4. Principles Of Petrolog y : G.W. Tyrell

List of Experiments:

1. ***Megascopic Description of Rock Forming Minerals.***
2. ***Megascopic Description of important Igneous, Sedimentary, Metamorphic Rocks.***
3. ***Basic Concept of Contours, Attitude of Beds, Width of Outcrop, True and Apparent Dips, Rules of V's.***
4. ***Study of Geological Maps and Preparation of Cross Sections.***

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Mining Surveying-I : (MIC-304)

UNIT 1: Chain Survey

Linear Measurements; Types of chains; Tapes; Errors in chaining and corrections in linear measurements; Direct and indirect Ranging; Principles of chain surveying. Offsets, Limiting length of offsets; Booking field notes; Obstacles in chaining; Instruments for setting out right angles.

UNIT 2: Compass Survey

Theory of Magnetism; Dip of Magnetic needle; Prismatic Compass; Surveyor's Compass; Bearings; Designation of Bearings; Calculation of Included Angles; Local Attraction; Magnetic Declination.

UNIT 3: Plane Table Surveying

Principles of Plane Tabling; Working operations; Methods of Plane Table Surveying; Two and Three point problems.

UNIT 4: Miner's Dial

Construction, Use, Tests and Adjustments; Loose and fast Needle surveying; Common sources of errors in Dial surveying; Methods of elimination and compensation.

UNIT 5: Levelling

Definitions of important terms used in levelling; Development in levelling Instruments; Types and Constructional details of Dumpy Level, Auto Level; Temporary and Permanent Adjustments; Methods of levelling; Straight edge levelling; Fly levelling; Check levelling; Reciprocal levelling; Longitudinal Sections; Cross- Sectioning; Trigonometric levelling; Methods of booking and reduction of levels; Levelling through drifts and shafts (Including steeply inclined shafts) ; Plumbing measurements of depth of shaft and subsidence.

Text Books:

1. Mine surveying by S. Ghatak
2. Surveying & Levelling by B. C. Punamia

List of Experiments:

1. **Ranging and Chaining of line of 50 Meter.**
2. **Determination of width of an obstacle which can be seen across but can't be chained.**
3. **Determination of area of a field by Cross staff survey.**
4. **Study of various types of chained**

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(MIC-305) Mechanics of Solids & Fluid

UNIT-1 Concept of Stress and Strain

Stress and strain at a point; Axial and shear stresses, Ultimate and working stresses; Relation between stress and strain, Poisson's Ratio; Two dimensional state of strain, Principle stresses and Principle planes, Mohr's Circle, Two state of strain, Principle strains and principle axis of strain; Determination of Principle strain from strain measurements; Calculation of Principle stresses from Principle strains; Composite bars in tension and compression; Thermal stresses in composite bars.

UNIT-2 Bending Stresses in Beams and plates

Pure bending, Bending Stresses, Section Modulus of rolled and built up sections, Composite beams, Distribution of normal and shear stresses across the section of a simple beam with vertical section of symmetry; Theory of plates.

UNIT-3 Deflection of beams

Slope and deflection of beams by deflection methods; Area moment and conjugate beam methods, propped cantilever and fixed beams.

UNIT-4 Introduction to Fluid Mechanics

Physical properties of fluids; Compressible and Incompressible fluids; Newtonian and Non-Newtonian fluids.

UNIT-5 (A) Fluid Statics

Pressure, density and height relationships; manometer pressure on curved and plane surfaces; Centre of Pressure; Buoyancy; Stability of Immersed and Floating bodies; Fluids in relative equilibrium.

UNIT-5 (B) Fluid Kinematics

Classification of flow: Uniform and Non-Uniform; Steady and Non- Steady; Laminar and Turbulent; One, Two, Three dimensional flows; Stream lines; Streak lines; Path lines; Stream Tubes; Elementary Explanation of stream function and velocity potential; Basic idea of flow nets.

Text Books:

1. Strength of material by B.S. Punmiya
2. Strength of material by Ramamurtham
3. Fluid Mechanics by Bansal

Reference Books:

1. Fluid Mechanics, F. M. White

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Mining Environment-I : (MIC-306)

Unit 1: Mine Atmosphere

Pollution in Mine Atmosphere, Mine Gases, Their Origin, Occurrence, Physiological effects and Detection, Calibration of Detectors, Methane Drainage. System for Monitoring of Mine Environment by Tube bundle apparatus and Telemonitoring systems. Analysis of Mine air by Haldane Apparatus, Gas Chromatograph.

Unit 2: Heat and Humidity

Heat and Humidity in Mine Atmosphere, their Sources and Effects, Cooling Power of Mine Air, Assessment of Comfort Conditions, Air Conditioning of Mines, Surface, Underground and Divided Installations, Spot Coolers.

Unit 3: Theory of Ventilation

Objects and Standards of Ventilation, Flow of Air in Ducts and Mine Roadways, Resistance of Air Ways, Laws of Ventilation, Chezy's and Atkinson's Equations, Equivalent Resistance and Equivalent Orifice of Mine.

Unit 4: Mine Ventilation And Ventilation Devices

Natural Ventilation Pressure and its Measurements, Thermodynamics of Natural Ventilation, Distribution and Control of Air Current, Doors, Regulators, Stoppings and their Types, Air Crossings, Air Locks.

Unit 5: Flame Safety Lamps And Mine Illumination

Constructional details of Flame Safety Lamp, Gas Testing by Flame Safety Lamp, Types of Portable Lamps, their Maintenance and Examination, Lamp Room Design and Organization, Lighting from Mains, Photometry and Illumination Surveys, Standards of Illumination for Underground and Open Cast Working

Text Books:

2. Elements of Mining Technology by D.J. Deshmukh,Vol.II
3. Mine Environment & Ventilation by G.B. Misra

Reference Books:

1. Mine Ventilation,UMS
2. Subsurface Mine Ventilation, M. J. McPherson

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MIC- 401
MINE SURVEYING II

UNIT 1: THEODOLITE SURVEYING

Types of Theodolites; Description of various parts of a Vernier Theodolite; Requirements of Mining type Theodolites; Measurements of height and distances of accessible and inaccessible points; Traversing with Theodolite on surface and underground; Checks on Closed and Open traverses; Balancing of traverses; Temporary & Permanent adjustments of Theodolites; Sources of errors and their prevention.

UNIT 2: TACHEOMETRY

Principles of Stadia Methods; Determination of constants; Theory of anallactic lens; Distance and elevation formulae, Sub tense and Tangential Methods; Auto- Reduction Tacheometer.

UNIT 3: SETTING OUT

Setting out simple curves on surface and in underground; Elementary knowledge of compound and transition curves; joint boundary survey; Equalization of boundaries; Maintenance of direction and radiant of roadways i.e. marking and checking of center line and grade line, transfer of point from roof to floor and floor to roof.

UNIT 4: ERRORS & PROBLEMS

Computation of areas and volumes; Earthwork calculation; Problems based on Coordinates, faults, Dip-Strike and boreholes; Sources, classification and relative importance of errors, their prevention and elimination, theory of errors, adjustment of errors.

UNIT 5: PLANS & SECTIONS

General requirements of mine plans; types of plans; Symbols used in mine plans; preparation of plans & sections; Plotting of traverse; Checking accuracy of old mine plans; Plan meter and its uses; Enlargement & reduction of plans.

REFERENCE BOOKS

1. Surface Mining: G.B. Misra
2. Surface mining equipment: Martin
3. Surface Mining: Pfleider
4. Mining: Boki
5. SME handbook: Hartman

MIC- 402
UNDERGROUND COAL MINING

UNIT I INTRODUCTION

Origin of Coal, Theories of Coal Formation, Classification of Coal, Coaking Coal, Coal Seam and its Classification, Coal Seam Structures and Abnormalities like Faults, Joints, Cleats, Folds etc., Coal Measuring Rocks and Their Characteristics, Distribution of Coal in India, Indian Coal Mining Industry; Choice of Coal Mining Methods.

UNIT II BOARD AND PILLAR METHOD

Important Terminology, Development Size and Shape of The Pillar, Galleries, Panel System and Without Panel System of Development, Size of Panel, Cycle Of Operation, Depillaring, Problems in Depillaring, Preparatory Arrangements, Depillaring by Stowing, Depillaring by Caving Methods, Pillar Extraction Techniques, Dangers Associated With Depillaring.

UNIT III LONGWALL MINING

Important Terminology, Types of Longwall Faces and Their Choice, Merits and Demerits of Longwall Mining, Development of Longwall Panels and Faces, Longwall Advancing Method, Longwall Retreating Method, Length of Longwall Faces, Rate of Face Advance, Double Unit Longwall Faces, Face organization and material supply.

UNIT IV THICK SEAM MINING

Problem in Mining of Thick Seams, Choice of Thick Seam Mining Methods, Inclined Slicing, Horizontal Slicing, Diagonal Slicing, Transverse Slicing, Sublevel Caving, Blasting Gallery Method, Cable-Bolting Method of Thick Seam Extraction.

UNIT V ROOM AND PILLAR MINING

Vermelles Method, Slant Method, Sublevel Method, Coal Saw Method, Mining of Contiguous Seams, Mining of Steeply Inclined Seam, Mining Under Water, Mining of Seams Prone to Spontaneous Heating, Bumps, Air blast etc.

TEXT BOOKS

1. Principle and practices of modem Coal Mining – R.D. Singh
2. Coal Mining in India – S.P. Mathur

REFERENCE BOOKS

1. Wining & working coal – R.T. Deshmukh
2. U/G winning of Coal – T.N. Singh

LIST OF EXPERIMENT

1. Study of layouts of Board and Pillar development working by without panel system.
2. Study of layouts of Board and Pillar development working by panel system.
3. Study of layout of Logwall Advancing system.
4. Study of layout of Logwall Retreating system.
5. Study of various line of extraction used for pillar extraction.
6. Study of stook extraction method under difficult roof conditions.

MIC- 403
UNDERGROUND MINE ENVIRONMENT – I

UNIT 1: MINE ATMOSPHERE

Pollution in Mine Atmosphere, Mine Gases, Their Origin, Occurrence, Physiological effects and Detection, Calibration of Detectors, Methane Drainage. System for Monitoring of Mine Environment by Tube bundle apparatus and Telemonitoring systems. Analysis of Mine air by Haldane Apparatus, Gas Chromatograph.

UNIT 2: HEAT AND HUMIDITY

Heat and Humidity in Mine Atmosphere, their Sources and Effects, Cooling Power of Mine Air, Assessment of Comfort Conditions, Air Conditioning of Mines, Surface, Underground and Divided Installations, Spot Coolers.

UNIT 3: THEORY OF VENTILATION

Objects and Standards of Ventilation, Flow of Air in Ducts and Mine Roadways, Resistance of Air Ways, Laws of Ventilation, Chezy's and Atkinson's Equations, Equivalent Resistance and Equivalent Orifice of Mine.

UNIT 4: MINE VENTILATION AND VENTILATION DEVICES

Natural Ventilation Pressure and its Measurements, Thermodynamics of Natural Ventilation, Distribution and Control of Air Current, Doors, Regulators, Stoppings and their Types, Air Crossings, Air Locks.

UNIT 5: FLAME SAFETY LAMPS AND MINE ILLUMINATION

Constructional details of Flame Safety Lamp, Gas Testing by Flame Safety Lamp, Types of Portable Lamps, their Maintenance and Examination, Lamp Room Design and Organization, Lighting from Mains, Photometry and Illumination Surveys, Standards of Illumination for Underground and Open Cast Working

TEXT BOOKS:

1. Elements of Mining Technology by D.J. Deshmukh,Vol.II
2. Mine Environment & Ventilation by G.B. Misra

REFERENCE BOOKS:

1. Mine Ventilation, UMS
2. Subsurface Mine Ventilation, M. J. McPherson

LIST OF EXPERIMENTS:

1. Detection of presence and accumulation of Firedamp in mine atmosphere.
2. Detection of presence and accumulation of CO in mine atmosphere.
3. Study of various techniques of methane drainage
4. Study of surface air conditioning plant.
5. Study of underground air conditioning plant .
6. Study of different types of ventilation devices.
7. Study of cap lamps used in underground mine.
8. Study of Flame safety lamps used in underground mine.
9. Design of a cap lamp room for a large underground coal mine.

MIC- 404
MINING MACHINERY – I

UNIT 1: WIRE ROPE

Wire ropes used in Mines and their installation, Application of wire ropes in Mines, Testing of wire Ropes, Factor of safety, Examination of Wire ropes, Care of wire ropes. Ropes splicing:Rope capels.

UNIT 2: HAULAGE

Different systems of rope haulage, rope haulage calculations, safety devices, tubs, haulage road and manholes, locomotive haulage and calculations based on it, track laying, mine cars.

UNIT 3: WINDING – I

Head gear arrangement, shaft fittings, safety devices, cages & skips, their suspension arrangements. Location of winding engine.

UNIT 4: WINDING – II

Electric winders, winding drums, types of construction, duty cycle, mechanical & electrical breaking, safety devices on winders, Electrical & Electronic methods of speed control, Multilevel winding; automatic winding, Torque- time & power- time diagram; calculation for winding.Pit top and pit bottom arrangements.

UNIT 5: PUMPING

Sources of mine water, types of pumps, design calculations, characteristics, operation,maintenance and selection, pump fittings, special types of pumps used in mines.

REFERENCE BOOKS:

1. Elements of Mining Tech. Vol I & Vol III by D. J. Deshmukh
2. Mining Machinery By S. C. Walker
3. Coal Mining Practice By Stathum

LIST OF EXPERIMENTS:

1. Study of Different types of Rope Capels.
2. Study of Rope Splicing.
3. Study of Clifton pulley.
4. Study of various safety devices on rope haulages
5. Study of Exhaust Conditioner on a diesel locomotive
6. Study of Cage Suspension Gear
7. Study of Detaching Safety Hook
8. Study of Lilly Controller

MIC- 405
MINE DEVELOPMENT

UNIT I INTRODUCTION TO MINING

History of mining, contribution of mining to civilization and national economy Indian mineral resources and world status, role of mining engineers in industry. Introduction to opencast and underground coal & metalliferous mining – selection criteria, comparison. Modes of entry into deposits for underground mining – shafts, inclines, adits, etc.

UNIT II INTRODUCTION TO DRILLING

Principles of drilling, methods, selection, applications and limitations, drill bits, flushing methods, fields of application, exploration and production drilling, drilling in underground workings, variables affecting the performance of drilling, novel methods of drilling.

UNIT III SHAFT SINKING

Selection of site and size, sinking methods, support system, ventilation, lighting and drainage arrangements during sinking, material handling and safety in sinking shafts. Introduction to piling, caisson and freezing methods - cementation method - widening and deepening of shafts. Modern techniques of shaft sink – shaft boring, design of shaft insets, pit bottom excavation and shaft raising.

UNIT IV INTRODUCTION TO EXPLOSIVES AND BLASTING

Types of explosives, fuses, detonators and other accessories, alternatives to explosives, cause of accidents and safety precautions, drilling and blasting pattern for underground excavations, merits, demerits and limitations of blasting. Storage and transport of explosives.

UNIT V DRIFTING AND TUNNELING

Drivage of drifts, organization and cycle of operations, supporting of development workings, modern methods of drifting, tunneling, road heading and tunnel boring.

REFERENCE BOOKS:

1. Hartman, H.L., Introduction to Mining Engineering, John Wiley and Sons, Second Edition, 1999.
2. Deshmukh,D.J., Elements of Mining Technology, Vol.I, Vidyaseva Prakashan, Nagpur,1994.
3. Chugh,C.P., Drilling Technology Hand Book, Oxford & IBH Publications, 1994.
4. Chugh, C.P. Diamond Drilling, Oxford & IBH Publishers, 1999.
5. Karnam,U.M.R., Principles of Rock Drilling, 1999.
6. Bhandari S., Engineering rock blasting operations, A. A. Balkema, 1997.

LIST OF EXPERIMENT

1. To introduce the field of mining and provide basic input about mining unit operations.
2. To know the history of mining and describe the correlation between the development of mining and cultural progress.
3. To study concept of exploration & development drilling, blasting and the technology employed.
4. To learn the various modes of access and study the methods of designing the access

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MIC- 406
MINING GEOLOGY II

UNIT 1 : INDIAN GEOLOGY

History of geology, major geomorphic division of India, general review of India, stratigraphy, description of important Indian geology formation, Archeans, Vindhyans, Gondwanas and tertiaries.

UNIT 2 : STRUCTURAL GEOLOGY

Study of topographic maps, attitude of planar and linear structures, effects of topography on outcrops, Unconformities, folds, faults and joints – their nomenclature, classification and recognition, Forms of igneous intrusion – dyke, sill and batholith, effect of folds and fractures on strata and their importance in mining operations, principles of stereographic projection of linear and planar features of rocks.

UNIT 3 : PETROLEUM GEOLOGY AND COAL

Rank characteristics and important constituents of coal, classification and origin of coals, geology of the principle coal field of India, concept of organic constituents of petroleum origin, migration, accumulation, concept of traps and important petroliferous basins of India.

UNIT 4: ECONOMIC GEOLOGY

Economic geology mode of Occurrence, origin, distribution, association and industrial uses of important Metallic (Au, Al, Cu, Fe, Mn, Sn, Pb And Zn) and Non-Metallic(Diamond, mica, Radioactive Minerals, Gypsum, Dolomite, Fire-clay, Magnesite, talc, asbestos, Graphite, Kyanite, Sillimanite, corundum, Fluorite, phosphorite, Precious and Semi-precious stones)

UNIT 5: EXPLORATION AND PROSPECTING GEOLOGY

Exploration and prospecting geology definition and classification of method; elementary method of geology , geophysical ,geochemical prospecting , ringed targets intersection loci.,exploration-minral concept and viz surface and subsurface; exploration strategy and design ; stage exploration ; resource and reserves.

REFERENCE BOOKS:

1. Engineering geology-Prabin singh
2. Engineering geology- P.k. Mukherjee
3. Mineralogy-Dana
4. Courses in mining geology –Arogyaswamy
5. Geology of india and (vol 1and 2) R.Vaidyanadhan and M.Ramakrishnan

LIST OF EXPERIMENT:

1. Study of topography maps
2. Study of sterographic projection
3. Standard tensile test on MS and CI Specimen
4. Identification of rocks.
5. Identification of simple rocks forming minerals and important ores

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SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
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(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department Of Mining Engineering

Minutes of Board of Studies Committee Meeting Dated : 03.6.2018

The Board of Studies Committee Meeting was held in the room of HOD (MI) at 10:30 AM on 03.6.2018. Following members were present.

1. Mr. Shyamanand Raizada (Mining Engineering), Chairman
2. Anil Verma, Asstt. Prof.(Mechanical Engineering), Member
3. Mrs. Priyanka Jhavar, Asstt. Prof.(Mechanical Engineering), Member
4. Mr. Prashant Singh, Asstt. Prof.(Aeronautical Engineering), Member
5. Mr. Dhananjay Yadav, Asstt. Prof.(Mechanical Engineering), Member

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda 1. Approval of MI-5th semester Scheme and Syllabus (CBCS)

Discussion (If any) : Scheme and Syllabus should be prepared as per current demand in industry.

Resolution of the Discussion : Scheme and Syllabus was prepared as per current demand in industries and was approved for forthcoming 5th semester

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Mr. Shyamanand Raizada (Mining Engineering), Chairman
2. Anil Verma, Asstt. Prof.(Mechanical Engineering), Member
3. Mrs. Priyanka Jhavar, Asstt. Prof.(Mechanical Engineering), Member
4. Mr. Prashant Singh, Asstt. Prof.(Aeronautical Engineering), Member
5. Mr. Dhananjay Yadav, Asstt. Prof.(Mechanical Engineering), Member

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Scheme of Examination-CBCS Pattern

Fifth Semester –BE (Mining Engineering)

Academic Year-2018-2019

S.No.	Subject Code	Subject Name	Maximum Marks Allotted						Total Marks	Periods/Hour/Week			Total Credits
			Theory Slot			Practical Slot				L	T	P	
			End Sem.	Mid Sem. MST (Two tests average)	Quiz, Assignment	End Sem	Term work						
							Lab work & sessional	Assignment/ quiz					
1	MIC-501	Surface Mining	60	30	10	30	10	10	150	2	1	2	04
2	MIC-502	Underground Metal Mining	60	30	10	30	10	10	150	2	1	2	04
3	MIC-503	Mining Machinery –II	60	30	10	30	10	10	150	2	1	2	04
4	MIC-504	Departmental Elective-I	60	30	10	-	-	-	100	2	1	-	03
5	MIC-505	Departmental Elective-II	60	30	10	-	-	-	100	2	1	-	03
6	MIC-506	Open Elective-I	60	30	10	-	-	-	100	2	1	-	03
7	MIC-507	Seminar /Industrial Training-I	-	-	-	-	50	50	100	0	0	4	02
		Total	360	180	60	90	80	80	850	12	6	10	23

Electives:

MIC-504 Departmental Elective-I	MIC-504(A) Pollution Control Engineering	MIC-504(B) Computer Application in Mining
MIC-505 Departmental Elective-II	MIC-505(A) Rock Mechanics	MIC-505(B) Mine Management
MIC-506 Open Elective-I	MIC-506(A) Mine Safety Engineering	MIC-506(B) Drilling and Blasting of Rocks

MIC-501 SURFACE MINING

UNIT 1: OPEN PIT DESIGN AND LAYOUTS

Classification of surface mining method mineral deposits suitable for open pit mining, Important parameters of Open pit design; Design of Benches, Ultimate pit, Stripping ratio, Break even stripping ratio, Different methods of opening up the deposits; Box cuts, internal and external box cut, Methods of driving Box cuts; Layout of open pits; Layout of waste dumps, unit operations in opencast mining.

UNIT 2: ROCK DRILLING

Theory of Rock Drilling, Different Types of Drill Machines Used in Open Pits; Rotary, Percussive and Rotary Percussive Drilling, Selection of Drill Machines on the basis of Drill ability; Computation of Productivity of Drill Machines; Inclined Drilling; their Advantages and Disadvantages.

UNIT 3: PIT PREPARATION

Dozers, Scrapers, Front-End Loaders, Grader, Back Hoe, etc.; their Construction, Operation, Suitability and applicability; Calculation of Their Productivity

UNIT 4: LOADING AND EXCAVATION

Different Types of Excavators used in Open Pits; Shovel, Dragline, Hydraulic Excavators, Multi Bucket Excavators, their Construction, Specifications, Operation, Suitability and Applicability; Calculation of their Productivity.

UNIT 5: TRANSPORT IN OPEN PITS

Automobile Transport, Rail Transport and Conveyors; their Suitability; Computation of their Productivity; Automation in Open Pit transport such as Truck Dispatch System.

