AMET
ACADEMY OF MARITIME EDUCATION AND TRAINING
DEEMED TO BE UNIVERSITY
(Under Section 3 of UGC Act 1956)

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE- Mining Engineering					
Course Code: UCLEC01	**Course Name:** **TECHNICAL ENGLISH-I**		**L** 2	**T** 0	**P** 0	**C** 2
Year and Semester	I Year (I SEMESTER)		Contact hours per week (2Hrs)			
Prerequisite course	NIL					
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**		
	✓					
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**		
Course Objective	1. Identify the process of communication and focus on language 2. Use Vocabulary & English Grammar in communication 3. Read and understand the language. 4. Learn to write technical drafts. 5. Application of imperative passive.					
Course Outcome	The student will be able to 1. Outline the importance of communication skill. 2. Illustrate technical and general vocabulary. 3. Distinguish different tenses and identification of common errors 4. Infer the skill for writing formal and informal letters 5. Develop good listening and speaking skills 6. Apply the skills to speak and write English grammatically					

POS/ COS	PO1	PO2	PO3	PO4	PO 5	PO 6	PO 7	PO8	PO9	PO10	PO11	PO 12	PS O1	PSO2	PS O 3
CO1	-	-	-	-	2	3	2	-	3	3	-	3	-	-	-
CO2	-	-	-	-	-	3	2	-	2	2	-	3	-	-	-
CO3	-	-	-	-	2	2	2	-	2	2	-	2	-	-	-
CO4	-	-	-	-	2	2	2	-	3	3	-	3	-	-	-
CO5	-	-	-	-	2	2	2	-	3	3	-	3	-	-	-
CO6	-	-	-	-	2	3	3	-	3	3	-	3	-	-	-
Average	-	-	-	-	2	2.5	2.2	-	2.7	2.7	-	3	-	-	-
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ;
PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome

UNIT I COMMUNICATION & FOCUS ON LANGUAGE 6Hrs

Process of Communication -Language as a tool of Communication-Importance of Technical Communication

UNIT II VOCABULARY & ENGLISH GRAMMAR 6Hrs

General Vocabulary-Dictionary-Word Formation: Prefix and Suffix-Synonyms and antonyms-Idioms and Phrases-Homophones -Parts of Speech-Subject Verb Agreement-Tenses, Articles, Prepositions-Common errors in English

UNIT III READING SKILL 6 Hrs

Intensive Reading-Skimming the text-Scanning-Topic sentence and Its Role-Reading and Interpretations-Critical Reading

UNIT IV WRITING SKILL 6Hrs

Descriptive Writing –Paragraph-Technical descriptions-Essays-Letter Writing – Formal and Informal-Business Letters-Job Application Letter-Types of reports-Instructions and Checklists

UNIT V LISTENING AND SPEAKING 6Hrs

Types of Listening -Listening and note taking-Pronunciations-Stress and Intonation-Conversation technique-Dialogue Writing -Professional Communication-Interview-Group Discussion –Power Point Presentation-Lab

Total : 30 Hours

TEXT BOOKS:

1. Cambridge Advanced Learner’s Dictionary (Latest Edition)
2. English and Communication Skill for Students of Science and Engineering by S.P.Dhanavel.(Orient Blackswan)

Designed by “ Department of English”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE- Mining Engineering				
Course Code UBMTC01	Course Name : ENGINEERING MATHEMATICS – I	**L** 3	**T** 1	**P** 0	**C** 4
Year and Semester	I Year (I SEMESTER)	Contact hours per week (4Hrs)			
Prerequisite course	NIL				
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**	
	Basic Science ✓	**Engineering Science**	**Open Elective**	**Mandatory**	
Course Objective	1. Identify the process of mechanics 2. Use the calculus 3. Functional variables 4. Learn to integrals 5. Application of integrals.				
Course Outcome	The student will be able to 1. Solve problems on Laplace Transform 2. Demonstrate the use of Fourier Transforms in solving physical problems 3. Evaluate Z-transform of physical systems 4. Apply probability distributions in physical systems 5. Evaluate Sampling distributions of physical systems 6. Apply the knowledge of Laplace transform , Fourier transform, probability and sampling distributions in engineering applications				

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	-	-	-	-	-	-	2	2	2	2
CO2	3	2	3	3	2	-	-	-	-	-	-	-	2	2	3
CO3	2	3	2	2	2	-	-	-	-	-	-	2	2	-	2
CO4	3	2	3	3	2	-	-	-	-	-	-	2	2	3	3
CO5	3	3	3	2	2	-	-	-	-	-	-	2	3	3	3
CO6	3	3	3	3	2	-	-	-	-	-	-	2	3	3	2
Average	2.83	2.50	2.83	2.50	1.67	-	-	-	-	-	-	2.00	2.33	2.40	2.17

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ;
PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome

UNIT I TRIGONOMETRY 12 Hrs

De Movier's Theorem and its applications - Expansion of Sin nθ, cosnθ, and Sinn θ, cosn θ. Hyperbolic functions - Separation into real parts and imaginary Parts - simple problems. Summation of series using C + is method.

UNIT II DIFFERENTIAL CALCULUS I

12 Hrs

Successive Differentiation of Standard forms -Leibnitz's theorem (Statement only)- simple problems. Length of Sub tangent and Subnormal. tangent and normal in Cartesian and polar form. Curvature, radius and centre of curvature in Cartesian and polar form - Evolutes and Envelopes

UNIT III DIFFERENTIAL CALCULUS II 12 Hrs

Functions of two variables - Partial derivatives - Euler's theorem on homogeneous functions and its generalization - total differentials Jacobian- Taylor's series in the case of two variables - Maxima /Minima of Two variables - Lagrange's method of undetermined multipliers.

UNIT IV INTEGRAL CALCULUS I 12 Hrs

Integration by trigonometric substitution, by parts, Bernoulli's rule. Reduction formulae - Properties of definite integrals - beta and gamma Functions and problems.

UNIT V INTEGRAL CALCULUS II 12 Hrs

Operations under the sign of integration - multiple integrals - change of order
coordinates -Area, Volume and Surface area of solids using multiple integrals of integration - Transformation of

Total : 60 Hours

TEXT BOOKS:

1. Dr. B.S. Grewal, “Higher Engineering Mathematics”, 40th edition, Khanna Publishers, New Delhi, 2007.

REFERENCES:

1. H.K.DASS “Advanced Engineering Mathematics”, 15th Revised edition, S.Chand & Co. Ltd., New Delhi, 2006.

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

<table>
<tr><td>PROGRAM</td><td colspan="6">BE-Mining Engineering</td></tr>
<tr><td rowspan="2">Course Code:
UBPHC01</td><td colspan="2" rowspan="2">**Course Name:**
ENGINEERING PHYSICS I</td><td>**L**</td><td>**T**</td><td>**P**</td><td>**C**</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>Year and Semester</td><td colspan="2">I Year (I SEMESTER)</td><td colspan="4" rowspan="2">Contact hours per week
(4Hrs)</td></tr>
<tr><td>Prerequisite course</td><td colspan="2">NIL</td></tr>
<tr><td rowspan="3">Course category</td><td>**Humanities and Social Sciences**</td><td>**Management courses**</td><td colspan="2">**Professional Core**</td><td colspan="2">**Professional Elective**</td></tr>
<tr><td></td><td></td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>**Basic Science**</td><td>**Engineering Science**</td><td colspan="2">**Open Elective**</td><td colspan="2">**Mandatory**</td></tr>
<tr><td></td><td>✓</td><td></td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Course Objective</td><td colspan="6">1. Demonstrate concepts of fluid at rest and motion.
2. Determine the elastic limit of different materials
3. To study the elastic limit of different materials
4. To estimate the basic heat laws and behavior of light.
5. To enhance concepts of electromagnetic induction and their applications</td></tr>
<tr><td>Course Outcome</td><td colspan="6">At the end of the course the student will be able to:
1. Summarize the laws and principles of basic mechanics
2. Explain the concepts of hydrostatics and hydrodynamics
3. Illustrate the properties of matter
4. Demonstrate the basic principles of heat and light
5. Outline the basic principles of electricity and electrical machines
6. Apply the fundamentals of electromagnetic induction for engineering applications</td></tr>
</table>

POS/ COS	PO 1	PO 2	PO 3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO12	PSO 1	PSO 2	PSO 3
CO1	2	2	-	-	2	-	-	-	-	-	-	2	3	2	3
CO2	2	-	2	2	2	-	-	-	-	-	-	2	3	3	3
CO3	2	2	-	2	2	-	-	-	-	-	-	-	-	-	-
CO4	2	2	2	-	2	-	-	-	-	-	-	2	-	2	-
CO5	3	3	2	2	3	-	-	-	-	-	-	2	2	3	2
CO6	3	3	3	2	3	-	-	-	-	-	-	3	2	3	2
Average	2.3	2.4	2.3	2	2.3	-	-	-	-	-	-	2.2	2.5	2.6	2.5

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ; PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome

Unit I: Mechanics
(9Hours)

Force-inertia-Newton`s laws of motion- impulse and impact - Friction- cause of friction- types of friction-laws of friction-coefficient of friction- angle of friction. Motion-types of motion- simple harmonic motion-simple pendulum- circular motion-centripetal and centrifugal force- *conical pendulum-working of a steam engine governor based on the principle of conical pendulam. Newton`s law of universal gravitation-*Satellite-principle of launching of satellite- orbital velocity-time period- escape velocity. Planetary motion and Kepler's Laws-Deduction of Kepler`s third law-Law of gravitation from Kepler`s third law.

Unit II: Hydrostatics and Hydrodynamics **(9Hours)**

Fluid-Pascal`s law-Archimedes principle-Laws of floatation- centre of buoyancy – stability of equilibrium of a floating body-metacentre - metacentric height of a ship – experiment*. Hydrostatic pressure, differential manometer - Centre of pressure- Centre of pressure of a rectangular lamina immersed in a homogenous liquid at rest - Centre of pressure of a triangular lamina with one side parallel to the surface-Surface tension- angle of contact-capillarity- derivation of surface tension. Viscosity-Viscous force-Stokes Law-coefficient of viscosity- experiment to find coefficient of viscosity. Bernoullis Theorem – Venturimeter - Plimsol lines

Unit III: Properties of matter **(9 Hours)**

Elasticity- stress and strain- -Hooke`s law –modulus of elasticity* –different types - Poisson ratio Torsion-torque per unit twist – work done in twisting- Torsion pendulum- theory and experiment-bending of beams--bending moment- Cantilevers- depression of a cantilever- non uniform bending and uniform bending- theory and experiment.

Unit IV: Heat and Light **(9 Hours)**

Laws of thermodynamics-Specific heat capacity - Specific heat capacity of gases – CP and CV –Relation between them-Transmission of heat – conduction- coefficient of thermal conductivity – Lee,s disc experiment- cylindrical flow of heat–convection- radiation-Black body radiation – distribution of energy-Wien`s displacement law-Rayleigh Jeans law. Interference*- Double slit experiment- Diffraction* due to single slit and circular aperture. Limit of resolution, Resolving power of optical instruments.

UNIT V: Electricity **(9 Hours)**

Heating effect of current–Joules law of heating-Applications–fuse- thermopile. Ampere`s Law, Biot Savart law. Magnetic field at a point due to straight conductor carrying current-Kirchoff's current and voltage laws – Wheatstone's network –Electromagnetic induction – Faraday's laws of Electromagnetic induction – Lenz law –Self induction–Mutual induction . DC Generator* – principle, construction and working- AC Generator*- principle, construction and working. Transformer- principle, construction and working –Losses in transformer- methods to reduce the losses.

TOTAL 45 HRS

TEXT BOOKS:

1. A Nelson, "Engineering Mechanics" Tata McGRaw Hill, 2009.
2. M. Narayanamurthi, M. Nagarathnam, "Statics, Hydrostatics and Hydrodynamics", The National Publishing Company, 8th Edition, 2008.
3. R. Murugeshan, Properties of matter and acoustics, S. Chand & Co, New Delhi 2012.
4. D.S. Mathur, Elements of properties of matter, S.Chand & Company Ltd., New Delhi 2010.
5. Brijlal, N. Subramanyam and P.S. Hemne "Heat and thermodynamics", S.Chand & Co,
6. N. Subramaniyam, Brijlal and M.N. Avadhanulu, A text book of Optics, S. Chand & Co, New Delhi, 2012.

REFERENCES:

1. R Feynmann, R Leighton, M Sands, "The Feynmann Lectures on Physics", Volume 1, Pearson Education; 1st edition 2012.
2. D Halliday, R Resenic and J Walker "Fundamentals of Physics", Wiley India, 6th edition, 2006.
3. Brijlal and Subramaniyam, "Properties of matter", S. Chand & Co, New Delhi, Revised edition, 2008.
4. R W. Fox, A T. McDonald, P J. Pritchard John, "Introduction to Fluid Mechanics", Wiley & Sons, 6th edition, 2008.
5. E M. Purcell and Morin, "Electricity and Magnetism", 3rd Edition, Cambridge University Press, 2011
6. A Ghatak, "Optics", McGraw-Hill Education; 1st Edition, 2009

PROGRAM	BE-Mining Engineering					
Course Code: UBCHC01	**Course Name:** Engineering Chemistry		**L**	**T**	**P**	**C**
			3	0	0	3
Year and Semester	I Year (I Semester)		Contact hours per week (3Hrs)			
Prerequisite course	NIL					
Course category	Humanities and Social Sciences	Management courses	Professional Core		Professional Elective	
	Basic Science	Engineering Science	Open Elective		Mandatory	
	✓					

Course Objective

1. Learn the technology of water Treatment for industrial purpose
2. Discuss corrosion & treatment of crude oil
3. Determine the technology of water Treatment for industrial purpose.
4. To study the Concept of analytical technique and the importance of fuels.
5. To know the principle involved in corrosion control, the concept of energy storage devices.

Course Outcome

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

1. Illustrate the fundamentals of phase rule and reduced phase rule
2. Outline the concepts of water treatment techniques
3. Identify the types of fuels and characterization of various constituents
4. Illustrate the basic principles of electrochemical reactions and redox reactions
5. Distinguish the production technologies of metallic and non-metallic materials
6. Apply corrosion Control techniques in on- board ships

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	-	-	-	-	-	2	-	-	-	-	2	2	2	2
CO2	2	2	-	-	-	-	3	-	-	-	-	-	-	-	-
CO3	2	2	-	-	-	-	3	-	-	-	-	-	-	-	-
CO4	2	2	-	-	-	-	3	-	-	-	-	-	-	-	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-	2	2	2
CO6	3	2	3	-	2	-	3	-	-	-	-	-	2	2	3
Average	2.3	2	3	-	2	-	2.8	-	-	-	-	2	2	2	2.3
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I PHASE RULE 9Hrs

Terminology, Phase rule – one component system, reduced phase rule – application of reduced phase rule to binary alloy system. Hazard of Inorganic, Organic cargos carried on board vessels with respect to flammability, toxicity, reactivity and solubility.

UNIT II WATER & IT TREATMENTS 9 Hrs

Sources of water, hard and soft water, determination of hardness, Softening of water- lime soda process Ion exchange process. Boiler feed water, removal of oil – blow down operation, Caustic embrittlement, internal conditioning. Water for domestic purposes screening, aeration, sedimentation, chlorination, break point chlorination. Disinfection with ozone, desalination. Waste water treatment-marine sediments.

UNIT III FUEL & COMBUSTION 9Hrs

Conventional & non-conventional energy resources and energy conversion, classification and properties of fuel, calorific value determination using bomb calorimeter. - Solid fuels -Analysis-proximate and ultimate analysis, hydrogenation & carbonization of coal.

Liquid fuels- characterization of various constituents viz petrol diesel with regard to their application in IC engine (knocking)Gaseous fuels- coal gas, producer gas, biogas, water gas and flue gas analysis using Orsat apparatus. Toxic and other ill effects of cargoes on human and environment.

UNIT IV ELECTROCHEMISTRY 9Hrs

Electrodes, Standard & single electrode potential, Nernst equation, Cell terminology, cell reaction Galvanic cells, fuel cells, Lead acid battery, Nickel cadmium battery. Electrochemical Reaction: Electrolysis- electroplating – galvanizing

CORROSION CONTROL ON BOARD SHIP: Thermodynamics & Kinetics of corrosion, various forms of corrosion, corrosion prevention methods.

LUBRICANTS: Classification and properties of lubricating oils (Viscosity, flash, fire point & cloud and pour points) Effects of pressure on melting & boiling point. Relevance of gas laws to LPG carrier and reefer ships.

PHYSICAL AND CHEMICAL PROPERTIES OF FUELS AND LUBRICANTS: Production of Oils from Crude Oil, Properties and characteristics of fuels and lubricants, Shore side and shipboard sampling and testing, Interpretation of test results, Contaminants including microbiological infection, Treatments of fuels and lubricants including storage, centrifuging, blending, pretreatment and handling.

UNIT V STEEL, CEMENT AND ORGANIC COMPOUNDS 9Hrs

Production of steel - Bessemer converter process. Open hearth process, Chemical addition to steels production of non-ferrous alloys, brass, bronze, aluminum alloys. Special reference to ship building (ship propellers etc) Cement – manufacturing of cement, setting & hardening of cement; concrete, reinforced concretes Basic Metallurgy, Metals and Processes, Properties and Uses, Non-Metallic Materials. Characteristics and limitations of process used for fabrication and repair - Process, Heat Treatment of Carbon Steel.

ORGANIC COMPOUNDS: Hydrocarbon- petroleum & its fractionated products, extraction of aromatic compounds from petroleum. Aromatic compounds - Benzene; polycyclic hydrocarbons- Naphthalene, anthracene, naphthacene. Fibre and Reinforced plastics

Total: 45 Hrs

TEXT BOOK:

1. Engineering Chemistry. Dr. V. Balasubramanian*et.al*., CARS Publishers
2. Engineering Chemistry Laboratory Manual. Dr. V. Balasubramanian*et.al.*, CARS Publishers

References

1. Engineering Chemistry. Rajesh. Saras Publication
2. Environmental Chemistry A K Dey

Designed by : “ Department of Chemistry”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

Course Code:	**Course Name:**	**L**	**T**	**P**	**C**
UBMCC03	ENGINEERING MECHANICS	3	1	0	3

Year and Semester	I Year (I Semester)	Contact hours per week (4Hrs)
Prerequisite course	NIL	

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**
		✓		

Course Objective

1. Understand of force and moments
2. To learn static equilibrium of particle and rigid bodies
3. Understand friction and its effects.
4. Understand moments in various solid bodies
5. Understand dynamic equilibrium of particles and rigid body.

Course Outcome

Students will be able to

1. Resolve of forces and moments
2. Analyze static equilibrium of particle and rigid bodies.
3. Understand Friction and its effects.
4. Analyze moments in various solid bodies
5. Analyze dynamic equilibrium of particles and rigid body.
6. Understand the concept of mechanics in rigid body.

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	3	2									1	2	
CO2	2	2	3	2			2	3	2				2	1	
CO3	1	1	3	3		2	2	3	2				3	3	1
CO4	1	1	2	1		1	1	3	3				3	2	2
CO5	1	1	2	2		1	1	2	1				2	2	
CO6	1	1	1	1									2	1	

Average	1.5	1.33	2.33	1.83									2.16	1.83	1.5
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			
KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ; **PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome**															

UNIT – I BASICS & STATICS OF PARTICLES 12 Hours

Introduction - Units and Dimensions – Forces – System of forces – Resultant forces – Parallelogram law of forces – Triangular law of forces – Polygon law of forces – Resolution and composition of forces – Principles of transmissibility. Single equivalent force - Equilibrium of particles – Moment and couple – Scalar components of moment – Varigon's Theorem

UNIT – II EQUILIBRIUM OF RIGID BODIES 12 Hours

Equilibrium of forces – Law of mechanics - Lami's theorem. - Free body diagram – Requirement of Stable Equilibrium – Equilibrium of rigid bodies in 2D – Examples. Type of supports and their support reactions.

UNIT – III FRICTION

Static and Dynamic Friction – Laws of friction - Equilibrium of a body on a rough Horizontal plane, inclined Plane and inclined plane subjected to a force acting along the inclined plane. Applications of friction - Simple contact friction (Ladder friction) – Screw friction – weight lifted by screw jack - Belt friction – Rolling Resistance.

UNIT – IV PROPERTIES OF SURFACES AND SOLIDS 12 Hours

Determination of Areas and Volumes-First moments of area and the Centroid of sections-Rectangle, circle, triangle from integration-T section, I section, Angle section, Hollow section y using standard formula- Second and product moments of plane area- Rectangle, triangle, circle from integration-T section. I section, Angle section, Hollow section by using standard formula-parallel axis theorem and perpendicular axis theorem- Mass moment of Inertia.

UNIT – V DYNAMICS OF PARTICLES AND RIGID BODIES 12 Hours

Dynamics of Particles - Displacement, velocity and acceleration, their relationship - Relative motion-Curvilinear motion – Newton's law – work-energy equation of particles - Impulse and Momentum – Law of conservation of momentum – D'Alembert's Principle – Types of collision - Collision of Elastic Bodies – Newton's law of collision of bodies - co-efficient of restitution. Dynamics of Rigid Bodies – General plane motion – Velocity and Acceleration – Absolute and relative motion method – Equilibrium of Rigid bodies in Plane motion.

TOTAL: 60 Hours

TEXT BOOK:

1. K.V. Natarajan, "Engineering Mechanics".
2. R.S Khurmi, "A Textbook of Engineering Mechanics".

REFERENCE :

1. S.S. Bhavikatti, "Engineering Mechanics"

2. Palanichamy & Nagan, "Engineering Mechanics Statics & Dynamics"
3. S. Rajasekaran, G. Sankara Subramania, "Fundamentals of Engineering Mechanics".

4. Beer, F.P and Johnson Jr. E.R, "Vector Mechanics for Engineers", Vol. (1) Statics and Vol. (2). Dynamics, McGraw-Hill International Edition.

Designed by " Department of Mechanical Engineering

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code	Course Name :	**L**	**T**	**P**	**C**
UBBTC01	Environmental Studies	0	0	2	2
(Common to BE – Mechanical , BE – EEEM, BE –PE, BE – HE, BE - NA&OE)					
Year and Semester	I Year (I Semester)	Contact hours per week (2 Hrs)			
Prerequisite course	NIL				

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
	✓			
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective	The objective of this course is to provide knowledge on	
	1	Environment and renewable resources
	2	Ecosystem and their functions
	3	Biodiversity and its importance
	4	Social impact on environment
	5	Human population and adverse effects
Course Outcome	At the end of the course, the student will be able to 1. Summarize Natural Resources such as Forest, water, mineral, Energy, land and Natural 2. Identify the interrelationship between living organism and environment 3. Illustrate the importance of environment by assessing its impact on the human world 4. Demonstrate different type of pollution and its hazards 5. Explain the impact of pollution explosion, family welfare program and Role of Information Technology in Environment and human health 6. Classify the integrated themes such as biodiversity natural resources, pollution control and waste management	

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO 9	PO 10	PO 11	PO1 2	PS O1	PSO 2	PSO3
CO1	-	-	-	-	-	2	1	2	2	-	-	2	-	-	-
CO2	-	-	-	-	-	2	1	2	2	-	-	2	-	-	-
CO3	-	-	-	-	-	2	2	2	2	-	-	2	-	-	-
CO4	-	-	-	-	-	2	3	1	2	-	-	2	-	-	-
CO5	-	-	-	-	-	3	2	3	2	-	-	2	-	-	-
CO6	-	-	-	-	-	2	3	2	2	-	-	2	-	-	-
Average	-	-	-	-	-	2.2	2	2	2	-	-	2	-	-	-
Correlation Levels				1.Slight (Low)				2.Moderate (Medium)				3.Substantial (High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

Unit1:NaturalResources 6Hrs

Environmental studies-terminologies, need for public awareness. Natural resources-Renewable and non-renewable resources; Characteristics, uses and conservation of natural resources-Forest resources, Water resources, Mineral resources, Food resources, Energy resources and Land resources. Role of an individual in conservation of natural resources; equitable use of resources for sustainable lifestyles.

Unit 2: Ecosystems 6Hrs

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers; Energy flow in the ecosystem; Ecological succession; Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of the different ecosystems- Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 3 : Biodiversity and its conservation 6Hrs

Introduction – Definition : genetic, species and ecosystem diversity; Biogeographical classification of India; Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values; Biodiversity at global, National and local levels; Inida as a mega-diversity nation; Hot-sports of biodiversity; Threats to biodiversity; Endangered and endemic species of India; Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

Unit 4: Environment and Social Issues 6Hrs

Environmental Pollution; Cause, effects and control measures of different types of pollution; Solid waste Management; Role of an individual in prevention of pollution; Disaster management. Social Issues and the Environment, From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics. Climate change, global warming, nuclear hazards, ill-effects of fireworks. Wasteland reclamation. Laws and acts in India for environment protection, Public awareness.

Unit 5: Human Population and the Environment 6Hrs

Population growth, variation among nations. Population explosion – Family Welfare Programme. Environment and human health- Human Rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and human health. Field work and Field Visit.

Total: 30 Hours

References

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Publications Limited, Bikaner, India

2. Erach Bharucha. 2013. Textbook of Environmental Studies for Undergraduate Courses. University Grants Commission, New Delhi

3. N. Arumugam and V Kumaresan. 2014. Environmental Studies (UGC Syllabus), Saras Publications, Nagarkoil, India

4. D.K. Asthana and Meera Asthana. 2010. A Textbook of Environmental Studies. S. Chand Publishingm, New Delhi

5. B.S. Chauhan. 2015. Environmental Studies. Laxmi Publications, New Delhi.

Designed by	“ Department of Biotechnology”

AMET
ACADEMY OF MARITIME EDUCATION AND TRAINING
DEEMED TO BE UNIVERSITY
(Under Section 3 of UGC Act 1956)

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

<table>
<tr><td>PROGRAM</td><td colspan="6">BE-Mining Engineering</td></tr>
<tr><td rowspan="2">Course Code:
UBPHCPA</td><td colspan="2" rowspan="2">Course Name:
Engineering Physics Lab</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Year and Semester</td><td colspan="2">I Year (I Semester)</td><td colspan="4" rowspan="2">Contact hours per week
(2Hrs)</td></tr>
<tr><td>Prerequisite course</td><td colspan="2">NIL</td></tr>
<tr><td rowspan="4">Course category</td><td>Humanities and Social Sciences</td><td>Management courses</td><td>Professional Core</td><td colspan="3">Professional Elective</td></tr>
<tr><td></td><td></td><td></td><td colspan="3"></td></tr>
<tr><td>Basic Science</td><td>Engineering Science</td><td>Open Elective</td><td colspan="3">Mandatory</td></tr>
<tr><td>✓</td><td></td><td></td><td colspan="3"></td></tr>
<tr><td>Course Objective</td><td colspan="6">1. To understand the physical properties of materials.
2. Determination of leading parameters to reduce deviation from standard values.
3. Conduct experiments on light and sound.
4. Understanding the concepts of microscopes.
5. To create knowledge on measuring instruments.
6.</td></tr>
<tr><td>Course Outcome</td><td colspan="6">At the end of the course the student will be able to:
1. Explain the calibration of Voltmeter and Potentiometer
2. Demonstrate the principles of light through convex lens and calculating its wavelength
3. Determine the surface tension and co-efficient of viscosity of water
4. Infer modulus of elasticity of torsion pendulum and Young’s modulus of elasticity of a bar
5. Illustrate how to measure the thickness of the wire
6. Explain the concepts behind measurement of magnetic field along the axis of a coil</td></tr>
</table>

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	2	1	-	-	-	1	2	-	2	2	2	3
CO2	2	-	2	2	2	-	-	-	2	1	-	2	2	3	3
CO3	2	2	3	3	1	-	-	-	2	2	-	-	2	-	-
CO4	2	2	2	3	2	-	-	-	2	2	-	2	2	2	2
CO5	3	2	2	2	3	-	-	-	2	3	-	2	2	3	2
CO6	3	3	3	3	3	-	-	-	3	2	-	3	2	3	2
Average	2.3	2.2	2.3	2.5	2	-	-	-	2	2	-	2.2	2	2.6	2.4

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

LIST OF EXPERIMENTS:

1. Calibration of low range voltmeter – potentiometer
2. Torsion pendulum – Rigidity modulus of elasticity
3. Spectrometer- Grating - wavelength of mercury spectral lines
4. Newton`s rings – Radius of curvature of a convex lens
5. Air wedge – Thickness of a wire
6. Surface tension of water -Capillary rise method
7. Uniform bending – Young’s modulus of elasticity of a bar
8. Coefficient of viscosity of water – graduated burette
9. Non uniform bending -Young’s modulus of elasticity of a bar
10. Field along the axis of a coil

erence

D Halliday, R Resenic and J Walker “Fundamentals of Physics”, Wiley India, 6th edition, 2006

DESIGNED BY :Department of Physics

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

Course Code: UBCHCPA	ENGINEERING CHEMISTRY LABORATORY	L	T	P	C
		0	0	2	1

Year and Semester	I Year (I Semester)	Contact hours per week (2Hrs)
Prerequisite course	NIL	

Course category				
	Humanities and Social Sciences	**Management courses**	**Professional Core**	**Professional Elective**
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**
	✓			

Course Objective	1. Determine different parameters of tachometry 2. Determine the calorific value of fuel 3. Determine the thermal properties of fuel 4. To study the various property of fuel 5. To study the calorific value of fuel
Course Outcome	**Students will be able to** 1. Illustrate how to estimate Bicarbonate and Hydroxide Alkalinity 2. Explain how to calculate Total Hardness and Chloride Content of water 3. Demonstrate how to estimate Temporary and Permanent Hardness, COD, BOD, TDS and TSS of water 4. Compare the titration methods of acid, base and Ferrous ion 5. Determine Single Electrode potential of Galvanic cell and Molecular weight and degree of dissociation of a polymer 6. Explain how to determine Proximate analysis of fuel and its Calorific value

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	-	-	2	-	-	-	-	2	3	-	2	1	2	2
CO2	2	2	-	1	-	-	2	-	3	2	-	-	-	-	-
CO3	2	1	-	2	2	-	2	-	2	3	-	-	-	-	-
CO4	2	1	-	3	2	-	3	-	3	2	-	-	-	-	-
CO5	3	2	-	2	2	-	-	-	2	3	-	-	2	2	2
CO6	3	2	3	2	2	-	3	-	3	2	-	-	2	2	3
Average	2.3	1.6	3	2	2	-	2.5	-	2.5	2.5	-	-	1.7	2	2.3
Correlation Levels			1.Slight(Low)					2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

LIST OF EXPERIMENTS

1. Estimation of Bicarbonate Alkalinity
2. Estimation of Hydroxyl Alkalinity
3. Estimation of Chloride Content of water
4. Estimation of Total Hardness of water
5. Estimation of Temporary and permanent Hardness of water
6. Determination of salinity of water
7. Conductometric Titration of a Strong Acid and a Strong Base
8. pH Titration of a Strong Acid and a Strong Base
9. Potentiometric Estimation of Ferrous Ion
10. Determination of Total dissolved solid by TDS meter
11. Determination of Calorific value of a solid fuel
12. Determination of Cloud and pour point of oil
13. Determination of Flash and fire point of oil
14. Proximate Analysis of a solid Fuel / Liquid Fuel 30 hrs

TEXT BOOK:

1. Engineering Chemistry. Dr. V. Balasubramanian*et.al*., CARS Publishers
2. Engineering Chemistry Laboratory Manual. Dr. V. Balasubramanian*et.al*., CARS Publishers

References

1. Engineering Chemistry. Rajesh. Saras Publication
2. Environmental Chemistry A K Dey

Designed by “Department Chemistry”

PROGRAM	BE- Mining Engineering

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

Course Code: UBWSCPA	Course Name: **Engineering PracticeS Lab-1**		L	T	P	C
			0	0	4	2
Year and Semester	I Year (I SEMESTER)		Contact hours per week (4Hrs)			
Prerequisite course	NIL					
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**		**Professional Elective**	
	Basic Science	**Engineering Science**	**Open Elective**		**Mandatory**	
		✓				
Course Objective	To provide students with knowledge of basic skills					
Course Outcome	At the end of the course the student will be able to understand: 1. Outline the operation of lathes and drilling machines. 2. Construct the structures using welding equipments 3. Create simple components using lathe and drilling machine 4. Develop the Process of chipping, filling, hack sawing, drilling and tapping 5. Plan assembling and dismantling of components 6. Construct simple lap, butt and tee joints using arc welding equipments					

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	2	-	2	-	-	-	2	2	-	-	-	-	-
CO2	2	-	2	-	2	-	-	-	2	2	-	-	-	-	-
CO3	2	-	2	-	2	-	-	-	2	2	-	-	-	-	-
CO4	2	-	2	-	2	-	-	-	2	2	-	-	-	-	-
CO5	2	-	2	-	2	-	-	-	2	2	-	2	-	-	-
CO6	2	-	2	-	2	-	-	-	2	2	-	2	-	-	-
Average	2	-	2	-	2	-	-	-	2	2	-	2	-	-	-
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ;
PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome

UNIT –I FITTING WORKSHOP

Hands on experience in preparation of V- Joint, Dove tail Joint, T-Joint and Square Joint.

UNIT –II GAS WELDING

Hands on experience in preparation of Butt Joint, Lap Joint, T– Joint and Fillet Joint.

UNIT –III PIPE FITTING SHOP

Hands on experience in preparation of Pipe fitting, Pipe Joints, overhauling valves and pressure testing of valves.

UNIT –IV CARPENTRY

Hands on experience in preparation of Square Joint, T-Joint and Dove tail Joint.

UNIT –V FOUNDARY

Process of foundry for different objects and shape

TEXT BOOK:

2. K.V. Natarajan, “Engineering Mechanics”.
3. R.S Khurmi, “A Textbook of Engineering Mechanics”.

REFERENCE :

5. S.S. Bhavikatti, “Engineering Mechanics”
6. Palanichamy & Nagan, “Engineering Mechanics Statics & Dynamics”
7. S. Rajasekaran, G. Sankara Subramania, “Fundamentals of Engineering Mechanics”.

PROGRAM	BE - Mining Engineering				
Course Code	Course Name :	**L**	**T**	**P**	**C**

UBLECPB	Soft Skills-I	0	0	4	2
Year and Semester	I Year (I Semester)	Contact hours per week (4 Hrs)			
Prerequisite course	NIL				
Course Objective	To help learners develop their listening skills, which will, enable them listen to lectures and comprehend them by asking questions, seek Clarifications. To help learners develop their speaking skills and speak fluently in real Contexts. Making them realise the importance of English as Global language and its importance in today‘s scenario.				
Course Outcome	Students will be able to understand				
	1. Develop skills in informal conversation; comprehend their views without making grammatical errors 2. Define their perspective more operationally 3. Infer the delicacy of using the linguistics skills 4. Develop listening and speaking skills for effective presentation 5. Develop good attitude and behavior 6. Build interview skills and personality development				

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	2	2	2	2	-	2	-	-	-
CO2	-	-	-	-	-	2	1	2	2	3	-	2	-	-	-
CO3	-	-	-	-	-	2	1	2	2	2	-	3	-	-	-
CO4	-	-	-	-	-	2	2	2	2	1	-	3	-	-	-
CO5	-	-	-	-	-	3	2	2	3	2	-	1	-	-	-
CO6	-	-	-	-	-	3	1	2	1	2	-	2	-	-	-
Average	-	-	-	-	-	2.3	1.5	2	2	2	-	2.2	-	-	-
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNIT 1: GRAMMAR AND FOUNDATON 18 Hrs

Training the students on basic grammar and foundation and laying the standard platform. A complete standard syllabus of Cambridge is used. The main part of the 1st semester is to cover the major tenses (Present tense, Present Continuous, Past Tense, Past Continuous, Present Perfect, and Present Perfect continuous.

UNIT II: FOCUS ON LANGUAGE – VOCABULARY 4 Hrs

General Vocabulary-Dictionary-Word Formation: Prefix and Suffix-Synonyms and antonyms-Idioms and Phrases- Diplomatic Phrases – Food Phrases- Vocabulary-Words commonly misspelt –Lab-Test.

UNIT III: INTERACTIVE ENGLISH

The main objective is English for International communication. It course contains conversations, snapshots, readings, activities, a greater variety and amount of listening materials and more visuals to introduce vocabulary, more opportunities to build fluency, and up-to-date art and design. The course covers the fours skills of listening, speaking, reading and writing, as well as improving pronunciation and building vocabulary.

UNIT IV: LISTENING AND SPEAKING 14 Hrs

Types of Listening -Listening and note taking-Pronunciations-Stress and Intonation-Conversation technique-Dialogue Writing -Professional Communication-Interview-Group Discussion –Power point Presentation- Debate , Oratorical Lab

UNIT V: INTERVIEW SKILLS AND PERSONALITY DEVELOPMENT 14 Hrs

Out of box thinking -Lateral Thinking- Intrinsic and Extrinsic Motivators- Factors influencing Attitude- Challenges and lessons from Attitude- Etiquette-Value of time- Diagnosing Time Management- Weekly Planner To do list- Prioritizing work.

TOTAL: 60 PERIODS

AMET
ACADEMY OF MARITIME EDUCATION AND TRAINING
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SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE- Mining Engineering				
Course Code: UBLEC02	**Course Name:** **TECHNICAL ENGLISH-II**	**L**	**T**	**P**	**C**
		2	0	0	2
Year and Semester	I Year (II SEMESTER)	Contact hours per week (2Hrs)			
Prerequisite course	NIL				
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**	
	✓				
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**	
Course Objective	1. Identify the process of communication and focus on language 2. Use Vocabulary & English Grammar in communication 3. Read and understand the language. 4. Learn to write technical drafts. 5. Application of imperative passive.				

Course Outcome	Students will be able to 1. Identify the importance of technical English 2. Apply good communication skill for enhancing vocabulary 3. Develop skills in reading 4. Build knowledge on writing letters and descriptive writings 5. Develop speaking and listening skills 6. Apply the correct pause and pronunciation

POS/ COS	PO1	PO2	PO3	PO4	PO 5	PO 6	PO 7	PO8	PO9	PO1 0	PO11	PO 12	PS O1	PSO 2	PSO3
CO1	-	-	-	-	-	2	2	-	2	2	-	2	-	-	-
CO2	-	-	-	-	-	3	2	-	2	2	-	2	-	-	-
CO3	-	-	-	-	-	2	1	-	2	2	-	2	-	-	-
CO4	-	-	-	-	-	2	2	-	2	2	-	2	-	-	-
CO5	-	-	-	-	-	2	2	-	2	2	-	2	-	-	-
CO6	-	-	-	-	-	1	3	-	2	2	-	2	-	-	-
Average	-	-	-	-	-	2	2	-	2	2	-	2	-	-	-
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)			3.Substantial(High)				

KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ;
PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome

UNIT I COMMUNICATION SKILL & READING SKILL **6 Hrs**

Process of Communication - Language as a tool of Communication- Importance of Technical Communication-Lab Intensive Reading-Skimming the text- Scanning- Topic sentence and Its Role-Reading and Interpretations-Critical Reading -Creative and Critical Thinking- Note Making -Transfer of Information-Visual Aids-Graphics-Lab

UNIT II FOCUS ON LANGUAGE – VOCABULARY **6Hrs**

General Vocabulary-Dictionary-Word Formation: Prefix and Suffix-Synonyms and antonyms-Idioms and Phrases-Homophones-Technical Vocabulary-Words commonly miss spelt –Lab-Test

UNIT III ENGLISH GRAMMAR **6Hrs**

Parts of Speech-Subject Verb Agreement-Tenses, Articles, Prepositions-Common errors in English-Lab-Test

UNIT IV WRITING SKILL **6Hrs**

Descriptive Writing –Paragraph-Technical descriptions-Essays-Letter Writing – Formal and Informal-Business Letters-Job Application Letter-Types of reports-Instructions and Checklists-Lab-Test

UNIT V LISTENING AND SPEAKING **6Hrs**

Types of Listening - Listening and note taking- Pronunciations- Stress and Intonation- Conversation technique-Dialogue Writing - Professional Communication- Interview- Group Discussion -PowerPoint Presentation

Total : 30 Hours

REFERENCES:

1. Anderson, Paul V. Technical Communication: A Reader-Centered Approach. Cengage. New Delhi. 2008
2. Muralikrishna, & Sunita Mishra. Communication Skills for Engineers. Pearson, New Delhi. 2011
3. Riordan, Daniel. G. Technical Communication. Cengage Learning, New Delhi. 2005
4. Sharma, Sangeetha & Binod Mishra. Communication Skills for Engineers and Scientists. PHI Learning, New Delhi. 2009
5. Smith-Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage, Mason USA. 2007

Designed by Department of English”

<table>
<tr><td>PROGRAM</td><td colspan="6">BE. MINING ENGINEERING</td></tr>
<tr><td>Course Code
UBMTC02</td><td colspan="2">Course Name
Engineering Mathematics-II</td><td>L
3</td><td>T
1</td><td>P
0</td><td>C
4</td></tr>
<tr><td>Year and Semester</td><td colspan="2">I Year & II Semester</td><td colspan="4" rowspan="2">Contact hours per week
(4Hrs)</td></tr>
<tr><td>Prerequisite course</td><td colspan="2">Nil</td></tr>
<tr><td rowspan="4">Course category</td><td>Humanities and Social Sciences</td><td>Management courses</td><td colspan="2">Professional Core</td><td colspan="2">Professional Elective</td></tr>
<tr><td></td><td></td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Basic Science</td><td>Engineering Science</td><td colspan="2">Open Elective</td><td colspan="2">Mandatory</td></tr>
<tr><td>✓</td><td></td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Course Objectives</td><td colspan="6">1. To provide the required knowledge to apply the concepts of ordinary differential equations.
2. To provide the required ideas to solve the problems on higher order ordinary differential equations.
3. To introduce the standard techniques of complex variable problems
4. To elaborate the classification of isolated singularities and examine the theory and illustrate the applications of the calculus of residues in the evaluation of integrals
5. To discuss multiple integration and their applications.</td></tr>
<tr><td>Course Outcomes</td><td colspan="6">At the end of the course the student will be able to:
1. Infer knowledge on ordinary differential first order equations
2. Illustrate the use of ordinary differential higher order equations
3. Solve problems using vector calculus
4. Demonstrate the properties of analytic functions
5. Demonstrate Laplace transforms in engineering applications
6. Apply differential equations, vector calculus and Laplace transforms in engineering applications</td></tr>
</table>

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	3	2		-	-	-	-	-	-	-	2	2	2
CO2	3	2	3	2		-	-	-	-	-	-	3	2	2	2
CO3	2	3	2	2	2	-	-	-	-	-	-	-	2	-	2
CO4	3	2	3	2		-	-	-	-	-	-	2	2	2	2
CO5	2	3	2	3		-	-	-	-	-	-	2	3	2	3
CO6	3	2	3	2	2	-	-	-	-	-	-	2	3	2	2
Average	2.7	2.3	2.7	2.2	2	-	-	-	-	-	-	2.3	2.3	2	2.2
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I **ORDINARY DIFFERENTIAL EQUATION** **12 Hrs**

First order Linear differential equation – Bernoulli’s Equation – Exact differential equation – Equations of first order higher degree – Solvable for p, x, y – Clairaut’s equation – Application to engineering problems. Higher order equations with constant coefficient – Method of variation of parameters.