REFERENCE BOOKS:

1. Surface Mining: Pfleider
2. Mining Equipment: Boki
3. SME handbook: Hartman
4. Surface Mining Technology: S. K. Das

LIST OF EXPERIMENTS:

1. Study of open pit design and layouts
2. Study of loading and Excavation
3. Study of rock Drilling
4. Study of transport in open pits

MIC- 502 UNDERGROUND METAL MINING

UNIT 1: GENERAL

Status and scope of Underground metal mining methods; Definitions of important terms used in underground metal mining methods. Classification of mining methods; Factors affecting the choice of mining methods.

UNIT 2: DEVELOPMENT

Mode of access; Variables affecting the choice of mode of access; Crosscuts, Levels, Raises, Winzes, Ore passes; Their method of drivages with the description of various unit operations; Introduction to Raise boring and introduction to tunnel boring .

UNIT 3: STOPING METHODS-I

Overhand, Underhand and Breast stoping methods; Open stoping; Vertical Crater Retreat method; Sub level stoping Room and Pillar method, Resuing method.

UNIT 4: STOPING METHODS-II

Shrinkage stoping; Cut and fill stoping, Introduction to Square set stoping, Sub level caving, Block caving, Top slicing.

UNIT 5: SUPPORT SYSTEMS

Pillars; Back fill, Cable bolting, Steel Rock bolting, Grouting, Shotcreting etc. Code of timbering rules.

REFERENCE BOOKS:

1. Elements of Mining Tech. Vol II by D. J. Deshmukh
2. S M E Handbook
3. Underground mining methods, Hustrulid
4. Introduction to Mining, H. L. Hartman

LIST OF EXPERIMENTS:

1. Study of Underground metal mining methods.
2. Study of method of drivages
3. Study of Underhand and Breast stoping methods
4. Study of Cut and fill stoping methods
5. Study of Steel Rock bolting

MIC-503 MINE MACHINERY- II

UNIT 1: AERIAL ROPEWAYS

Different types, their constructions & installation, operation & maintenance, design calculation, their layout including rope-tensioning arrangements.

UNIT 2: CONVEYORS - I

Different types of belt conveyors, their construction, installation, maintenance & design.

UNIT 3: CONVEYOR - II

Shaker conveyor, scraper chain conveyor and armored chain conveyor, their installation & construction maintenance. Safety Devices; Pit top and pit bottom arrangements.

UNIT 4: SKIP & KOEPE WINDING

Skip types & construction, pit top & pit bottom arrangements, advantages and disadvantages, Types of Koepe Winder, Koepe wheel, Floating platforms, Two winders working in the same shaft, Winding with side by side and up and down sheaves, advantages and disadvantages. Multirope winding. Calculation of H.P.

UNIT 5: HYDRAULIC TRANSMISSIONS

Fundamental of hydrostatic compression, hydraulic fluids, hydraulic pumps, motors, cylinders and accumulators, different types of valves, hydraulic coupling and torque converters, Application in mines, Advantages of hydraulic transmission.

REFERENCE BOOKS:

1. Elements of Mining Tech. Vol I & Vol III by D. J. Deshmukh
2. Mining Machinery by S. C. Walker
3. Coal Mining Practice by Stathum

LIST OF EXPERIMENTS:

1. Study of Monocable aerial Ropeway.
2. Study of Bicable aerial Ropeway.
3. Study of Loop take-up and tensioning arrangement of a belt conveyor.
4. Study of pit top and pit bottom arrangements for a belt conveyor.
5. Study of Belt Conveyor
6. Study of an Armoured face Conveyor.
7. Study of Various Koepe Arrangements

MIC-504 (A) - Pollution Control Engg.

UNIT-I

ENVIRONMENTAL POLLUTION Introduction and classification of environmental pollution, ecological conservation. Salient features of the environmental laws in India and Occupational disease. Environmental Impact Assessment, Environmental Management Plan, Environmental Audit.

UNIT-II

AIR POLLUTION Air pollution due to various gases and suspended particulate materials, causes, consequences, preventive measures, dust measuring equipment.

UNIT-III

NOISE POLLUTION Pollution due to noise and its consequences, noise produced by different machinery, control and safety, measurement of noise levels.

UNIT -IV

WATER POLLUTION Water pollution, its causes and preventive measures, acid-mine drainage, water pollution in mines and mineral beneficiation plants, water purification schemes in brief.

UNIT-V

LAND POLLUTION Land pollution and land reclamation, land reclamation techniques, Physical and Biological reclamation, Mine Closure Plan.

Reference Books:

1. Air & Water Acts.
2. Forest Conservation acts.
3. Legislation in Indian Mines - A Critical appraisal by Rakesh and Prasad.
4. Environmental Impact of Mining By Down and Stokes

MIC-504(B) COMPUTER APPLICATION IN MINING

UNIT 1: INTRODUCTION TO SOFTWARE PACKAGES APPLICABLE TO MINING

Computational systems inspired by natural evolution; natural and artificial evolution, evolutionary; chromosome representations; search operators;

UNIT 2: CO-EVOLUTION

Constraint handling techniques; niching and speciation; genetic programming; classifier systems and theoretical foundations; implementation of selected algorithms.

UNIT 3: DEVELOPMENT OF ALGORITHMS

Slope stability. Pillar design. Open pit configuration. Design of mine ventilation system. Optimisation of cycle of operations. Blast design.

UNIT 4 : SIMPLEX TECHNIQUE

Simplex technique for mining. Rock reinforcement design. Modelling of mining pollution phenomena. Management information systems.

UNIT5: DEVELOPMENT OF PROGRAMS

Simple computer programs based on the above algorithms.

REFERENCE BOOKS:

1. Fundamental of Database Systems by Elmasri & Navathe
2. Introduction to operations research by Hillier/Lieberman

MIC-505(A) ROCK MECHANICS

UNIT I

Application of rock mechanics in mining, Definition of important terms used in Rock mechanics, Classification of rock mass, Parameters of rock mass classification, Importance of rock mass classification, RQD, Q –system and Bieniskiwi's Geomechanics classification of rock mass.

UNIT II

Rock properties, Physico-mechanical properties of rock, Preparation and testing of specimen in the laboratory, ISRM standards, Determination of Physico-mechanical properties of rock as per ISRM standard testing procedures, Strength indices and their importance. Point load, Protodyaknov, Impact and Cone Indenter strength Index.

UNIT III

Rock as an elastic medium, Principle of elastic analysis, Rheological properties of rock, Importance of rheological models, Different types of rheological models, Dynamic properties of rocks, Anisotropy and Creep.

UNIT IV

Principal stress and Principal plane, Analytical method of determining the magnitudes and directions of normal and shear stress on failure plane, Mohr's circle, Theories of failure of rock, CoulombNavier theory, Mohr's theory, Griffith's theory, Empirical theories of failure of rock, Different modes of failure of rock.

UNIT V

Earth stresses, Importance of measurements of in situ stress, measurements of insitu stress by Flat jack, Overcoring and Hydraulic fracturing technique. Design of circular and elliptical openings. Determination of safe span of roof.

REFERENCE BOOKS:

1. Rock Mechanics By Obertabd Duvall
2. Rock Mechanics By Goodman
3. Rock Mechanics By Jager& Cook
4. Rock Mechanics by B.S. Verma

MIC-505(B) MINE MANAGEMENT

UNIT 1: EVOLUTION OF MANAGEMENT THEORY

Principle of Scientific management, Elements of management functions, Planning, Organizing and Control, Levels of Management. Structure and design of organization for mining enterprises.

UNIT 2: PERSONNEL MANAGEMENT

Selection, training and development of human resources, Job evaluation, job analysis, incentive and theories of motivation, Productivity, its concept and measurement, Leadership and Communication.

UNIT 3: PRODUCTION MANAGEMENT

Determination of norms and standards of operations by work study, work measurements, production planning, Scheduling and control, Queuing theory, short and long term planning, Quality control, introduction to MIS, Material Management

UNIT 4: INDUSTRIAL PSYCHOLOGY

Its relation with other branches of knowledge, studies of physical factors and their effect on man, Industrial relations, Human relations, trade union movements in India.

UNIT 5: INDUSTRIAL ACT AND LAWS

Industrial Dispute Act, Industrial Trade Union Act, Analysis of industrial disputes, Prevention and settlement of industrial disputes, Payment of wages act, Workmen's compensation act, Contract labour laws.

REFERENCE BOOKS:

1. Mine Management : V. N. Singh
2. Management & Administration : S.K.Gupta
3. Introduction to Management: O.P. Khanna

MIC-506 (A) MINE SAFETY ENGINEERING

UNIT 1:

Safety scenario in Indian mines., Safety management and organisation

UNIT 2:

Causes of accidents, accident report. ,Human behavioural approach in safety

UNIT 3:

Accident analysis and control.

UNIT 4:

Cost of accident., Emergency organisation for disaster management.

UNIT 5:

Systems engineering approach to safety, techniques used in safety analysis.

REFERENCE BOOKS:

1. Mines Act-1952 & Mines Rules-1955 L. C. Kaku.
2. Vocational Training Rules L. C. Kaku.
3. Mine Accidents S.J. Kejeriwal

MIC-506(B) DRILLING AND BLASTING OF ROCKS

UNIT 1: DRILLING OF ROCKS IN UNDERGROUND AND SURFACE MINES

Principles of rock drilling. Classification of drilling system. Rock drilling methods, parameters affecting the choice of drilling system, long hole drilling, ring drilling and rotary drilling methods for underground mines. Drilling bits.

UNIT 2: BLASTING IN UNDERGROUND MINES

Explosives. Initiation systems and accessories for blasting in the underground mines. Blasting off the solid. Blasting of cut faces. Mass-blasting system for heavy blasting in hard rock mines.

UNIT 3: BLASTING IN SURFACE MINES

Principles of blast round design for single and multi-row. Blast round design in surface mines. Bulk explosives Initiation systems and accessories.

UNIT 4: EVALUATION METHODS,

Evaluation of drilling and blasting methods for underground and surface mines by use of state-of-art techniques and gadgets.

UNIT 5: NUISANCES AND MITIGATION

Blasting nuisances and their mitigation for underground and surface mines.

REFERENCE BOOKS:

1. Elements of Mining Tech. Vol I,II,III by D. J. Deshmukh
2. Coal Mine Ground Control by Syd S Peng
3. Mining and rock construction technology

SRI SATYA SAI

UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
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Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Mining Engineering

Minutes of Board of Studies Committee Meeting Dated : 10.12.2018

The Board of Studies Committee Meeting was held in the room of Department of Mining Engineering at 02:30 PM on 10.12.2018. Following members were present.

1. Mr. Chandan, Asstt. Prof.(Mining Engineering), Chairman
2. Mr. Anil Verma, Asstt. Prof.(Mechanical Engineering), Member
3. Mrs. Priyanka Jhavar, Asstt. Prof.(Mechanical Engineering), Member
4. Mr. Prashant Singh, Asstt. Prof.(Aeronautical Engineering), Member
5. Mr. Dhananjay Yadav, Asstt. Prof.(Mechanical Engineering), Member

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda 1. Approval of MI-6th semester Scheme and Syllabus (CBCS)

Discussion (If any): Scheme and Syllabus should be prepared as per current demand in industry.

Resolution of the Discussion :

Scheme and Syllabus should be prepared as per current demand in industries and was approved for coming 6th semester.

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Mr. Chandan, Asstt. Prof.(Mining Engineering), Chairman
2. Mr. Anil Verma, Asstt. Prof.(Mechanical Engineering), Member
3. Mrs. Priyanka Jhavar, Asstt. Prof.(Mechanical Engineering), Member
4. Mr. Prashant Singh, Asstt. Prof.(Aeronautical Engineering), Member
5. Mr. Dhananjay Yadav, Asstt. Prof.(Mechanical Engineering), Member

SEHORE (M.P.) S S S U T M S

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Scheme of Examination-CBCS Pattern

SIX Semester –B.E. (Mining Engineering)

Academic Year-2018-2019

S.No.	Subject Code	Subject Name	Maximum Marks Allotted						Total Marks	Periods/Hour/ Week			Total Credits
			Theory Slot			Practical Slot							
			End Sem.	Mid Sem. MST (Two tests average)	Quiz, Assignment	End Sem	Term work			L	T	P	
							Lab work & sessional	Assignment/ quiz					
1	MIC-601	Mineral Processing	60	30	10	30	10	10	150	2	1	2	04
2	MIC-602	Blasting Technology	60	30	10	30	10	10	150	2	1	2	04
3	MIC-603	Mining Economics	60	30	10	30	10	10	150	2	1	2	04
4	MIC-604	Departmental Elective-III	60	30	10	-	-	-	100	2	1	-	03
5	MIC-605	Departmental Elective-IV	60	30	10	-	-	-	100	2	1	-	03
6	MIC-606	Open Elective-II	60	30	10	-	-	-	100	2	1	-	03
7	MIC-607	Seminar /Industrial Training-II	-	-	-	-	50	50	100	0	0	4	02
		Total	360	180	60	90	80	80	850	12	6	10	23

Electives:

MIC-604 Departmental Elective-III	MIC-604(A) Ground Control	MIC-604(B) Mine Reclamation
MIC-605 Departmental Elective-IV	MIC-605(A) Mine Planning & Development	MIC-605(B) Clean Coal Technology
MIC-606 Open Elective-II	MIC-606(A) Technology of Underground Excavation	MIC-606(B) Fundamentals of Drilling Technology

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

MIC-601 MINERAL PROCESSING

UNIT 1: COMMINUTION

Introduction, definition, scope and economic justification, main steps in ore dressing operations, comminution, crushing, principles of crushing , jaw crushers, gyratory crushers, cone crushers, roll crushers, gravity stamps their classifications and applications, grinding principles of grinding, application and classification of ball mills, rod mills, tube mills and Pebble mills.

UNIT 2: SIZING

Object of sizing, scale of sizing, laboratory sizing, screening and classification, different type of screens, their mode of operations and application and limitation, classification principles of classification, movement of solids through fluids, different types of classifiers, hydraulic and pneumatic classifiers, sampling-importance of sampling and methods used.

UNIT 3: GRAVITY CONCENTRATION

Jigging, flowing film concentrators like spirals and shaking tables, heavy media separation, applications and limitations of methods.

UNIT 4: FLOTATION

Physico-chemical principles, function of various flotation reagents, important machines, their principles, and working, flotation of sulphide, oxide and non-sulphide ores.

UNIT 5: PROCESSING METHODS OF SOME COMMON MINERALS

Electrostatic and Magnetic Separation - Principle operation and field of application, Pelletisation of low grade iron ore, Drying and dewatering - thickening, filtration and drying. Coal washing; Simplified flow sheets for beneficiation of coal and typical ores of copper, lead, zinc, iron and manganese with special reference to Indian deposits.

REFERENCE BOOKS:

1. Ore Dressing by Gaudin
2. Ore Dressing by B. A. Wills

LIST OF EXPERIMENTS:

1. Study of Jaw crusher
2. Study of Roll crusher
3. Study of Grinding mills
4. Study of Akin's classifier
5. Study of Shaking table
6. Study of Mineral jig.
7. Study of Spiral concentrator
8. Study of Floatation cell
9. Study of Thickners
10. Study of Washability curves

MIC-602 BLASTING TECHNOLOGY

UNIT 1: COMMERCIAL EXPLOSIVES

Classification ,Low and High Explosive, Permitted and non-permitted explosives, Important characteristics, ANFO, Slurry, Emulsion explosives, Primers and boosters, cast booster, Bulk explosive system.

UNIT 2: INITIATION SYSTEM, STORAGE AND TRANSPORTATION OF EXPLOSIVES

Detonators, safety fuse, Detonation cord, Detonating relay, Non-electric initiation system, NONEL, Electronic detonators, Exploder and other blasting tools, Magazines, transportation of explosives.

UNIT 3: SURFACE BLAST DESIGN

Theory of Breakage, Bench Blasting terminology, Estimation of Spacing, Burden, Stemming length, Sub-grade drilling etc., Charge calculation, initiation sequence, delay timing, Decking decoupling, Secondary Blasting.

UNIT 4: UNDERGROUND BLAST DESIGN

Terminology, cut holes, easers, trimmers, commonly used cut patterns, Wedge cut, drag cut, Pyramid cut, Burn cut, etc., blasting in sinking shaft, underground coal mine blasting, series and parallel connections of detonators.

UNIT 5: ENVIRONMENTAL IMPACT OF BLASTING

Blast induced ground vibration, its measurement, prediction and control, Noise, its measurements and control, Fly rock its causes and control, Controlled Blasting Techniques.

REFERENCE BOOKS:

1. Surface Blast Design by C.J. Konya.
2. Explosives and Blasting by G.K. Pradhan
3. Modern Techniques of Rock Blasting by U. Langefors and B. Kihlstrom.
4. Indian Explosive Act and Rules
5. Engineering Rock blasting operations, Bhandari
6. Surface Blast Evaluation, N. R. Thote & Pradhan
7. Surface Blasting, P. Pal Roy

LIST OF EXPERIMENTS:

1. Measurement of ground vibration by seismograph
2. Development of predictor equation from the recorded data
3. Measurement of VOD by VOD mate and its analysis
4. Study of various fragmentation assessment techniques
5. Handling of WIPFRAG software
6. Design of blast for coal face
7. Design of blast for underground metal mine
8. Design of blast for bench blasting
9. Study of various blasting tools
10. Study of bulk explosive systems

MIC-603 MINING ECONOMICS

UNIT 1: SAMPLING
Methods of sampling, Errors in sampling, analysis of samples, estimation of grade and reserves Different types of reserves. Salting, precautions against salting.

UNIT 2: MINE VALUATION
Different methods, Depreciation, Amortization and Redemption of capital, life and present value of a mine.

UNIT 3: FINANCIAL MANAGEMENT
Methods of framing and financing industrial enterprises, Memorandum and articles of association, shares, debentures, dividends and interest. Break even chart and inventory control.

UNIT 4: INVESTMENT DECISIONS
Discounted cash flow methods, non-discounted cash flow methods, advantages and disadvantages of them, internal rate of return, Net Present Value.

UNIT 5: BOOK KEEPING
Preparation of Balance sheet, Profit and Loss Account.

REFERENCE BOOKS:

1. Mineral Economics , R.T. Deshmukh
2. SME Handbook, Vol. I
3. Mineral Economics , Sinha and Sharma

MIC-604(A) GROUND CONTROL

UNIT-1 DESIGN OF MINE OPENING

Stress distribution around narrow and wide openings. Extent of failure around mine openings. Determination of size of opening and extent of failure.

UNIT-2 DESIGN OF PILLARS

Determination of shape and size of pillars in coal and hard rock mines, barrier pillars.

UNIT-3 SUBSIDENCE

Theories of subsidence. Factors affecting subsidence. Sub-critical, critical and super-critical widths of extraction. Subsidence prediction and control. Design of shaft pillar.

UNIT-4 SLOPES

Types of slope failure. Analysis of slope failure. Factors affecting slope stability. Drainage and reinforcement of slopes. Monitoring of slopes. Stability of waste dump.

UNIT-5 ROCK BURSTS

Rock bursts and bumps – mechanism, prediction and control.

REFERENCE BOOKS:

1. Elements of Mining Tech. Vol I,II,III by D. J. Deshmukh
2. Coal Mine Ground Control by Syd S Peng

LIST OF EXPERIMENT:

1. Study of Factors affecting subsidence
2. Study of Prediction and Control of Rock Burst

MIC-604(B): UNDERGROUND METALLIFEROUS MINING

STATUS OF METALLIFEROUS MINING INDUSTRY IN INDIA

DEVELOPMENT

Opening of deposits – shafts (vertical and inclined), declines and adits. Cross-cuts. Division of ore body into levels and blocks. Level interval.

DRIVING OF RAISES

Conventional and raise boring machines methods.

STOPING METHODS

Classification. Room and Pillar method. Sublevel stoping. VCR method. Shrinkage stoping – conventional and VCR. Cut and fill stoping and its variation. Sublevel caving. Block caving – spontaneous and induced. Dilution and recovery. Productivity. Unit supports and mass support systems. Selection of stoping methods.

SPECIAL MINING SITUATIONS

Special problems in deep mines. Solution mining. Leaching methods. Bacterial leaching. Sea-bed Mining.

ORE BODY AND HOST ROCK

Salient features, dilutions, type of dilutions, methods of dilution assessment, computation of net smelter returns of mine, economic considerations for selection of stoping methods.

PILLAR RECOVERY METHODS

MIC -605(A) MINE PLANNING & DEVELOPMENT

UNIT I

Coal reserves and their estimation, Geological and technological data needed for mine planning, Preparation of project and feasibility reports, Planning and scheduling of various mining operations.

UNIT II

Planning and scheduling of various mining operations, linear programming, Simplex methods and transportation problem. Operation Research - Scope of application in mining, Linear programming, formulation and solution, Network planning with special reference to CPM/PERT, System approach for project scheduling.

UNIT III

Division of mine area into units and sub units, Area, Reserve, Life and Capacity of mine, Panel size, Design of long wall face.

UNIT IV

Cost of various mining operations, Optimum size of mines, Mode of opening up of deposits, Choice of opening, Location and size of Development openings.

UNIT V

Mine Services Design of haulage, hoisting and drainage systems, Design of pit top and pit bottom, Coal handling plants, Railway siding etc.

TEXT BOOKS:

1. Advance Coal Mining by R.T. deshmukh and V.S. Vorobjev
2. Mine Planning by S.P. Mathur
3. Mine Planning by BJ. Bhattacharya

LIST OF EXPERIMENT:

1. Study of Coal Reserve in India.
2. Study of Mode of Openings.

MIC-605(B) CLEAN COAL TECHNOLOGY

UNIT 1: COAL UTILIZATION

Coal Production and utilization trends, Status of coal utilization technology and related operation and environment problems, Coal qualities and their effect on selection of efficient methods for eco-friendly utilization of coal.

UNIT 2: PRE-COMBUSTION TECHNOLOGY

Necessity, Scope and limitation of pre-combustion coal cleaning technology, Washability characteristics and preparation problem related to coal quality, Principles, operations and selection of processes for coal preparation, Plant performance evaluation, and forecasting of cleaning results, Environment problems and related mitigating measures

UNIT 3: COMBUSTION AND PRE- COMBUSTION TECHNOLOGY

Necessity, scope, and limitations of combustion and post-combustion clean coal technologies, Developments, basic principles, operating features of clean coal technologies, Selection, Performance and related environmental problems and their Control

UNIT 4: WATERS AND POLLUTANTS

Characterization, impacts, control, treatment and safe disposal of water pollutants released from various stages of clean coal technologies, Utilization of Wastes and Pollutants.

MIC-606(A) TECHNOLOGY OF UNDERGROUND EXCAVATION

TUNNELLING

Drilling and blasting, mucking, transportation support, ventilation and illumination. Tunnel boring machines – factors influencing its performance, choice of TBMs, types of TBMs.

DESIGN AND CONSTRUCTION OF LARGE UNDERGROUND EXCAVATIONS

Shape, dimensions, structural behaviour, methods and sequence of excavations.

Power stations.

Storage caverns.

Metro and large diameter trenches for communication.

Nuclear waste repositories and excavations for defence purposes.