UNIT II **PARTIAL DIFFERENTIAL EQUATIONS**

Formation of partial differential equation – Solution of PDE by direct Integration- Solution of equations of First order – Four types -

UNIT III **ALGEBRA OF MATRICES** **12Hrs**

Rank of a matrix – Gauss Jordan method to find the inverse – Consistency and inconsistency of system of linear equations – solution of system of linear equations- characteristic equation – Eigen values and Eigen vectors – Cayley Hamilton theorem.

UNIT-IV **DIFFERENTIATION OF VECTORS** **12Hrs**

Vector differentiation – Velocity and acceleration – Vector operator del, gradient, divergence and curl – Physical interpretation of divergence of F and Curl F – del applied twice to point function and del applied product of point functions.

UNIT V **INTEGRATION OF VECTORS**
12Hrs

Line integrals – work - surface integrals- Flux- Green’s theorem in the plane – Stoke’s theorem- Volume integral – Gauss Divergence theorem – Simple problems. **Total: 60 hours**

TEXT BOOKS:

1. Dr. B.S. Grewal, “Higher Engineering Mathematics”, 40th edition, Khanna Publishers, New Delhi, 2007.
2. T. Veerarajan, “Engineering Mathematics for First Year”, 1st edition, Tata McGraw – Hill Publishing Co. Ltd., New Delhi, 2008.

REFERENCES:

1. H.K.DASS “Advanced Engineering Mathematics”, 15th Revised edition , S.Chand& Co. Ltd., New of variables in double and triple integrals with simple examples.
2. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice HallIndia, 1995.
3. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
4. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.

Designed by “ Department of Mathematics”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE. MINING ENGINEERING				
Course Code UBPHC02	Course Name: Engineering Physics- II	**L** 2	**T** 0	**P** 0	**C** 2
Year and Semester	I Year (II Semester)	Contact hours per week 3 Hours			
Prerequisite course	Higher Secondary School Education; Fundamental concepts of Physics				
Course category	Humanities and Social Sciences	Management courses	Professional Core	Professional Elective	
	Basic Science	Engineering Science	Open Elective	Mandatory	
	✓				
Course Objective	1. Students should acquire knowledge of electromagnetic theory 2. To know the basic concepts of Electromagnetic theory 3. To familiarize the Quantum physics 4. To determine the crystal structures of solids 5. To know about semiconductors and superconductors				
Course Outcome	Students will be able to 1. Demonstrate the applications of sound waves 2. Explain the principles of laser and its applications 3. Illustrate miller indices and X-Ray power defraction method to identify crystal structure 4. Compare the electrical conductivity in semiconductors and superconductors 5. Contrast dielectric and magnetic materials 6. Infer the principles of light and sound waves in various applications				

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	-	-	-	-	-	-	-	-		2	2	2
CO2	2	1	2	2	-	-	-	-	-	-	-		2	2	2
CO3	3	2	1	2	-	-	-	-	-	-	-	-	2	-	-
CO4	2	3	2	1	1	-	-	-	-	-	-		2	2	2
CO5	3	3	2	2	2	-	-	-	-	-	-	2	2	2	2
CO6	3	2	2	1	-	-	-	-	-	-	-	2	2	2	2
Average	2.5	2.2	1.7	1.6	1.5	-	-	-	-	-	-	2	2	2	2

Correlation Levels 1.Slight(Low) 2.Moderate(Medium) 3.Substantial(High)

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNIT – I: Acoustics and Ultrasonics

musical sound. Loudness – Weber Fechner law – Decibel – Reverberation – Reverberation time – Sound absorption coefficient- Sabine's formula for determining reverberation time (Rate of Growth and Rate of Decay) – determination of sound absorption coefficient – ***Factors affecting acoustics of buildings** (Optimum reverberation time, loudness, focusing, eco, echelon effect, resonance and noise) and their remedies. Ultrasonics- production- piezo-electric method – SONAR-Ultrasonic flaw detector as non-destructive testing technique.

UNIT-II: Laser and Fibre Optics: (9 Hours)

Laser-principle-properties-Einstein coefficient (A and B)-Nd-YAG laser- CO$_2$ laser-Applications of laser-***Holography-construction and reconstruction of a hologram**. Principle and propagation of light in an optical fibre-types of optical fibres-applications-fibre optic communication system (block diagram)-fibre optic sensors.

UNIT-III: Crystal Physics: (9 Hours)

Lattice-unit cell-Bravais lattice-lattice planes-Miller indices-'d' spacing in cubic lattice-calculation of number of atoms per unit cell-atomic radius-coordination number-packing factor for ***SC, BCC, FCC and HCP structures**-Diamond and graphite structures (qualitative treatment). X-ray - Powder diffraction method to identify crystal structure parameters.

UNIT-IV: Semiconductors and superconductors (9 Hours)

Semiconductors- intrinsic and extrinsic semiconductor. Fermi level-Variation of Fermi level with temperature-electrical conductivity. Band gap determination-Hall effect-Determination of Hall coefficient –Applications. Superconductivity: Properties-Type I and Type II superconductors-BCS theory of superconductivity-High T_c superconductors- ***Applications of superconductors-SQUID, cryotron, magnetic levitation**.

UNIT-V: Dielectric, Magnetic and New engineering materials (9 Hours)

Electrical susceptibility-dielectric constant-electronic, ionic, orientational and space charge polarizations-frequency and temperature dependence on polarization-internal field-Claussius-Mosotti relation-uses of dielectric materials. Magnetic properties-diamagnetic-paramagnetic- -ferromagnetic materials- super paramagnetism-Transducers. ***Properties and applications of metallic glasses- nano materials-shape memory alloys-bio materials**.

TOTAL: 45 PERIODS

1. S. O Pillai "Solid State Physics", New Age International Pvt Ltd; 7th edition, 2015.
2. Ajoy Ghatak , "Optics", McGraw-Hill Education; 1st edition 2009.
3. Ajoy Ghatak, "Introduction to Fiber optics", Foundation Books, 2002.

References:

1. Charles Kittel," Introduction to Solid state physics", Wiley; Eighth edition 2012.
2. Ghatak and Thyagarajan, "Laser Fundamentals and Applications", Springer, 2011.
3. Richard Feynmann, Robert Leighton and Matthew Sands,"The Feynmann Lectures on Physics",Volume 1, Student Edition, Narosa Publishing house, 2003.
4. Richard Feynmann, Robert Leighton and Matthew Sands "The Feynmann Lectures" on Physics,Volume 2, Student Edition, Narosa Publishing house, 2003.

Designed by Department of Physics

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBEEC01	**Course Name:** Basic Electrical and Electronics Engineering	**L**	**T**	**P**	**C**
		3	0	0	3

Year and Semester	I Year (II Semester)		Contact hours per week (3 Hrs)	
Prerequisite course	NIL			
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**
		✓		

Course Objective	1. The students can understand the electrical components 2. Explain the characteristics of electrical machines 3. Identifying the electronic components. 4. Use of then in design circuits.
Course Outcome	At the end of the course the student will be able to: 1. Outline KCL, KVL and related methods to solve DC circuits 2. Illustrate the operation of single phase AC Circuits 3. Explain the principle of operation of three phase AC Circuits 4. Infer the performance characteristics of Semiconductor Devices 5. Demonstrate the working principle of Electrical instruments 6. Apply the knowledge of electric circuits and electronic devices for engineering applications

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	3	2	-	-	-	-	-	-	-	3	3	2	3
CO2	2	3	2	2	-	-	-	-	-	-	-	2	2	2	3
CO3	2	3	3	2	-	-	-	-	-	-	-	2	2	2	3
CO4	3	3	2	2	-	-	-	-	-	-	-	3	3	2	3
CO5	3	2	2	2	-	-	-	-	-	-	-	2	2	2	3
CO6	3	3	3	2	-	-	-	-	-	-	-	3	3	2	3
Average	2.7	2.7	2.5	2	-	-	-	-	-	-	-	2.5	2.5	2	3
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I **ELECTRICAL CIRCUITS** 9 Hrs

Ohm's Law – Kirchhoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveform and RMS Value – Power and Power factor – Single Phase and Three Phase Balanced Circuits.

UNIT II ELECTRICAL MECHANICS 9 Hrs

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, Single phase induction Motor.

UNIT III SEMICONDUCTOR DEVICES 9 Hrs

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics–Voltage regulation Bipola Junction Transistor – CB, CE, CC Configurations and Characteristics

UNIT IV DIGITAL ELECTRONICS 9 Hrs

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion

UNIT V RECTIFIERS AND FILTERS 9 Hrs

Half wave and Full wave Rectifiers – Capacitor filter – inductor filter- LC filter- CLC Filter.

Total : 45 Hours

TEXT BOOKS:

1. Mittle N., “Basic Electrical Engineering”, Tata McGraw Hill Edition, New Delhi, 1990.
2. Sedha R.S., “Applied Electronics”, S. Chand & Co., 2006.

REFERENCES:

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, “Basic Electrical, Electronics and Computer Engineering”, Tata McGraw Hill, Second Edition, (2006).
2. Nagsarkar T K and Sukhija M S, “Basics of Electrical Engineering”, Oxford press (2005).
3. Mehta V K, “Principles of Electronics”, S.Chand& Company Ltd, (1994).
4. MahmoodNahvi and Joseph A. Edminister, “Electric Circuits”, Schaum’ Outline Series, McGraw Hill, (2002).
5. Premkumar N, “Basic Electrical Engineering”, Anuradha Publishers, (2003).

Designed by “ Department of Electrical and Electronics Engineering

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE - Mining Engineering				
Course Code UBITC01	Course Name : **Fundamentals of Computer Programming**	**L** 3	**T** 0	**P** 0	**C** 3
(Common to BE – Mechanical Marine, BE – EEEM, BE –PE, BE – HE, BE - NA&OE)					
Year and Semester	I Year (II Semester)	Contact hours per week (3 Hrs)			
Prerequisite course	NIL				
Course Objective	Learn to Programming in C language. Students will be gain the knowledge in usage of arrays, strings, functions, pointers, structures and unions in C language.				

Course Outcome	Student will be able to	
	1.	Learn the organization of a digital computer
	2.	Learn to think logically and write pseudo code or draw flow charts for problems
	3.	Use arrays and functions in programming
	4.	Understand the function and pointers
	5.	Familiar with functions of structure and unions
	6.	Summarize the usage of pointers and structures in C language

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-		-	-	-	-	-	3	2	-
CO2	2	3	2	3	-	-	2	3	2	3	-	-	2	3	
CO3	2	2	2	2	-	-	2	2	2	2	-	-	3	3	2
CO4	1	1	2	1	-	-					-	-	3	2	3
CO5	1	1	1	3	-	-		2	3	2	3		2	2	-
CO6	1	1	1	1	-	-		2	2	2	2		2	1	-
Average	1.66667	1.83333	1.83333	2.16667	-	-	-				-	-	2.5	2.16667	2.5
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION 9Hrs

Generation and Classification of Computers - Basic Organization of a Computer – Input and Output Devices - Number System – Binary – Decimal – Conversion – Problems. Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart

UNIT II C PROGRAMMING BASICS 9Hrs

Problem formulation – Problem Solving - Introduction to "C" programming – fundamentals - structure of a "C" program – compilation and linking processes – Constants, Variables – Data Types – Expressions using operators in "C" – Managing Input and Output operations – Decision Making and Branching – Looping statements – solving simple scientific and statistical problems.

UNIT III ARRAYS AND FUNCTIONS 9Hrs

Arrays – Initialization – Declaration – One dimensional and two dimensional arrays. String - String operations – String Arrays - Simple Programs – sorting and searching – matrix operation

UNIT IV FUNCTION AND POINTERS 9Hrs

Function – definition of function – Declaration of function – Pass by value – Pass by reference – Recursion – pointers – definition – initialization – pointer arithmetic – pointers and arrays – examples

UNIT V STRUCTURES AND UNIONS 9Hrs

Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure – Union – program using structures and Unions – storage classes, pre-processors directives.

Total : 45 Hours

TEXTBOOKS:

1. Balagurusamy E, "Programming in ANSI C", Sixth Edition, TATA McGraw Hill.

REFERENCES:

1. Computer Fundamentals Concepts, Systems and Applications- D.P.Nagpal (Wheeler Publishing)
2. A.N.Kanthane – Programming with ANSI and TURBO C, Pearson Education, New Delhi 2004.
3. Y.Kanetkar – Let Us C 4th Edition BPB Publications, New Delhi 2004.
4. Foundations Of Information Technology- Chanchal Mittal &PragatiPrakashan

" Department of Information Technology"

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SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE- Mining Engineering
Course Code: UBMCCPA	**Course Name:** **ENGINEERING GRAPHICS**

L	T	P	C
0	2	1	3

Year and Semester	I Year (II SEMESTER)
Prerequisite course	NIL
Contact hours per week	(4Hrs)

Course category

Humanities and Social Sciences	**Management courses**	**Professional Core**	**Professional Elective**
			✓
Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective

Understanding the course for

1. Solid structures and shapes
2. Gain knowledge on planes and projections
3. Projection of solids
4. To improve the skills on solid developments
5. Knowledge on isometric planes

Course Outcome

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

1. Identify the three Dimensional objects in two-dimensional media
2. Construct the projection of points, straight lines and determination of true length and true inclination
3. Illustrate the simple solid on plain surface
4. Demonstrate the projection of solids and development of surfaces
5. Construct the isometric projection of simple solids
6. Examine the different isometric views and projections

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	2	2	2	2	2	-	-	-	-	1	-	-	-	-	-
CO2	3	3	2	3	1	-	-	-	-	2	-	-	-	2	-
CO3	2	2	3	2	2	-	-	-	-	3	-	-	-	2	-
CO4	3	3	2	2	1	-	-	-	-	1	-	-	3	-	-
CO5	3	2	2	3	3	-	-	-	-	2	-	-	2	-	2
CO6	3	3	2	2	3	-	-	-	-	3	-	2	-	-	2
Ave rage	2.7	2.5	2.2	2.3	2	-	-	-	-	2	-	2	2.5	2	2

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ;
PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome

UNIT I : PLANE CURVES AND ORTHOGRAPHIC VIEWS

Introduction-Use of drafting instruments-Drawing conventions-size-Line types-Lettering and dimensioning Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves Visualization concepts: Representation of Three Dimensional objects in two dimensional media-Visualization of objects from pictorial views to orthographic views

UNIT II: PROJECTION OF POINTS, LINES AND PLANE SURFACES

Orthographic projection: Principal views and principal planes of projection-First angle projection-Third angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes -Determination of true lengths and true inclinations by rotating line method-Projection of plane surfaces

UNIT III: PROJECTION OF SOLIDS

Projection of simple solids placed in Different positions-perpendicular to HP or VP-parallel to either HP or VP and inclined to the other-Inclined to both VP and HP

UNIT IV: PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES

Sectioning of simple solids in simple vertical position when the cutting plane is inclined to the one of the principal planes-Development of lateral surfaces of simple solids by Parallel line method and radial line method

UNIT V: ISOMETRIC PROJECTION AND ISOMETRIC VIEWS

Principles of isometric projection-isometric projection of simple solids-Guide lines to read the isometric view visualizing of plane surfaces inclined to the direction of view.

TOTAL : 60 Hours

TEXT BOOK:

1. Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 2008.

REFERENCES:

1. Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 50th Edition, 2010
2. Natrajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2009.

Designed by“ Department of mechanical Engineering

PROGRAM	BE- Mining Engineering				
Course Code: UBEECPA	**Course Name:** **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**	**L**	**T**	**P**	**C**
		0	0	2	1
Year and Semester	I Year (II SEMESTER)		Contact hours per week (2Hrs)		
Prerequisite course	NIL				
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**	
		✓			
Course Objective	1. To provide exposure to the students with hands on experience on various electrical engineering practices. 2. To familiarize the students with the design, analyze and application of electronic devices. 3. To provide knowledge on circuits. 4. To enrich knowledge on measuring devices. 5. Providing subject knowledge on troubleshooting on electrical equipment.				
Course Outcome	On completion of this LAB course, the students will be able to 1. Demonstrate instruments such as ammeter and voltmeter for measuring resistance, power and power factor 2. Compare the vector diagrams of series and parallel R,L and C circuits 3. Explain how to measure power input to three phase induction motor using watt meters 4. Illustrate the characteristics of PN diode, Zener diode and JFET 5. Contrast the working principle of half wave and full wave rectifier using CRO 6. Combine measuring instruments for different parameters in engineering applicat				

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	-	-	-	-	2	-	-	-	2	2	-
CO2	2	2	3	2	-	-	-	-	1	2	-	2	3	1	2
CO3	2	2	2	2	1	-	-	-	2	2	2	2	2	2	2
CO4	2	2	2	2	1	-	-	-	1	2	-	1	3	1	2
CO5	2	2	2	2	2	-	-	-	3	1	3	3	3	2	2
CO6	2	2	3	2	3	-	-	-	2	3	3	3	3	1	2
Average	2	2	2.3	1.8	1.8	-	-	-	1.8	2	2.7	2.2	2.7	1.5	1.7

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)
KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ; **PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome**			

1. Experimental verification of Kirchhoff’s voltage and current laws
2. Study of CRO and measurement of sinusoidal voltage, frequency and power factor.
3. Experimental determination of time constant of series R-C electric circuits.
4. Experimental determination of frequency response of RLC circuits.
5. Characteristics of Semiconductor diode and Zener diode.
6. Characteristics of a NPN Transistor under common emitter, common collector and common base Configurations.
7. Characteristics of JFET.
8. Realization of passive filters.
9. Single Phase half-wave and full wave rectifiers with inductive and capacitive filters.

Total : 30 Hours

Designed by Department of Electrical and Electronics Engineering”

PROGRAM	BE - Mining Engineering				
Course Code UBITCPA	Course Name : **Fundamentals of Computer Programming Lab**	L	T	**P**	**C**
		0	0	2	1

Year Semester	I Year (II Semester)	Contact hours per week (2 Hrs)
Prerequisite course	NIL	
Course Objective	To learn, write and execute program in C language.	

Course Outcome	Student will	
	1	Learn the organization of a digital computer
	2	Be exposed to the number systems
	3	Learn to think logically and write pseudo code or draw flow charts for problems
	4	Be exposed to the syntax of C
	5	Be familiar with programming in C

Course Outcome	After completion of the course, the students will be able 1. Develop logics to swap two numbers, finding largest of given numbers and roots of quadratic equation 2. Develop logic to print Fibonacci Series and sum of odd numbers and to find the area and Perimeter of the Circle, Triangle, and Square 3. Determine maximum, minimum, Sum and average of elements of an array 4. Determine the sum and multiplication of two matrices 5. Determine whether a string is palindrome or not and find number of vowels and of consonants in a given string **6.** Develop logic to perform the operations using function and pointer

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	1		-	-	-	-	2	-	1	-	-	-

CO2	3	2	3	2	-	-	-	-	-	2	-	2	-	-	-
CO3	3	2	3	2	2	-	-	-	-	1	-	2	-	-	-
CO4	2	2	2	1	2	-	-	-	-	1	-	2	-	-	-
CO5	2	2	2	2	2	-	-	-	-	2	-	2	-	-	-
CO6	2	3	3	2	3	-	-	-	-	2	-	2	-	-	-
AVERAGE	2.3	2.2	2.5	1.7	2.3	-	-	-	-	1.7	-	1.8	-	-	-
CORRELATION LEVELS				1.SLIGHT(LOW)				2.MODERATE(MEDIUM)				3.SUBSTANTIAL(HIGH)			
KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: **CO-Course Outcome :PSO-Programe Specific Outcome**															

LIST OF EXPERIMENTS

1. Program to Swap Two Numbers without using Third variable
2. Program to find the Largest of the given three numbers
3. Program to find the roots of the Quadratic Equation
4. Program to find the Reverse of the given number
5. Program to print the Fibonacci Series
6. Program to display series and find the sum of 1+3+5+……..+n
7. Program to find the Area and Perimeter of the Circle, Triangle, Square using switch and while statements
8. Program to find the maximum and minimum number in an array
9. Program to show the Sum of 10 elements of an array and show the Average
10. Program to find the sum of two matrices
11. Program to find the Multiplication of two matrices
12. Program to find whether a string is palindrome or not.
13. Program to find number of vowels and number of consonants in a given string.