MIC-606(B) FUNDAMENTALS OF DRILLING TECHNOLOGY

DRILLING METHODS

Classification, factors affecting drilling of rock – thrust, rotation, flushing, feed, rock type, alignment and deviation, flushing and suction drilling. Drillability of rocks. Basis for choice of methods - diameter, depth, and rock types. Ergonomics of drilling.

PRINCIPLES OF DRILLING

Drilling mechanics, factors affecting rock drilling, alignment and deviation.

EXPLORATORY DRILLING

Diamond drilling – types, rocks, barrels, bits and wire line system.

PRODUCTION DRILLING

Percussive drilling – mechanism, types and methods. Constructional features, specifications, merits and limitations of various types of percussive drills machines. Rotary blast hole drilling – classification, characteristics, performance and applications of rotary cutting and rotary crushing drilling techniques.

MISCELLANEOUS DRILLING TECHNIQUES

Water-jet assisted drilling, fire jet drill, drilling for coal field degasification and horizontal and directional drilling.

SRI SATYA SAI

UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite PachamaOilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Mining Engineering

Minutes of Board of Studies Committee Meeting Dated : 10.06.2019

The Board of Studies Committee Meeting was held in the room of Department of Mining Engineering at 02:30 PM on 10.06.2019. Following members were present.

1. Mr. Chandan, Asstt. Prof.(Mining Engineering), Chairman
2. Mr. Anil Verma, Asstt. Prof.(Mechanical Engineering), Member
3. Mrs. Priyanka Jhavar, Asstt. Prof.(Mechanical Engineering), Member
4. Mr. Prashant Singh, Asstt. Prof.(Aeronautical Engineering), Member
5. Mr. Dhananjay Yadav, Asstt. Prof.(Mechanical Engineering), Member

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda 1.

Approval of MI-7th & 8th semester Scheme and Syllabus (CBCS)

Discussion (If any)

Scheme and Syllabus should be prepared as per current demand in industry.

Resolution of the Discussion :

Scheme and Syllabus should be prepared as per current demand in industries and was approved for coming 7th

And 8th semester.

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Mr. Chandan, Asstt. Prof.(Mining Engineering), Chairman
2. Mr. Anil Verma, Asstt. Prof.(Mechanical Engineering), Member
3. Mrs. Priyanka Jhavar, Asstt. Prof.(Mechanical Engineering), Member
4. Mr. Prashant Singh, Asstt. Prof.(Aeronautical Engineering), Member
5. Mr. Dhananjay Yadav, Asstt. Prof.(Mechanical Engineering), Member

SSSUTMS SEHORE (M.P.) School of Engineering

Registrar
Sri Satya Sai University of Technology & Medical Sciences Sehore (M.P.)

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Scheme of Examination-CBCS Pattern

Seventh Semester –BE (Mining Engineering)

Academic Year-2019-2020

S.No.	Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Periods/Hour/Week			Total Credits
			Theory Slot			Practical Slot						
			End Sem.	Mid Sem. MST (Two tests average)	Quiz, Assignment	End Sem, Practical & Viva	Practical Record/ Assignment/ Quiz/ Presentation		L	T	P	
1	MIC-701	Surface Mine Environment	60	30	10	30	20	150	2	1	2	04
2	MIC-702	Strata Control	60	30	10	30	20	150	2	1	2	04
3	MIC-703	Mine Machinery-III	60	30	10	30	20	150	2	1	2	04
4	MIC-704	Departmental Elective-V	60	30	10	-	-	100	2	1	-	03
5	MIC-705	Departmental Elective-VI	60	30	10	-	-	100	2	1	-	03
6	MIC-706	Open Elective-III	60	30	10	-	-	100	2	1	-	03
7	MIC-707	Industrial Training-II	-	-	-	-	100	100	-	-	4	02
		Total	360	180	60	90	160	850	12	6	10	23

MIC-704	Departmental Elective-V	MIC-704(A) Surface Mining-II	MIC-704(B) Numerical Method in Mining Engg.	MIC-704(C) Mine Ventilation & Climate Engg.
MIC-705	Departmental Elective-VI	MIC-705(A) Mine Disasters	MIC-705(B) Numerical Method in Geomechanics	MIC-705(C) Mine Hazard and Rescue
MIC-706	Open Elective-III	MIC-706(A) Mining Induced Subsidence Engg.	MIC-706(B) Operation Research in Mining	MIC- 705(C) Mine Legislation and Safety-I

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MIC-701 SURFACE MINE ENVIRONMENT

UNIT-1

Environmental issues in mineral industry — national and global; ambient environment mining complexes; environmental impacts of mineral exploitation - underground and opencast mining and associated activities.

UNIT-2

Societal Environment : Societal environment and its management including resettlement and rehabilitation; socio-economic impacts; sustainable development; concept of carrying capacity based planning. Ecological environment and its management including biological reclamation. Land

UNIT-3

Environment : Visual impacts; landscape analysis; land use; landscape planning; physical reclamation and subsidence management.

UNIT-4

Air Pollution : Air pollution - sources, monitoring and control

Water Regime: Availability; water quality; water pollution treatment and water management.

Waste Management : solid wastes - generation, treatment and disposal

Noise and Vibrations : Causes, precautions, measurement, prevention and reduction. Blasting :

UNIT-5

Environmental aspects of blasting.:

Environmental Administration in India: Administration and Management, preparation of Environmental Management Plan. Environmental audit, salient features of Environment Protection Act

Reference Books

1. Environmental Impact of Mining : Stocks
2. Mining and Environment : Dr. B.B.Dhar
3. Mine Environment : Dhar and Thakur

LIST OF EXPERIMENT

1. Study of various types of pollution in surface mining
2. Study of mine reclamation and its types
3. Study of various environmental effect of surface mining

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MIC-702 STRATA CONTROL

UNIT 1

SUPPORTS -Timber & steel supports, Examination of roof, Roof bolting, roof stitching, method of supporting roadways. Supporting under different conditions viz. Pit bottom, crossing, junctions, faulted area, longwall faces, depillaring areas and stoping areas, support loads .SSR, CTR, Support plan, Support withdrawal.

UNIT 2

POWERED SUPPORTS - their principles of operation, Classification, designation, constructional features and applications, Hydraulic fluids.

UNIT 3

STOWING -Principal methods of stowing, their relative merits and applicability, Hydraulic stowing, Pneumatic stowing, Mechanical stowing, Hand packing, face arrangements, pipe wear, pipe jams.

UNIT 4

STRATA CONTROL -Theories of ground movement, Rock pressure due to Narrow and Wide excavation, Front abutment and back abutment, Failure of roof and floor, measurement of strata movement, rock burst, bumps, gas outbursts, pot holes.

UNIT 5

SUBSIDENCE-Theories of subsidence, damage and loss due to subsidence, vertical and lateral movements and their estimation, angle of fracture and angle of draw, factors affecting subsidence, subsidence control, protection of surface structures, design of protection pillars including shaft pillars. Pot holes.

Reference Books:

1. Strata control in mines Chaing & Peng
2. Winning and Working of Coal R. T. Deshmukh & D. J. Deshmukh
3. Modern Coal Mining Practices R. D. Singh
4. D.G.M.S. Circulars (Tech.) 1995 onwards
5. Longwall Mining Syd. S. Chaing & Peng

LIST OF EXPERIMENT:

1. Study of Stowing
2. Study of Subsidence
3. Study of Support System

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MIC-703 MINING MACHINERY – III

UNIT 1: FACE MACHINERY

Coal and rock Drilling, their constructional details, their applications, operation and maintenance, jumbo drill machines, introduction to coal cutting machine.

UNIT 2: LOADING AND TRANSPORTATION

Rocker shovel, gathering arms loaders, LHD and SDL machines- their construction and operation and maintenance, cavo loader, shuttle car and underground trucks, its construction, operation and application.

UNIT 3: CUTTER LOADERS

Different types of cutter loaders suitable for long wall and short wall faces, their constructions, operation and maintenance, winning methods different types of continuous miner & road headers their suitability, construction, operation and maintenance , mechanics of rock cutting, rock cutting tools and their performance.

UNIT 4: COMPRESSED AIR

Basic concept, compression process, working and constructional features of single stage and multistage compressor, unloading arrangement of compressor, layout of pipelines, transmission of compressed air, testing of compressor, safety features of compressor

UNIT 5: USE OF ELECTRICITY IN MINES

Flame proof enclosures & intrinsically safe apparatus, underground cables, drill panel, gate end box, circuit breakers, remote control (pilot circuit), installation of underground substation, earth leakage protection, cable joining, Electrical signaling provisions of IER related to mines

Reference books:

1. Elements of Mining Vol. III by D. J. Deshmukh
2. UMS Booklet
3. Winning and Working of Coal : R. T. Deshmukh & D. J. Deshmukh
4. Modern Coal Mining Practices : R. D. Singh
5. Longwall Mining : Syd. S. Chaing & Peng
6. Mine Winding & Transport by S.C.Walker

LIST OF EXPERIMENTS:

1. Study of LHD
2. Study of SDL
3. Study of Continuous Miner

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MIC-704(A) SURFACE MINING –II

Unit I

Dragline, Stripping Shovel Layouts of open pit mines, Methods of sidecasting, Sidecasting by Stripping Shovel and Dragline, Range/ Balancing Diagram, calculation of operating radius. Layouts of waste dumps. Design of Haul roads.

Unit II

Introduction to continuous surface mining equipment, Bucket wheel excavators, constructional features, basic operation and productivity, Continuous surface miner, their construction, basic operation and productivity. Face Layouts.

Unit III

Ultimate pit design, Factors affecting ultimate pit limits; Significance of ultimate pit limits; Manual methods of developing ultimate pit limits. Floating cone technique, Production planning, some basic mine life and plant size concepts, Mine and Mill plant sizing

Unit IV

Introduction to rock slope engineering, Slopes in surface mines and their formation, Pit slopes and their influence on mine economics, Slope/Dump stability, Factors influencing slope/dump stability, various types of slope failure and their geometrical conditions.

Unit V

Determination of factor of safety of a slope under plane and circular failure, planning of slope stability investigations, Stabilization and protection methods for stability of slopes. Waste dump stability parameters

Reference Books:

1. Surface Mining : G.B. Misra
2. Surface mining equipment : Martin
3. Surface Mining : Pfleider
4. Rock slope Engg. : Hoek & Bray
5. SME handbook : Hartman
6. Surface Mine Planning & Design : Hustrulid & Kuchha

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MIC-704(B) NUMERICAL METHODS IN MINING ENGINEERING

UNIT-1

Introduction To Elastic And Plastic Models Fundamentals, elastic, plastic, homogeneous and isotropic, non-linear elastic and elastoplastic models.

UNIT-2

Finite Difference Methods Concept, formation of mesh element, finite difference patterns, solutions, application to mining.

UNIT-3

Finite Element Methods Concept, discretisation, element configuration, element stiffness, assemblage and solutions, two and three dimensional solutions, linear and non-linear analysis, applications in geomechanics; simulation of joints in strata.

UNIT-4

Boundary Element Method Concept, discretisation, different methods of solution for isotropic and infinite media.

UNIT-5

Practical Applications In Mining And Rock Mechanics Practical Applications in stress analysis, slope stability, subsidence prediction, pillar design, rock burst, etc.

Reference Books:

1. Desai, C.S. and Abel, J.F. Introduction to the finite Element Method, Van Nostrand Riehokl Co., New York, 1983
2. Zienkiewicz, O.C. The Finite Element Method in Engineering Science, Tata McGraw Hill.
3. Segerlind, L.J., Applied Finite Element Analysis, John Wiley and Sons, New York, 1987
4. Mukhopadyay, M. Matrix Finite Element – Computer and Structural Analysis, Oxford and IBH Publishing co., 1984
5. Brown, E.T. (Ed) Analytical and Computational Methods in Engineering and Rock Mechanics, Allen and Unwin, London, 1987

MIC-704(C) MINE VENTILATION AND CLIMATE ENGINEERING

UNIT-1

Composition Of Mine Atmosphere Mine gases - production, properties, effects and detection; sampling and analysis of mine air; methane content; methane drainage; methane layering; flame safety lamp and its uses; methanometer; radon gas and its daughter products; continuous monitoring of gases

UNIT- 2

Heat And Humidity Sources of heat in mines; effects of heat and humidity; psychrometry, kata thermometer; heat stress, air-conditioning

UNIT-3

Natural Ventilation Seasonal variations, calculation of NVP from air densities and thermodynamic principles

UNIT- 4

Air Flow Through Mine Openings Laws of flow, resistance of air ways, equivalent orifice, distribution of air; flow control devices; automation and remote control of ventilation installations; ventilation surveys; permissible air velocities in different types of workings

UNIT- 5

Mechanical Ventilation Types of mine fans; theory, characteristics and suitability of fans; selection, testing and output control; fans in series and parallel; forcing and exhaust configurations; reversal of flow; fan drifts, diffusers, evasees

Reference Books:

1. Mine Ventilation : G. B. Mishra
2. Sub-surface mine ventilation : Macperson
3. Mine ventilation and air-conditioning in mines : Harman
4. Element of Mining Technology Vol 2 : D. J. Deshmukh

MIC-705(A) MINE DISASTERS

UNIT-1

Spontaneous Combustion Mechanism, causes, susceptibility indices, detection, preventive measures and control. Incubation period and its determination.

UNIT-2

Mine Fires Classification of fires, causes, detection, preventive measures. Dealing with underground and surface fires. Fire fighting – direct methods, sealing off and inertisation.

UNIT-3

Explosions Mechanism, causes, characteristics, preventive and control measures of firedamp and coal dust explosions. Investigation after explosion.

UNIT-4

Reopening of Sealed-off Area Monitoring of atmosphere behind sealed-off area. Precautions to be taken before reopening. Methods of reopening.

UNIT-5

Inundation Causes and preventive measures. Precautions to be taken while approaching old water-logged workings and while working under water bodies. Safety boring apparatus. Dewatering procedure. Design and construction of water dams and barriers.

Reference Books:

1. Mine Disasters and Mine Rescue- M.A. Ramlu
2. Mine Disasters- Misra G.B.
3. Mine Disasters -R.D. Singh

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MIC-705(B) NUMERICAL METHODS IN GEOMECHANICS

UNIT- 1

Finite Difference Method Concept, formation of mesh, finite difference patterns, solutions.

UNIT- 2

Application in mining problems.

UNIT-3

Finite Element Method Concept, discretization into elements, element types, element stiffness,

UNIT- 4

assemblage and solution. Simulation based on FEM.

UNIT- 5

Boundary Element Method Concept, discretization, solution for isotropic and infinite media.

Application to Mining Engineering Problems.

Reference Books:

1. Numerical Methods In Geomechanics -Mcgrawhill.
2. Numerical Methods In Geomechanics -Gupta Dey
3. Numerical Methods In Geomechanics -Dr. C.P.Gandhi

MIC-705(C) MINE HAZARD AND RESCUE

UNIT-1

Mine Fires : Causes of mine fires; spontaneous combustion - mechanism, susceptibility indices, factors 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.

UNIT-2

Mine Explosions : Firedamp and coal dust explosions – mechanisms, causes and prevention; stone-dust and water barriers; investigations after an explosion.

UNIT-3

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

UNIT-4

Rescue And Recovery : Rescue equipment and their uses, rescue stations and rescue rooms; organization of rescue and recovery areas, re-opening of sealed-off workings Illumination in mines- it's effect on safety, efficiency and health ; common types of safety lamps & their uses and limitations, maintenance and examination of lamps, their charging, cleaning, lighting, re-lighting ; lamp room design and organization;

UNIT-5

lighting from mains – different types of illumination devices; illumination of pit bottoms. main roads, faces, pump houses and haulage rooms; standards of illumination in underground and opencast mines Airborne respirable dust in underground mines - generation, dispersion, measurement and contro; classification, physiological effects, dust measurement, sampling of air-bone dust

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Reference Books:

1. Mine Hazard And Rescue -M.A. Ramlu
2. Mine Hazard And Rescue -R.D. Singh
3. Mine Hazard And Rescue- D. J. Deshmukh

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MIC-706(A) MINING INDUCED SUBSIDENCE ENGINEERING

UNIT-1

Causes – Effect of depth, width of excavation, seam thickness and angle of draw.

UNIT-2

Types of subsidence – non-effective width, sub-critical, super-critical width.

UNIT-3

Theories of subsidence, sub-surface subsidence due to mining.

UNIT-4

Rock kinematics, Extent of movement in the overlying beds.

UNIT-5

Special Methods of Mining to control subsidence.

Prediction and nomograms of subsidence.

Reference Books:

1. Mining Induced Subsidence Engineering- Kolymbas, Dimitrios
2. Mining Induced Subsidence Engineering- Gattinoni, Paola, Pizzarotti, Enrico, Scesi, Laura
3. Mining Induced Subsidence Engineering -Dimitrakopoulos, Roussos (Ed.)

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MIC-706(B) OPERATIONS RESEARCH IN MINING

UNIT-1

Introduction to Operations Research

UNIT-2

Linear Programming & Dynamic Programming Transportation – problems in mining, supply of coal from various mines to various destinations, cost optimisations and optimisations tools.

UNIT-3

Network Analysis

CPM and PERT Analysis.

UNIT-4

Inventory Models

Definition, deterministic models, probabilistic models and their applications to mining.

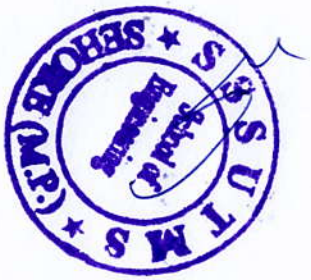
UNIT-5

Non-linear Programming

Unconstrained and constrained external problems. Programming methods – separable, quadratic,stochastic, geometric.

Reference Books:

1. Operations Research In Mining -Frederick S. Hillier
2. Operations Research In Mining -Wayne L. Winston
3. Operations Research In Mining -Paul Goodwin



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MIC-706(C) MINING LEGISLATION & SAFETY-I

UNIT-1

Introduction to Acts, Rules & Regulation applicable to Mining Industry, Development of mining legislation in India.

UNIT-2

Mines Act – 1952 & **Mines Rules – 1955**

UNIT-3

Coal Mines Regulations –1957, Ventilation,Standard of ventilation, main mechanical ventilator, Installations & Restrictions, Splits and Airways, Introduction to draft CMR-2006 & **Metalliferous Mines Regulation-1961** Ventilation, Explosives,Official Duties

UNIT-4

Mine Crèche Rules 1966

UNIT- 5

Mine Vocational Training Rules- 1966 Application of Rules, General vocational training (scope and standard), training centres, and arrangements for training

Reference Books:

1. Legislation in Indian Mines (A critical Appraisal) Vol. II & I, - S. D. Prasad & Prof. Rakesh
2. CMR-1957 & MMR-1961 - L. C. Kaku
3. Mines Act-1952 & Mines Rules-1955 - L. C. Kaku
4. Vocational Training Rules - L. C. Kaku
5. Mine Accidents - S.J. Kejeriwal
6. CMR-2017- L C Kaku

S S U T M S * SEHORE (M.P.) * School of Engineering

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MIC-707 Industrial Training –II

Duration:- 2 weeks after the VI semester in the summer break, Assessment in VII semester. Students must observe following to enrich their learning during industrial training:

- Industrial environment and work culture.
- Organizational structure and inter personal communication.
- Machines/ equipment/ instruments - their working and specifications.
- Product development procedures and phases.
- Project planning, monitoring and control.

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Scheme of Examination-CBCS Pattern

Eighth Semester –BE (Mining Engineering)

Academic Year-2019-2020

S.No.	Subject Code	Subject Name	Maximum Marks Allotted						Total Marks	Periods/Hour/Week			Total Credits
			Theory Slot			Practical Slot							
			End Sem.	Mid Sem. MST (Two tests average)	Quiz, Assignment	End Sem	Term work			L	T	P	
							Lab work & sessional	Assignment/ quiz					
1	MIC-801	Mining Surveying – III	60	30	10	30	10	10	150	2	1	2	04
2	MIC-802	Mining Environment – III	60	30	10	30	10	10	150	2	1	2	04
3	MIC-803	Departmental Elective-VII	60	30	10	-	-	-	100	2	1	-	03
4	MIC-804	Departmental Elective-VIII	60	30	10	-	-	-	100	2	1	-	03
5	MIC-805	Open Elective-IV	60	30	10	-	-	-	100	2	1	-	03
6	MIC-806	Industrial Training Project - II	-	-	-	50	50	50	150	-	-	8	04
7	MIC-807	General Proficiency	-	-	-	-	50	50	100	-	2	-	02
		Total	300	150	50	60	120	170	850	10	7	12	23

Electives:

MIC-803 Departmental Elective-VII	MIC-803(A) Mining legislation & Safety-II	MIC-803(B) Computer Applications in Mining	MIC-803(C) Mine Automation
MIC-804 Departmental Elective-VIII	MIC-804(A) Mine Planning	MIC-804(B) Geostatistics	MIC-804(C) Rock Slope Engg.
MIC-805 Open Elective-IV	MIC-805(A) Mining Management.	MIC-805(B) Fundamentals Of Rock Mechanics Instrumentation	MIC-805(C) Rock Excavation Engg.

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MIC-801 MINING SURVEYING – III

UNIT 1: TRIANGULATION

Principles of forming network of triangles; Selection of sites of triangulation stations; Base and Check base lines; Measurement and adjustment of angles by simple methods; Calculation of Co-ordinates.

UNIT 2: CORRELATION SURVEY

Methods of correlation of surface and underground surveys through adits, inclines, and shafts; Use of magnetic needle and Gyro theodolites; Different methods of Stope surveying and open pit surveying;

UNIT 3: ASTRONOMICAL SURVEY

Definitions of important terms; Determination of azimuth by astronomical observations.

UNIT 4: PHOTOGRAPHIC SURVEYING

Terrestrial photogrammetry, General Principles; Phototheodolite; Stereo photographic Surveying; Aerial Surveying - Field of application; Vertical and oblique photographs; Aerial photography; Preparation of photographical maps by simple methods

UNIT 5: MODERN SURVEYING TECHNIQUES

Electronic distance measuring equipment; Geodimeter, Tellurometer, Distomat, Total station, Surveying software with plotting system, GPS, principle, method and its application in mining.

Reference Books:

1. Mine surveying by S. Ghatak
2. Surveying & Levelling by B. C. Punamia
3. Surveying & Levelling by Kanetkar & Kulkarni
4. Mine surveying by Winniberg

List Of Experiment:

1. Study of Triangulation Survey.
2. Study of Correlation Survey
3. Study of Astronomical Survey.

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MIC-802 MINING ENVIRONMENT – III

UNIT 1 : SPONTANEOUS HEATING

Causes, detection and preventive measures in underground and surface coal mines, control of spontaneous heating in stacks and dumps..

UNIT 2: MINE FIRES

Mine fires, control of fires and fires extinguishers, study of atmosphere behind sealed off areas, fire stopping and sealing off an area, pressure balancing, conditions and procedure of reopening a sealed off area, fire fighting organization. Fires in opencast mines and surface storage systems, emergency organization in mines.