Total : 30 Hrs

Designed by	“ Department of Information technology”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE - Mining Engineering				
Course Code UBWSCPB	Course Name : Engineering Practice Practical-II	**L** 0	**T** 0		**C** 2
Year Semester	I Year (II Semester)	Contact hours per week (4 Hrs)			
Prerequisite course	NIL				

Course category	Humanities and Social Sciences	Management courses	Professional Core	Professional Elective
	Basic Science	Engineering Science	Open Elective	Mandatory
		✓		

Course Objective

1. To provide exposure to the students with hands on experience on var fittings engineering practices.
2. To familiarize the students with the design, analyze and application of welding.
3. To provide knowledge on lab joints.
4. To enrich knowledge on Pipe fitting.
5. Providing subject knowledge on Hands on experience in preparation of Sq Joint.

Course Outcome

Students will be able to understand

1. Outline the operation of lathes and drilling machines.
2. Construct the structures using welding equipments
3. Create simple components using lathe and drilling machine
4. Develop the Process of chipping, filling, hack sawing, drilling and tapping
5. Plan assembling and dismantling of components
6. Construct simple lap, butt and tee joints using arc welding equipments

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	2	-	2	-	-	-	2	2	-	-	-	-	-
CO2	2	-	2	-	2	-	-	-	2	2	-	-	-	-	-
CO3	2	-	2	-	2	-	-	-	2	2	-	-	-	-	-
CO4	2	-	2	-	2	-	-	-	2	2	-	-	-	-	-

CO5	2	-	2	-	2	-	-	-	2	2	-	2	-	-	-	
CO6	2	-	2	-	2	-	-	-	2	2	-	2	-	-	-	
Average	2	-	2	-	2	-	-	-	2	2	-	2	-	-	-	
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)			3.Substantial(High)					
KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ; **PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome**																

UNIT I FITTING

Hands on experience in preparation of V- Joint, Dove tail Joint, T-Joint and Square Joint.

Hands on experience in preparation of Butt Joint, Lap

UNIT II WORKSHOP

UNIT III GAS WELDING

Joint , T– Joint and Fillet Joint.

UNIT IV PIPE FITTING SHOP

Hands on experience in preparation of Pipe fitting, Pipe Joints, overhauling valves and pressure testing of valves.

UNIT V CARPENTRY

Hands on experience in preparation of Square Joint, T-Joint and Dove tail Joint.

(Total: 60 Hrs)

Designed by	“ Department of Mechanical Engineering”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

<table>
<tr><td>PROGRAM</td><td colspan="6">BE-Mining Engineering</td></tr>
<tr><td rowspan="2">Course Code:
UBLECPC</td><td colspan="2" rowspan="2">Course Name:
SOFT SKILLS-II</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>0</td><td>0</td><td>4</td><td>2</td></tr>
<tr><td>Year and Semester</td><td colspan="2">I Year (II Semester)</td><td colspan="4" rowspan="2">Contact hours per week
(2Hrs)</td></tr>
<tr><td>Prerequisite course</td><td colspan="2">NIL</td></tr>
<tr><td rowspan="4">Course category</td><td>Humanities and Social Sciences</td><td>Management courses</td><td colspan="2">Professional Core</td><td colspan="2">Professional Elective</td></tr>
<tr><td>✓</td><td></td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Basic Science</td><td>Engineering Science</td><td colspan="2">Open Elective</td><td colspan="2">Mandatory</td></tr>
<tr><td></td><td></td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Course Objective</td><td colspan="6">1. Students should obtain the skill to design experiments to demonstrate various concepts of Spoken English.
2. Strengthen English communication skills.
3. Enrich the vocabulary for best communication.
4. Create knowledge on synonyms and antonyms.
5. To built time managing skills.</td></tr>
<tr><td>Course Outcome</td><td colspan="6">At the end of the course the student will be able to:
1. Apply Articles, Prepositions, Pronouns, Adjectives and Adverbs in their speaking and writing skills
2. Infer the knowledge on public speaking and conduct of meetings
3. Develop skills on interactive English
4. Develop listening and speaking skills for effective presentation
5. Develop good attitude , behavior and communication skills
6. Build interview skills and personality development.</td></tr>
</table>

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO3
CO1	-	-	-	-	-	2	2	2	2	2	-	-	-	-	-
CO2	-	-	-	-	-	2	1	2	2	3	-	-	-	-	-
CO3	-	-	-	-	-	2	1	2	1	2	-	2	-	-	-
CO4	-	-	-	-	-	2	2	3	2	3	-	2	-	-	-
CO5	-	-	-	-	-	3	2	1	3	2	-	2	-	-	-
CO6	-	-	-	-	-	2	1	2	3	3	-	2	-	-	-
Average	-	-	-	-	-	2.2	1.5	2	2.2	2.5	-	2	-	-	-
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNIT 1: GRAMMAR AND FOUNDATON 14 Hrs

Training the students on second phase of grammar such as (Articles, Prepositions, Pronouns, Modal Auxiliaries, Parts of Speech, Adjectives and Adverbs)

UNIT II: INTRO TO PROFESSIONAL ETHICHS **8 Hrs**

Stepping the students to advanced learning resource and introducing them about International standards How to conduct meetings, huddle, public speaking, free speech. Dress code.

UNIT III: INTERACTIVE ENGLISH
(Unit 9 to Unit 16)

10 Hrs

The main objective is English for International communication. It course contains conversations, snapshots, readings, activities, a greater variety and amount of listening materials and more visuals to introduce vocabulary, more opportunities to build fluency, and up-to-date art and design.

UNIT IV: LISTENING AND SPEAKING **14 Hrs**

Types of Listening –Introduction to International Standards of listening skills. Presentation skills: delivery (emphasis and phrasing) / making it interesting / body language / referring to visual aids

UNIT V: INTERVIEW SKILLS AND PERSONALITY DEVELOPMENT **14 Hrs**

Familiarize the students with types of Interviews such as mock interviews , campus Interview, skype interview, telephonic Interview, Panel Interview,

(TOTAL: 60 Hrs)

TEXT BOOKS:

1. Essential Grammar in use- Raymond Murphy ,Cambridge , New Third Edition

REFERENCE BOOKS:

1. New Interchange (English for International Communication) Jack C. Richards

Designed by “AMET CENTRE FOR IELTS”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBMTC03	**Course Name:** Engineering Mathematics –III	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

Year and Semester	II Year (III Semester)	Contact hours per week (4 Hrs)
Prerequisite course	NIL	

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**
	✓			

Course Objective	1. To introduce Fourier series and its applications in engineering fields 2. To introduce the effective mathematical tools for the solutions of partial differential Equations that model several physical processes. 3. To Solve the boundary value problems in one and two dimensional. 4. To expose the statistical methods designed to contribute the process of making scientific judgments in the face of uncertainty and variation. To make a decision about the value of a population parameter based on sample data
Course Outcome	At the end of the course the student will be able to: 1. Analyze the Partial Differential Equations 2. Infer about the Fourier Series 3. Classify the Boundary Value Problems 4. Analyze the Fourier Transform 5. Infer the Z -Transform And Difference Equations 6. Apply the PDE in engineering calculations

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
3	3	3	2	-	-	-	-	-	-	-	-	2	2	2	3
3	3	3	2	2	-	-	-	-	-	-	2	2	2	2	3
2	2	2	2	-	-	-	-	-	-	-	-	-	-	-	2
3	3	3	2	2	-	-	-	-	-	-	2	2	2	2	3
2	2	2	2	2	-	-	-	-	-	-	2	-	3	3	2
3	3	3	2	2	-	-	-	-	-	-	2	3	3	3	3
2.7	2.7	2.7	2	2	-	-	-	-	-	-	2	2.3	2.4	2.4	2.7
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equation – Solution of PDE by direct Integration- Solution of equation $Pp \quad Qq \quad R$ Nonlinear equations of First order – Four types $f(p,q) \; 0, f(z,p,q) \; 0, f \; x, p \; f \; y, q$ and $z \; xp \; yq \; f(p,q)$

UNIT II FOURIER SERIES 12

Definition of Fourier's series – Fourier Coefficients – Expansion of functions in Fourier series – Even and odd functions – Half range Fourier series for any interval l, l. Harmonic analysis – Estimation of Fourier coefficients given values of function in it domain.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 12

Classification of PDE – Method of separation of variables **-** Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction (excluding insulated edges).

NIT IVFOURIER TRANSFORMS 12 Hrs

Definition-Fourier Integral Theorem-Fourier Transform-Properties of Fourier transform (Without proof)-Convolution-Relation between Fourier and Laplace transforms.

UNIT V Z – TRANSFORMS 12 Hrs

Definition- standard Z-transforms- Standard results- properties of Z- transform (Without proof)-Initial value and Final value theorem- Inverse Z-transform –Convolution theorem-Convergence-Evaluation of Z-transform

Total 60 Hrs

TEXT BOOKS:

1. Veerarajan. T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt.Ltd., New Delhi, Second reprint, 2012.
2. Grewal. B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 2012.
3. Narayanan.S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 1998.

REFERENCES:

1. Bali.N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd , 2007.
2. Ramana.B.V., "Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company Limited,NewDelhi, 2008.
3. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.
4. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, Wiley India, 2007.
5. Ray Wylie. C and Barrett.L.C, "Advanced Engineering Mathematics" Tata McGraw Hill Education Pvt Ltd, Sixth Edition, New Delhi, 2012.

Datta.K.B., "Mathematical Methods of Science and Engineering", Cengage Learning India Pvt Ltd,Delhi

Designed by " Department of Mathematics"

PROGRAM	BE-Mining Engineering				
Course Code: UBMN301	**Course Name:** INTRODUCTION TO MINING ENGINEERING	**L** 3	**T** 1	**P** 0	**C** 3
Year and Semester	II Year (III Semester)	Contact hours per week (4 Hrs)			
Prerequisite course	NIL				

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
			✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective

1. To know the knowledge about Mineral resources of India.
2. To know about surface mining
3. Understand about underground mining
4. Introduction about machineries used in mines
5. Understand the environmental impacts due to mining

Course Outcome

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

1. Describe about Mining industry
2. Explain about Surface mining
3. Summarize about Underground mining
4. Illustrate about machines used in mining industry
5. Identify the potential environmental impacts
6. Describe the role of mining in economy of a country.

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	1		2		3		1		2		3	2		3
CO2	1		2		2		3	2		2	1		3	2	
CO3		2		3	2		1		2		3	2	1		3
CO4	2		3		2		3		2		3		2	2	
CO5	1	2		3		2		2		3		2	3		2
CO6	2		1		3			2		3		2	2	2	
Average	2	1.6	2	2.6	2.2	2.5	2.3	2.3	2	2.5	2.3	2.2	2.2	2	
Correlation Levels			1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)				

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION **09 Hrs**

Mining definition – Historical overview – Role of the industry – Economic importance and impact on society – Mineral resources of India

UNIT II SURFACE MINING **09 Hrs**

Overview – Types of surface mines – Planning & Selection of sites – Unit operations – Basic bench geometry – Applicability and Limitations – Advantages and Disadvantages.

UNIT III UNDERGROUND MINING

Overview – Coal mining methods –applicability and limitations- advantages and Disadvantages – Metal mining Methods– Applicability - Limitations – Advantages and Disadvantages.

UNIT IV MINING MACHINERY **09 Hrs**

Drilling machines for coal and metals mining – Dewatering pumps – Hydraulic escalators – aerial ropeways – crushers – breakers and feeders.

UNIT V ENVIRONMENT AND SAFETY **09** Hrs

Environmental impact of mining and associated activities – Pollution – air, water, noise – Mine safety systems – Mining laws and regulations

Total:50 Hrs

Text Books:

1. H.L.Hartman “Introduction to Mining Engineering”, John Wiley and Sons, Second Edition,1999
2. D.J.Deshmukh “Elements of Mining Technology”, Vol.1, Vidyaseva Prakashan, Nagpur,1994

Reference Books

1. Introduction to Mining Engineering - H.L.Hartman – 4th Edition

Designed by: “Department of Mining Engineering

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBMN302	**Course Name:** GEOLOGY -I	**L**	**T**	**P**	**C**
		3	1	0	3

Year and Semester	II Year (III Semester)		Contact hours per week (4Hrs)	
Prerequisite course	NIL			
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
			✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective

1. Illustrate about the geologic structures
2. Describe about the stratigraphy
3. Classify the minerals
4. Understand about the stratigraphy
5. Understand about the geologic structures

Course Outcome

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

1. Explain details of Mineral exploration
2. Distinguish the types of Rocks
3. Classify the minerals
4. Summarize the stratigraphy
5. Explain details of geologic structures
6. Explain about Differentiate the types of rocks

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	1		2	1								1	2	2
CO2	1		2		3								2	3	1
CO3	1	2		3		2	2						1	2	3
CO4	2	2	3	2			3						2	3	2
CO5	2		3		2			2					3	1	2
CO6	1	1	2	2						2		3	2	2	2
Average	1.5	1.5	2	2.2	2	2	3	2		2		3	1.8	2.1	2

Correlation Levels | 1.Slight(Low) | 2.Moderate(Medium) | 3.Substantial(High)

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION 10 Hrs

Earth and its interiors – Composition – Scope of economic geology and exploration geology – Mineral exploration - Concepts and methods - Stages of exploration - Strategy and design – Resources and Reserves

UNIT II PETROLOGY 10 Hrs

Rocks and their classification – Formation of igneous, metamorphic and sedimentary rocks – mode of occurrence – Common rocks and composition

UNIT III MINERALOGY 10 Hrs

Physical and Chemical properties – Crystal classes and systems – Properties of common silicate minerals – Quartz, feldspar, pyroxene, amphibole, garnet, olivine, mica – Sulphides – Pyrite, chalcopyrite, Galena, Sphalerite and Oxides – Haematite, Magnetite, Chromite, Pyrolesite, Psilomelane **-** Atomic minerals – Beach sands

UNIT IV STRATIGRAPHY

Geological time scale – distribution of mineral resources – economic importance of Archaean, Paleozoic, Mesozoic and Cenozoic rocks of India.

UNIT V STRUCTURAL GEOLOGY

Topographic maps – Aerial photographs and Satellite imageries – Attitude of planar and linear structures – Strike, dip, foliation – Geological structures – folds, faults, unconformities and joints – Igneous intrusions – dykes, sills, batholiths – Principles of stereographic projections of linear and planar features

Text Books:

1. Parbin Singh. Geology for Engineers, IBH Publications, N. Delhi. 1991.
2. Arthur Holemess, Principles of Physical Geology, Thomas Nelson and Sons, USA, 1964.

Reference Books

1. Blyth F.G.H. and de Freitas M.H. Geology for Engineers, 7th edition, Elsevier Publications, 2006.
2. Bell F.G. Engineering Geology, Elsevier Publications, 2007.
3. Ford, W.E. Dana’s Textbook of Minerology (4th edition), Wiley Eastern Ltd., N. Delhi, 1989.
4. Winter, J.D. An Introduction to Igneous and Metamorphic Petrology, Prentice Hall, N. Delhi, 2001.
5. Billings, M.P. Structural Geology, Prentice Hall Ino., N. Jersey, USA, 1972.

Designed by “ Department of Mining Engineering

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBMN303	**Course Name:** FLUID FLOW OPERATIONS	**L**	**T**	**P**	**C**
		3	1	0	3

Year and Semester	II Year (III Semester)		Contact hours per week (4Hrs)	
Prerequisite course	NIL			
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
			✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective	1. Differentiate Fluid Statics and Fluid Dynamics 2. Determine the Flow Measurement and Transmission Of Energy 3. Describe the types of fluids and its properties 4. To acquire the knowledge about the Flow Measurement and Transmission Of Energy 5. To know about the dimensional analysis
Course Outcome	At the end of the course the student will be able to: 1. Explain about Fluid Mechanics and physical and thermodynamic properties of fluid. 2. Understand about pressure variation in a fluid at rest and application to manometer. 3. Analyze the flow regimes using Reynold's number and calculate the minor losses in pipe systems. 4. Classify the types of pumps and understand the performance curves. 5. Solve the dimensional analysis , types of similitude and types of forces acting in a fluid. 6. Understand about the types of fluids, flow measurement, dimensional analysis and types of similitude and types of forces acting in a fluid..

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	2	2	2	-	-	-	-	-	-	-	1	2	-
CO2	2	2	2	2	2	-	-	-	-	-	-	-	1	2	-
CO3	3	1	3	3	3	-	-	-	-	-	-	-	2	3	-
CO4	2	2	2	2	2	-	-	-	-	-	-	-	1	2	-
CO5	3	1	3	3	3	-	-	-	-	-	-	-	2	3	-
CO6	2	1	2	2	2	-	-	-	-	-	-	-	3	2	-
Aver	2.3	1.5	2.3	2.3	2.3								1.6	2.3	

age															
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			
KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome															

UNIT I INTRODUCTION

Units and Dimensions – Properties of fluids - Mass, Density, Specific weight, Specific volume, Specific gravity, Viscosity, Compressibility, Vapour pressure, Capillary and surface tensions – Thermodynamic properties - Isothermal process, adiabatic process.

UNIT II FLUID STATISTICS & FLUID DYNAMICS

Fluid pressure – Pascal's law – Pressure variation in a fluid at rest – Measurement of pressure - Manometers - simple & differential manometer – Pressure & Temperature at any point in compressible fluid – Classification of fluid flow – Equation of continuity & its application – Equation of motion – Bernoulli's equation – Navier stokes equation of motion.

UNIT III FLOW MEASUREMENT & TRANSMISSION OF ENERGY

Venturi, Orifice, Nozzles, Mouth pieces – pitot tube & sharp crested weirs/notches – Steady flow through pipes – Darcy weisbach equation – Losses in pipelines - Hydraulic & energy gradient

UNIT IV DIMENSIONAL ANALYSIS

Introduction – Need for dimensional analysis – Methods of dimensional analysis – Dimensions of physical quantities – Dimensional groups – Buckingham π theorem – group method – Rayleigh's method of indices – Dimensionless numbers – Applications of dimensional method – Similitude – Types of similitude.

UNIT V PUMPS & TURBINES 10 Hrs

Centrifugal pumps - Working principle – Reciprocating pump - Working principle - Indicator diagram – Rotary pumps - Classification - Comparison of working principle with other pumps - Advantages – Classification of turbines - heads and efficiencies - velocity triangles - axial, radial and mixed flow turbines - pelton wheels and francis turbine.

(Total: 50 Hrs)

Text Book:

1. Streeter, V. L. and Wylie E. B., Fluid Mechanics, McGraw Hill Publishing Co.(2010)
2. Kumar K. L., Engineering Fluid Mechanics, Eurasia Publishing House (p) Ltd. New Delhi(2004)

References Books:

1. Robert .Fox, Alan T. McDonald, Philip J.Pritchard, "Fluid Mechanics and Machinery", ISBN 978-0-470-54755-7, 2011.

Designed by "Department of Mining Engineering".

PROGRAM	BE-Mining Engineering				
Course Code: UBMN304	**Course Name:** MINE DEVELOPMENT		**T**	**P**	**C**
		3	1	0	3

Year and Semester	II Year (III Semester)		Contact hours per week (4 Hrs)	
Prerequisite course	NIL			
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
			✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective	1. To know the knowledge about mines of India. 2. To know about surface mining 3. Understand about underground mining 4. Introduction about machineries used in mines 5. Understand the environmental impacts due to mining
Course Outcome	At the end of the course the student will be able to: 1. Describe about Mining industry 2. Explain about Surface mining 3. Summarize about Underground mining 4. Illustrate about machines used in mining industry 5. Identify the potential environmental impacts 6. Describe the role of mining in economy of a country

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	1		2		3		1		2		3	2		3
CO2	1		2		2		3	2		2	1		3	2	
CO3		2		3	2		1		2		3	2	1		3
CO4	2		3		2		3		2		3		2	2	
CO5	1	2		3		2		2		3		2	3		2
CO6	2		1		3			2		3		2	2	2	
Average	2	1.6	2	2.6	2.2	2.5	2.3	2.3	2	2.5	2.3	2.2	2.2	2	
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION 10 Hrs

Historical overview of mining - Role of the mining industry in the modern world and contribution to national economy – Role of mining engineers in industry – Present and Future trends of mining industry – Mineral deposit - Different types and their classification – Indian mineral resources

UNIT II OPENING-UP OF DEPOSITS 10 Hrs

Choice of mode of entry – adit, shaft, decline and combined mode, their applicability, number and disposition – Vertical and Inclined Shafts – Location, shape, size, and organisation of shaft sinking, construction of shaft collar, shaft fittings

UNIT III SINKING OPERATIONS 10 Hrs

Ground bearing and muck disposal - tools and equipment, lining, ventilation, lighting and dewatering – Sinking in difficult and water-bearing ground – Insets - Design, excavation and lining – Mechanised Sinking - Simultaneous sinking and lining - slip-form method of lining - high speed sinking.

UNIT IV SHAFT BORING 10 Hrs

Methods and equipment – Special Attributes – Widening and deepening of inclined and vertical shafts - staple shafts - raised shafts.

UNIT V DRIFTING & TUNNELLING 10 Hrs

Purpose, shape, size and location – Excavation – ground breaking, muck disposal, ventilation and supporting – High speed Drifting & Tunnelling – Application of mechanised methods – roadheaders and tunnel boring machines.

(Total: 50 Hrs)

TEXT 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.

REFERENCES:

1. Hartman, H. L. (Editor), SME Mining Engineering Handbook, 3rd edition, Vol I & II, Society of Mining Engineers, New York, 2011.

Designed by “ Department of Mining Engineering”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBMCC06	**Course Name:** Material Science	**L**	**T**	**P**	**C**
		2	0	0	2

Year and Semester	II Year (III Semester)	Contact hours per week (2Hrs)
Prerequisite course	NIL	

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**
		✓		

Course Objective

- To help learners know about the Material Science.
- listen to lectures and comprehend Properties of materials them by asking questions, seek clarifications
- To help learners Developments in materials, engineering profession and materials

Making them realize the importance of Ferrous materials: Cast iron, Steel, Stainless Steel, Prominent alloy steel.

Course Outcome

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

1. Organize the constitution alloys and phase diagrams to identify the metal properties
2. Infer the material properties by various material testing techniques
3. Classify the various ferrous and non-ferrous metals with its application
4. Illustrate the various heat treatment process and its significance
5. Examine the various non-metallic materials with its applications
6. Analyze the knowledge of material science on material selection for specific requirements

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2										2			3
CO2	3											2			3
CO3	3											3			3
CO4	3	3										2			3
CO5	3	2	2		3							3			3
CO6	3	2	3		3	3						3			3
Average	3	2										2			3

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I: Materials Science and Engineering **9 Hrs**

Introduction, Developments in materials, engineering profession and materials, classification of materials, criteria for selection of materials for petroleum industries.

Ferrous materials: Cast iron, Steel, Stainless Steel, Prominent alloy steel.

Non-Ferrous materials: Copper, Brass, Bronze, Aluminium, Lead, Tin.

Materials for High and Low temperature service, classification of heat resistant materials

UNIT II: Properties of materials **9 Hrs**

Mechanical Properties: Hardness, Strength, Toughness, Stiffness, Ductility, Malleability, Harden ability, creep and fatigue

Electrical properties: Conduction, Semiconductors and insulators

Optical properties: Absorption, Reflection, Transmission and Refraction optical fibers and lasers. Magnetic properties: Various types of magnetic materials, Diamagnetic, Paramagnetic, Ferromagnetic, Anti ferronmagnetic and ferromagnetic materials, hard and soft materials

Thermal properties: Thermal expansion, Heat capacity, Thermal conduction, Thermal Stresses

UNIT III: Composite Materials **9 Hrs**

Classification of composites, Reinforcing phase, Matrix phase, Fiber reinforced plastics, Metal matrix composites, General and practical composite systems, Tribological behavior of composite, special composites. Concrete, Asphalt concrete, reinforced concrete, prestressed concrete, concrete polymer composite, fiber reinforced cements.Nanostructures materials, Powder processing

UNIT IV: Heat Treatment and Material Testings **9 Hrs**

Heat treatment: Annealing, Normalizing, Hardening, Tempering

Case Hardening – Carburizing, Nitriding, Cyaniding and carbon nitriding,Flame hardening, induction Hardening, Surface treatmentStudy of fractures of engineering materialsDestructive testing, Tensile testing, compression testing, Impact Testing, Hardness test, Jominy endquench test for hardenability of steel.Non destructive testing.

UNIT V: Materials environment interactions **9 Hrs**

Principles of corrosion, Electrochemical corrosion direct dissolution mechanisms, Dry and wet corrosion, Galvanic corrosion.

Methods of corrosion control, cathodic and anodic protection, corrosion inhibitors. Surface coatings, corrosion monitoring, Polarization corrosion prevention.

TOTAL:45 Hrs

Reference Books:

1. Schaeffer J.P: Saxena A, Antolovich S.D, Sanders T.H. Jr., Warner S.B., The Science & Design of Engineeing Materials, McGraw-Hill International.
2. Askeland Donald R. and Phule P.P. The science and engineering materials, Thomson learning.
3. Callister william D.Jr Material Science and Engineering an Introduction, John Wiley & sons inc.

Designed by “ Department of Mechanical Engineering

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBMN3PA	**COURSE FILE:** GEOLOGY PRACTICAL - I	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

Year and Semester	II Year (IV Semester)	Year and Semester	II Year (III Semester)	Contact hours per week (2 Hrs)	Contact hours per week (2 Hrs)
Prerequisite course	NIL	Prerequisite course	NIL		

Course category	Humanities and Social Sciences	Management courses	Professional Core	Professional Elective
			✓	
	Basic Science	Engineering Science	Open Elective	Mandatory

Course Objective	1. Identification of minerals 2. Identification of ores 3. Recognition of faults, folds and joints 4. Measurement of dip and strike 5. Stereographic projections and contour maps
Course Outcome	At the end of the course the student will be able to: 1. Understanding of minerals 2. Understanding of rocks 3. Understanding of ores 4. Recognition of faults, folds and joints 5. Measurement of dip and strike 6. Stereographic projections and contour maps

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO3**
CO1	1	2		2		3			2			1	2		2
CO2	2		2		3		2			3		2	2		2
CO3		2		2			3		2		1		1	2	
CO4	3		2			2		3			2		2	2	
CO5	1	3		1		2		1		2		2		2	2
CO6	2		1				3		2		1		2		2
Average	1.8	2.3	1.6	1.6	2.5	2.3	2.6	2	2	2.5	1.3	1.6	1.8	2	2
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)			3.Substantial(High)				

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

List of Experiments

1. Identification of minerals
2. Identification of rocks
3. Identification of ores
4. Recognition of faults, folds, joints etc
5. Measurement of strike using Brunton compass and Clinometer

6. Measurement of dip using Brunton compass and Clinometer
7. Stereographic projections
8. Contour Maps

TOTAL 24 Hrs

TEXT BOOKS:

Bateman, A.M., Economic Mineral Deposits, John Wiley and Sons, 1956.

Krishnaswamy, S. Indian Mineral Resources, Oxford and IBH Publication Company, New

Bell F.G., Engineering Geology, Elsevier Publications, 2007.

Designed by “ Department of Mining Engineering”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBPE3PB	**Course Name:** FLUID FLOW OPERATION LAB	**L**	**T**	**P**	**C**
		0	0	2	1
Year and Semester	II Year (III Semester)	Contact hours per week (2Hrs)			
Prerequisite course	NIL				

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
			✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective

- Describe the role of flow measurements
- Describe the role of losses in pipes
- Describe the role of different pumps

Course Outcome

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

1. Compute the coefficient of discharge using Orifice Meter
2. Compute the coefficient of discharge using Venturi Meter
3. Analyze the Bernoulli's Theorem using Bernoulli's theorem Apparatus

4. Evaluate the type of flow using Reynolds Apparatus
5. Determine the kinematic viscosity and dynamic viscosity of the lubricating oil at different temperatures.
6. Compute the friction factor for the pipes with different diameters.

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2	PSO3
CO1	2	2	2	2	2	-	-	-	-	-	-	-	1	2	-
CO2	2	2	2	2	2	-	-	-	-	-	-	-	1	2	-
CO3	3	1	3	3	3	-	-	-	-	-	-	-	2	3	-
CO4	2	2	2	2	2	-	-	-	-	-	-	-	1	2	-
CO5	3	1	3	3	3	-	-	-	-	-	-	-	2	3	-
CO6	2	1	2	2	2	-	-	-	-	-	-	-	3	2	-
Average	2.3	1.5	2.3	2.3	2.3								1.6	2.3	
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

LIST OF EXPERIMENTS:

1. Flow Measurement **8 Hrs**

i) a. Calibration of Rotometer
   b. Flow through Venturimeter
ii) Flow through a circular Orifice
iii) Determination of mean velocity by Pitot tube
iv) Verification of Bernoulli's Theorem
v) a. Flow through a Triangular Notch b. Flow through a Rectangular Notch

2. Losses in Pipes **6 Hrs**

Determination of friction coefficient in pipes
Determination of losses due to bends, fittings and elbows

3. Pumps **6 Hrs**

i. Characteristics of Centrifugal pumps
ii. Characteristics of Submersible pump
iii. Characteristics of Reciprocating pump

4. Determination of Metacentric height **4 Hrs**

Demonstration Only

(Total : 24 hrs)

TEXT BOOKS:

1. Hydraulic Laboratory Manual, Centre for Water Resources, Anna University, Chennai. 2004.
2. Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics. Standard Book House, New Delhi, 2000.

REFERENCES:

1. Subramanya, K. Flow in open channels, Tata McGraw - Hill pub. Co.1992.
2. Subramanya, K. Fluid mechanics, Tata McGraw- Hill Pub. Co., New Delhi, 1992.

(Total: 24 Hrs)

Designed by " Department of Mining Engineering"

PROGRAM	BE - Mining Engineering				
Course Code UBLECPD	Course Name : Soft Skills -III	**L** 4	**T** 0	**P** 0	**C** 1
(Common to BE – Mechanical, BE – EEEM, BE –PE, BE – HE, BE - NA&OE)					
Year and Semester	II Year (III Semester)	Contact hours per week (4 Hrs)			
Prerequisite course	SOFT SKILLS-III				
Course Objective	To make students to learn the advanced English To raise up their confidence level Making them aware of the corporate world and the expectations Prepare them for campus Interview				

Course Outcome	The student will be able to	
	1	Constructivism : Conceptualizing the nuances of the tenses in situational usage
	2	Learning Theory : Enhancing verbal and collaborating other communicative activities
	3	Critical thinking: coordinating and building fluency in the individuals lexical
	4	Cooperative learning : Interactive participation of the self with other individuals
	5	Active Participation: to confidently step into and command situations with Clair.
	6	Enhances the versatility of the students on all skills.

Course Outcome	The student will be able to 1. Apply listening sharply and reading keenly to understand and act aptly. 2. Take part in presentations and in Group Discussions. 3. Build skills to write international competitive examinations 4. Develop felicity of expression and familiarity with technology enabled Communication 5. Analyse, distinguish and Prepare their own resume and report. 6. Apply skills to successfully get jobs by enhancing the Overall Personality

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1						2		2	2	3		2			
CO2						2		2	2	3		2			
CO3						2		2	2	3		2			
CO4						2		2	2	3		2			
CO5						2		2	2	3		2			
CO6						2		2	2	3		2			
Ave						2		2	2	3		2			

<table>
<tr><td>rage</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4">Correlation Levels</td><td colspan="4">1.Slight(Low)</td><td colspan="4">2.Moderate(Medium)</td><td colspan="4">3.Substantial(High)</td></tr>
<tr><td colspan="16">KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome</td></tr>
</table>

UNIT 1: GRAMMAR AND FOUNDATON 10 Hrs

Training the students on basic grammar and foundation and laying the standard platform. A complete standard syllabus of Cambridge is used. The main part of the 1st semester is to cover the major tenses (Present tense, Present Continuous, Past Tense, Past Continuous, Present Perfect, and Present Perfect continuous.

UNIT II: BODY LANGUAGE AND LEXICAL RESOURCE WITH BASIC WRITTEN SKILLS 8hrs

Posture, eye contact, gestures with hands and arms, speech, tone of the voice
One word substitutes, E-mail communication, creating blogs, free writing on any given topic, writing definitions.

UNIT III: INTERACTIVE ENGLISH 6 Hrs

(Unit 1 to 8)

The main objective is English for International communication. It course contains conversations, snapshots, readings, activities, a greater variety and amount of listening materials and more visuals to introduce vocabulary, more opportunities to build fluency, and up-to-date art and design. The course covers the fours skills of listening, speaking, reading and writing, as well as improving pronunciation and building vocabulary.

UNIT IV: LISTENING AND SPEAKING 8 Hrs

Types of Listening -Listening and note taking-Pronunciations-Stress and Intonation-Conversation technique-Dialogue Writing -Professional Communication-Interview-Group Discussion –Power point Presentation-Lab.

UNIT V: INTERVIEW SKILLS AND PERSONALITY DEVELOPMENT 8 Hrs

Personality development – Self motivation, Self-actualization, Stress management, Interview skills,
Negotiation skills, familiarization and strategies of telephonic , skype, one on one, panel, exit interviews

TOTAL: 40 PERIODS

TEXT BOOKS:

1. Essential Grammar in use- Raymond Murphy ,Cambridge , New Third Edition
2. Communication skills

1. New Interchange (English for International Communication) Jack C. Richards

Designed by“AMET CENTRE FOR IELTS

AMET
ACADEMY OF MARITIME EDUCATION AND TRAINING
DEEMED TO BE UNIVERSITY
(Under Section 3 of UGC Act 1956)

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering					
Course Code: UBMTC04	**Course Name:** PROBABILITY& STATISTICS		**L**	**T**	**P**	**C**
			4	**0**	**0**	**4**
Year and Semester	II Year (IV Semester)		Contact hours per week (4 Hrs)			
Prerequisite course	NIL					
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**		
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**		
	✓					
Course Objective	1. To introduce Fourier series and its applications in engineering fields 2. To introduce the effective mathematical tools for the solutions of partial differential Equations that model several physical processes. 3. Describe the notion of sampling distributions and have acquired knowledge of statistical techniques useful in making rational decision in management problems . 4. To expose the statistical methods designed to contribute the process of making scientific judgments in the face of uncertainty and variation. To make a decision about the value of a population parameter based on sample data 6. Explain the application of probability in locating a mine reserve					
Course Outcome	At the end of the course the student will be able to: 1. Describe types of classification in variance. 2. Infer about the Fourier Series 3. Classify the Boundary Value Problems 4. Analyze the Fourier Transform 5. Infer the Z -Transform And Difference Equations 6. Apply the PDE in engineering calculations					

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	1		2	1								1	2	2
CO2	1		2		3								2	3	1
CO3	1	2		3		2	2						1	2	3
CO4	2	2	3	2			3						2	3	2
CO5	2		3		2			2					3	1	2
CO6	1	1	2	2						2		3	2	2	2
Average	1.5	1.5	2	2.2	2	2	3	2		2		3	1.8	2.1	2

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNITI RANDOM VARIABLES 12 Hrs

Discrete and continuous random variables - Properties- Moments - Moment generating functions and their properties. Binomial, Poisson, Geometric, Negative binomial, Uniform, Exponential, Gamma, and Weibull distributions.

UNIT II TWO DIMENSIONAL RANDOM VARIABLES 12 Hrs

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression – function of a random variable-Transformation of random variables - Central limit theorem.

UNIT III TESTING OF HYPOTHESIS 12

Sampling distributions – Testing of hypothesis for mean, variance, proportions and differences using Normal, t, Chi-square and F distributions - Tests for independence of attributes and Goodness of fit.

UNIT IV DESIGN OF EXPERIMENTS 12 Hrs

Analysis of variance – One way classification – CRD - Two – way classification – RBD - Latin square.

UNIT V RELIABILTY AND QUALITY CONTROL 12 Hrs

Concepts of reliability-hazard functions-Reliability of series and parallel systems- control charts for measurements (x and R charts) – control charts for attributes (p, c and np charts)

TOTAL :60Hrs

TEXT BOOKS

1. J. S. Milton and J.C. Arnold, "Introduction to Probability and Statistics", Tata McGraw Hill, 4th edition, 2007. (For units 1 and 2)
2. R.A. Johnson and C.B. Gupta, "Miller and Freund‟s Probability and Statistics for Engineers", Pearson Education, Asia, 7th edition, (2007)

REFERENCES

1. Walpole, R. E., Myers, R. H. Myers R. S. L. and Ye. K, "Probability and Statistics for Engineers and Scientists", Seventh Edition, Pearsons Education, Delhi, 2002.
2. Navidi, W, "Statistics for Engineers and Scientists", Special Indian Edition, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3. Spiegel, M.R, Schiller, J and Alu Srinivasan, R, "Schaum‟s Outlines Probability and Statistics", Tata McGraw-Hill Publishing Company Ltd. New Delhi, 2007.

Designed by " Department of Mathematics"

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

<table>
<tr><td>PROGRAM</td><td colspan="6">BE-Mining Engineering</td></tr>
<tr><td rowspan="2">Course Code:
UBMCC09</td><td colspan="2" rowspan="2">Course Name:
Strength of material (Mechanics of solids)</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td colspan="7"></td></tr>
<tr><td>Year and Semester</td><td colspan="2">II Year (IV Semester)</td><td colspan="4" rowspan="2">Contact hours per week
(4Hrs)</td></tr>
<tr><td>Prerequisite course</td><td colspan="2">NIL</td></tr>
<tr><td rowspan="4">Course category</td><td>Humanities and Social Sciences</td><td>Management courses</td><td>Professional Core</td><td colspan="3">Professional Elective</td></tr>
<tr><td></td><td></td><td></td><td colspan="3"></td></tr>
<tr><td>Basic Science</td><td>Engineering Science</td><td>Open Elective</td><td colspan="3">Mandatory</td></tr>
<tr><td></td><td>✓</td><td></td><td colspan="3"></td></tr>
<tr><td>Course Objective</td><td colspan="6">• To help learners know about the Material Science.
• listen to lectures and comprehend Properties of materials them by asking questions, seek clarifications
• To help learners Developments in materials, engineering profession and materials
Making them realize the importance of Ferrous materials: Cast iron, Steel, Stainless Steel, Prominent alloy steel.</td></tr>
<tr><td>Course Outcome</td><td colspan="6">At the end of the course the student will be able to:
1. Apply the concept of stress-strain relationship on the bars with different loading conditions.
2. Analyse the impact of stresses on thin and thick shells due to internal pressure
3. Construct shear force and bending moment diagrams of various beams under various load conditions.
4. Analyse the bending stress of various section of beams.
5. Categorise the maximum power and torque transmitted through Solid shafts and Hollow shafts
6. Identify the stiffness of closed and open coil springs for real time applications</td></tr>
</table>

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2									3	2		
CO2	3	3	3									3	2		
CO3	3	2	2									3	3		
CO4	3	3	3									3	3		
CO5	3	3	3									3	3		
CO6	3	2	2			3		3				3	2		
Avera	3	2.5	2.5			3		3				3	2.5		

ge															
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			
KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: **CO-Course Outcome :PSO-Programe Specific Outcome**															

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS (10 Hrs)

Rigid bodies and deformable solids – Tension, Compression and Shear stresses – Deformation of simple and compound bars – Thermal stresses – Elastic constants – Volumetric strains – Stresses on inclined planes – principal stresses and principal planes – Mohr’s circle of stress.

UNIT II TRANSVERSE LOADING ON BEAMS AND STRESSES IN BEAM (10Hrs) Beams – types transverse loading on beams – Shear force and bending moment in beams –

Cantilevers – Simply supported beams and over – hanging beams. Theory of simple bending – bending stress distribution – Load carrying capacity – Proportioning of sections – Flitched beams – Shear stress distribution.

UNIT III TORSION (10 Hrs)

Torsion formulation stresses and deformation in circular and hollow shafts – Stopped shafts – Deflection in shafts fixed at the both ends – Stresses in helical springs – Deflection of helical springs, carriage springs.

UNIT IV DEFLECTION OF BEAMS (10 Hrs)

Double Integration method – Macaulay’s method – Area moment theorems for computation of slopes and deflections in beams – Conjugate beam and strain energy – Maxwell’s reciprocal theorems.

UNIT V THIN CYLINDERS, SPHERES AND THICK CYLINDERS (10 Hrs)

Stresses in thin cylindrical shell due to internal pressure circumferential and longitudinal stresses and deformation in thin cylinders – spherical shells subjected to internal pressure – Deformation in spherical shells – Lame’s theory – Application of theories of failure.

(Total: 50 Hrs)

Text Books :

1. Bansal.R.K., Strength of Materials, Laxmi publications (P) Ltd., 2007
2. Jindal U.C., Strength of Materials, Asian Books Pvt.Ltd., New Delhi, 2007

Reference Books :

1. Egor. P.Popov “Engineering Mechanics of Solids”, Prentice Hall of India, New Delhi, 2001.
2. Hibbeler.R.C., “Mechanics of Materials”, Pearson Education, Low Price Edition, 2007

Designed by “ Department of Mechanical Engineering

PROGRAM	BE- Mining Engineering					
Course Code: UBMN401	**Course Name:** MINING GEOLOGY		**L**	**T**	**P**	**C**
			4	0	0	3
Year and Semester	II Year (IV SEMESTER)		Contact hours per week (4Hrs)			
Prerequisite course	NIL					
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**		**Professional Elective**	
			✓			
	Basic Science	**Engineering Science**	**Open Elective**		**Mandatory**	
Course Objective	1. Describe the physical geology 2. Explain the mineral deposits in India 3. Differentiate coal and petroleum geology 4. Describe the role of geophysical prospecting methods 5. Discuss geological investigation.					
Course Outcome	At the end of the course the student will be able to: 1. Explain the physical geology 2. Analyze the mineral deposits in India 3. Explain the coal and petroleum geology 4. Apply knowledge petrology 5. Discuss remote sensing and GIS 6. Discuss remote sensing and GIS					

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		3		1		2					1	2		1
CO2	2				2		1	3					3	2	
CO3	3		3				2			2		1			3
CO4	2				2		1	3					3	2	

CO5	3		3		1		2					1	1		2
CO6		2		3		1		2		3	2		1		1
Average	2.17	0.33	1.50	0.50	1.00	0.17	1.33	1.33	0.00	0.83	0.33	0.50	1.67	0.67	1.17

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ;
PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome

UNIT I INTRODUCTION (10 Hrs)

Introduction and scope of Economic geology – Process of Ore formation – Mineral deposits formed from magmatic, hydrothermal and volcanic process.