UNIT 3: EXPLOSION

Fire damp and coal dust explosions, their causes and prevention, stone dust and water barriers, investigations of explosion.

UNIT 4: MINE INNUNDATION

Causes and precautionary measures, bulk head doors, barriers, dams, their design, precautions to be taken while approaching old workings, burnside drilling apparatus, recovery of flooded mines and de watering of old workings.

UNIT 5: RESCUE AND RECOVERY

Types of rescue equipment and their use, features of rescue stations and rescue rooms, first aid appliances, training of personnel, and organization of rescue and recovery work during mine fires, explosion, inundation.

Reference Books:

1. Mine Environment By G.B. Mishra
2. Elements of Mining Tech. Vol.2 by D. J. Deshmukh
3. Subsurface Mine Ventilation. by Mcpherson
4. Mine fires by Dr. Ramlu

List Of Experiments:

1. Study of Spontaneous Heating
2. Study of Fire Damp
3. Study of Rescue Equipments

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MIC-803(A) MINING LEGISLATION & SAFETY-II

UNIT -1

Principal Provisions of Mines & Minerals (Regulation & Development) Act – 1957
Coal Mines Conservation & Development Act. – 1960

UNIT -2

Mineral Concession Rules, Indian Electricity Rules related to mining activity

UNIT -3

Byelaws & D.G.M.S. Circulars.
Mines Rescue Rules – 1985

UNIT-4

Mine Accident, their classification and analysis, Causes & preventive measures, Cost of accident, Preparation of Accident report, Court of Enquiry

UNIT-5

Safety Campaign, Causes of major mining accidents which occurred in India & Suggested remedial measures. National Safety Conferences.

Reference Books:

1. Legislation in Indian Mines (A critical Appraisal) Vol. I & II, S. D. Prasad & Prof. Rakesh
2. Coal Mines Conservation & Development Act Mines & Minerals (Development and Regulation) Act Vocational Training Rules
3. Mine Accidents : B. K. Kejariwal
4. Mines Rescue Rules
5. Indian Electricity Rules
6. Mineral Concession Rules
7. D.G.M.S. Circulars and Bylaws

MIC-803(B) COMPUTER APPLICATIONS IN MINING

UNIT 1

Introduction to Software Packages Applicable to Mining Development of Algorithms Slope stability. Pillar design. Open pit configuration.

UNIT 2

Design of mine ventilation system. Optimisation of cycle of operations.

UNIT -3

Blast design. Simplex technique for mining. Rock reinforcement design.

UNIT -4

Modelling of mining pollution phenomena. Management information systems.

UNIT -5

Development of Programs Simple computer programs based on the above algorithms.

Reference Books:

1.Computer Applications In Mining- S.P. Mathur

2.Computer Applications In Mining- BJ. Bhattacharya

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MIC-803(C) MINE AUTOMATION

UNIT 1

Scope and role of automation in mining operation and human related factors. System engineering approach and use of operational data from mining equipment and its use the mining process.

UNIT 2

Data communication and modern computerised control systems Data formats and IREDES, mine process data, AGV technology

UNIT 3

Basic foundations for automation of mining equipment. Navigation, surface navigation and GNSS (satellite navigation), mine planning tools, etc

UNIT 4

Automation of drilling and drill rig, drilling process. Automation of underground loading and transportation systems. Automation in tunnelling projects.

UNIT 5

Automation in monitoring of environments in longwall and continuous mining system Automation of transportation system in surface mining. Use of robotics in mining for production and disaster management purpose

Reference Books:

1. Society of Mining Engineering Handbooks –Vol. I and II
2. Introductory Mining Engineering: Hartman
3. Underground Mining Methods Handbook: Hustrulid (SME NY, 1994)

MIC-804(A) MINE PLANNING

UNIT 1

Coal reserves and their estimation, Geological and technological data needed for mine planning, Preparation of project and feasibility reports, project monitoring.

UNIT 2

Planning and scheduling of various mining operations, linear programming, Simplex methods and transportation problem. Operation Research - Scope of application in mining, Linear programming, formulation and solution, Network planning with special reference to CPM/PERT, System approach for project scheduling.

UNIT 3

Division of mine area into units and sub units, Area, Reserve, Life and Capacity of mine, Panel size, Design of long wall face.

UNIT 4

Cost of various mining operations, Optimum size of mines, Mode of opening up of deposits, Choice of opening, Location and size of Development openings.

UNIT 5

MINE SERVICES Design of haulage, hoisting and drainage systems, Design of pit top and pit bottom, Coal handling plants, Railway siding , design of rapid loading system etc

.

Books Recommended :

1. Advance Coal Mining by R.T. deshmukh and V.S. Vorobjev
2. Mine Planning by S.P. Mathur
3. Mine Planning by BJ. Bhattacharya

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MIC-804(B) GEOSTATISTICS

UNIT 1

Introduction to Classical statistics, Histrograms, mean, median, mode, skewness, Kurtosis, standard deviation, variance, confidence interval, normal and lognormal distribution.

UNIT 2

Different types of mineral reserves, estimation of grade and reserves, Different techniques of grade estimation, rule of nearest point , constant distance weighting technique and inverse distance weighting technique, method of triangles and polygonal method, bench compositing.

UNIT 3

Introduction to Geostastistics, theory of reigonalised variable, application of Geostastistics in mining, Covariogram and semivariogram, definitions and their estimation, Parameters of semivariogram, sill variance, nugget effect, range of influence, zonal and directional anisotropy.

UNIT 4

Mathematical representation of semivariogram and covariogram, Semivariogram models and their characterics, calculation, plotting and fitting of experimental semivariogram.

UNIT 5

Volume-Variance relationship, Extension variance and estimation variance, optimal valuation and kriging, Kriging estimator and kriging error, Kriging of a square block valued by two samples, Grade tonnage relationship.

Reference Books:

1. Geostatistics: Runge
2. Basic Geostatistics: Liu
3. Application of Geostatistics: Isobel Clark

MIC-804(C) ROCK SLOPE ENGINEERING

UNIT 1

Basic Concepts: Engineering issues of Slope stability, Basic terminology, Slope failure causes and process, basic mechanism of slope failure Rock mass properties: various properties, data collection, stereographic projections

UNIT 2

Ground Water: Role of ground water flow, influence of ground water on slope stability, evaluation of ground water conditions in slopes

UNIT 3

Plane Failure : general conditions and failure analysis

UNIT 4

Wedge Failure: general conditions and failure analysis

Circular Failure: general conditions and failure analysis

UNIT 5

Toppling Failure: general conditions and failure analysis Rock slope stabilization techniques, Geotechnical Instrumentation and Monitoring Aspect of Waste dump stability analysis

Reference Books :

1. Rock Slope Stability, Charles A Kliche (SME publication)
2. Rock Slope Engineering, Hoek & Brown SME
3. Slope Stability in Surface mining, WA Hustrulid, SME

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MIC-805(A) MINING MANAGEMENT

UNIT 1

Evolution Of Management Theory - Principle of Scientific management, Elements of management functions, Planning, Organizing and Control, Levels of Management. Structure and design of organization for mining enterprises.

UNIT 2

Personnel Management - Selection, training and development of human resources, Job evaluation, job analysis, incentive and theories of motivation, Productivity, its concept and measurement, Leadership and Communication.

UNIT 3.

Production Management - Determination of norms and standards of operations by work study, work measurements, production planning, Scheduling and control, Queuing theory, short and long term planning, Quality control, introduction to MIS, Material Management

UNIT 4

Industrial Psychology - Its relation with other branches of knowledge, studies of physical factors and their effect on man, Industrial relations, Human relations, trade union movements in India

UNIT 5

Industrial Act And Laws - Industrial Dispute Act, Industrial Trade Union Act, Analysis of industrial disputes, Prevention and settlement of industrial disputes, Payment of wages act, Workmen's compensation act, Contract labour laws.

Reference Books:

1. Mine Management :V. N. Singh
2. Management & Administration : S.K.Gupta
3. Introduction to Management : O.P. Khanna

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MIC-805(B) FUNDAMENTALS OF ROCK MECHANICS INSTRUMENTATION

UNIT 1

Basic Concepts - Sensitivity, range, reproducibility and accuracy, drift, absolute and relative measurements, error, environmental factors and planning for instrumentation.

UNIT 2

Operating Principles -Mechanical, pneumatic, optical, vibrating wire, piezoelectric, electrical and thermal.

UNIT 3

Field Instruments - Load cells, MPBX, tape extensor meters, convergence recorders.

UNIT 4

Laboratory Instruments -Load, stress, deformation, strain measuring instruments.

UNIT 5

Applications In Mining -Coal mining – bord and pillar development, depillaring and Longwall. Metal mining applications

Reference Books:

1_Fundamentals Of Rock Mechanics Instrumentation. - J.C. Jaeger.

2 Fundamentals Of Rock Mechanics Instrumentation. -.N.G.W. Cook .

3. Fundamentals Of Rock Mechanics Instrumentation. - R.W. Zimmerman .

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MIC-805(C) ROCK EXCAVATION ENGINEERING

UNIT 1

Introduction: Scope and importance of rock excavation engineering in mining and construction industries; physico-mechanical and geotechnical properties of rocks vis-a-vis excavation method; selection of excavation method.

UNIT 2

Drilling : Mechanics of rock drilling; design and operating parameters of surface and underground drilling; evaluation of drill performance; drillability of rocks; mechanism of bit wear; bit selection; problems of drilling; economics of drilling.

UNIT 3

Blasting: Mechanics of rock fragmentation by explosives; advancement in explosives and blasting technique; their selection criteria for rock excavation; blast design for surface excavations and optimization;

UNIT 4

Advanced Blasting Techniques; blast performance evaluation; cast blasting; techno-economic and safety aspects of surface and underground blasting; advances in blast design for underground excavations; control blasting; computer aided blast designs; review of tunnel blasting techniques, recent advances and novel techniques of blasting

UNIT 5

Rock Cutting: Theories of rock tool interaction for surface excavation machinery; design of cutter head - rippers, dozers, scrapers, BWE. Continuous surface miners, auger drills;

Reference Books:

1. Blasting Practices : G.K.Pradhan
2. Explosives and Blasting Practices in Mines : Dr. Sameer Kumar Das
3. Drilling : G. Chugh
4. SME – Mining Engineers Handbook
5. Surface Mining – SME . Introduction to Mining : Hartman

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MIC-806 Industrial Training Project - II

Objectives of the course Industrial Training Project - II

To provide students with a comprehensive experience for applying the knowledge gained so far by studying various courses. To develop an inquiring aptitude and build confidence among students by working on solutions of small industrial problems. To give students an opportunity to do something creative and to assimilate real life work situation in institution. To adapt students for latest development and to handle independently new situations. To develop good expressions power and presentation abilities in students.

The focus of the Major Project is on preparing a working system or some design or understanding of a complex system using system analysis tools and submit it the same in the form of a write up i.e. detail project report. The student should select some real life problems for their project and maintain proper documentation of different stages of project such as need analysis market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan. Each student is required to prepare a project report and present the same at the final examination with a demonstration of the working system (if any)

Working schedule The faculty and student should work according to following schedule:

Each student undertakes substantial and individual project in an approved area of the subject and supervised by a member of staff. The student must submit outline and action plan for the project execution (time schedule) and the same be approved by the concerned faculty.

Action plan for Major Project work and its evaluation scheme #(Suggestive)

Task/Process	Week	Evaluation	Marks For Term Work#
Orientation of students by HOD/Project Guide	1st	-	-
Literature survey and resource collection	2nd	-	-
Selection and finalization of topic before a committee*	3rd	Seminar-I	10
Detailing and preparation of Project (Modeling, Analysis and Design of Project Work	4th to 5th	-	10
Development stage			
Testing, improvements, quality control of Project	6th to 10th 11th	-	25
Acceptance testing	12th	-	10

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Report Writing	13th to 15th	-	15
Presentation before a committee (including user manual, if any)	16th	- Seminar-II	30

* Committee comprises of HOD, all project supervisions including external guide from industry (if any)

The above marking scheme is suggestive, it can be changed to alternative scheme depending on the type of project, but the alternative scheme should be prepared in advance while finalizing the topic of project before a committee and explained to the concerned student as well.

NOTE: At every stage of action plan, students must submit a write up to the concerned guide.

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MIC - 807General Proficiency

Objective of GD and seminar- is to improve the MASSCOMMUNICATION and CONVINCING / under standing skills of students and it is to give student anopportunityto exercise their rights to expressthemselves.

Evaluation will be done by assigned faculty base don group discussion and power point presentation.

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SRI SATYA SAI

UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite PachamaOilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Mining Engineering

Minutes of Board of Studies Committee Meeting Dated : 04.06.2019

The Board of Studies Committee Meeting was held in the room of Department of Mining Engineering at 02:30 PM on 04.6.2019. Following members were present.

1. Mr. Anil Verma, Asstt. Prof.(Mechanical Engineering), Chairman
2. Mrs. Priyanka Jhavar, Asstt. Prof.(Mechanical Engineering), Member
3. Mr. Prashant Singh, Asstt. Prof.(Aeronautical Engineering), Member
4. Mr. Dhananjay Yadav, Asstt. Prof.(Mechanical Engineering), Member

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda Preparation of Syllabus and Scheme for III rd and IVth Sem.

Discussion Scheme and Syllabus Was Put up before the member as per recent AICTE guidelines. It was discussed in detail by the members and some modifications were suggested.

Resolution of the Discussion :

It was resolved that Scheme and Syllabus as Proposed with some modification and may be accepted.

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Mr. Anil Verma, Asstt. Prof.(Mechanical Engineering), Chairman
2. Mrs. Priyanka Jhavar, Asstt. Prof.(Mechanical Engineering), Member
3. Mr. Prashant Singh, Asstt. Prof.(Aeronautical Engineering), Member
4. Mr. Dhananjay Yadav, Asstt. Prof.(Mechanical Engineering), Member

SSUTMS (M.P.) SEHORE School of Engineering

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Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Scheme of Examination

Third Semester –BE (Mining Engineering))

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Total Marks	Credits Allotted			Total Credits
			Theory Slot			Practical Slot							
			End Sem.	Mid Sem. MST (Two tests average)	Quiz, Assignment	End Sem	Term work			L	T	P	
							Lab work & sessional	Assignment/ quiz					
1	BE-301	Engg Mathematics-I	70	20	10	-	-	-	100	3	1	-	4
2	MI-302	Drilling and Shot Firing	70	20	10	-	-	-	100	3	1	-	4
3	MI-303	Mine-Technology –I	70	20	10	30	10	10	150	3	1	2	6
4	MI-304	Geology –I	70	20	10	30	10	10	150	3	1	2	6
5	MI-305	Mine Surveying	70	20	10	30	10	10	150	3	1	2	6
6	MI-306	Computer Programming Lab (C Language)	-	-	-	30	10	10	50	-		2	2
7	MI-307	Self Study (Internal Assessment)						50	50			2	2
8	MI-308	Mine Excursion /Seminar						50	50			2	2
		Total	350	100	50	150	40	140	800	15	5	12	32

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BEA-301 Mathematics-III

UNIT-I

Numerical Methods–Solution of polynomial and transcendental equations – Bisection method, Newton- Raphson method and Regula-Falsi method. Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

UNIT-II

Numerical Methods - Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Solution of Simultaneous Linear Algebraic Equations by Gauss's Elimination, Gauss's Jordan, Crout's methods, Jacobi's, Gauss- Seidal and Relaxation method.

UNIT-III

Numerical Methods – Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge Kutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator-corrector methods. Partial differential equations: Finite difference solution two dimensional Laplace equation and Poisson equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank- Nicholson methods), Finite difference explicit method for wave equation.

UNIT-IV

Transform Calculus - Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace Transform method, Fourier transforms.

UNIT-V

Concept of Probability - Probability Mass function, Probability Density Function, Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution.

REFRENCES:

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
7. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
8. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
9. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968. Statistics.

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MIA-302 Mining Environment – I

UNIT-I

Introduction Ventilation requirements in mines, natural ventilation and mechanical ventilation. Mine Gases Composition of atmospheric air. Mine gases - occurrences, properties, physiological effects.

UNIT-II

Detection; sampling, analysis, monitoring. Methane layering, methane drainage. Radon and its daughter products - effects and control. Heat and Humidity Sources, effects and control of heat and humidity in mines.

UNIT-III

Cooling power of mine air – psychrometry, Kata thermometer, effective temperature. Air conditioning. Spot coolers. Airflow in Mine Workings Reynold's number, laminar and turbulent flow. Square law of mine ventilation.

UNIT-IV

Frictional and shock losses. Equivalent orifice. Resistance in series and parallel. Ventilation control devices. Splitting of air current. Ventilation network analysis – conventional method and scope for computer application. Airborne Respirable Dust Definition – generation, physiological effects, sampling.

UNIT-V

Measurement And Control Measures. Mine Illumination Flame safety lamp – construction, maintenance, gas testing. Cap lamps. Lamp room layout and organization. Underground lighting from mains. Illumination standards. Photometry. Illumination survey. Miners' Diseases.

REFRENCES:

1. G.B. Mishra, Mine Environment and Ventilation, Oxford University Press, 1992.
2. Hartman, H.L. Mine Ventilation and Air Conditioning, Wiley Interscience publication, 1993.
3. Hall, C.J, Mine Ventilation Engineering, Society of Mining Engineers, New Engineers, New York, Second Edition, 1992.
4. Vutukuri, V.S., Mine Environment Engineering, Trans Tech Publishers, 1986.
5. McPherson, M.J., Subsurface Ventilation and Environmental Engineering, Chapman andHall Publication, London, 1993.
6. Elements of mining technology by D.J Deshmukh vol.2

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MIA-303 Mining Surveying – I

UNIT-I

Chain Survey Linear Measurements; Types of chains; Tapes; Errors in chaining and corrections in linear measurements; Direct and indirect Ranging; Principles of chain surveying. Offsets, Limiting length of offsets; Booking field notes; Obstacles in chaining; Instruments for setting out right angles.

UNIT-II

Compass Survey Theory of Magnetism; Dip of Magnetic needle; Prismatic Compass; Surveyor's Compass; Bearings; Designation of Bearings; Calculation of Included Angles; Local Attraction; Magnetic Declination.

UNIT-III

Plane Table Surveying Principles of Plane Tabling; Working operations; Methods of Plane Table Surveying; Two and Three point problems.

UNIT-IV

Miner's Dial Construction, Use, Tests and Adjustments; Loose and fast Needle surveying; Common sources of errors in Dial surveying; Methods of elimination and compensation.

UNIT-V

Levelling; Definitions of important terms used in levelling; Development in levelling Instruments; Types and Constructional details of Dumpy Level, Auto Level; Temporary and Permanent Adjustments; Methods of levelling; Straight edge levelling; Fly levelling; Check levelling; Reciprocal levelling; Longitudinal Sections; Cross- Sectioning; Trigonometric levelling; Methods of booking and reduction of levels; Levelling through drifts and shafts (Including steeply inclined shafts) ; Plumbing measurements of depth of shaft and subsidence.

REFRENCES:

1. Mine surveying by S. Ghatak
2. Surveying & Levelling by B. C. Punamia
3. Bannister, A. and Raymond. S., Surveying, ELBS, 6th Edition 1992.
4. Kennetkar, T.P. Surveying and Levelling, Vols. 1 and 2, United Book Corporation, Pune,

LIST OF EXPERIMENTS:

1. Ranging and Chaining of line of 50 Meter.
2. Determination of width of an obstacle which can be seen across but can't be chained.
3. Determination of area of a field by Cross staff survey.
4. Study of various types of chained

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MIA-304 Rock Mechanics

UNIT-I

Application of rock mechanics in mining, Definition of important terms used in Rock mechanics, Classification of rock mass, Parameters of rock mass classification, Importance of rock mass classification, RQD, Q –system and Bieniawski Geo-mechanics classification of rock mass.

UNIT-II

Rock properties, Physico-mechanical properties of rock, Preparation and testing of specimen in the laboratory, ISRM standards, Determination of Physico-mechanical properties of rock as per ISRM standard testing procedures, Strength indices and their importance. Point load, Protodyakonov test, Impact and Cone Indenter strength Index.

UNIT-III

Rock as an elastic medium, Principle of elastic analysis, Rheological properties of rock, Importance of rheological models, Different types of rheological models, Dynamic properties of rocks, Anisotropy and Creep.

UNIT-IV

Principal stress and Principal plane, Analytical method of determining the magnitudes and directions of normal and shear stress on failure plane, Mohr's circle, Theories of failure of rock, Coulomb Navier theory, Mohr's theory, Griffith's theory, Empirical theories of failure of rock, Different modes of failure of rock.

UNIT-V

Earth stresses, Importance of measurements of in situ stress, measurements of insitu stress by Flat jack, Overcoring and Hydraulic fracturing technique. Design of circular and elliptical openings. Determination of safe span of roof.

REFERENCE:

1. Rock Mechanics By Obertabd Duvall.
2. Rock Mechanics By Goodman.
3. Rock Mechanics By Jager& Cook.
4. Rock Mechanics by B.S. Verma.
5. Rock Mechanics by B.P. Verma.
6. Rock Mechanics by Howard L. Hartman .

LIST OF EXPERIMENTS:-

1.To determine the important terms used in Rock mechanics.
2.To determine the Rock properties.
3.To determine the Different types of rheological models.
4.To determine the Mohr's circle.
5.To determine the Theories of failure of rock.
6.Brazilian Test for Tensile strength test.
7.Uniaxial strength test.
8.Triaxial strength test.
9.Stress relief or over coring technique.

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MIA-305 Geology – I

UNIT-I

The Earth in Space and Time Solar System: - Size, Shape, Mass and Density of Earth; A Brief idea of the origin and the age of the Earth; Interior of the Earth:- seismic data, Density and Pressure within the Earth; The internal structure and composition of Earth; Elementary knowledge of Diastrophism, Earthquakes and volcanism:-Volcanic and Earthquake belts, their relationship with Plate Tectonics.

UNIT-II

Mineralogy Physical Properties of Minerals; Classification of various Rock forming Minerals; Introduction and preliminary study of principle Rock-Forming Mineral groups:- Garnet, Pyroxene, Amphibole, Mica, Feldspar and Felspethoid, Megascopic Properties of economically important Non-Silicate Minerals.

UNIT-III

Igneous and Metamorphic Petrology Elementary knowledge of Magma and its Crystallization; Classification of Igneous Rocks; Textures and Structures of Igneous Rocks; Petrographic Description of Common Igneous Rocks; Agents and Types of Metamorphism; Depth zones, Facies and Grades of Metamorphism and Petrographic Description of Common Metamorphic Rocks.

UNIT-IV

Sedimentary Petrology Textures and Structures of Sedimentary Rocks; Sedimentary Processes-Weathering, Transportation and Deposition; Classification and Petrographic Description of Common Sedimentary Rocks.