UNIT II ECONOMIC MINERAL DEPOSITS IN INDIA (10 Hrs)

Metallic – Non-metallic deposits – Study of Graphite, copper, zinc, gold, lead, iron, manganese, radioactive minerals, asbestos, mica, gemstone – Origin, mode of occurrence and distribution in India – Origin and occurrence of industrial minerals – ceramic, refractory, abrasive, glass and paint industry.

UNIT III COAL AND PETROLEUM GEOLOGY (10 Hrs)

Origin – Physical properties – Processes – Occurrence of coal and its types – Petroleum deposits – Fossil fuel distribution in sedimentary basins of India.

UNIT IV GEOPHYSICS (10 Hrs)

Geophysical prospecting methods – Seismic, electrical, magnetic and gravity methods of mineral prospecting – Location of ore body, coal and petroleum reserves, subsurface litho- log – 3D models.

UNIT V REMOTE SENSING AND GIS (10 Hrs)

Introduction to aerial and satellite remote sensing – Identification of photo recognition elements – Applications of remote sensing and GIS in geological mapping and mineral exploration.

(Total: 50 Hrs)

Text Books:

1. Bateman, A.M., Economic Mineral Deposits, John Wiley and Sons, 1956

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBMN402	**Course Name:** DRILLING AND BLASTING	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	II Year (IV Semester)		Contact hours per week (34Hrs)		
Prerequisite course	NIL				
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**	
			✓		
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**	
Course Objective	1. Discuss types of exploratory drills and their applicability 2. Explain types of drilling in surface mines 3. Define blasting in surface mines 4. Understand the explosives and detonating methods 5. Understand drilling and blasting in underground mines				
Course Outcome	At the end of the course the student will be able to: 1. Classify the types of exploratory drills and their applicability 2. Explain the explosives and detonating methods 3. Distinguish types of drilling in surface mines 4. Discuss the blasting in surface mines 5. Explain drilling and blasting in underground mines 6. Discuss the methods to drill a mineral reserve.				

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	1		2		3		1		2		3	2		2
CO2	1		2		2		3	2		2	1		3	2	
CO3		2		3	2		1		22		3	2	1		2
CO4	2		3		2		3		22		3		2	2	
CO5	1	2		3		2		2				2	3		2
CO6			1		3			2		3		2	2	2	2
Average	2	1.6	2	2.6	2.2	2.5	2.3	2.3	2	2.5	2.3	2.2	2.2	2	2
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:
CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION (09 Hrs)

Boring for exploration – Various types of exploratory drills and their applicability – Auger - Cable-tool - Odex – Core drills – Core recovery - Single and double tube core barrels - Wireline core barrel - Storage of cores –

Interpretation of borehole data.

UNIT II EXPLOSIVES AND ACCESSORIES (09Hrs)

Types of explosives – Composition, properties, classification – Selection of explosives – manufacture, transport, storage and handling of explosives, testing of explosives - Types of initiating systems – electrical detonators - detonating fuse - detonating relays - NONEL – Blasting accessories –exploders..

UNIT III DRILLING IN SURFACE MINES 09 Hrs

Blasthole drills – types, classes, classification, applicability and limitations - Mechanics of drilling – performance parameters – drilling cost – compressed air requirement for hole cleaning – selection of drilling systems – drilling errors – organization of drilling.

UNIT IV BLASTING IN SURFACE MINES 09 Hrs

Mechanics of rock fragmentation – Livingstone theory of crater formation – factors affecting blasting – blast design – estimation of burden and spacing – estimation of charge requirement – initiation patterns – secondary blasting – pop and plaster shooting – problems associated with blasting – ground vibration and air over pressure – blast instrumentation

UNITV:DRILLING&BLASTINGINUNDERGROUNDMINES 09 Hrs

Coal mines - drilling systems and their applicability – blasting-off-solid – different Blasting cuts – ring hole blasting – calculation of specific charge – specific drilling and detonator factor – initiation patterns Metal mines - drilling systems and their applicability – blast design for horizontal drives - different blasting cuts – long hole blasting – vertical crater retreat blasting.

Text Book:

1. Rao, K.U.M, and Misra, B., (1998), Principles of Rock Drilling, Oxford & IBH Publications, New Delhi, p.265.
2. Jimeno, C.L., Jimeno, E.L, Carcedo, E.J. Drilling and Blasting of Rocks, A. A. Balkema, Rotterdam

1. Clark, G.B., Principles of Rock fragmentation, Wiley Interscience Publication, 1987.
2. Konya, C.J. and Walter, E.J. Surface Blast Design, New Jersey, 1990.
3. Bhandari, Sushil, Engineering Rock Blasting Operations, A. A. Balkema, Rotterdam, 1997.
4. Per-Anders Persson, Roger Holmberg, and Jaimin Lee. Rock Blasting and Explosives Engineering, CRC Press, 1994.
5. Hustrulid, W. A. Blasting Principles of Open Pit Mining, Vol. 1- General Design Concept, A.A. Balkema, Rotterdam, 1999.
6. Singh, B and Pal Roy, P., (1993), Blasting in Ground Excavations and Mines, Oxford & IBH Publications, New Delhi, p.177.
7. Chugh, C.P., (1999), Diamond Drilling, Oxford & IBH Publications New Delhi.
8. Pradhan, G.K., and Sandhu, G.S., Manual of Rock Blasting, IME Publications, 1996.
9. Janusz Reś, Krzysztof Wladzielczyk and Ajoy K. Ghose., Environment-friendly Techniques of rock breaking, CRC Press, 2003.
10. Langefors, U., and Kihlstrom, (1973), B., The Modern Techniques of Rock Blasting, URMO Publications

TOTAL: 45 Hrs

Designed By:Department of Mining Engineering

PROGRAM	BE-Mining Engineering					
Course Code: UBMN403	**Course Name:** MINE SURVEYING		**L**	**T**	**P**	**C**
			3	1	0	3
Year and Semester	II Year (IV Semester)		Contact hours per week (4 Hrs)			
Prerequisite course	NIL					
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**		**Professional Elective**	
			✓			
	Basic Science	**Engineering Science**	**Open Elective**		**Mandatory**	
Course Objective	1. To understand the mathematics in surveying to calculate areas and volumes for different projects. To identify, formulate and solve problems in the field of advanced surveying. 2. Ability to analyze survey data and design mining engineering projects. 3. To engage in life- long learning with the advances in survey techniques. 4. Understand the principles of triangulation survey					
Course Outcome	1. At the end of the course, students will be able to Summarize Plane Surveying and Distance and Directions in real mining lease surveying 2. Illustrate different types of Leveling Instruments and methods of leveling 3. Explain to use the contouring and Theodolite Surveying in mining area 4. Apply Principles of Traversing 5. Apply Principles of triangulation survey. 6. Describe overall conventional methods of surveying					

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO 7**	**PO8**	**PO9**	**PO1 0**	**PO11**	**PO1 2**	**PSO1**	**PSO 2**	**PSO3**
CO1	2		1	3					2				2	1	3
CO2		2	2		1		3			2		2		2	2
CO3	2	1		3		2		3		2	1		2		1
CO4	2	1		2	3		2		3		1		2	3	
CO5	1	3		2		3		2		1		2	1	2	3
CO6	1	2		3	2				2		2		2	2	1
Average	1.6	1.8	1.5	2.6	2	2.3	2.6	2.5	2.3	1.6	1.3	2	1.8	2	2
Correlation Levels				1.Slight(Low)			2.Moderate(Medium)				3.Substantial(High)				

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION (10 Hrs)

Definition – Objective – Classification and principles of surveying

UNIT II LINEAR MEASUREMENT (10 Hrs)

Instruments for measuring distances – Chains – tapes - electronic distance measurement - total station - ranging and taping survey lines – Chain surveying - principle- field work-offsets- booking and planning- obstacles in taping – Total station - construction & working with total stations.

UNIT III ANGULAR MEASUREMENT (10 Hrs)

Bearing of lines – Rectangular coordinate system – Essentials of the micro-optic theodolite - Measurement of horizontal and vertical angles - temporary and permanent adjustments - theodolite traversing - computation of co-ordinates - adjustment of traverse - temporary and permanent adjustments.

UNIT IV LEVELLING (10 Hrs) Definition & terminology – Levelling instruments - Types - tilting, autoset and digital levels – levelling stares – different types of levelling - differential, profile, cross-sectional and reciprocal levelling – booking and reduction methods – underground levelling – temporary and permanent adjustments of levels.

UNIT V CONTOURS (10 Hrs)

Concepts - characteristics of contour - contour interval - methods of contouring - plane table contouring – Uses of contours.

(Total: 50 Hrs)

Text Books:

1. Punmia, B.C., Surveying Vol I and II, Laxmi Publication, New Delhi, 1991
2. Kenetkar, T.P., Surveying and Levelling, Vol I and Vol II, United Book Corporation,Poona, 1991.

Reference Books:

1. Winniberg, F., Metalliferous Mine Surveying
2. Mason,E., Coal Mining Series, Surveying ,Vol I And Vol II, Virtue And Company Limited, London.
3. Clark, D., Plane And Geodetic Surveying,Vol I And Vol II, CBS Publishing Co., 1986.
4. Borshch,V., Komponiets,A., Navitny, G.AndKnysh., Mine Surveying, MIR Publishers, Moscow,1989.

Designed by “ Department of Mining Engineering”

PROGRAM	BE-Mining Engineering				
Course Code: UBMN404	Course Name: Disaster management	**L** 3	**T** 0	**P** 0	**C** 3

Year and Semester	II Year (IV Semester)	Contact hours per week (3 Hrs)
Prerequisite course	NIL	

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**
			✓	

Course Objective

1. Understand the types of hazards
2. Discuss the methods to prevent risk
3. Describe the impacts of disaster on development
4. Explain the contingency plan of disaster management
5. Discuss the lessons leamt from various disasters

Course Outcome

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

1. Explain the disaster management
2. Analyze the method of prevention
3. Explain the impacts of disaster on development
4. Apply contingency plan of disaster management
5. Create the prevention chart for various disasters
6. Explain the overall prevention and mitigation measures.

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	2	1		2		3		1		2		3	2		2
CO2	1		2		2		3	2		2	1		3	2	
CO3		2		3	2		1		2		3	2	1		2
CO4	2		3		2		3		2		3		2	2	
CO5	1	2		3		22		2		3		2	3		2
CO6			1		3			2		3		2	2	2	2
Aver age	2	1.6	2	2.6	2.2	2.5	2.3	2.3	2	2.5	2.3	2.2	2.2	2	2
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:
CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION (9 Hrs)

Definition – Disaster, Hazard, Vulnerability, Resilience, Risks – Types of disasters

–Earthquake, Landslide, Flood, Drought, Fire – Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) (9 Hrs)

Disaster cycle – Phases, Culture of safety, prevention, mitigation and preparedness of community based DRR, structural – non-structural measures, Roles and responsibilities of community, Panchayat Raj Institutions/Urban Local Bodies (PRI/ULB), States, Centre and other stake-holders – Institutional Processes and Framework at State and Central level – State Disaster Management Authority (SDMA).

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT (9 Hrs)

Factors affecting Vulnerabilities, differential impacts, impact of development projects such as dams, embankments, changes in Land-use – Climate change adaptation – IPCC scenario and Scenarios in the context of India.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA (9 Hrs)

Hazard and Vulnerability profile of India, Components of Disaster relief – Water, Food, Sanitation, Shelter, Health, Waste management – Role of GIS and Information technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT:
APPLICATIONS AND CASE STUDIES AND FIELDWORKS (9 Hrs)

Landslide Hazard Zone - Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure – Drought Assessment - Case studies – Coastal Flooding – Storm Surge Assessment – Floods - Fluvial and Pluvial Flooding - Case studies – Forest Fire - Case studies – Man Made Disasters - Case studies.

(TOTAL: 45Hrs)

Text Books

1. Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13:978-9380386423
2. Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India Education Pvt.Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

References:

1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
2. Government of India, National Disaster Management Policy,2009.

Designed by: “Department of Mining Engineering

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBMN405	**Course Name:** INTRODUCTION TO PETROLEUM ENGINEERING	**L** 3	**T** 0	**P** 0	**C** 3

Year and Semester	II Year (IV Semester)		Contact hours per week (3 Hrs)	
Prerequisite course	NIL			
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
				✓
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective

1. Explain the physical and chemical properties of oil
2. Describe the types of wells and its limitations
3. Illustrate the rock properties obtained from core samples for oil
4. Discuss the methods used to produce oil from well
5. Explain the non-technical operations performed in well
6. Describe the exploration and exploitation of petroleum reserve

Course Outcome

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

1. Describe about oil industry
2. Explain about Surface structures
3. Summarize about Underground oil
4. Illustrate about machines used in oil industry
5. Identify the potential environmental impacts of oil Industry
6. Describe the role of oil production in economy of a country.

POS / COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	2	1		2		3		1		2		3	2		3
CO2	1		2		2		3	2		2	1		3	2	
CO3		2		3	2		1		2		3	2	1		3
CO4	2		3		2		3		2		3		2	2	
CO5	1	2		3		2		2		3		2	3		2
CO6	2		1		3			2		3		2	2	2	
Aver age	2	1.6	2	2.6	2.2	2.5	2.3	2.3	2	2.5	2.3	2.2	2.2	2	
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:
CO-Course Outcome :PSO-Programe Specific Outcome

UNIT-I INTRODUCTION **(10 Hrs)**

Chemistry of petroleum. Structure of petroleum compounds. Types – alkanes, Naphthenes, paraffins, aromatics. Physical and chemical properties of oil, gas and formation water.

UNIT II DRILLING A WELL **(10 Hrs)**

Drilling – History, types of drilling –cable tool, rotary, drilling rigs and components. Types of wells – exploratory, delineation, development wells. Vertical, deviated, inclined, horizontal and ERD wells. Drilling fluids, casing and cementation. Planning – GTO.

UNIT III FORMATION EVALUATION (10 Hrs) Formation Evaluation – cutting, cores, mud logging unit. Well logging, types of well logs their use. Sub surface correlation.

UNIT IV WELL ACTIVATION **(10 Hrs)**

Well Testing, perforation, testing methods, well completion production. Stimulation methods, recovery methods, Material balance, reserves estimation

UNIT V WELL SITE OPERATIONS **(10 Hrs)**

Wellsite operations, roles of drilling, reservoir and production hazards, environmental concerns transportation of oil and gas, oil pollution and control, petroleum economics

(**TOTAL: 50 Hrs**)

TEXT BOOKS:

Geology of Petroleum – Leverson, A.L
Formation Evaluation – Lynch
Drilling Manual – ONGC
Principles of oil Production – T.E.W. Wind

REFERENCES

Introduction to Petroleum Engineering – Geltin

Designed by	“ Department of Petroleum Engineering”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code:	**Course Name:**	**L**	**T**	**P**	**C**
UBMN4PA	GEOLOGY PRATICAL-II	**0**	**0**	**2**	**1**
Year and Semester	II Year (IV Semester)				
Prerequisite course	NIL				

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
			✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective	1. Identification of minerals 2. Identification of ores 3. Recognition of faults, folds and joints 4. Measurement of dip and strike 5. Stereographic projections and contour maps
Course Outcome	At the end of the course the student will be able to: 1. Classification of minerals 2. Discussion of rocks 3. Classificataion of ores 4. Recognition of faults, folds and joints 5. Measurement of dip and strike eplanation 6. Preparationof Stereographic projections and contour maps

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	1	2		2		3			2			1	2		2
CO2	2		2		3		2			3		2	2		2
CO3		2		2			3		2		1		1	2	
CO4	3		2			2		3			2		2	2	
CO5	1	3		1		2		1		2		22		2	2
CO6	2		1		2		3		22		1		2		2
Aver age	1.8	2.3	1.6	1.6	2.5	2.3	2.6	2	2	2.5	1.3	1.6	1.8	2	2
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:
CO-Course Outcome :PSO-Programe Specific Outcome

List of Experiments

1. Identification of minerals
2. Identification of rocks
3. Identification of ores
4. Recognition of faults, folds, joints etc
5. Measurement of strike using Brunton compass and Clinometer
6. Measurement of dip using Brunton compass and Clinometer
7. Stereographic projections
8. Contour Maps

TOTAL 24 Hrs

TEXT BOOKS:

Bateman, A.M., Economic Mineral Deposits, John Wiley and Sons, 1956.

Krishnaswamy, S. Indian Mineral Resources, Oxford and IBH Publication Company, New

Bell F.G., Engineering Geology, Elsevier Publications, 2007.

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PROGRAM	BE-Mining Engineering				
Course Code: UBMCCPG	**Course Name:** STRENGTH OF MATERIALS LAB	**L**	**T**	**P**	**C**
		0	0	2	1

Year and Semester	II Year (IV Semester)	Contact hours per week (2 Hrs)
Prerequisite course	NIL	

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
			✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective	1. Explain Compression test 2. Discuss various test on wood 3. Describe Hardness test on metals 4. Explain double shear & torsion 5. Describe the deflection limit of beam
Course Outcome	At the end of the course the student will be able to: 1. Determine the values of yield stress, breaking stress and ultimate stress of the given specimen under tension test. 2. Explain the procedure to perform Hardness test and finding hardness number with various specimens 3. Experiment with Deflection test on Mild Steel, Aluminium to find the young's modulus. 4. Determine the modulus of rigidity of Mild steel using torsion test 5. Identify the stiffness of the open coil and closed coil spring and grade them. 6. Experiment with given specimen to find the compression strength and fatigue strength and impact strength of materials

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3					3			3	3	3	
CO2	3	3	3	3					3			3	3	2	
CO3	3	2	2	2					3			3	3	2	
CO4	3	3	3	3					3			3	3	3	
CO5	2	2	2	2					3			3	3	2	
CO6	2	2	2	2					3			3	3	2	
Average	2.7	2.5	2.5	2.5					3			3	3	2.3	
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:
CO-Course Outcome :PSO-Programe Specific Outcome

LIST OF EXPERIMENTS

1. Tension test on mild steel rod
2. Compression test on wood
3. Double shear test on wood
4. Torsion test on mild steel rod
5. Impact test on metal specimen (Izod and Charpy)
6. Hardness test on metals (Rockwell and Brinell Hardness Tests)
7. Deflection test on metal beam
8. Compression test on helical spring
9. Deflection test on carriage spring

(24 Hrs)

REFERENCES

1. IS 432(Part I) – 1992 – Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement.

Designed by	“ Department of Mining Engineering”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

<table>
<tr><td>PROGRAM</td><td colspan="11">BE - Mining Engineering</td></tr>
<tr><td rowspan="2">Course Code
UBLECPE</td><td colspan="4" rowspan="2">Course Name :
Soft Skills-IV</td><td colspan="2">L</td><td colspan="2">T</td><td colspan="2">P</td><td>C</td></tr>
<tr><td colspan="2">0</td><td colspan="2">0</td><td colspan="2">2</td><td>2</td></tr>
<tr><td colspan="12"></td></tr>
<tr><td>Year and Semester</td><td colspan="4">II Year (IV Semester)</td><td colspan="7" rowspan="2">Contact hours per week
(2 Hrs)</td></tr>
<tr><td>Prerequisite course</td><td colspan="4">SOFT SKILL-III</td></tr>
<tr><td rowspan="2">Course category</td><td colspan="2">General</td><td colspan="2">Foundation</td><td colspan="3">Core / Professional</td><td colspan="4">Elective</td></tr>
<tr><td colspan="2">-</td><td colspan="2">-</td><td colspan="3">C- 14</td><td colspan="4">-</td></tr>
<tr><td rowspan="2">Learning outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>✓</td><td></td><td></td><td></td><td>✓</td><td></td><td></td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>Mapping of instructional Objectives with learning Outcome</td><td>1-5</td><td></td><td></td><td></td><td>1-5</td><td></td><td></td><td></td><td>1-5</td><td></td><td></td></tr>
<tr><td>Aim / Purpose of the course</td><td colspan="11">To make the students to learn the corporate culture and master the professional ethics
Prepare them to achieve their organizational goals</td></tr>
<tr><td rowspan="7">Instructional objective of the course</td><td colspan="11">Students will be able to</td></tr>
<tr><td>1</td><td colspan="10">Improvise on the usage of grammar and vocabulary in all circumstances</td></tr>
<tr><td>2</td><td colspan="10">To carry oneself expressing behavioral ethics</td></tr>
<tr><td>3</td><td colspan="10">To collaborate with individual such as to improve pronunciation</td></tr>
<tr><td>4</td><td colspan="10">To distinguish between standards and illustrate a change in listening and speaking skills.</td></tr>
<tr><td>5</td><td colspan="10">Formulating and applying various forms of written communications that are learnt.</td></tr>
<tr><td>6</td><td colspan="10">Actively participate in the class and understand concepts. Will be ready to handle large groups without any fear</td></tr>
<tr><td>Course Outcome</td><td colspan="11">At the end of the course the student will be able to:
1. Develop vocabulary and language skills relevant to engineering as a profession
2. Analyze, interpret and effectively summarize a variety of textual content
3. Organize a given technical/non-technical topic in a group setting and arrive at generalizations/consensus
4. Illustrate the Engineering activities with effective presentation and report
5. Develop various personality skills to groom in profession
6. Analyze professional and technical documents that are clear and adhering to all the necessary documents</td></tr>
</table>

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1						2		2	1	2		2			
CO2						2		2	1	2		2			
CO3						3		2	2	3		3			
CO4						3		2	2	3		3			
CO5						2		2	1	2		2			
CO6						3		2	2	3		3			
Average						2.5		2	1.5	2.5		2.5			
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			
KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome															

Training the students on basic grammar and foundation and laying the standard platform. A complete standard syllabus of Cambridge is used. The main part of the 1st semester is to cover the major tenses (Present tense, Present Continuous, Past Tense, Past Continuous, Present Perfect, and Present Perfect continuous.