UNIT-V

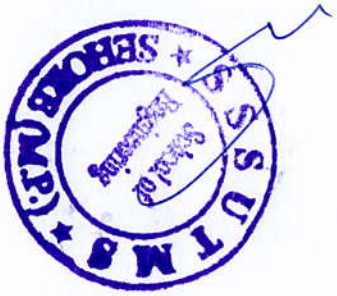
Structural Geology Concept of Deformation; Primary and Secondary Planer & Linear Structure of Rocks; Topography and its Representation. Altitude of strata- Dip and strike; Outcrop patterns; Width of Outcrop and Thickness of beds; Structural Contours; Geological Maps; Study of Unconformity; Folds, Joints, Faults and their influence in Mining Operations.

TEXT BOOKS:

1. Engineering And General Geology : Parbin Singh
2. Physical And Engineering Geology : S.K. Garg
3. Rutley's Elements of Mineralogy : H.H. Read
4. Principles Of Petrolog y : G.W. Tyrell

LIST OF EXPERIMENTS:

1. Megascopic Description of Rock Forming Minerals.
2. Megascopic Description of important Igneous, Sedimentary, Metamorphic Rocks.
3. Basic Concept of Contours, Attitude of Beds, Width of Outcrop, True and Apparent Dips, Rules of V's.
4. Study of Geological Maps and Preparation of Cross Sections.



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MIA-306 Computer Programming (C Language)

UNIT-I

Fundamentals of C Programming: History of C; Structure of a C Program; Data types; Constant & Variable, naming variables; Operators & expressions; Control Constructs – if-else, for, while, do-while; Case switch statement.

UNIT-II

Functions; Arguments; Return value; Parameter passing – call by value, call by reference; Return statement; Scope, visibility and life-time rules for various types of variable. static variable; Calling a function; Recursion – basics, comparison with iteration, types of recursion- direct, indirect, tree and tail recursion, when to avoid recursion, examples.

UNIT-III

Arrays: Arrays: Introduction to Arrays, Array Declaration, Single and Multidimensional Array, Memory Representation, Strings, String handling functions.
Pointers: Introduction to Pointers, Address operator and pointers, Declaring and Initializing pointers, Assignment through pointers. Pointer v/s array; Pointer to pointer; Array of pointer & its limitation; Function returning pointers; Pointer to function, Function as parameter.

UNIT-IV

Structure and Union: Declaration of structure, Accessing structure members, Structure Initialization, Union. Advanced Programming Techniques: Special constructs – Break, continue, exit(), goto & labels; Pointers- & and * operators, pointer expression, pointer arithmetic, dynamic memory management functions like malloc(), calloc(), free();

UNIT V

Miscellaneous Features: File handling and related functions; printf & scanf family;C preprocessor – basics, #Include, #define, #undef, conditional compilation directive like #if, #else, #elif, #endif, #ifdef
and #ifndef; Variable argument list functions.

REFERENCES:

1. Kerninghan & Ritchie "The C programming language", PHI
2. Schildt "C:The Complete reference" 4th ed TMH.
3. Cooper Mullish "The Spirit of C", Jaico Publishing House, Delhi
4. Kanetkar Y. "Let us C", BPB.

LIST OF EXPERIMENTS:

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1. WAP to perform arithmetic operations (Addition, Subtraction, Multiplication, Division) on two numbers.
2. WAP to calculate gross salary of an employee [using formula: gross_sal = basic_sal+hra+da].
3. WAP to calculate area of circle.
4. WAP to evaluate marks of student for 3 subjects, calculate percentage and display their grades. Marks grades
5. CASE -1: 90-100 A
6. CASE -2: 80-89 B
7. CASE -3: 65-79 C
8. CASE -4: Otherwise D
9. WAP to determine sum of odd series from 1 to N
10. WAP to calculate factorial of a number.
11. WAP to print Fibonacci series up to N. [E.g. - 0 1 1 2 3 5.....]
12. WAP to identify whether given number is prime or not.
13. WADF to identify whether given number is even or odd.
14. WADF to print whether given year is leap year or not.
15. WADF to check whether the 5 digit number is palindrome or not [A palindrome number or numeral palindrome is a number that remains the same when its digits are reversed. Like 16461, for example, it is "symmetrical".].
16. WADF to check whether 5 number entered is Armstrong number or not.[An Armstrong number is an n-digit number that is equal to the sum of the nth powers of its digits. Like 153]
17. WAP to find the sum of the digits of a number.
18. WAP to input 3 sides of triangle and identify the type of triangle.
19. WAP to input 5 digit numbers and find the sum of the first and last digit.
20. WAP to check whether the number is power of 2 or not.
21. WAP to find out GCD of two numbers.
22. WAP to check whether given number is perfect power of any natural numbe

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MIA–307 Self study/GD Seminar

Objective of GD and seminar- is to improve the MASS COMMUNICATION and CONVINCING / under standing skills of students and it is to give student an opportunity to exercise their rights to express themselves. Evaluation will be done by assigned faculty base don group discussion and power point presentation.

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Scheme of Examination

Fourth Semester –BE (Mining Engineering)

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Total Marks	Credits Allotted			Total Credits
			Theory Slot			Practical Slot							
			End Sem.	Mid Sem. MST (Two tests average)	Quiz, Assignment	End Sem	Term work			L	T	P	
							Lab work & sessional	Assignment/ quiz					
1	BS-401	Engg. Mathematics-II	70	20	10	-	-	-	100	3	1	-	4
2	MI-402	Mining Technology – II	70	20	10	-	-	-	100	3	1	-	4
3	MI-403	Geology Engineering- II	70	20	10	30	10	10	150	3	1	2	6
4	MI-404	Mechanical Engineering	70	20	10	30	10	10	150	3	1	2	6
5	MI-405	Electrical Power in Mining	70	20	10	30	10	10	150	3	1	2	6
6	MI-406	Programming in C ++	-	-	-	30	10	10	50	-		2	2
7	MI-407	Self Study (Internal Assessment)						50	50			2	2
8	MI-408	Mine Excursion /Seminar						50	50			2	2
		Total	350	100	50	120	40	140	800	15	5	12	32

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BEA-401 Energy, Ecology, Environment and Society

UNIT-I

Sources of Energy : Renewable & Non Renewable, Fossil fuel, Biomass Geothermal, Hydrogen, Solar, Wind, hydal, nuclear sources.

UNIT-II

Segments of Environment: Atmosphere, hydrosphere, Lithosphere, biosphere. Cycles in Ecosystem – Water, Carbon, Nitrogen. Biodiversity: Threats and conservation

UNIT-III

Air Pollution: Air pollutants, classification, (Primary & secondary Pollutants) Adverse effects of pollutants. Causes of Air pollution chemical, photochemical, Green house effect, ozone layer depletion, acid Rain. Sound Pollution: Causes, controlling measures, measurement of sound pollution (deciblage), Industrial and non – industrial.

UNIT-IV

Water Pollution– Water Pollution: Pollutants in water, adverse effects. Treatment of Domestic & Industrial water effluent. Soil Pollution – Soil Profile, Pollutants in soil, their adverse effects, controlling measures.

UNIT-V

Society, Ethics & Human values– Impact of waste on society. Solid waste management Nuclear, Thermal, Plastic, medical, Agriculture, domestic and e-waste). Ethics and moral values, ethical situations, objectives of ethics and its study. Preliminary studies regarding Environmental Protection Acts , introduction to value education, self exploration, sanyam & swasthya.

REFERENCES:

1. Rana SVS ; "Essentials of Ecology and Environment"; PHI Pub.
2. Raynold, GW "Ethics in information Technology"; Cengage.
3. Svakumar; Energy Environment & Ethics in society; TMH
4. AK De "Environmental Chemistry"; New Age Int. Publ.
5. BK Sharma, "Environmental Chemistry" ; Goel Publ. House.
6. Bala Krishnamoorthy; "Environmental management"; PHI
7. Gerard Kiely, "Environmental Engineering" ; TMH
8. Miller GT JR; living in the Environment Thomson/cengage
9. Cunninghan WP and MA; principles of Environment Sc; TMH
10. Gandhiji M.K.- My experiments with truth

MIA-402 Drilling & Blasting

UNIT-I

DRILLING OF ROCKS IN UNDERGROUND AND SURFACE MINES- Principles of rock drilling. Classification of drilling system. Rock drilling methods, parameters affecting the choice of drilling system, long hole drilling, ring drilling and rotary drilling methods for underground mines. Drilling bits.

UNIT-II

BLASTING IN UNDERGROUND MINES - Explosives. Initiation systems and accessories for blasting in the underground mines. Blasting off the solid. Blasting of cut faces. Mass-blasting system for heavy blasting in hard rock mines.

UNIT-III

BLASTING IN SURFACE MINES - Principles of blast round design for single and multi-row. Blast round design in surface mines. Bulk explosives Initiation systems and accessories

UNIT-IV

EVALUATION METHODS, Evaluation of drilling and blasting methods for underground and surface mines by use of stateof-art techniques and gadgets.

UNIT-V

NUISANCES AND MITIGATION -Blasting nuisances and their mitigation for underground and surface mines.

REFERENCE:

1. Coal Mine Ground Control by Syd S Peng.
2. Mining and rock construction technology.
3. Mining and Blasting Techniques by Partha sharma.
4. SME Handbook: Hartman.
5. Surface Mining, by Dr T.N.Singh, Lovely Prakashan, Dhanbad
6. Surface Mining Technology, by Prof S.K.Das, Lovely Prakashan, Dhanbad.
7. Surface Mining, by Prof G.B.Mishra, available at Lovely Prakashan, Dhanbad.
8. Explosives & Blasting Techniques, by Prof G.K.Pradhan, Mintech Publication, Bhubaneswar.
9. Advanced Surface Mining, by Prof G.K.Pradhan & Manoj Pradhan, Mintech Publication, Bhubaneswar.

LIST OF EXPERIMENT:

1. Drawing of schematic diagram showing different types of surface mining methods adopted in Coal, Lignite and non-coal mineral mining.
2. Designing an approach road/ramp to open a deposit by surface mining.
3. Various techniques used in over cast from cost benefit point of view.
4. Designing various layouts for hilly deposits of vein and bedded formation.
5. Designing various types of layouts for deposits below the general ground level.
6. Designing of various types of layouts for placer deposits.
7. Designing a deposit by opencast mining, which has been partially excavated by underground mining.
8. Performance and choice of drilling equipment in surface mine working. (Mine visit to assess rate of drilling, blast hole drilling usage from drill movement to positioning and final hole completion stages).

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MIA-403 Underground Coal Mining

UNIT-I

INTRODUCTION Origin of Coal, Theories of Coal Formation, Classification of Coal, Coaking Coal, Coal Seam and its Classification, Coal Seam Structures and Abnormalities like Faults, Joints, Cleats, Folds etc., Coal Measuring Rocks and Their Characteristics, Distribution of Coal in India, Indian Coal Mining Industry; Choice of Coal Mining Methods.

UNIT-II

BOARD AND PILLAR METHOD Important Terminology, Development Size and Shape of The Pillar, Galleries, Panel System and Without Panel System of Development, Size of Panel, Cycle Of Operation, Depillaring, Problems in Depillaring, Preparatory Arrangements, Depillaring by Stowing, Depillaring by Caving Methods, Pillar Extraction Techniques, Dangers Associated With Depillaring.

UNIT-III

LONGWALL MINING Important Terminology, Types of Longwall Faces and Their Choice, Merits and Demerits of Longwall Mining, Development of Longwall Panels and Faces, Longwall Advancing Method, Longwall Retreating Method, Length of Longwall Faces, Rate of Face Advance, Double Unit Longwall Faces, Face organization and material supply.

UNIT-IV

THICK SEAM MINING Problem in Mining of Thick Seams, Choice of Thick Seam Mining Methods, Inclined Slicing, Horizontal Slicing, Diagonal Slicing, Transverse Slicing, Sublevel Caving, Blasting Gallery Method, Cable-Bolting Method of Thick Seam Extraction.

UNIT-V

ROOM AND PILLAR MINING Vermelles Method, Slant Method, Sublevel Method, Coal Saw Method, Mining of Contiguous Seams, Mining of Steeply Inclined Seam, Mining Under Water, Mining of Seams Prone to Spontaneous Heating, Bumps, Air blast etc.

REFERENCE:

1. Principle and practices of modem Coal Mining –R.D. Singh.
2. Coal Mining in India – S.P. Mathur
3. Wining & working coal – R.T. Deshmukh
4. U/G winning of Coal – T.N. Singh

LIST OF EXPERIMENT:

1. Study of layouts of Board and Pillar development working by without panel system.
2. Study of layouts of Board and Pillar development working by panel system.
3. Study of layout of Logwall Advancing system.
4. Study of layout of Logwall Retreating system.
5. Study of various line of extraction used for pillar extraction.
6. Study of stook extraction method under difficult roof conditions.

MIA-404 Mining Machinery – I

UNIT-I

Wire ropes used in Mines and their installation, Application of wire ropes in Mines, Testing of wire Ropes, Factor of safety, Examination of Wire ropes, Care of wire ropes. Ropes splicing:Rope capels.

UNIT-II

HAULAGE Different systems of rope haulage, rope haulage calculations, safety devices, tubs, haulage road and manholes, locomotive haulage and calculations based on it, track laying, mine cars.

UNIT-III

WINDING – I Head gear arrangement, shaft fittings, safety devices, cages & skips, their suspension arrangements. Location of winding engine.

UNIT-IV

WINDING – II Electric winders, winding drums, types of construction, duty cycle, mechanical & electrical breaking, safety devices on winders, Electrical & Electronic methods of speed control, Multilevel winding; automatic winding, Torque- time & power- time diagram; calculation for winding.Pit top and pit bottom arrangements.

UNIT-V

PUMPING Sources of mine water, types of pumps, design calculations, characteristics, operation,maintenance and selection, pump fittings, special types of pumps used in mines.

REFERENCE:

1. Elements of Mining Tech. Vol I & Vol III by D. J. Deshmukh
2. Mining Machinery By S. C. Walker
3. Coal Mining Practice By Stathum
4. Heavy Earth Moving Machinery, by Prof. Amitosh Dey, Available at Lovely Prakashan, Dhanbad
5. Principles & Practices of Modern Coal Mining, Prof R.D.Singh, New Age International Pvt.Ltd. New Delhi.
6. Mining Machinery Maintenance and Capacity Utilization, by Prof Khanindra Pathak, Published by Cygnus Publication, Kolkata

LIST OF EXPERIMENTS:

1. Study of Different types of Rope Capels.
2. Study of Rope Splicing.
3. Study of Clifton pulley.
4. Study of various safety devices on rope haulages
5. Study of Exhaust Conditioner on a diesel locomotive
6. Study of Cage Suspension Gear
7. Study of Detaching Safety Hook
8. Study of Lilly Controller

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MIA-405 Geology –II

UNIT-I

INDIAN GEOLOGY History of geology, major geomorphic division of India, general review of India, stratigraphy, description of important Indian geology formation, Archeans, Vindhyans, Gondwanas and tertiaries.

UNIT-II

STRUCTURAL GEOLOGY Study of topographic maps, attitude of planar and linear structures, effects of topography on outcrops, Unconformities, folds, faults and joints – their nomenclature, classification and recognition, Forms of igneous intrusion – dyke, sill and batholith, effect of folds and fractures on strata and their importance in mining operations, principles of stereographic projection of linear and planar features of rocks.

UNIT-III

PETROLEUM GEOLOGY AND COAL Rank characteristics and important constituents of coal, classification and origin of coals, geology of the principle coal field of India, concept of organic constituents of petroleum origin, migration, accumulation, concept of traps and important petroliferous basins of India.

UNIT-IV

ECONOMIC GEOLOGY Economic geology mode of Occurrence, origin, distribution, association and industrial uses of important Metallic (Au, Al, Cu, Fe, Mn, Sn, Pb And Zn) and Non-Metallic(Diamond, mica, Radioactive Minerals, Gypsum, Dolomite, Fire-clay, Magnesite, talc, asbestos, Graphite, Kyanite, Sillimanite, corundum, Fluorite, phosphorite, Precious and Semi-precious stones).

UNIT-V

Exploration and prospecting geology definition and classification of method; elementary method of geology, geophysical ,geochemical prospecting , ringed targets intersection loci.,exploration-minral concept and viz surface and subsurface; exploration strategy and design ; stage exploration ; resource and reserves.

REFERENCE:

1. Engineering geology-Prabin singh
2. Engineering geology- P.k. Mukherjee
3. Mineralogy-Dana
4. Courses in mining geology –Arogyaswamy
5. Geology of india and (vol 1and 2) R.Vaidyanadhan and M.Ramakrishnan

LIST OF EXPERIMENT:

1. Study of topography maps
2. Study of stenographic projection
3. Standard tensile test on MS and CI Specimen
4. Identification of rocks.
5. Identification of simple rocks forming minerals and important ores

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MIA-406 Computer Programming (Java)

UNIT-I

Basic Java Features - C++ Vs JAVA, JAVA virtual machine, Constant & Variables, Data Types, Class, Methods, Objects, Strings and Arrays, Type Casting, Operators, Precedence relations, Control Statements, Exception Handling, File and Streams, Visibility, Constructors, Operator and Methods Overloading, Static Members, Inheritance: Polymorphism, Abstract methods and Classes.

UNIT-II

Java Collective Frame Work - Data Structures: Introduction, Type-Wrapper Classes for Primitive Types, Dynamic Memory Allocation, Linked List, Stack, Queues, Trees.

UNIT-III

Generics: Introduction, Overloading Generic Methods, Generic Classes, Collections: Interface Collection and Class Collections, Lists, Array List and Iterator, Linked List, Vector.Collections Algorithms: Algorithm sorts, Algorithm shuffle, Algorithms reverse, fill, copy, max and min Algorithm binary Search, Algorithms add All, Stack Class of Package java. Util, Class Priority Queue and Interface Queue, Maps, Properties Class, Un-modifiable Collections.

UNIT-IV

Advance Java Features - Multithreading: Thread States, Priorities and Thread Scheduling, Life Cycle of a Thread, Thread Synchronization, Creating and Executing Threads, Multithreading with GUI, Monitors and Monitor Locks. Networking: Manipulating URLs, Reading a file on a Web Server, Socket programming, Security and the Network, RMI, Networking, Accessing Databases with JDBC: Relational Database, SQL, MySQL, Oracle

UNIT-V

Advance Java Technologies - Servlets: Overview and Architecture, Setting Up the Apache Tomcat Server, Handling HTTP get Requests, Deploying a web Application, Multitier Applications, Using JDBC from a Servlet, Java Server Pages (JSP): Overview, First JSP Example, Implicit Objects, Scripting, Standard Actions, Directives, Multimedia: Applets and Application: Loading, Displaying and Scaling Images, Animating a Series of Images, Loading and playing Audio clips Advance Web/Internet Programming (Overview): J2ME, J2EE, EJB, XML.

REFERENCES:

1. Deitel & Deitel, "JAVA, How to Program"; PHI, Pearson.
2. E. Balaguruswamy, "Programming In Java"; TMH Publications
3. The Complete Reference: Herbert Schildt, TMH
4. Peter Norton, "Peter Norton Guide To Java Programming", Techmedia.
5. Merlin Hughes, et al; Java Network Programming , Manning Publications/Prentice Hall

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LIST OF PROGRAM:

1. Installation of J2SDK
2. Write a program to show Concept of CLASS in JAVA
3. Write a program to show Type Casting in JAVA
4. Write a program to show How Exception Handling is in JAVA
5. Write Programs to show Inheritance and Polimorphism.
6. Write a program to show Interfacing between two classes
7. Write a program to Add a Class to a Package
8. Write a program to demonstrate AWT.
9. Write a Program to show Data Base Connectivity Using JAVA
10. Write a Program to show "HELLO JAVA " in Explorer using Applet
11. Write a Program to show Connectivity using JDBC
12. Write a program to demonstrate multithreading using Java.
13. Write a program to demonstrate applet life cycle.

MIA-407 Industrial Training –I

Duration:- 2 weeks after the IV semester in the summer break, Assessment in V semester.
Students must observe following to enrich their learning during industrial training:

- Industrial environment and work culture.
- Organizational structure and inter personal communication.
- Machines/ equipment/ instruments - their working and specifications.
- Product development procedures and phases.
- Project planning, monitoring and control.

SRI SATYA SAI

UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite PachamaOilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Mining Engineering

Minutes of Board of Studies Committee Meeting Dated : 06.06.2019

The Board of Studies Committee Meeting was held in the room of Department of Mining Engineering at 02:30 PM on 06.06.2019. Following members were present.

1. Mr. Anil Verma, Asstt. Prof.(Mechanical Engineering), Chairman
2. Mrs. Priyanka Jhavar, Asstt. Prof.(Mechanical Engineering), Member
3. Mr. Prashant Singh, Asstt. Prof.(Aeronautical Engineering), Member
4. Mr. Dhananjay Yadav, Asstt. Prof.(Mechanical Engineering), Member

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda Preparation of Syllabus and Scheme for Vth and VIth Sem.

Discussion Scheme and Syllabus Was Put up before the member as per recent AICTE guidelines. It was discussed in detail by the members and some modifications were suggested.

Resolution of the Discussion :

It was resolved that Scheme and Syllabus as Proposed with some modification and may be accepted.

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Mr. Anil Verma, Asstt. Prof.(Mechanical Engineering), Chairman
2. Mrs. Priyanka Jhavar, Asstt. Prof.(Mechanical Engineering), Member
3. Mr. Prashant Singh, Asstt. Prof.(Aeronautical Engineering), Member
4. Mr. Dhananjay Yadav, Asstt. Prof.(Mechanical Engineering), Member

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Scheme of Examination

Fifth Semester –BE (Mining Engineering)

S. No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Total Marks	Credits Allotted			Total Credits
			Theory Slot			Practical Slot				L	T	P	
			End Sem.	Mid Sem. MST (Two tests average)	Quiz, Assignment	End Sem	Term work						
							Lab work & sessional	Assignment/ quiz					
1	MI-501	Mining Survey -II	70	20	10	30	10	10	150	3	1	2	06
2	MI-502	Underground Metal Mining	70	20	10	30	10	10	150	3	1	2	06
3	MI-503	Pollution Control Engineering	70	20	10	30	10	10	150	3	1	2	06
4	MI-504	Mining Machinery -I	70	20	10	30	10	10	150	3	1	2	06
5	MI-505	Surface Mining- I	70	20	10	-	-	-	100	3	1	-	04
6	MI-506	Self Study (Internal Assessment)	-	-	-	-	-	50	50	0	0	2	02
7	MI-507	Seminar / Group Discussion (Internal Assessment)	-	-	-	-	--	50	50	0	0	2	02
		Total	350	100	50	120	40	140	800	15	5	12	32

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MIA-501 MINING SURVEYING II

MIA-501	MINING SURVEYING-II	2L:1T:0P	3 credits	3Hrs/Week

Course objectives:
· 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.
· Application of the network of triangles, setting of curve in mine survey, transfer reduced level from surface to underground.
· To evaluate the accuracy of the survey.

Course outcomes:
At the end of the course the student will be able to:
· Ability to use optical means determine distance, elevation, area and volume. To set out baseline according to the rules and responsibilities of surveyor.
· To set out a curve and to locate the underground features through survey.
· Determination of the reduced level in underground.
· Ability to determine the accuracy of the surveyed area..

UNIT 1: THEODOLITE SURVEYING (10 Hours)
Types of Theodolites; Description of various parts of a Vernier Theodolite; Requirements of Mining type Theodolites; Measurements of height and distances of accessible and inaccessible points; Traversing with Theodolite on surface and underground; Checks on Closed and Open traverses; Balancing of traverses; Temporary & Permanent adjustments of Theodolites; Sources of errors and their prevention.

UNIT 2: TACHEOMETRY (6 Hours)
Principles of Stadia Methods; Determination of constants; Theory of anallactic lens; Distance and elevation formulae, Sub tense and Tangential Methods; Auto- Reduction Tacheometer.

UNIT 3: SETTING OUT (8 Hours)
Setting out simple curves on surface and in underground; Elementary knowledge of compound and transition curves; joint boundary survey; Equalization of boundaries; Maintenance of direction and radiant of roadways i.e. marking and checking of center line and grade line, transfer of point from roof to floor and floor to roof.

UNIT 4: ERRORS & PROBLEMS (10 Hours)
Computation of areas and volumes; Earthwork calculation; Problems based on Coordinates, faults, Dip- Strike and boreholes; Sources, classification and relative importance of errors, their prevention and elimination, theory of errors, adjustment of errors.

UNIT 5: PLANS & SECTIONS (8 Hours)
General requirements of mine plans; types of plans; Symbols used in mine plans; preparation of plans & sections; Plotting of traverse; Checking accuracy of old mine plans; Plan meter and its uses; Enlargement & reduction of plans.

REFERENCE BOOKS

1. Surface Mining: G.B. Misra
2. Surface mining equipment: Martin
3. Surface Mining: Pfleider
4. Mining: Boki
5. SME handbook: Hartman

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MIA-501	Mining Surveying-II	0L:0T:2P	1 Credits	2 Hrs/week

Course objectives: To Understand different equipment and compare accuracy levels and to study several experiments and conversant with it. To find the importance of latest technology through total station. To be familiar with conventional symbols used in mines. it enables the student to attain good practical knowledge.

Course outcomes: At the end of the course the student will be able to:
- An ability to measure distance and elevation using optical instruments.
- An ability to set out an curve in underground and surface.
- An ability to connect the baseline from surface to underground.

List of Experiments
1. Triangulation survey by theodolite
2. Measure horizontal and vertical angles by theodolite
3. Measure horizontal angles by method of repetition and reiteration using theodolite
4. Trigonometric Leveling - Heights and distance problem
5. Signs and conventions used by GSI, MMR, CMR
6. Finding heights and distance using Principles of tachometric surveying
7. Curve setting – different methods by total station
8. Setting out works for buildings & pipe lines.
9. Determine area using total station
10. Traversing using total station
11. contouring using total station
12. Determination of remote height using total station
13. Coordinate measurement by total station and GPS
14. Traversing and recording position of points by GPS
15. Distance, gradient, Difference, height between two inaccessible points using total stations.

EQUIPMENT TO BE USED:
1. Theodolites, and leveling staffs.
2. Tachometers.
3. Total Station.

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MIA-502 MINERAL PROCESSING

MIA-502	MINERAL PROCESSING	2L:1T:0P	3 Credits	3Hrs/Week

Course objectives:

- To review all unit operations in mineral processing and fuel technology.
- To understand the importance and principles of materials handling in the mineral processing plant.
- To explain the methods of analysis of comminution theory, selection criteria for crushing, grinding and screening equipment, selection principles for mineral concentration techniques, criteria for mineral concentration equipment selection.

Course outcomes:

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

- Ability to understand the importance and principles of materials handling in the mineral processing plant.
- Ability to explain the methods of analysis of comminution theories, selection criteria for crushing, grinding and screening equipment, selection principles for mineral concentration techniques, criteria for mineral concentration equipment selection.

UNIT 1: COMMINUTION (10 Hours)

Introduction, definition, scope and economic justification, main steps in ore dressing operations, comminution, crushing, principles of crushing , jaw crushers, gyratory crushers, cone crushers, roll crushers, gravity stamps their classifications and applications, grinding principles of grinding, application and classification of ball mills, rod mills, tube mills and Pebble mills.

UNIT 2: SIZING (10 Hours)

Object of sizing, scale of sizing, laboratory sizing, screening and classification, different type of screens, their mode of operations and application and limitation, classification principles of classification, movement of solids through fluids, different types of classifiers, hydraulic and pneumatic classifiers, sampling-importance of sampling and methods used.

UNIT 3: GRAVITY CONCENTRATION (6 Hours)

Jigging, flowing film concentrators like spirals and shaking tables, heavy media separation, applications and limitations of methods.

UNIT 4: FLOTATION (6 Hours)

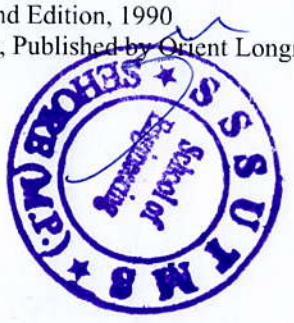
Physico-chemical principles, function of various flotation reagents, important machines, their principles, and working, flotation of sulphide, oxide and non-sulphide ores.

UNIT 5: PROCESSING METHODS OF SOME COMMON MINERALS (10 Hours)

Electrostatic and Magnetic Separation - Principle operation and field of application, Pelletisation of low grade iron ore, Drying and dewatering - thickening, filtration and drying. Coal washing; Simplified flow sheets for beneficiation of coal and typical ores of copper, lead, zinc, iron and manganese with special reference to Indian deposits.

REFERENCE BOOKS:

1.Ore Dressing by Gaudin
2.Ore Dressing by B. A. Willstion,1991.
3.Ore Processing S.K.Jain, Oxford IBH, 2nd Edition, 1990
4.Fuels and Combustion, Dr. Samir Sarkar, Published by Orient Longman Ltd., 1990.



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MIA-502	**MINERAL PROCESSING**	**0L:0T:2P**	**1 Credits**	**2 Hrs/week**

Course objectives:

- To study the different types of sampling methods
- To study the laboratory sizing and separation of particles.
- To study the process of comminution
- To study the settling of solids in fluids
- To study the different types of concentration process.

Course outcomes: At the end of the course the student will be able to:

- An ability to identify different types of sampling methods, comminution methods and concentration methods.
- An ability to explain laboratory sizing, comminution and concentration methods.
- An ability to interpret laboratory sizing, comminution and concentration methods.

LIST OF EXPERIMENTS:

1. Study of Jaw crusher
2. Study of Roll crusher
3. Study of Grinding mills
4. Study of Akin's classifier
5. Study of Shaking table
6. Study of Mineral jig.
7. Study of Spiral concentrator
8. Study of Floatation cell
9. Study of Thickners
10. Study of Washability curves

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MIA-503 MINE MACHINERY- II

MIA-503	MINE MACHINERY-II	2L:1T:0P	3 Credits	3Hrs/Week

Course Objective:

The students completing this course are expected to understand the nature and role of the kinematics of machinery, the mechanisms and machines.

To understand the functioning of winding engines and other winding accessories.

The course includes velocity and acceleration diagrams, analysis of mechanisms joints, Cams and their applications. It exposes the students to various kinds of power transmission devices like belt, rope, chain and gear drives and their working principles and their merits and demerits.

Course Outcome:

The students will have basic knowledge on motive power used in mines, pumping, rope haulage and face haulage & conveying transport systems.

UNIT 1: AERIAL ROPEWAYS (10 Hours)

Different types, their constructions & installation, operation & maintenance, design calculation, their layout including rope-tensioning arrangements.

UNIT 2: CONVEYORS – I (6 Hours)

Different types of belt conveyors, their construction, installation, maintenance & design.

UNIT 3: CONVEYOR – II (10 Hours)

Shaker conveyor, scraper chain conveyor and armored chain conveyor, their installation & construction maintenance. Safety Devices; Pit top and pit bottom arrangements.

UNIT 4: SKIP & KOEPE WINDING (10 Hours)

Skip types & construction, pit top & pit bottom arrangements, advantages and disadvantages, Types of Koepe Winder, Koepe wheel, Floating platforms, Two winders working in the same shaft, Winding with side by side and up and down sheaves, advantages and disadvantages. Multirope winding. Calculation of H.P.

UNIT 5: HYDRAULIC TRANSMISSIONS (6 Hours)

Fundamental of hydrostatic compression, hydraulic fluids, hydraulic pumps, motors, cylinders and accumulators, different types of valves, hydraulic coupling and torque converters, Application in mines, Advantages of hydraulic transmission.

REFERENCE BOOKS:

1. Elements of Mining Tech. Vol I & Vol III by D. J. Deshmukh
2. Mining Machinery by S. C. Walker
3. Coal Mining Practice by Stathum

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MIA-503	**MINE MACHINERY-II**	**0L:0T:2P**	**1 Credits**	**2 Hrs/week**

LIST OF EXPERIMENTS:

1. Study of Monocable aerial Ropeway.
2. Study of Bicable aerial Ropeway.
3. Study of Loop take-up and tensioning arrangement of a belt conveyor.
4. Study of pit top and pit bottom arrangements for a belt conveyor.
5. Study of Belt Conveyor
6. Study of an Armoured face Conveyor.
7. Study of Various Koepe Arrangements

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Program Elective - I

MIA -504(A) POLLUTION CONTROL ENGINEERING

MIA - 504(A)	**POLLUTION CONTROL ENGINEERING**	**3L:1T:0P**	**4 Credits**	**4Hrs/Week**

UNIT 1: ENVIRONMENTAL POLLUTION (10 Hours)

Introduction and classification of environmental pollution, ecological conservation. Salient features of the environmental laws in India and Occupational disease. Environmental Impact Assessment, Environmental Management Plan, Environmental Audit.

UNIT 2: AIR POLLUTION (8 Hours)

Air pollution due to various gases and suspended particulate materials, causes, consequences, preventive measures, dust measuring equipment.

UNIT 3: NOISE POLLUTION (8 Hours)

Pollution due to noise and its consequences, noise produced by different machinery, control and safety, measurement of noise levels.

UNIT 4: WATER POLLUTION (10 Hours)

Water pollution, its causes and preventive measures, acid-mine drainage, water pollution in mines and mineral beneficiation plants, water purification schemes in brief.

UNIT 5: LAND POLLUTION (6 Hours)

Land pollution and land reclamation, land reclamation techniques, Physical and Biological reclamation, Mine Closure Plan

Reference Books:

1. Air & Water Acts
2. Forest Conservation acts
3. Legislation in Indian Mines - A Critical appraisal by Rakesh and Prasad
4. Environmental Impact of Mining By Down and Stokes

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MIA-504(B) COMPUTER APPLICATION IN MINING

MIA-504(B)	COMPUTER APPLICATION IN MINING	3L:1T:0P	4 Credits	4Hrs/Week

Course objectives:
- To make students conversant with importance of computers in mining engineering
- To make aware about the various software and its application to mine planning and design
- To demonstrate and impart initial training to use the software.

Course outcomes: At the end of the course the student will be able to:
- Students will have knowledge about various software application worldwide in the field of mining engineering
- Students will develop some skill to use the software with cases.

UNIT 1: INTRODUCTION TO SOFTWARE PACKAGES APPLICABLE TO MINING (10 Hours)

Computational systems inspired by natural evolution; natural and artificial evolution, evolutionary; chromosome representations; search operators;

UNIT 2: CO-EVOLUTION (8 Hours)

Constraint handling techniques; niching and speciation; genetic programming; classifier systems and theoretical foundations; implementation of selected algorithms.

UNIT 3: DEVELOPMENT OF ALGORITHMS (8 Hours)

Slope stability. Pillar design. Open pit configuration. Design of mine ventilation system. Optimisation of cycle of operations. Blast design.

UNIT 4 : SIMPLEX TECHNIQUE (8 Hours)

Simplex technique for mining. Rock reinforcement design. Modelling of mining pollution phenomena. Management information systems.

UNIT5: DEVELOPMENT OF PROGRAMS (8 Hours)

Simple computer programs based on the above algorithms.

REFERENCE BOOKS:

1. Fundamental of Database Systems by Elmasri & Navathe
2. Introduction to operations research by Hillier/Lieberman
3. CAD/CAM : Computer Aided Design and Manufacturing, Mikell P. Groover, Emory W. Zimmers, Jr. PHI Inida, 1989.

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Open Core Elective-I
MIA-505(A) MINE LEGISLATION

MIA-505(A)	**MINE LEGISLATION**	**3L:1T:0P**	**4 Credits**	**4Hrs/Week**

Course Objectives:
It is very important to all mining engineering students because, it provides an insight to various laws, rules and Acts related to Mines Safety and mining legislation. A separate paper on the above subject is one of the requirements for the DGMS certification for qualifying in the exam of Mines Manager.

Course Outcome:
The student will be benefitted with this course paper as it covers all the mining legislation and statutory Ruls, Acts and amendments made from time to time. This paper is one of the qualifying papers for DGMS exams.

UNIT-1 (10 Hours)
Introduction to Acts,Rules &Regulation applicable to Mining Industry, Development of mining legislation in India.

UNIT-2 (6 Hours)
Mines Act – 1952 & Mines Rules – 1955

UNIT-3 (10 Hours)
Coal Mines Regulations –1957, Ventilation,Standard of ventilation, main mechanical ventilator, Installations & Restrictions, Splits and Airways, Introduction to draft CMR-2006 &
Metalliferous Mines Regulation-1961 Ventilation, Explosives,Official Duties

UNIT-4 (6 Hours)
Mine Crèche Rules 1966

UNIT-5 (10Hours)
Mine Vocational Training Rules- 1966 Application of Rules, General vocational training (scope and standard), training centres, and arrangements for training

Reference Books:

1. Legislation in Indian Mines (A critical Appraisal) Vol. II & I, - S. D. Prasad & Prof. Rakesh
2. CMR-1957 & MMR-1961 - L. C. Kaku
3. Mines Act-1952 & Mines Rules-1955 - L. C. Kaku
4. Vocational Training Rules- L. C. Kaku
5. Mine Accidents - S.J. Kejeriwal
6. CMR-2017- L C Kaku

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MIA-505(B) MINE MANAGEMENT

MIA-505(B)	MINE MANAGEMENT	3L:1T:0P	4 Credits	4Hrs/Week

Course objectives:

- To understand the selection, prioritization and initiation of individual projects and strategic role of project management.
- To understand the work breakdown structure by integrating it with organization.

Course outcomes: At the end of the course the student will be able to:

- Understand the selection, prioritization and initiation of individual projects and strategic role of project management.
- Understand the work breakdown structure by integrating it with organization.
- Understand the scheduling and uncertainty in projects.

UNIT 1: EVOLUTION OF MANAGEMENT THEORY (10 Hours)

Principle of Scientific management, Elements of management functions, Planning, Organizing and Control, Levels of Management. Structure and design of organization for mining enterprises.

UNIT 2: PERSONNEL MANAGEMENT (8 Hours)

Selection, training and development of human resources, Job evaluation, job analysis, incentive and theories of motivation, Productivity, its concept and measurement, Leadership and Communication.

UNIT 3: PRODUCTION MANAGEMENT (6 Hours)

Determination of norms and standards of operations by work study, work measurements, production planning, Scheduling and control, Queuing theory, short and long term planning, Quality control, introduction to MIS, Material Management

UNIT 4: INDUSTRIAL PSYCHOLOGY (8 Hours)

Its relation with other branches of knowledge, studies of physical factors and their effect on man, Industrial relations, Human relations, trade union movements in India.

UNIT 5: INDUSTRIAL ACT AND LAWS (10 Hours)

Industrial Dispute Act, Industrial Trade Union Act, Analysis of industrial disputes, Prevention and settlement of industrial disputes, Payment of wages act, Workmen's compensation act, Contract labour laws.

REFERENCE BOOKS:

1. Mine Management : V. N. Singh
2. Management & Administration : S.K.Gupta
3. Introduction to Management: O.P. Khanna
4. Mine Management, Legislation and General Safety ,S. Ghatak Coal Field Publishers ,Asansol 1999.
5. Management Harold Koontz and Heinz Weihrich, Mc Graw Hill Company 1990.
6. Modern Production Management Buffa John Wiley and Sons, 1998.

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Department of Mining Engineering
MIA-506 Industrial Training-II

MIA-506	**Industrial Training-I**	**0L:0T:4P**	**1 credits**	**4Hrs/Week**

Course Preamble:

1. To expose the students to actual working environment of Mining engineering and enhance their knowledge and skill from what they have learned in the classes.
2. Another purpose of this program is to instill the good qualities of integrity, responsibility and self-confidence.
3. To persue students with the Mining field ethics and rules in terms of the society.

Course Outcomes:

Ability to communicate efficiently. Acquired to be a multi-skilled engineer with good technical knowledge of Mining Engineering Field and their processing, management, leadership and entrepreneurship skills. Ability to identify, formulate and model problems and find engineering solution based on a systems approach.
Students must observe following points to enrich their learning in Mining engineering during industrial training:

- Industrial environment and work culture.
- Organizational structure and inter personal communication.
- Machines/ equipment/ instruments - their working and specifications.
- Product development procedures and phases.
- Project planning, monitoring and control.
- Quality control and assurance.
- Maintenance system.
- Costing system.
- Stores and purchase systems.
- Roles and responsibilities of different categories of personnel.
- Customer services.

-Problems related to various areas of Work etc.

- Layout if any

To be submitted : The students has to submit the power point presentation of minimum15 slides of the training performed(comprising of points stated above) along with the original certificate of training performed with proper seal and signature of the authorized person.

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Scheme of Studies:
Duration: Minimum 2 weeks in summer break after IV semester, assessment to be done in V Semester

Scheme of Examination:
For the assessment of industrial training undertaken by the students, following components are considered with their weightage.
(a) Term Work in Industry Marks Allotted
Attendance and General Discipline 20
Daily diary Maintenance 20
Initiative and participative attitude during training 30
Assessment of training by Industrial Supervisor 30

Total 100*

(b) Practical/Oral Examination (Viva-Voce) in Institution Marks Allotted
1. Training Report 50
2. Seminar and cross questioning (defense) 100

Total 150

*** - Marks of various components in industry should be awarded by the I/c of training in Industry but in special circumstances if not awarded by the industry then faculty in charge /T.P.O. will give the marks.**
During training students will prepare a first draft of training report in consultation with section In charge. After training they will prepare final draft with the help of T.P.O. /Faculty of the Institute. Then they will present a seminar on their training and they will face viva-voce on training in the Institute.

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Scheme of Examination

SIX Semester –BE (Mining Engineering)

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Total Marks	Credits Allotted			Total Credits
			Theory Slot			Practical Slot							
			End Sem.	Mid Sem. MST (Two tests average)	Quiz, Assignment	End Sem	Term work			L	T	P	
							Lab work & sessional	Assignment/ quiz					
1	MI-601	Mineral Processing	70	20	10	30	10	10	150	3	1	2	06
2	MI-602	Mining Machinery- II	70	20	10	30	10	10	150	3	1	-	04
3	MI-603	Mining Environment	70	20	10	30	10	10	150	3	1	2	06
4	MI-604	Blasting Technology	70	20	10	30	10	10	150	3	1	2	06
5	MI-605	Mining Economics	70	20	10	-	-	-	100	3	1	2	06
6	MI-606	Self Study (Internal Assessment)	-	-	-	-	-	50	50	0	0	2	02
7	MI-607	Seminar / Group Discussion (Internal Assessment)	-	-	-	-	--	50	50	0	0	2	02
		Total	350	100	50	120	40	140	800	15	5	12	32

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Semester – VI
MIA 601- MINING ENVIRONMENT-II

MIA 601	MINE ENVIRONMENT-II	2L:1T:0P	3 credits	3Hrs/Week

Course objectives:

- To study the measure and monitor different types of gases in mines.
- To study the theory of Mine Fans.
- To study ventilation survey
- To study the handling of rescue apparatus
- To study the dust sampling in mines.

- An ability to measure and monitor different types of gases in mines.
- An ability to do ventilation survey.
- An ability to handling of rescue apparatus.
- An ability to dust sampling in mines.

UNIT 1: VENTILATION SYSTEMS AND PLANNING (10 Hours)

Calculation of pressure and quantity requirements, network problems, Hardy-Cross method, Ventilation planning and economic analysis, central and boundary ventilation, ascensional and descensional ventilation, antitropal, homotropal ventilation

UNIT 2: MECHANICAL VENTILATION - I (6 Hours)

Theory of mine fans, Types of mine fans, their characteristics & suitability, Process for selection of mine fans

UNIT 3: MECHANICAL VENTILATION – II (8 Hours)

Auxiliary and booster fans, series and parallel operation of fans, fan drift and evasee, forcing and exhaust ventilation, fan reversal, ventilation in long headings

UNIT 4: VENTILATION SURVEY (8 Hours)

Object of ventilation survey, instruments for the measurement of pressure, velocity, and quantity of air.

UNIT 5: MINE DUST (10 Hours)

Classification, physiological effects, measurement of dust concentration, dynamics of small particles, sampling of air borne dust, prevention and suppression of dust

Reference Books:

1. Mine Environment - G.B. Mishra
2. Elements of Mining Technology, Vol.2, D. J. Deshmukh
3. Underground Mine Environment, M. Mcpherson
4. Subsurface Mine Ventilation, H.L. Hartman

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MIA 601	**MINE ENVIRONMENT-II**	**0L:0T:2P**	**1 credits**	**2Hrs/Week**

List of experiments (Extendable):

1. Study of installation of axial flow fan.
2. Study of installation of centrifugal flow fan.
3. Study of installation and positioning of booster fan.
4. Study of characteristic curve of different fans and their comparison
5. Study of principal and working of vane anemometer
6. Study of principal and working of velometer.
7. Study of principal and working of pitot tube.
8. Study of central and boundary ventilation system.
9. Study of gravimetric dust sampler
10. Study of thermal precipitator dust sampler

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MIA- 602 UNDERGROUND METAL MINING

MIA- 602	**UNDERGROUND METAL MINING**	**2L:1T:0P**	**3 credits**	**3Hrs/Week**

Course objectives:

- Understand the construction of the mine developments to the deposit.
- Understand the different methods of extraction of ore blocks in metal mine.
- Understand the modern methods of extraction of ore blocks in metal mine.
- Understand the problems, method of extraction in deep mining and machineries used.

Course outcomes: At the end of the course the student will be able to:

- Ability to construct the mine developments to the deposit
- Ability to extract the ore block by different methods.
- Ability to extract the ore block by modern methods.
- Ability to identify the machineries used, methods of extraction and to analyse the problems in deep underground mine.

UNIT-I GENERAL(8 Hours)

Status and scope of Underground metal mining methods; Definitions of important terms used in underground metal mining methods. Classification of mining methods; Factors affecting the choice of mining methods.