UNIT II: PROFESSIONAL ETHICS 10 Hrs

How to address the gathering, people, authorities, open forum, how to conduct the meetings, huddle, calibration. Learning about organizational behaviors, achieving organizational goals, nurturing professional integrity.

UNIT III: INTERACTIVE ENGLISH 8 Hrs
(Unit 9 to Unit 16)

Second level: The main objective is English for International communication. It course contains conversations, snapshots, readings, activities, a greater variety and amount of listening materials and more visuals to introduce vocabulary, more opportunities to build fluency, and up-to-date art and design. The course covers the fours skills of listening, speaking, reading and writing, as well as improving pronunciation and building vocabulary.

UNIT IV: LISTENING AND SPEAKING

Basics of International listening, reading, writing and speaking skills. **8 Hrs**

UNIT V: WRITTEN ENGLISH 8 Hrs

How to write memos, emails, short notes, drafting of letters , requesting leave, permission, reports, requisitions, approvals and indents.

TOTAL: 40 PERIODS

TEXT BOOKS:

1. Essential Grammar in use- Raymond Murphy ,Cambridge , New Third Edition
2. Communication Skills

REFERENCE BOOKS:

1. New Interchange (English for International Communication) Jack C. Richards

Designed by “ AMET CENTRE FOR IELTS”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBMN501	**Course Name:** ROCK MECHANICS- I	**L** 3	**T** 0	**P** 0	**C** 3
Year and Semester	III Year (V Semester)	Contact hours per week (3Hrs)			
Prerequisite course	NIL				

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
			✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective

1. Define the terminologies used in rock mechanics
2. Explain the mechanical parameters of rocks
3. Illustrate the change of properties with respect to time
4. Understand The Presence Of Ground Water In Rock Matrix
5. Understand the rock and its associated properties

Course Outcome

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

1. Explain the Terminologies Used In Rock Mechanics
2. Analyze the Properties of Rocks
3. Explain the Mechanical Parameters of Rocks
4. Explain the Change of Properties with Respect to Time
5. Analyze the Presence of Ground Water In Rock Matrix
6. Describe the rock and its associated properties

POS/ COS	**PO1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**P O1 2**	**PSO1**	**PS O2**	**PSO3**
CO1	2	1		2	1								1	2	2
CO2	1		2		3								2	3	1
CO3	1	2		3		2	2						1	2	3
CO4	2	2	3	2			3						2	3	2
CO5	2		3		2			2					3	1	2
CO6	1	1	2	2						2		3	2	2	2
Average	1.5	1.5	2	2.2	2	2	3	2		2		3	1.8	2.1	2

Correlation Levels 1.Slight(Low) 2.Moderate(Medium) 3.Substantial(High)

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:
CO-Course Outcome :PSO-Programe Specific Outcome

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

UNIT I INTRODUCTION 12 Hrs

Definition of some important terms used in rock mechanics – Application of rock mechanics in mining – Introduction to stress analysis - stresses in 2D & 3D – Mohr's circle

UNIT II PHYSICAL PROPERTIES OF ROCKS AND ROCK INDICES 12 Hrs

Physical properties of rocks – Density, porosity, moisture content, permeability, water absorption – Various indices of rocks like swell index, slake durability index, impact strength index, protodynakov index, thermal conductivity, hardness, durability – Rock mass classification

UNIT III MECHANICAL PROPERTIES OF ROCKS 12 Hrs

Preparation of test specimens, laboratory determination of mechanical properties of rocks – compressive strength, tensile strength, flexural strength, shear and triaxial strength, modulus of elasticity, Poisson's ratio, Mohr's envelope – Effect of various parameters on the strength of rocks, in-situ strength, post failure behavior of rocks

UNIT: IV ROCK MASS CLASSIFICATION 12 Hrs

Engineering Rock Mass Classification: Tirzah's rock mass classification; Stand up Mine. Rock Quality Designation, Rock structure rating (RSR): Geo Mechanical Classification: Modifications to RMR for Mining: Uses of Rock Mass Classification Systems.

UNIT: V INDUCED STRESS 12 Hrs

Stress around Undergoing openings, displaced caused by undergoing openings. Stress around circular openings, Radical Stress, Tangential stress, Radial Displacement , Tangential Displacement, Stress around semi circular Openings.

TEXT BOOKS: TOTAL: 60 Hrs

Vutukuri, V.S., and Lama, R.D., Handbook on Mechanical Properties of Rocks, Vol. I, II, III and IV, Transtech Publication, Berlin, 1974/78.

1. Peng, S.S., Ground Control, Wiley Interscience, New York, 1987.

REFERENCES:

Obert, L. and Duvall, W.I., Rock Mechanics and Design of Structure in Rock John Wiley and Sons Inc., New York, 1967.

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SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBMN502	**Course Name:** SURFACE MINING	**L**	**T**	**P**	**C**
		3	0	0	3
Year and Semester	III Year (V Semester)	Contact hours per week (3Hrs)			
Prerequisite course	NIL				
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**	
			✓		
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**	
Course Objective	1. Define the terminologies used in surface mining 2. Specify the factors affecting the site selection 3. Describe the operations needed in special condition				
Course Outcome	At the end of the course the student will be able to: 1. Explain the Terminologies Used in Surface Mining 2. Discuss the Designing & Planning of Layout 3. Describe the Factors Affecting the Site Selection 4. Explain the how to Excavate the Mine Reserve 5. Understand the Operations Needed in Special Conditions 6.Apply the surface mining operations. 6.				

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	1		2		3		1		2		3	2		2
CO2	1		2		2		3	2		2	1		3	2	
CO3		2		3	2		1		2		3	2	1		2
CO4	2		3		2		3		2		3		2	2	
CO5	1	22		3		2		2		3		2	3		2
CO6	2		1		3			2		3		2	22	2	2
Average	2	1.6	2	2.6	2.2	2.5	2.3	2.3	2	2.5	2.3	2.2	2.2	2	2
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			
KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome															

UNIT I INTRODUCTION

General information and classification of Surface mining methods – associated terms, determination of major dimensions and main parameters – Annual production and life of mine – Surface mining methods **-** Scope, applicability and limitations.

UNIT II BASIC LAYOUTS

Layout planning for horizontal, inclined and steep deposits – Factors influencing the choice of layouts – Design of benches

UNIT III OPENING UP OF DEPOSITS

Box cut **-** Objective, types, parameters, methods – Factors affecting selection of box cut site – Production benches **-** formation, parameters and factors affecting their selection

UNIT IV PREPARATION FOR EXCAVATION

Ripper **-** Types, classification, applicability and limitations – Method and cycle of operation – Estimation of output – Concept of rippability – Estimation of number of drills required for a given mine production

UNIT V SPECIAL MINING SITUATION

Quarrying of dimensional stones – Hydraulicking – Dredging of placers – Mining over old underground workings.

(Total: 50 Hrs)

Text Books :

1. Kennedy, B.A., Surface Mining – 2nd Edition, SME, New York, 1990.
2. Hartman H.L., Introductory Mining Engineering, John Wiley and Sons, 2002.

Reference Books :

1. Hartman, H.L. (Ed.), SME Mining Engg. Handbook Vol. I and II, Society for Mining, Metallurgy, and Exploration, Inc., 3rd edition, 2011.
2. Mishra G.B., Surface Mining, Dhanbad Publishers, Dhanbad, 1990.
3. Pfleider, E. P, Surface Mining, 1st Edition, New York, 1968.
4. Rzhevsky V., Open pit Mining Operations, Mir Publications, 1971.
5. Das, S.K., Surface Mining Technology, Lovely Prakashan, Dhanbad, 1994.

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SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBMN503	**Course Name:** SUB SURFACE MINING FOR COAL	**L**	**T**	**P**	**C**
		4	0	0	3

Year and Semester	III Year (V Semester)	Contact hours per week (4Hrs)
Prerequisite course	NIL	

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
			✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective

1. Illustrate Coal Mining and its geological seam structure
2. Describe Bord and pillar method – development
3. Describe the extraction methods
4. Describe continuous and cyclic methods of extraction
5. Understand the rock and its associated properties

Course Outcome

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

1. Illustrate Coal Mining and its geological seam structure
2. Describe Bord and pillar method – development
3. Describe the extraction methods
4. Describe continuous and cyclic methods of extraction
5. Explain the rock and its associated properties
6. Discuss the complete details of sub surface mining for coal.

POS / COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	1		2	1								1	2	2
CO2	1		2		3								2	3	1
CO3	1	2		3		2	2						1	2	3
CO4	2	2	3	2			3						2	3	2
CO5	2		3		2			2					3	1	2
CO6	1	1	2	2						2		3	2	2	2
Average	1.5	1.5	2	2.2	2	2	3	2		2		3	1.8	2.1	2

Correlation Levels 1.Slight(Low) 2.Moderate(Medium) 3.Substantial(High)

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:
CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION **(10 Hrs)**

History of coal mining – Coal resource and their geographical distributions – Coalification and factors affecting coalification process – Modes of accumulation of coal – Formation of coal – Occurrence and distribution of coal in various stratigraphic horizons – Coal seam structure and abnormalities – geological and other features of Indian coalfields.

UNIT II BORD AND PILLAR METHOD – DEVELOPMENT **(10 Hrs)**

Design and development of a district/panel – sizes and shapes of galleries and pillars – bord and pillar, room and pillar methods – with conventional and continuous mining techniques with various equipment.

UNIT III BORD AND PILLAR METHOD – EXTRACTION **(10 Hrs)**

Pillar extraction – Caving and stowing methods – Mechanized extraction of pillars – shaft pillar extraction – systematic supports – surface, underground and face arrangements for stowing – Partial extraction.

UNIT IV LONGWALL METHOD (10 Hrs) Advance and retreat methods – continuous and cyclic systems – extraction with different machines – ploughs, shearers – design of longwall workings – optimum length of face, size of panel, gates, support system, personnel, organisation and safety measures, salvaging and relocations of equipment – Punch longwall.

UNIT V SPECIAL METHODS OF WORKING **(10 Hrs)**

Problems of working thick & thin seams – multi slices – sublevel caving – horizon mining – gallery blasting method – contiguous seam working – working steeply inclined seams – working under surface structures and seams liable to spontaneous heating – outburst and bumps – Hydraulic mining – Wongawalli – shortwall – highwall mining – Underground coal gasification – coal bed methane – shield mining.

(**TOTAL: 50 Hrs**)

TEXT BOOKS:

1. Singh, R.D. Principles and Practices of Modern Coal Mining, New Age International (P) Ltd., Chennai, 1994.
2. Peng S.S., and Chiang, H.S., Longwall Mining, John Willey and Sons, New York, 1992.

REFERENCES

1. Singh, T.N. Singh, Underground Winning of Coal – Oxford & IBH Publishing Co. Ltd.,1992.

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Course Code: UDMN504	**Course Name:** Underground Mining for metals	**L**	**T**	**P**	**C**
		4	0	0	4

Year and Semester	III Year (V Semester)	Contact hours per week (4Hrs)
Prerequisite course	NIL	

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
			✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective	1. Define the terminologies used in metal mining 2. Describe the layout using stoping 3. Discuss the recent advancements in mining and its advantages 4. Discuss the various methods of stoping 5. Describes the methods used in mineral exploitation
Course Outcome	At the end of the course the student will be able to: 1. explain the terminologies used in metal mining 2. Illustrate the design procedure for a mine 3. Describe the layout using stoping 4. Explain the various methods of stoping 5. Discuss the recent advancements in mining and its advantages 6. Describe the methods used in mineral exploitation

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1					2				3					
CO2	1					2			3						
CO3		1			2				3						
CO4		1			2			3							
CO5	1				2					3					
CO6															
Average	0.5	0.3	0	0	1	0	0	0.5	1	1	0	0	0	0	0

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:

UNIT I INTRODUCTION (9 Hrs)

Metal mining Terminology – Typical modern metal mine features – Exploration – estimation of block wise and mine wise reserves and actual production – typical pre-stoping ore block constructional features – classification of mining/stoping methods.

UNIT II GENERAL MINE DESIGN (9 Hrs)

Mode of mine and stope entry – Layouts – Determination of optimum production level – sequence of extraction – production scheduling – Basic design – Level Intervals, ore pass, common ore pass, size of blocks ore handling in stope and other openings – overview of constructional features – X cuts, Raises, Winzes.

UNIT III STOPING - GENERAL CONCEPTS (9 Hrs)

Techno-economic characteristics impacting choice of method – typical unit cost parameters – Optimum size of a mine and slope – stope layout, design, equipment selection – preparing a stoping block – organization – production cycle – unit cost calculation – comparison of methods and costs.

UNIT IV STOPING METHODS (9 Hrs)

Unsupported methods – Stope and pillar, room and pillar, shrinkage, sublevel stoping– Supported stoping – cut and fill, stull, square set – Caving methods – Top slicing, sublevel caving, block caving, case studies of indian and foreign underground metal mines – Comparison of various methods of stoping and costs.

. UNIT V ADVANCEMENTS AND SPECIAL APPLICATION (9 Hrs)

Hydraulic mining – slurry mining – solution mining – nuclear mining – Rapid excavation – Radial – axial splitter – Thermal fragmentation – shock wave breaking – Deep mining – narrow contiguous veins – Shaft and remnant pillars – VCR – Ring drilling – Large Blast hole stoping.

(Total : 45Hrs)

TEXT BOOKS:

7. Hartman, H.L., Introductory Mining Engineering, John Wiley and Sons, New York, 1987.

8. Hustrulid, W.A. Ed., Underground Mining Methods Handbook Society of Mining Engineering, AMIE, New York, 1990.

REFERENCES:

1. BICCARD J C, Gold mining in Witwatersrand, The Transvaal chamber of mines, Volume I, II, 1946

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SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE- Mining Engineering				
Course Code: UBMN506	**Course Name:** **Rock excavation Engineering**	**L** 3	**T** 0	**P** 0	**C** 3
Year and Semester	III Year (V SEMESTER)	Contact hours per week (3Hrs)			
Prerequisite course	NIL				
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**	
				✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**	
Course Objective	1. Study about Ore and economic block model and ultimate pit limit calculations. 2. Students must know about Ore reserve estimation techniques and different drilling techniques during exploration. 3. Students should have basic knowledge about break even analysis and economic appraisal of mining projects during feasibility studies. 4. Students enhance their knowledge on different explosives, initiators, initiation sequence and blast design calculations. 5. Recent developments in surface mining methods and their applicability in different scenarios are studied briefly.				
Course Outcome	At the end of the course the student will be able to: 1. Understand the economic block model in manual and computer methods 2. Explain about various the geotechnical parameters role in slope stability 3. Describe the production and equipment planning opencast mines 4. Realize the importance of various explosives, initiators and significance of initiation sequence. 5. Discuss the modern trends in opencast mines. 6. Students learn about recent advancement.				

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		3		1		2					1	2		1
CO2	2				2		1	3					3	2	
CO3	3		3				2			2		1			3
CO4	2				2		1	3					3	2	
CO5	3		3		1		2					1	1		2
CO6		2		3		1		2		3	2		1		1

Average	2.17	0.33	1.50	0.50	1.00	0.17	1.33	1.33	0.00	0.83	0.33	0.50	1.67	0.67	1.17
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ;
PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome

UNIT -I: Pit Planning (9 Hrs)

Development of economic block model; Pit cut-off grade and its estimation; Ultimate pit configuration and its determination – hand method, floating cone technique, Lerchs-Grossmann algorithm, and computer assisted hand method. Addition of haul road on pit plan; Pit layouts. Open-pit optimization techniques for mine geometry and output, mine development phases, quality control Output and manpower planning; calendar planning, mine scheduling, production scheduling, truck dispatch system; Feasibility Report, DPR-contents and preparation.

UNIT -II: Geotechnical Parameters (9 Hrs)

Influence of pit slope on mine economics; High wall slope stability analysis and design methodology; stability analysis and design methodology for waste dumps; Application of geotechnical investigation for design of ultimate pit slope and other design parameters. Numerical problems on slope stability analysis including mine waste rock dumps and tailing dumps.

UNIT -III: Production and Equipment Planning (9 Hrs)

Determination of mine size and sequencing by nested pits; Cash flow calculations; mine and mill plant sizing; Production scheduling. Stockpiling and blending, Spreaders and Reclaimers; computerized truck dispatch.

Selection of mining system vis-à-vis equipment system; Computations for the capacity and number of machines vis-à-vis mine production. Machine availability, productivity, maintenance scheduling, preventive maintenance, control and monitoring inventory. Workshops for HEMM. Power supply arrangements in opencast mines.

UNIT -IV: Health, Safety and Environmental Management (9 Hrs)

Occupational health hazards due to mine dust, poor lighting and ventilation, noise and vibration, radioactive emission; Impact of surface subsidence; Accidents in Surface mining and their prevention; Sources of water, assessment of drainage requirements, sump design and drainage patterns - pumping systems. Pre-drainage through diversion channels and boreholes; Water pollution, Methods of reclamation of mined out areas, dumps and tailing ponds, environmental audit. Socio-economic factors in surface mines.

UNIT -V: Modern Trends in Opencast Mines (9 Hrs)

Recent developments in mining methods and layouts. In pit crushing & conveying, continuous surface mining. Selective extraction and dumping. Extraction of seams developed/extracted by underground methods. Deep Open pit Mining; Placer mining and solution mining – scope of applicability, sequence of development and machinery; Closure of surface mines.

TEXT BOOKS :

1. W. Hustrulid, M. Kuchta and R. Martin, Open Pit Mine Planning & Design.
2. Fundamentals of Open Pit Mine Planning & Design: Hustrulid, W. and Kuchta, M.
3. Surface Mining : Kennedy, B.A., 2nd Edition, SME, New York, 1990.
4. Surface Mining Technology, : Das, S.K., Lovely Prakashan, Dhanbad, 1994.
5. SME Mining Engg. Hand book Vol.I and II: Cummings, A.B. and Given, I.V., New York

REFERENCES:

1. SME Mining hand book I,II
2. S. k. Das Surface mining technology.

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SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBMN507	Methods of Excavation and Transport	L 3	T 0	P 0	C 3

Year and Semester	III Year (V Semester)		Contact hours per week (3Hrs)	
Prerequisite course	NIL			
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
				✓
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective

1. Define the types of transportation of mineral ore
2. Describe the batch process of excavation of a rock
3. Explain the methods used in channeling of rock
4. Discuss the calculation of production by various methods
5. Describe the step-wise process in transportation of mineral

Course Outcome

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

1. Explain the Terminologies Used in Surface Mining
2. Explain the Designing & Planning of Layout
3. Discuss the Factors Affecting the Site Selection
4. Describe the Excavate the Mine Reserve
5. Explain the Operations Needed in Special Conditions
6. Illustrate the surface mining operationS

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	2	1		2		3		1		2		3	2		2
CO2	1		2		2		3	2		2	1		3	2	
CO3		2		3	2		1		2		3	2	1		2
CO4	2		3		2		3		2		3		2	2	
CO5	1	22		3		2		2		3		2	3		2
CO6	2		1		3			2		3		2	22	2	2
Aver age	2	1.6	2	2.6	2.2	2.5	2.3	2.3	2	2.5	2.3	2.2	2.2	2	2
Correlation Levels			1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)				

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:
CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION (10 Hrs)

Modes of excavation and transportation – Cyclic – continuous – semi-continuous – Scrapers – dozers – conveyors.

UNIT II CYCLIC METHODS OF EXCAVATION (10 Hrs) Shovel-dumper operation – Applicability and limitations of electric shovel – hydraulic excavators and dumpers – Cycle time and productivity calculation for shovel and dumper – Estimation for equipment required for a given mine production – Dragline operation - Applicability and limitations – different modes of operation – Side cast diagram and calculation of reach – Cycle time and productivity calculation – Calculation of required bucket capacity for a given handling requirement.