UNIT-II DEVELOPMENT (10 Hours)

Mode of access; Variables affecting the choice of mode of access; Crosscuts, Levels, Raises, Winzes, Ore passes; Their method of drivages with the description of various unit operations; Introduction to Raise boring and introduction to tunnel boring .

UNIT 3: STOPING METHODS-I (8 Hours)

Overhand, Underhand and Breast stoping methods; Open stoping; Vertical Crater Retreat method; Sub level stoping Room and Pillar method, Resuing method.

UNIT 4: STOPING METHODS-II (6 Hours)

Shrinkage stoping; Cut and fill stoping, Introduction to Square set stoping, Sub level caving, Block caving, Top slicing.

UNIT 5: SUPPORT SYSTEMS (10 Hours)

Pillars; Back fill, Cable bolting, Steel Rock bolting, Grouting, Shotcreting etc. Code of timbering rules.

REFERENCE BOOKS:

1. Elements of Mining Tech. Vol II by D. J. Deshmukh
2. S M E Handbook
3. Underground mining methods, Hustrulid
4. Introduction to Mining, H. L. Hartman

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MIA-602	**UNDERGROUND METAL MINING**	**0L:0T:2P**	**1 credits**	**2Hrs/Week**

LIST OF EXPERIMENTS:

1. Study of Underground metal mining methods.
2. Study of method of drivages
3. Study of Underhand and Breast stoping methods
4. Study of Cut and fill stoping methods
5. Study of Steel Rock bolting

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Program Elective - II
MIA-603(A) SURFACE MINING

MIA-603(A)	SURFACE MINING	3L:1T:0P	4 credits	4Hrs/Week

Course objectives:

- Understand the basic concept of surface mining and associated methods.
- Learn various aspects of drilling and blasting practices in open cast mines.
- Learn application of various heavy earth moving machinery and their selection criteria.

Course outcomes:

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

- An understanding of various design parameters associated with different methods of surface mining.
- Ability to design blasting round to have desired productivity with minimum damaging effect.
- Ability to select appropriate equipment for excavating, loading and transporting material in opencast mines.

UNIT-I

OPEN PIT DESIGN AND LAYOUTS (10 Hours)

Classification of surface mining method mineral deposits suitable for open pit mining, Important parameters of Open pit design; Design of Benches, Ultimate pit, Stripping ratio, Break even stripping ratio, Different methods of opening up the deposits; Box cuts, internal and external box cut, Methods of driving Box cuts; Layout of open pits; Layout of waste dumps, unit operations in opencast mining.

UNIT-II

ROCK DRILLING (10 Hours)

Theory of Rock Drilling, Different Types of Drill Machines Used in Open Pits; Rotary, Percussive and Rotary Percussive Drilling, Selection of Drill Machines on the basis of Drill ability; Computation of Productivity of Drill Machines; Inclined Drilling; their Advantages and Disadvantages.

UNIT-III

PIT PREPARATION (6 Hours)

Dozers, Scrapers, Front-End Loaders, Grader, Back Hoe, etc.; their Construction, Operation, Suitability and applicability; Calculation of Their Productivity.

UNIT-IV

LOADING AND EXCAVATION (10 Hours)

Different Types of Excavators used in Open Pits; Shovel, Dragline, Hydraulic Excavators, Multi Bucket Excavators, their Construction, Specifications, Operation, Suitability and Applicability; Calculation of their Productivity.

UNIT-V

TRANSPORT IN OPEN PITS (6 Hours)

Automobile Transport, Rail Transport and Conveyors; their Suitability; Computation of their Productivity; Automation in Open Pit transport such as Truck Dispatch System.

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REFERENCE BOOKS:

1. Surface Mining: Pfleider
2. Mining Equipment: Boki
3. SME handbook: Hartman
4. Surface Mining Technology: S. K. Das
5. Rock Slope Engineering Hock and Bray, The Institution of Mining and Metallurgy, 1981
6. Opencast Mining R.T. Deshmukh M. Publications, Nagpur 1996

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MIA-603(B) MINE VENTILATION AND CLIMATE ENGINEERING

MIA-603(B)	MINE VENTILATION AND CLIMATE ENGINEERING	3L:1T:0P	4 credits	4Hrs/Week

Course objectives:

- To gain insights of mine air, mine climate and mine ventilation
- To comprehend the ventilation requirements of an underground mine.
- Analysis of mine air, mine climate, natural ventilation, mechanical ventilation and to conduct ventilation survey.

Course outcomes:

At the end of the course the student 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.

UNIT-1

Composition Of Mine Atmosphere (10 Hours)

Mine gases - production, properties, effects and detection; sampling and analysis of mine air; methane content; methane drainage; methane layering; flame safety lamp and its uses; methanometer; radon gas and its daughter products; continuous monitoring of gases

UNIT- 2

Heat And Humidity (6 Hours)

Sources of heat in mines; effects of heat and humidity; psychrometry, kata thermometer; heat stress, air-conditioning

UNIT-3

Natural Ventilation (6 Hours)

Seasonal variations, calculation of NVP from air densities and thermodynamic principles

UNIT- 4

Air Flow Through Mine Openings (10 Hours)

Laws of flow, resistance of air ways, equivalent orifice, distribution of air; flow control devices; automation and remote control of ventilation installations; ventilation surveys; permissible air velocities in different types of workings

UNIT- 5

Mechanical Ventilation (10 Hours)

Types of mine fans; theory, characteristics and suitability of fans; selection, testing and output control; fans in series and parallel; forcing and exhaust configurations; reversal of flow; fan drifts, diffusers, evasees

Reference Books:

1. Mine Ventilation : G. B. Mishra
2. Sub-surface mine ventilation : Macperson
3. Mine ventilation and air-conditioning in mines : Hartman
4. Element of Mining Technology Vol 2 : D. J. Deshmukh

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Program Elective-III MIA-604(A) GROUND CONTROL

MIA-604(A)	GROUND CONTROL	3L:0T:0P	3 credits	3Hrs/Week

- Knowledge of underground excavation ; stability around the excavation, subsidence and stress around the excavation
- To comprehend the rock mass classification and support system for underground excavation
- To monitor and predict subsidence and underground disasters
- To design single and multiple opening and support system for underground excavations.

Course outcomes: At the end of the course the student will be able to:

- To be familiar with the types of underground excavation and to stabilize the excavation.
- Support the rock mass based on different properties of rock.
- Ability to estimate the subsidence and monitor the disasters.
- To design an opening and support system for underground.

UNIT-1 DESIGN OF MINE OPENING (10 Hours)

Stress distribution around narrow and wide openings. Extent of failure around mine openings. Determination of size of opening and extent of failure.

UNIT-2 DESIGN OF PILLARS (6 Hours)

Mine pillars and their classification; pillar mechanics; Design of mine pillars and shaft pillar: stresses acting on pillars; stress distribution in pillars; mechanics of pillar failure; interaction of pillar,floor and roof; design of rooms and pillars; design of barrier and yield pillars, Numerical Problems.

UNIT-3 SUBSIDENCE (10 Hours)

Theories of subsidence. Factors affecting subsidence. Sub-critical, critical and super-critical widths of extraction. Subsidence prediction and control. Design of shaft pillar.

UNIT-4 SLOPES (10 Hours)

Types of slope failure. Analysis of slope failure. Factors affecting slope stability. Drainage and reinforcement of slopes. Monitoring of slopes. Stability of waste dump.

UNIT-5 ROCK BURSTS (6 Hours)

Phenomenology of rockbursts and coal bump; causes, prediction, monitoring and control of rockbursts; gas outbursts.

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REFERENCE BOOKS:

1. Elements of Mining Tech. Vol I,II,III by D. J. Deshmukh
2. Coal Mine Ground Control by Syd S Peng
3. Underground Excavations in rock, E. Hoek and E.T. Brown, IMM, 1980
4. Underground Excavation in Hard Rock ,E. Hoeket. Al, Oxford and IBH 1995

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MIA-604(B) MINE SAFETY ENGINEERING

MIA-604(B)	**MINE SAFETY ENGINEERING**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Course Preambles:

- To learn the level of risk associated with mining, risk assessment and management .
- To know the occupational diseases, mine disasters and mitigation.
- Gain insights of hazards and accidents of different working conditions in industries.
- Have knowledge of occupational health and safety in different industries

Course Outcome:

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

- The students will have deep knowledge about the mine accidents, disaster, disease and mine safety with risk assessment, mitigation and management.
- Be familiar with hazards in different industries.
- Decide precautions of safety and health in different occupation.

UNIT 1:(10 Hours)

Safety scenario in Indian mines., Safety management and organization.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.

UNIT 2: (10 Hours)

Causes of accidents, accident report. ,Human behavioural approach in safety 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.

UNIT 3: (8 Hours)

Accident analysis and control. Safety in demolition operation, Safety in underground works such as Excavation, Drilling and Blasting, Tunnelling, Pneumatic, Trenching, Safety in working of fragile roof.

UNIT 4: (8 Hours)

Cost of accident., Emergency organisation for disaster management.
Classification of accidents, statistics, causes and preventive measures of various accidents; Accident enquiry report for accidents due to roof fall, blasting, machinery failure etc.

UNIT 5: (6 Hours)

Systems engineering approach to safety, techniques used in safety analysis. 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,

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REFERENCE BOOKS:

1. Mines Act-1952 & Mines Rules-1955 L. C. Kaku.
2. Vocational Training Rules L. C. Kaku.
3. Mine Accidents S.J. Kejeriwal

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Open Core Elective - II
MIA -605(A) MINE DEVELOPMENT

MIA-605(A)	MINE DEVELOPMENT	3L:0T:0P	3 credits	3Hrs/Week

- Design tunnels, rock support and grouting and evaluate the most important issues in the procedure
- To make students aware about the concept of excavation engineering and its relevance to minin
- To be familiar with the various methods for opening up of deposits.
- To understand the technical details of various unit operations involved in shaft sinking.
- To learn various methods of shaft sinking and Tunneling methods.

Course outcomes:
At the end of the course the student will be able to:
- The students will gain technical knowledge on stages of mining and methods of development.
- They will be able to design various drilling patterns used in drivage of adit, shaft, incline, drives, crosscut and tunnel.
- They will be able to identify, formulate and solve engineering problems in shaft sinking.
- They will possess ability to use the techniques, skills, and modern engineering tools necessary for mine development practice.
- Design tunnels, rock support and grouting and evaluate the most important issues in the procedure
- Students will acquire knowledge about excavation techniques and their selection

UNIT I INTRODUCTION TO MINING (10 Hours)
History of mining, contribution of mining to civilization and national economy Indian mineral resources and world status, role of mining engineers in industry. Introduction to opencast and underground coal & metalliferous mining – selection criteria, comparison. Modes of entry into deposits for underground mining – shafts, inclines, adits, etc.

UNIT II INTRODUCTION TO DRILLING (8 Hours)
Principles of drilling, methods, selection, applications and limitations, drill bits, flushing methods, fields of application, exploration and production drilling, drilling in underground workings, variables affecting the performance of drilling, novel methods of drilling.

UNIT III SHAFT SINKING (10 Hours)
Selection of site and size, sinking methods, support system, ventilation, lighting and drainage arrangements during sinking, material handling and safety in sinking shafts. Introduction to piling, caisson and freezing methods - cementation method - widening and deepening of shafts. Modern techniques of shaft sink – shaft boring, design of shaft insets, pit bottom excavation and shaft raising.

UNIT IV INTRODUCTION TO EXPLOSIVES AND BLASTING (8 Hours)

Types of explosives, fuses, detonators and other accessories, alternatives to explosives, cause of accidents and safety precautions, drilling and blasting pattern for underground excavations, merits, demerits and limitations of blasting. Storage and transport of explosives.

UNIT V DRIFTING AND TUNNELING (6 Hours)
Drivage of drifts, organization and cycle of operations, supporting of development workings, modern methods of drifting, tunneling, road heading and tunnel boring.

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REFERENCE BOOKS:

1. Hartman, H.L., Introduction to Mining Engineering, John Wiley and Sons, Second Edition, 1999.
2. Deshmukh,D.J., Elements of Mining Technology, Vol.I, Vidyaseva Prakashan, Nagpur,1994.
3. Chugh,C.P., Drilling Technology Hand Book, Oxford & IBH Publications, 1994.
4. Chugh, C.P. Diamond Drilling, Oxford & IBH Publishers, 1999.
5. Karnam,U.M.R., Principles of Rock Drilling, 1999.
6. Bhandari S., Engineering rock blasting operations, A. A. Balkema, 1997.

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MIA-605(B) – MINE RECLAMATION

MIA-605(B)	MINE RECLAMATION	3L:0T:0P	3 credits	3Hrs/Week

UNIT-I MINE RECLAMATION PROCESSES (10 Hours)
Introduction and classification and types of Mine Reclamation processes, Salient features of the Mine Reclamation laws in India. Environmental Impact Assessment, Environmental Management Plan, Environmental Audit

. UNIT-II Reclamation (8 Hours)
Act of 1977 Under the Surface Mining Control and Reclamation Act of 1977, Abandoned Mine Lands Program, Clean Water act, Land rehabilitation, Environmental remediation

UNIT-III MINE CLOSURE PLANNING (6 Hours)
Introduction, predevelopment conditions, mine operation explained, Reclamation technologies and methods.

UNIT -IV ENVIRONMENTAL IMPACT OF MINING (8 Hours)
Introduction , Environmental impact of mining coal industry, Environmental impact of iron ore mining, Ecological impact of Explosives.

UNIT-V LAND POLLUTION (10 Hours)
Land pollution and land reclamation, land reclamation techniques, Physical and Biological reclamation, Mine Closure Plan.

Reference Books:

1. Air & Water Acts.
2. Forest Conservation acts.
3. Legislation in Indian Mines - A Critical appraisal by Rakesh and Prasad.
4. Environmental Impact of Mining By Down and Stokes.
5.Surface mining Technology By S.K. Das.

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Department of Mining Engineering

MIA-606Minor Project

MIA-606	Minor Project	0L:0T:4P	2 credits	4Hrs/Week

Course objectives:

- To support independent learning and innovative attitude.
- To guide to select and utilize adequate information from varied resources upholding ethics.
- To guide to organize the work in the appropriate manner and present information (acknowledging the sources) clearly.
- To develop interactive, communication, organisation, time management, and presentation skills.
- To impart flexibility and adaptability.
- To inspire independent and team working.
- To expand intellectual capacity, credibility, judgement, intuition.
- To adhere to punctuality, setting and meeting deadlines.
- To instil responsibilities to oneself and others.
- To train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas.

Course outcomes: At the end of the course the student will be able to:

- Present the mini-project and be able to defend it.
- Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
- Habituated to critical thinking and use problem solving skills.
- Communicate effectively and to present ideas clearly and coherently in both the written and oral forms.
- Work in a team to achieve common goal.
- Learn on their own, reflect on their learning and take appropriate actions to improve it.

Course content:

The student should work in groups to achieve the aforementioned objectives and the outcomes.

Task/Process	Week	Evaluation	Marks For Term Work
Orientation of students by HOD/Project Guide	1st	-	-
Literature survey and resource collection	2nd	-	-
Selection and finalization of topic before a Committee*	3rd	Seminar-I	20
(Detailing and preparation of Project) Modeling, Analysis and Design of Project work	4th to 5th	-	20
Testing, improvements, quality control of project	6th to 10th - 12th		25

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Report Writing	12th to 15th		25
Presentation before a committee (including user manual, if any)	16th	Seminar-II	30

Working schedule:

The faculty and student should work according to following schedule:
Each student undertakes substantial and individual project in an approved area of the subject and supervised by a member of staff. The student must submit outline and action plan for the project execution (time schedule) and the same be approved by the concerned faculty.

Action plan for Minor Project work and its evaluation scheme (Suggestive)

* Committee comprises of HOD, all project supervisions including external guide from Industry (if any)

Note: At every stage of action plan, students must submit a write up to the concerned guide.

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SRI SATYA SAI

UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]
Approved by Madhya Pradesh Private University Regulatory Commission
Bhopal Indore Road, Opposite PachamaOilfed Plant, Pachama, Sehore. Phone: (07562) - 222482
Corp. Office: 202, Zone-I, Ganga Jamuna Complex (Basement), M.P. Nagar, Bhopal (M.P.) Ph: (0755) 5270996, Fax (0755) 5270916

(Minutes of the Board of Studies Committee Meeting)

School Of Engineering

Department of Mining Engineering

Minutes of Board of Studies Committee Meeting Dated : 10.06.2019

The Board of Studies Committee Meeting was held in the room of Department of Mining Engineering at 02:30 PM on 10.06.2019. Following members were present.

1. Mr. Anil Verma, Asstt. Prof.(Mechanical Engineering), Chairman
2. Mrs. Priyanka Jhavar, Asstt. Prof.(Mechanical Engineering), Member
3. Mr. Prashant Singh, Asstt. Prof.(Aeronautical Engineering), Member
4. Mr. Dhananjay Yadav, Asstt. Prof.(Mechanical Engineering), Member

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda Preparation of Syllabus and Scheme for VII and VIII Sem.

Discussion Scheme and Syllabus Was Put up before the member as per recent AICTE guidelines. It was discussed in detail by the members and some modifications were suggested.

Resolution of the Discussion :

It was resolved that Scheme and Syllabus as Proposed with some modification and may be accepted.

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including chairman)

1. Mr. Anil Verma, Asstt. Prof.(Mechanical Engineering), Chairman
2. Mrs. Priyanka Jhavar, Asstt. Prof.(Mechanical Engineering), Member
3. Mr. Prashant Singh, Asstt. Prof.(Aeronautical Engineering), Member
4. Mr. Dhananjay Yadav, Asstt. Prof.(Mechanical Engineering), Member

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Scheme of Examination

Seventh Semester –BE (Mining Engineering))

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Total Marks	Credits Allotted			Total Credits
			Theory Slot			Practical Slot							
			End Sem.	Mid Sem. MST (Two tests average)	Quiz, Assignment	End Sem	Term work			L	T	P	
							Lab work & sessional	Assignment/ quiz					
1	MI-701	ELECTIVE-I	70	20	10	-	-	-	100	3	1	-	4
2	MI-702	Mine Planning & Development	70	20	10	-	-	-	100	3	1	-	4
3	MI-703	Rock Mechanics	70	20	10	30	10	10	150	3	1	2	6
4	MI-704	Mineral Processing	70	20	10	30	10	10	150	3	1	2	6
5	MI-705	Underground Coal Mining	70	20	10		-	-	100	3	1	-	4
6	MI-706	Minor Project& Seminar	-	-	-	60	20	20	100	-		4	4
7	MI-707	Industrial Training (Two Week)				60	20	20	100			4	4
		Total	350	100	50	180	60	60	800	15	5	12	32

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ELECTIVE-I

MI-701[A] Mine Legislation & Safety.

MI-701[B] GIS & REMOTE SENSING IN MINING.

MI-701[C] Ecology & Sustainable Development.

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SCHOOL OF ENGINEERING

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MIA 701-MINE MACHINERY-III

MIA 701	MINE MACHINERY-III	3L:0T:0P	3 credits	3Hrs/Week

Course Preambles:

- To understand the functioning of winding engines and other winding accessories
- To study surface and pit bottom layouts, various coal face machinery
- To study the design and construction details of excavating & transporting equipments used in surface mines.
- To know the various statutory aspects like CMR, MMR and the relevant DGMS circulars related to this course.

Course outcomes:

- The students will have the knowledge on functions of winding engines, winding accessories, pit-top and bottom mine circuits. They will also know about working of various coal face machinery, and design & constructional details of excavating and other prominent machinery used in surface mines.

UNIT 1: FACE MACHINERY (8 Hours)

Coal and rock Drilling, their constructional details, their applications, operation and maintenance, jumbo drill machines, introductiontocoalcuttingmachine.

UNIT 2: LOADING AND TRANSPORTATION (8 Hours)

Rocker shovel, gathering arms loaders, LHD and SDL machines- their construction and operation and maintenance, cavo loader, shuttle car and underground trucks, its construction, operation and application.

UNIT 3: CUTTER LOADERS (10 Hours)

Different types of cutter loaders suitable for long wall and short wall faces, their constructions, operation and maintenance, winning methods different types of continuous miner & road headers their suitability, construction, operation and maintenance , mechanics of rock cutting, rock cutting tools and their performance.

UNIT 4: COMPRESSED AIR (8 Hours)

Basic concept, compression process, working and constructional features of single stage and multistage compressor, unloading arrangement of compressor, layout of pipelines, transmission of compressed air, testing of compressor, safety features ofcompressor

UNIT 5: USE OF ELECTRICITY IN MINES (8 Hours)

Flame proof enclosures & intrinsically safe apparatus, underground cables, drill panel, gate end box, circuit breakers, remote control (pilot circuit), installation of underground substation, earth leakage protection, cable joining, Electrical signaling provisions of IER related to mines.

Reference books:

1. Elements of Mining Vol. III by D. J. Deshmukh
2. UMS Booklet
3. Winningand Working of Coal: R. T. Deshmukh & D. J. Deshmukh
4. Modern Coal Mining Practices : R. D.Singh

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5. LongwallMining : Syd. S.Chaing & Peng
6. Mine Winding & Transport byS.C.Walker

MIA 701	**MINE MACHINERY-III**	**0L:0T:1P**	**1 credits**	**2 Hrs/Week**

LIST OF EXPERIMENTS:

1. Study of LHD.
2. Study of SDL.
3. Study of Continuous Miner.
4. Study Of Jumbo Drill.
5. Study of Coal Cutting Machine.

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MIA-702 STRATA CONTROL

MIA-702	STRATA CONTROL	3L:0T:0P	3 credits	3Hrs/Week

Course objectives:

· Knowledge of underground excavation ; stability around the excavation, subsidence and stress around the excavation

· To comprehend the rock mass classification and support system for underground excavation

· To monitor and predict subsidence and underground disasters

· To design single and multiple opening and support system for underground excavations

Course outcomes: At the end of the course the student will be able to:

· To be familiar with the types of underground excavation and to stabilize the excavation.

· Support the rock mass based on different properties of rock.

· Ability to estimate the subsidence and monitor the disasters.

· To design an opening and support system for underground.

UNIT 1 (10 Hours)

SUPPORTS -Timber & steel supports, Examination of roof, Roof bolting, roof stitching, method of supporting roadways. Supporting under different conditions viz. Pit bottom, crossing, junctions, faulted area, longwall faces, depillaring areas and stoping areas, support loads. SSR, CTR, Support plan, Support withdrawal.

UNIT 2 (8 Hours)

POWERED SUPPORTS - their principles of operation, Classification, designation, constructional features and applications, Hydraulic fluids.

UNIT 3 (6 Hours)

STOWING -Principal methods of stowing, their relative merits and applicability, Hydraulic stowing, Pneumatic stowing, Mechanical stowing, Hand packing, face arrangements, pipe wear, pipejams.

UNIT 4 (10 Hours)

STRATA CONTROL -Theories of ground movement, Rock pressure due to Narrow and Wide excavation, Front abutment and back abutment, Failure of roof and floor, measurement of strata movement, rock burst, bumps, gas outbursts, pot holes.

UNIT 5 (8 Hours)

SUBSIDENCE-Theories of subsidence, damage and loss due to subsidence, vertical and lateral movements and their estimation, angle of fracture and angle of draw, factors affecting subsidence, subsidence control, protection of surface structures, design of protection pillars including shaft pillars. Pot holes.

Reference Books:

1. Strata control in mines Chaing & Peng
2. Winning and Working of Coal R. T. Deshmukh & D. J. Deshmukh
3. Modern Coal Mining Practices R. D. Singh
4. D.G.M.S. Circulars (Tech.) 1995onwards
5. Longwall Mining Syd. S. Chaing & Peng

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MIA-702	**STRATA CONTROL**	**0L:0T:1P**	**1 credits**	**2Hrs/Week**

List Of Experiments :

1. Study of Timber and Steel types of Supports.
2. Study of Roof Bolting.
3. Study Of Powered support.
4. Study of Theories of Subsidence.
5. Study of Hydraulic and Pneumatic Stowing.
6. Study of Theories of Ground Movement.
7. Study of Angle of Fracture.

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Program Elective - IV

MIA 703(A)-MINE DISASTERS

MIA 703(A)	MINE DISASTERS	3L:0T:0P	3 credits	3Hrs/Week

Course Preambles:

· To understand the causes of mine fire and spontaneous heating.
· To know how to tackle the mine disasters like mine fire and inundation.
· To understand the lighting in underground and open cast mine.
· To understand the rescue and recovery operation in a mine.

Course outcomes:

At the end of the course the student will be able to:
An ability to know the causes of mine fire and spontaneous heating.
· An ability to tackle the mine disasters like mine fire and inundation.
· An ability to design the lighting in underground and open cast mine.
· An ability to carry out the rescue and recovery operation in a mine.

UNIT-1 (8 Hours)

Spontaneous Combustion Mechanism, causes, susceptibility indices, detection, preventive measures and control. Incubation period and its determination.

UNIT-2 (8 Hours)

Mine Fires Classification of fires, causes, detection, preventive measures. Dealing with underground and surface fires. Firefighting– directmethods,sealingoffand inertisation.

UNIT-3 (8 Hours)

Explosions Mechanism, causes, characteristics, preventive and control measures of firedamp and coal dust explosions. Investigation after explosion.

UNIT-4 (8 Hours)

Reopening of Sealed-off Area Monitoring of atmosphere behind sealed-off area. Precautions to be taken before reopening. Methods of reopening.

UNIT-5 (10 Hours)

Inundation Causes and preventive measures. Precautions to be taken while approaching old water-logged workings and while working under water bodies. Safety boring apparatus. Dewatering procedure. Design and construction of water dams and barriers.

Reference Books:

1. Mine Disasters and Mine Rescue- M.A.Ramlu
2. Mine Disasters-G.B. Mishra

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MIA-703(B) MINING INDUCED SUBSIDENCE ENGINEERING

MIA-703(B)	Mining induced subsidence engineering	3L:0T:0P	3 credits	3Hrs/Week

Course Preambles:
The mine subsidence is a common phenomena in any underground coal mining operations. The subsidence prediction, causes and analysis and preventive measures to be taken form an important role in coal mining operations. The subsidence impact on surface structures, governing laws to subsidence control, instrumentation and monitoring techniques and to minimize such effects need to be emphasized.

Course Outcome:
The subsidence of mined out areas. The mechanism of failure of strata after creating the voids and filling the mine voids with different materials need to be addressed to monitor the ground movement.

UNIT-1 (10 Hours)
Introduction: strata movement at the mining horizon, convergence in mine working, factors influencing convergence in mine working. subsidence mechanism; Zones of movement in the ovelying beds, veritical and horizontal movements, subsidence trough, angle of draw, angle of break sub-surface subsidence.

UNIT-2 (9 Hours)
Types of subsidence – non-effective width, sub-critical, super-critical width.
subsidence prediction: different methods of surface subsidence prediction - graphical, analytical, profile function, empirical and theoretical models.

UNIT-3 (6 Hours)
Theories of subsidence, sub-surface subsidence due to mining.
Mining damage to building, industrial installations, railway lines, pipes cannels, etc.

UNIT-4 (7 Hours)
Rock kinematics, Extent of movement in the overlying beds.
calculation of ground movement over time. types of stress on structures stress-strain behavior of soils. Different standards suggested for mining and ground in respect of subsidence.

UNIT-5 (10 Hours)
Special Methods of Mining tocontrol subsidence. Prediction and nomograms of subsidence.
Time influence and impact on structures: influence of item on subsidence, examplr from long wall and board and pillar working.

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Reference Books:

1. Mining Induced Subsidence Engineering-Kolymbas, Dimitrios
2. Mining Induced Subsidence Engineering-Gattinoni, Paola, Pizzarotti, Enrico, Scesi, Laura
3. Mining Induced Subsidence Engineering -Dimitrakopoulos,

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OPEN Core Elective-III MIA-704(A) MINING ECONOMICS

MIA-704(A)	MINING ECONOMICS	3L:0T:0P	3 credits	3Hrs/Week

Course Preambles:

- Gain knowledge on role of mineral industry in national economy, national mineral policy, financial management and cost accounting applicable to mining industry.
- Comprehend sampling, classification of ore reserves and resources.
- Learn various methods of ore reserve estimation and mine valuation.
- Evaluate the economic feasibility of a mining project.

Course outcomes:

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

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

UNIT 1: SAMPLING (10 Hours)

Methods of sampling, Errors in sampling, analysis of samples, estimation of grade and reserves Different types of reserves. Salting, precautions against salting.

UNIT 2: MINE VALUATION (8 Hours)

Different methods, Depreciation, Amortization and Redemption of capital, life and present value of a mine.

UNIT 3: FINANCIAL MANAGEMENT (8 Hours)

Methods of framing and financing industrial enterprises, Memorandum and articles of association, shares, debentures, dividends and interest. Break even chart and inventory control.

UNIT 4: INVESTMENT DECISIONS (10 Hours)

Discounted cash flow methods, non-discounted cash flow methods, advantages and disadvantages of them, internal rate of return, Net Present Value.

UNIT 5: BOOK KEEPING (6 Hours)

Preparation of Balance sheet, Profit and Loss Account.

REFERENCE BOOKS:

Mineral Economics , R.T. Deshmukh

SME Handbook, Vol. IMineral Economics , Sinha and Sharma

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MIA-704(B) MINE HAZARD AND RESCUE

MIA-704(B)	MINE HAZARD AND RESCUE	3L:0T:0P	3 credits	3Hrs/Week

Course Preambles:

- To understand the causes of mine fire and spontaneous heating.
- To know how to tackle the mine disasters like mine fire and inundation.
- To understand the lighting in underground and open cast mine.
- To understand the rescue and recovery operation in a mine.

Course outcomes:

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

- An ability to know the causes of mine fire and spontaneous heating.
- An ability to tackle the mine disasters like mine fire and inundation.
- An ability to design the lighting in underground and open cast mine.
- An ability to carry out the rescue and recovery operation in a mine.

Unit-1:Mine Fires : (10 Hours)

Causes of mine fires; spontaneous combustion - mechanism, susceptibility indices, factors 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.

UNIT-2: Mine Explosions : (8 Hours)

Firedamp and coal dust explosions – mechanisms, causes and prevention; stone-dustandwaterbarriers; investigations after anexplosion.

UNIT-3 Inundation : (8 Hours)

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.

UNIT-4:Rescue And Recovery : (10Hours)

Rescue equipment and their uses, rescue stations and rescuerooms; organization of rescueand recoveryareas, re-opening ofsealed-off workings Illumination in mines- it's effect on safety, efficiency and health ; common types of safety lamps & their uses and limitations, maintenance and examination of lamps, their charging, cleaning, lighting, re-lighting ; lamp room design and organization;

UNIT-5:Lighting from mains –(6 Hours)

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different types of illumination devices; illumination of pit bottoms. main roads, faces, pump houses and haulage rooms; standards of illumination in underground and opencast mines Airborne respirable dust in underground mines - generation, dispersion, measurement and contro; classification, physiological effects, dust measurement, sampling of air-bone dust

Reference Books:

1. Mine Hazard And Rescue -M.A. Ramlu
2. Mine Hazard And Rescue -R.D. Singh
3. Mine Hazard And Rescue-D. J. Deshmukh

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MIA-705	**PROJECT STAGE-I**	**0L:0T:1P**	**10 credits**	**12Hrs/Week**

Course Preambles:

- To support independent learning and innovative attitude.
- To guide to select and utilize adequate information from varied resources upholding ethics.
- To guide to organize the work in the appropriate manner and present information (acknowledging the sources) clearly.
- To develop interactive, communication, organisation, time management, and presentation skills.
- To impart flexibility and adaptability.
- To inspire independent and team working.
- To expand intellectual capacity, credibility, judgement, intuition.
- To adhere to punctuality, setting and meeting deadlines.
- To instil responsibilities to oneself and others.
- To train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas.

Course outcomes:

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

- Present the project and be able to defend it.
- Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
- Habituated to critical thinking and use problem solving skills.
- Communicate effectively and to present ideas clearly and coherently in both the written and oral forms.
- Work in a team to achieve common goal.
- Learn on their own, reflect on their learning and take appropriate actions to improve it.

Project Work Phase - I: Each student of the project batch shall involve in carrying out the project work jointly in constant consultation with internal guide, co-guide, and external guide and prepare the project report as per the norms avoiding plagiarism.

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MIA-706	SELF STUDY/GD/SEMINAR	0L:0T:1P	1 credits	2 Hrs/Week

Course Preambles:
The objective of the seminar is to inculcate self
skill, involve in group discussion and present and exchange ideas.
Each student, under the guidance of a Faculty, shall choose, preferably, a rece
relevant to the Course of Specialization.
- Carryout literature survey, organize the seminar content in a systematic manner.
- Prepare the report with own sentences, avoiding cut and paste act.
- Type the matter to acquaint with the use of Micro
facilities.
- Present the seminar topic orally and/or through power point slides.
- Answer the queries and involve in debate/discussion.
- Submit typed report with a list of references.

The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards.

Course outcomes: At the end of the course th eand become self
- Attain, use and develop knowledg in the field of engineering and other disciplines through independent learning and collaborative study.
- Identify, understand and discuss current, real
- Improve oral and written communication skills.
- Explore an appreciation of the self in relation to its larger diverse social and academic contexts.
- Apply principles of ethics and respect in interaction with others.

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Scheme of Examination

VIII Semester –BE (Mining Engineering)

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted							Credits Allotted Subject wise			Total Credits	Remark
			Theory Slot			Practical Slot			Total Marks					
			End Sem.	Mid Sem. MST (Two tests average)	Quiz, Assig-nment	End Sem	Term work			Period per week				
							Lab work & sessional	Assignment/ quiz		L	T	P		
1	Refer Table Below	Elective -II	70	20	10	-	-	-	100	3	1	-	04	
2	MI-802	Disaster Management	70	20	10	-	-	-	100	3	1	-	04	
3	MI-803	Strata Control	70	20	10	30	10	10	150	3	1	2	06	
4	MI-804	Mining Machinery III	70	20	10	30	10	10	150	3	1	2	06	
5	MI-805	Major Project	-	-	-	100	50	50	200	0	0	8	8	
	MI-806	Geovia Insite				30	10	10	50	0	0	2	02	
6	MI-807	Seminar & Group Discussion	-	-	-	-	-	50	50	0	0	2	02	Grand Total
		Total	280	80	40	190	80	130	800	12	4	16	32	800

MST: Mid Semester Tests Taken at Least twice Per Semester **L: Lecture - T: Tutorial - P: Practical**

Elective –II

MI-801(1)	Safety Engineering
MI-801(2)	GIS & Remote Sensing in Mining
MI-801(3)	Ecology and sustainable development

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MIA-801 MINING SURVEYING-III

MIA-801	**MINING SURVEYING-III**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Course Preambles:
To impart the knowledge of measurements of distances and angles, determination of different levels and level difference and computation of areas, volumes which includes determination of capacity of reservoirs, volumes of barrow pits. The knowledge of modern instruments like Theodolite surveying and tachometric surveying, designing & setup of curves and global positioning systems.
To Understand correlation and stope survey methods and know and limitations of photogrammetry and modern survey methods. To be Familiar with dip and strike problems and surveyor responsibility in underground .

UNIT 1: TRIANGULATION (8 Hours)

Principles of forming network of triangles; Selection of sites of triangulation stations; Base and Check base lines; Measurement and adjustment of angles by simple methods; Calculation of Co-ordinates.

UNIT 2: CORRELATION SURVEY (10 Hours)

Methods of correlation of surface and underground surveys through adits, inclines, and shafts; Use of magnetic needle and Gyro theodolites; Different methods of Stope surveying and open pit surveying.

UNIT 3: ASTRONOMICAL SURVEY (6 Hours)
Definitions of important terms; Determination of azimuth by astronomical observations.

UNIT 4: PHOTOGRAPHIC SURVEYING (8 Hours)

Terrestrial photogrammetry, General Principles; Phototheodolite; Stereo photographic Surveying; Aerial Surveying - Field of application; Vertical and oblique photographs; Aerial photography; Preparation of photographical maps by simplemethods.

UNIT 5: MODERN SURVEYING TECHNIQUES (10 Hours)

Electronic distance measuring equipment; Geodimeter, Tellurometer, Distomat, Total station, Surveying software with plotting system, GPS, principle, method and its application in mining.

Reference Books:

1. Mine surveying by S.Ghatak
2. Surveying & Levelling by B. C. Punamia
3. Surveying & Levelling by Kanetkar & Kulkarni
4. Mine surveying by Winniberg

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MIA-801	**MINING SURVEYING-III**	**0L:0T:1P**	**1 credits**	**2Hrs/Week**

Course Preambles:
To Understand different equipment and compare accuracy levels and to study several experiments and conversant with it. To find the importance of latest technology through total station. To be familiar with conventional symbols used in mines. it enables the student to attain good practical knowledge.

Course outcome:
Familiar with equipment and capable to do work independently at any time if you get chance

List Of Experiment:

1. Triangulation survey by theodolite
2. Measure horizontal and vertical angles by theodolite
3. Measure horizontal angles by method of repetition and reiteration using theodolite
4. Signs and conventions used by GSI, MMR, CMR
5. Curve setting – different methods by total station
6. Determine area using total station
7. Traversing using total station
8. contouring using total station
9 . Determination of remote height using total station
10. Coordinate measurement by total station and GPS
11. Traversing and recording position of points by GPS
12. Distance, gradient, Difference, height between two inaccessible points using total stations.

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Program Elective-V

MIA-802 (A) MINING ENVIRONMENT – III

MIA-802 (A)	**MINING ENVIRONMENT – III**	**3L:0T:0P**	**3 credits**	**3Hrs/Week**

Course Preambles:
- To understand the causes of mine fire and spontaneous heating.
- To know how to tackle the mine disasters like mine fire and inundation.
- To understand the lighting in underground and open cast mine.
- To understand the rescue and recovery operation in a mine.

Course outcomes: At the end of the course the student will be able to:
- An ability to know the causes of mine fire and spontaneous heating.
- An ability to tackle the mine disasters like mine fire and inundation.
- An ability to design the lighting in underground and open cast mine.
- An ability to carry out the rescue and recovery operation in a mine.

UNIT 1 : SPONTANEOUS HEATING (8 Hours)

Causes, detection and preventive measures in underground and surface coal mines, control of spontaneous heating in stacks and dumps.

UNIT 2: MINE FIRES (10 Hours)

Mine fires, control of fires and fires extinguishers, study of atmosphere behind sealed off areas, fire stopping and sealing off an area, pressure balancing, conditions and procedure of reopening a sealed off area, fire fighting organization. Fires in opencast mines and surface storage systems, emergency organization in mines.

UNIT 3: EXPLOSION (6 Hours)

Fire damp and coal dust explosions, their causes and prevention, stone dust and water barriers, investigations of explosion.

UNIT 4: MINE INNUNDATION (8 Hours)

Causes and precautionary measures, bulk head doors, barriers, dams, their design, precautions to be taken while approaching old workings, burnside drilling apparatus, recovery of flooded mines and de watering of old workings.

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UNIT 5: RESCUE AND RECOVERY (10 Hours)

Types of rescue equipment and their use, features of rescue stations and rescue rooms, first aid appliances, training of personnel, and organization of rescue and recovery work during mine fires, explosion, inundation.

Reference Books:

1. Mine Environment By G.B. Mishra
2. Elements of Mining Tech. Vol.2 by D. J. Deshmukh
3. Subsurface Mine Ventilation. by Mcpherson
4. Mine fires by Dr. Ramlu

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MIA-802(B) ROCK SLOPE ENGINEERING

MIA-802(B)	ROCK SLOPE ENGINEERING	3L:0T:0P	3 credits	3Hrs/Week

Course Preambles:
To introduce the basic mechanics of rock slope failures To learn the types of rock failure and its influencing parameters.

Course Outcome:
The students will know the fundamental mechanics of rock slope failure, types of failure and its influencing parameters.

UNIT 1:Basic Concepts: (8 Hours)

Engineering issues of Slope stability, Basic terminology, Slope failure causes and process, basic mechanism of slope failure Rock mass properties: various properties, data collection, stereographic projections

UNIT 2:Ground Water: (9 Hours)

Role of ground water flow, influence of ground water on slope stability, evaluation of ground water conditions in slopes

UNIT 3:Plane Failure : (8 Hours)

general conditions and failure analysis

UNIT 4:WedgeFailure: (9 Hours)

generalconditionsandfailureanalysis .**Circular Failure:** general conditions and failure analysis

UNIT 5:Toppling Failure: (8 Hours)

general conditions and failure analysis Rock slope stabilization techniques, Geotechnical Instrumentation and Monitoring Aspect of Waste dump stability analysis

Reference Books :

1. Rock Slope Stability, Charles A Kliche (SME publication)
2. Rock Slope Engineering, Hoek & Brown SME
3. Slope Stability in Surface mining, WA Hustrulid, SME

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Open Core Elective-IV

MIA-803(A) MINE PLANNING)

MIA-803(A)	MINE PLANNING	3L:0T:0P	3 credits	3Hrs/Week

Course Preambles:

- Understand the basic principles of mining law in India and role and influence of government onmining industries. To identify software for mine planning and designing.
- Explain the process of strategic mine planning and its impact on decision-making during project development and the factors considered in underground coal mine planning. Explain novel mining methods.
- Illustrate surface layouts, pit bottom and pit top layouts for different transport systems.
- Analyze and select suitable mine development and working methods.

Course outcomes:

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

- Knowledge of Mining laws in India and role and influence of government on mining industries and software for mine planning and designing.
- Ability to explain Process of strategic mine planning, Factors considered in underg ound coal mine planning and Novel mining methods.
- Ability to apply Surface layouts, pit bottom and pit top layouts for different transport systems.
- Ability to analyze and select suita le mine development and working methods.

UNIT 1: (8 Hours)

Coal reserves and their estimation, Geological and technological data needed for mine planning, Preparation of project and feasibility reports, project monitoring.

UNIT 2: (10 Hours)

Planning and scheduling of various mining operations, linear programming, Simplex methods and transportation problem. Operation Research - Scope of application in mining, Linear programming, formulation and solution, Network planning with special reference to CPM/PERT, System approach for project scheduling.

UNIT 3: (6 Hours)

Division of minearea intounits andsub units, Area, Reserve, Lifeand Capacity of mine, Panel size, Design of long wall face.

UNIT 4: (8 Hours)

Cost of various mining operations, Optimum size of mines, Mode of opening up of deposits, Choice of opening, Location and size of Development openings.

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UNIT 5: (8 Hours)

MINESERVICESDesignofhaulage, hoistinganddrainagesystems,Designofpittopandpitbottom, Coalhandling plants, Railway siding , design of rapid loading system etc

Books Recommended :

1. Advance Coal Mining by R.T. deshmukh and V.S. Vorobjev
2. Mine Planning by S.P.Mathur
3. Mine Planning by BJ.Bhattacharya
4. Modern Coal Mining Technology S.K.Das, Lovely Prakashan, Dhanbad, 1996

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MIA-803(B) ROCK EXCAVATION ENGINEERING

MIA-803(B)	ROCK EXCAVATION ENGINEERING	3L:0T:0P	3 credits	3Hrs/Week

Course Preambles:

- To make students aware about the concept of excavation engineering and its relevance to mining
- To expose the students to various excavation techniques and their design aspects.

Course outcomes: At the end of the course the student will be able to:

- Students will acquire knowledge about excavation techniques and their selection.

UNIT 1:Introduction: (10 Hours)

Scope and importance of rock excavation engineering in mining and construction industries; physico-mechanical and geotechnical properties of rocks vis-a-vis excavation method; selection of excavation method.

UNIT 2:Drilling : (10 Hours)

Mechanics of rock drilling; design and operating parameters of surface and underground drilling; evaluation of drill performance; drillability of rocks; mechanism of bit wear; bit selection; problemsof drilling; economics of drilling.

UNIT 3:Blasting: (8 Hours)

Mechanics of rock fragmentation by explosives; advancement in explosives and blasting technique; their selection criteria for rock excavation; blast design for surface excavations and optimization;

UNIT 4:Advanced Blasting Techniques: (8 Hours)

blast performance evaluation; cast blasting; techno-economic and safety aspects of surface and underground blasting; advances in blast design for underground excavations; control blasting; computer aided blast designs; review of tunnel blasting techniques, recent advances and novel techniques ofblasting

UNIT 5:Rock Cutting: (6 Hours)

Theories of rocktool interactionforsurfaceexcavationmachinery; designofcutterhead - rippers, dozers, scrapers, BWE. Continuous surface miners, auger drills;

Reference Books:

1. Blasting Practices : G.K.Pradhan
2. Explosives and Blasting Practices in Mines : Dr. Sameer Kumar Das
3. Drilling : G. Chugh
4. SME – Mining Engineers Handbook
5. Surface Mining – SME . Introduction to Mining - Hartman

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MIA 804 Projects –II (Major)

MIA- 804	**Projects –II (Major)**	**0L:0T:6P**	**16 credits**	**12Hrs/Week**

Preambles:

The object of Project Work II & Dissertation is to enable the student to extend further the investigative study taken up under EC P1, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone orjointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The assignment to normally include:

1. In depth study of the topic assigned in the light of the Report prepared under EEP1;
2. Review and finalization of the Approach to the Problem relating to the assigned topic;
3. Preparing an Action Plan for conducting the investigation, including team work;
4. Detailed Analysis/Modelling/Simulation/Design/Problem Solving/Experiment as needed;
5. Final development of product/process, testing, results, conclusions and future directions;
6. Preparing a paper for Conference presentation/Publication in Journals, if possible;
7. Preparing a Dissertation in the standard format for being evaluated by the Department.
8. Final Seminar Presentation before a Departmental Committee

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