UNIT III CYCLIC METHODS OF TRANSPORT

Scrapers, Dozers, Front-end-loaders – Applicabilit And limitations Types and classification – Method and cycle of operation. **(10 Hrs**

UNIT IV CONTINUOUS METHODS OF EXCAVATION & TRANSPORT (10 Hrs)

Bucket wheel excavators – Applications and limitations – Types and principles of operation – Operational methods – half block method, full block method – Calculation of productivity – Continuous surface miners – Types, Applications and limitations, principles of operation – Operational methods – full bench method, block mining method, stepped cut method, empty travel back method, continuous mining method – Conveyors – Shiftable and high angle conveyors – Mode of operation – applicability and limitations – Merits and demerits of conveyor as a system of transportation.

UNIT V SEMI-CONTINUOUS METHODS OF EXCAVATION & TRANSPORT (10 Hrs) Continuous excavation and partly/fully cyclic transport system – Different methods and applicability & limitations – Cyclic excavation and partly/fully continuous transport system – Different in-pit crushing and conveying and their respective applicability & limitations.

(**TOTAL: 50 Hrs**)

TEXT BOOKS:

1. Kennedy, B.A., Surface Mining – 2nd Edition, SME, New York, 1990.
2. Hartman H.L., Introductory Mining Engineering, John Wiley and Sons, 2002.

REFERENCES:

1. Hartman, H.L. (Ed.), SME Mining Engg. Handbook Vol. I and II, Society for Mining, Metallurgy, and Exploration, Inc., 3rd edition, 2011.

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SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBMN508	**MINERAL RESOURCES OF INDIA**	L	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	III Year (V Semester)	Contact hours per week (3Hrs)			
Prerequisite course	NIL				
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**	
			✓		
Course Objective	1. Define the properties of metallic and non-metallic minerals 2. Discuss the PSU and its role in mining 3. Discuss the PSU and its role in mining 4. Understand the regulatory frame of mineral authority in India 5. Understand the distribution of mineral resources in India				
Course Outcome	At the end of the course the student will be able to: 1. Explain the properties of metallic and non-metallic minerals 2. Explain the regulatory frame of mineral authority in India 3. Explain the PSU and its role in mining 4. Explain the distribution of mineral resources in India 5. Explain the PSU and its role in mining 6. Explain the outline of mineral and its regulating authority				

POS/ COS	**PO 1**	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PS O1**	**PS O2**	**PSO3**
CO1	2	1		2		3		1		2		3	2		2
CO2	1		2		2		3	2		2	1		3	2	
CO3		2		3	2		1		2		3	2	1		2
CO4	2		3		2		3		2		3		2	2	
CO5	1	2		3		2		2		3		2	3		2
CO6	2		1		3			2		3		2	2	2	2
Averag	2	1.6	2	2.6	2.2	2.5	2.3	2.3	2	2.5	2.3	2.2	2.2	2	2

e															

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:
CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION (09 Hrs)

Minerals – Physical properties of minerals – Metallic and Non-metallic minerals – Distribution of minerals.

UNIT II GOVERNING BODY OF MINERALS IN INDIA (09 Hrs)

Ministry of Mines - Organisational structure – Cabinet minister – Minister of state – Secretary – Financial advisor – Director - Geological Survey of India - Indian Bureau of Mines.

UNIT III PUBLIC SECTOR COMPANIES & INSTITUTIONS (09 Hrs)

National Aluminium Company Limited (NALCO), Bhubaneswar - Hindustan Copper Limited (HCL), Kolkata - Mineral Exploration Corporation Limited (MECL), Nagpur - Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC), Nagpur - National Institute of Rock Mechanics (NIRM), Kolar Gold Fields, Karnataka - National Institute of Miners' Health (NIMH), Nagpur.

UNIT IV MINERAL RESOURCES (09 Hrs)

Occurrence - Mineral fuels - Coal & lignite – Petroleum - Metallic Minerals – Bauxite Chromite - Iron ore - Manganese ore - Industrial Minerals – Barytes - Kyanite, andalusite & sillimanite – Magnesite - Apatite & rock phosphate - Talc/steatite/ pyrophyllite – Mica.

UNIT V METAL MINERAL RESOURCES (09 Hrs)

Occurrence – Aluminium – Copper – Steel – Lead – Zinc – Gold

TEXT BOOKS:

1. NCERT E books on mining.
2. S.Krishnaswamy Indian mineral resources

REFERENCES:

1. Geological Survey of India
2. United States Geological Survey

Designed by	" Department of Mining Engineering"

AMET
ACADEMY OF MARITIME EDUCATION AND TRAINING
DEEMED TO BE UNIVERSITY
(Under Section 3 of UGC Act 1956)

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BEMning Engineering				
Course Code: UBMN5PA	COURSE NAME: ROCK MECHANICS LAB I	**L**	**T**	**P**	**C**
		0	0	2	1

Year and Semester	III Year (V Semester)		Contact hours per week (2Hrs)	
Prerequisite course	NIL			
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
			✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective	1. Analyze the Hardness of Rock 2. Determine the Porosity of rocks 3. Illustrate the Impact Strength Index of rocks 4. The Water Absorption In Rocks 5. The Tensile Strength In Rocks
Course Outcome	Students will be able to understand the 1. Discuss the Hardness Of Rock 2. Discuss the Porosity Of Rocks 3. Explain the Water Absorption In Rocks 4. Explain the Tensile Strength In Rocks **5.** Discuss the Velocities Using Non-Destructive Testing **6.** Discuss the Impact Strength Index of rocks

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	2	1		2		3		2			1		2		1
CO2		2	2		1	2		2		1		2		2	2
CO3	2	2		3		1	2		2	3		2	2		2
CO4	2		3		2		2		1		1	2		2	2
CO5	1		3		2		2			2		2		2	
CO6	1	2		1		3			2		2		3		2
Average	1.6	1.7	2.6	2	1.6	2.2	2	2	1.6	2	1.3	2	2.3	2	1.8
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:
CO-Course Outcome :PSO-Programe Specific Outcome

List of Experiments

DETERMINATION OF

1. RQD of rocks
2. Protodyaknov index of rocks
3. Point load index strength of rock
4. Porosity of rocks
5. Water abosorption of rocks
6. Impact strength index.
7. Hardness of rocks by different methods
8. Uni-axial compressive strength of dry and water saturated rock samples
9. Tensile strength of rock using Brazilian test method
10. Flextural Strength of rocks
11. Tri-axial strength of rock and drawing of Mohr’s envelope
12. Determination of longitudinal wave velocities of rocks using NDT
13. Determination of longitudinal wave velocities of rocks using NDT

Reference Books

1) Vutukuri, V.S., and Lama, R.D., Handbook on Mechanical Properties of Rocks, Vol. I, II, III and IV, Transtech Publication, Berlin, 1974/78.
2) Peng, S.S., Ground Control, Wiley Interscience, New York, 1987.
3) Hoek, E and Brown, E.T., Underground Excavations in Rocks, Institute of Mining Metallurgy, London, 1980.

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SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBMN5PB	MINI PROJECT	**L**	**T**	**P**	**C**
		0	0	4	2

Year and Semester	III Year (V SEMESTER)	Contact hours per week (2Hrs)
Prerequisite course	NIL	

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
	Basic Science	**Engineering Science**	[✓ **Open Elective**]	**Mandatory**

Course Objective

1. Define the problem
2. Discuss the factors influencing it
3. Understand the principals involved
4. Understand the problem solving procedure
5. Understand the remedial methods.

Course Outcome

After completion of the portion students will be able to understand

1. Explain the problem
2. Explain the factors influencing it
3. Explain the principals involved
4. Explain the problem solving procedure
5. Explain the remedial methods.
6. Explain the result of the mini project

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	-	3	2	3	-	-	2	3	2	2	1	1
CO2	3	2	2	2	2	-	2	-	-	-	2	1	1	2	1
CO3	2	3	2	2	-	-	2	-	-	2	2	1	2	2	2
CO4	2	2	1	3	-	2	2	-	-	1	3	1	2	1	1
CO5	2	1	2	2	3	3	2	-	-	2	2	2	2	1	1
CO6	2	1	2	1	2	3	3	-	-	2	3	2	3	2	1
Average	2.1	1.8	1.6	1.8	2.5	2	2.33	-	-	2.2	2.5	1.5	2	1.5	1.1

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO - Programe Outcome: CO-Course Outcome :PSO - Programe Specific Outcome

Designed By: Department of Mining Engineering

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBMN601	COURSE NAME: ROCK MECHANICS II	**L**	**T**	**P**	**C**
		3	0	0	3

Year and Semester	III YEAR (VI SEMESTER)	Contact hours per week (3Hrs)
Prerequisite course	Rock mechanics-I	

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
			✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective

1. Discuss the various failure mode analysis
2. Explain the design parameters in underground mines
3. Describe the methods & application of stowing
4. Understand the basics of hydraulic rock mechanics
5. Understand the various physical phenomenon in rock mechanics

Course Outcome

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

1. Discuss the various failure mode analysis
2. Explain the design parameters in underground mines
3. Describe the methods & application of stowing
4. Briefly explain the basics of hydraulic rock mechanics
5. Explain the methods & application of stowing

POS / COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2		1	3		2			2				2	1	3
CO2		2	2		1		3			2		2		2	2
CO3	2	1		3		2		3		2	1		2		1
CO4	2	1		2	3				3		1		2	3	
CO5	1	3		2		3		2		1		2	1	2	3
CO6	1	2		3	2		3		2		2		2	2	1
Average	1.6	1.8	1.5	2.6	2	2.3	2.6	2.5	2.3	1.6	1.3	2	1.8	2	2
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:
CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION (10 Hrs)

Convergence indicators - load cells - strain gauges - flat jacks – LVDT - dial gauges - pressure cells and recorder - anchorage testing equipment - laboratory and in situ measurements - hydraulic fracturing rock mechanics instrumentation for B & P and longwall workings.

UNIT II PIT SLOPE STABILITY & SUBSIDENCE (10 Hrs)

Approach to slope stability – slope measurements – different types of slope failures – factors affecting slope stability – introduction to methods of failure, analysis, determination of factor of safety – introduction to different rock slope stabilisation techniques – Theories of subsidence – factors affecting subsidence – subsidence surveys – subsidence prediction techniques – subsidence control – surface and underground measures, pseudo-mining damage.

UNIT III THEORIES OF FAILURE OF ROCKS & PILLAR DESIGN AND ROCK BURST (10Hrs)

Different theories of failure of rocks – modes of failure – Griffith, Coulumb-Navier, Mohr's, Hoek-Brown, empirical criteria and their field of applications – Strength of pillars, barrier and shaft pillar design – load estimation, factor of safety, various formulae, rock burst and bumps – phenomena, causes, prediction, monitoring and control, gas outbursts.

UNIT IV DESIGN OF UNDERGROUND WORKINGS (10 Hrs)

Stress distribution in underground workings including bord and pillar and longwall workings – rock load assessment – introduction to numerical methods of geomechanics – scaled model studies – principles of modelling.

UNIT V STOWING (10 Hrs)

Selection and preparation of stowing materials – principal methods of stowing – collection – fields of application and limitations – preparation and transport of materials – surface, underground and face arrangements – design of stowing plants.

(Total: 50 Hrs)

TEXT BOOKS:

1. Obert, L. and Duvall, W.I., Rock Mechanics and Design of Structure in Rock John Wiley and Sons Inc., New York, 1967.
2. Vutukuri, V.S. and Lama, R.D., Handbook on Mechanical Properties of Rocks, Vol.I, II, III and IV, Transtech Publication Berlin, 1974/78.

REFERENCES:

1. Brady, B.H.G. and Brown, S.T., Rock Mechanics, Wiley Interscience, 1985.
2. Hoek, E and Brown, E.T., Underground Excavations in Rocks, Institute of Mining Metallurgy, London, 1980.
3. Peng, S.S. Ground Control, Wiley Interscience, New York, 1987.

Jumkis, A.R. Rock Mechanics, Transtech Publications, Berlin,

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SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE- Mining Engineering					
Course Code: UBMN602	COURSE NAME: SURFACE MINE PLANNING AND DESIGN		**L**	**T**	**P**	**C**
			3	1	0	3
Year and Semester	III Year (VI SEMESTER)		Contact hours per week (4Hrs)			
Prerequisite course	NIL					
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**		**Professional Elective**	
			✓			
	Basic Science	**Engineering Science**	**Open Elective**		**Mandatory**	
Course Objective	1. To understand the planning of opencast & underground mines 2. To understand the fundamental principles of mine planning and design. 3. To study about effective equipment utilization. 4. To study project implementation and monitoring. 5. To enhance knowledge on designing of high wall, waste dump and haul roads.					
Course Outcome	At the end of the course the student will be able to: 1. Describe the steps involved in mining 2. Discuss the estimation of ore in a given location 3. Design a layout for mining. 4. Describe the production projection of a mine 5. Discuss the facilities required to fasten the project 6. Explain the parameters involved in planning a mine					

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2		3		1				1	1	1	3	2
CO2	2	2		2		1		2		1			2	2	
CO3	2		1		3				1			2	1	3	2
CO4	2			2							1		1	2	
CO5	3				3				1			1	2	3	2
CO6	2	1	1		2		1		1		2		1	2	1
Average	2.33	0.67	0.67	0.67	1.83	0.17	0.33	0.33	0.50	0.17	0.67	0.67	1.33	2.50	1.17
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ;
PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome

UNIT I INTRODUCTION (12 Hrs)

Stages of mine life – Preliminary evaluation of surface mining prospects – Mine planning and its importance – Mining revenues and costs and their estimation – Mine planning components – Planning steps and planning inputs.

UNIT II ORE RESERVE ESTIMATION (12 Hrs)

Ore zone and bench compositing – Objectives and principles of ore reserve estimation - Estimation of grade at unknown point – Methods of ore reserve estimation – vertical cross section method, horizontal cross section method and 3-D geological block method – Stripping ratio – Concept of stripping ratio – Types of stripping ratios and their significance – Choice between surface and underground mining.

UNIT III GEOMETRICAL CONSIDERATIONS AND PIT PLANNING (12 Hrs)

Basic bench geometry – Ore access – pit slope geometry – addition of haul road on pit plan – pit layouts – Pit Planning – Development of economic block model – Pit Cut-off grade and its estimation – Ultimate pit configuration and its determination – hand method, floating cone technique, Lerchs-Grossmann algorithm and computer assisted hand method.

UNIT IV PRODUCTION PLANNING (12 Hrs)

Determination of optimum mine size and Taylor's mine life rule – Sequencing by nested pits – Cash flow calculations – Mine and mill plant sizing – Lanes algorithm for estimation of optimum mill cut of grade – Introduction to production scheduling.

UNIT V DESIGN OF HIGHWALL SLOPES, WASTE DUMPS AND HAUL ROADS (12 Hrs)

Influence of pit slope on mine economics – Highwall slope stability analysis and design methodology – Stability analysis and design methodology for waste dumps – Design of road cross section – Design of road width, curves and gradient – Haul road safety features and their design.

(Total: 60 Hrs)

Text Books:

1. Jayanth Bhattacharya, Principles of Mine Planning-Allied Publishers, Delhi 2003.
2. Hustrulid, W. and Kuchta, M., (eds), Fundamentals of Open pit Mine Planning and Design, Elsevier, 1995.

REFERENCES

1. Ehrenburger, V and Fajkos, A., Mining Modelling, Elsevier, 1995.
2. Bawden, W.F., and Archibald., J.F., Innovative Mine Design for the 21st Century
3. Christoper J. Bise, Mining Engineering Analysis, 2nd Edition, Society for Mining, Metallurgy, and Exploration, 2003.
4. Pazdziora, J., Design of Underground Hard Coal Mines, Elsevier, 1988.
5. Swilski, and Richards, Underground Hard Coal Mines, Elsevier, 1986.
6. Singh, B. and Pal Roy, P., Blasting in Underground excavations and mines, CMRS Dhanbad, 1993.
7. Peng, S.S. and Chaing, H.S., Longwall Mining, John Wiley & Sons, New York, 1984.

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SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE - Mining Engineering				
Course Code	Course Name :	**L**	**T**	**P**	**C**
UBMN606	MATERIAL HANDLING	3	0	0	3
Year and Semester	III Year (VI Semester)	Contact hours per week (3 Hrs)			
Prerequisite course	NIL				

Course category				
	Humanities and Social Sciences	**Management courses**	**Professional Core**	**Professional Elective**
				✓
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Instructional objective of the course	Students will be able to	
	1	Define the various process in handling of ore
	2	Describe the transportation of ore for shorter distance
	3	Discuss the components of conveyor system
	4	Explain the various types of conveyers used in transportation
	5	Describe the materials required in mining industry
	6	Illustrate the various types of materials used in processing and transportation.

Course Outcome

At the end of the course the student will be able to:
1. Explain the methods and growth in rock excavation systems
2. Describe the properties related to rock excavation process
3. Explain the various methods used in the cutting of rocks
4. Summarize the tools employed in excavation process
5. Describe the tools employed in excavation process
6. Explain the Rock cutting tool materials

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2		3		1				1	1	3		2
CO2	2	2		2		1		2		1			3		
CO3	2		1		3				1			2	3		2
CO4	2			2							1		3		
CO5	3				3				1			1	3		2
CO6	2		1		1	2	2		1	2	1	2		1	
Average	2.33	0.50	0.67	0.67	1.67	0.50	0.50	0.33	0.50	0.50	0.50	1.00	2.50	0.17	1.00
Correlation Levels			1.Slight(Low)					2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ;
PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome

UNIT-I INTRODUCTION

Basic principles in material handling exclusive to mining industry and its benefits. Classification of material handling equipments. Current state of art of bulk handling materials in mining in the world and Indian scenario; Selection of suitable types of systems for application. Stacking, blending, reclaiming and wagon loading, machinery and systems used at the stack yards; stock piles, silos, bunkers – their design, reclamation from them, various types of weigh bridges. Segregation - size wise and grade wise, Railway sidings.

UNIT II CONVEYORS HAULAGE SYSTEMS (10 Hrs)

Roller conveyor, overhead conveyor, screw conveyor, auger conveyor, apron feeder, bucket elevators, scraper haulage, conveyors in steep gradient, Armoured face conveyor, Off-highway Trucks, haul roads, In-pit crushers and modular conveyors, electric trolley assisted haulage, shuttle cars, skip hoist, winders, pneumatic conveying, hydraulic transport.

UNIT III ROPE HAULAGE SYSTEM (10 Hrs)

Rail track and tubs – gauge, layout, curves, turnouts and cross-over – track maintenance – main features of rolling stock like tubs, mine cars, man riding cars and tripplers – Types of rope haulages – merits, demerits and fields of application, constructional features, safety appliances and rope haulage

UNIT IV AERIAL ROPEWAY SYSTEMS (10 Hrs)

Curved conveyors, cable belts, pipe conveyors, rock belts – mine-run-rock conveyor, steel belt conveyors, steel slot conveyor, chain belt conveyors, etc., and other new developments, stackers and reclaimers, High Angle Conveyors (HAC); New inventions in HAC , Mobile or fixed installations; Woven wire belts, En Masse conveyor, Vibrating conveyor, gravity bucket conveyor.

UNIT V MATERIAL HANDLING IN MINES, PLANTS AND WORKSHOPS (10 Hrs)

Locomotives – diesel, trolley-wire, battery locomotives, constructional features and safety devices and comparison of different types – underground and surface battery charging stations and safety measures – locomotive calculations – shuttle cars, underground trucks, load-haul dumpers, SDL vehicles, aerial rope ways, gravity transport, principles of hydraulic & pneumatic transportation and their field of application, electric layouts, man-riding systems.

(Total: 50 Hrs)

TEXT BOOKS:

1. Allegri (Sr.), T.H., Material Handling – Principles and Practices, CBS Publishers and Distributors, Delhi, 1987.
2. Hustrulid, W., and Kuchta, M. Open Pit Mine Planning & Design, Vol. 1, Fundamentals, Balkema, Rotterdam, 1998.

REFERENCES:

1. Kennedy, B.A., Surface Mining – 2nd Edition, SME, New York, 1990.
2. Deshmukh, D.J., Elements of Mining Technology, Vol.I, II and III, EMDEE Publishers, Nagpur, 1979.
3. Peng, S.S., and Chiang, H.S., Longwall Mining, John Wiley and Sons, New York, 1984.

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SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE- Mining Engineering				
Course Code: UBMN603	COURSE NAME: MINING MACHINERY I	L	T	P	C
		4	0	0	3

Year and Semester	III Year (VI SEMESTER)		Contact hours per week (4Hrs)	
Prerequisite course	NIL			
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
			✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective

1. Illustrate the auxiliary equipment’s in Mining
2. Describe the transportation of ore by wireline modes
3. To study the various modes of transport means and electrical circuits.
4. To study the types of pumps, installations and design calculations.
5. To understand the electrical layouts and power distribution in mine

Course Outcome

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

1. Explain the auxiliary equipment’s in Mining
2. Discuss the transportation of ore by wireline modes
3. Explain the locomotives used in mining
4. Describe the various types of drives used in mine operation
5. Explain the mine communication system
6. Summarize the mechanical & electrical machineries involved in mining

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		2			3				1			3	1	2
CO2		2			2			3			2		2		1
CO3	1		2		2		1		2		3		3		1
CO4		1								2			2	2	1
CO5			2		2		1		3				3		1
CO6		2			2		2	2	2			2		1	
Average	0.33	0.83	1.00	0.00	1.33	0.50	0.67	0.83	1.17	0.50	0.83	0.33	2.17	0.67	1.00

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ;
PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome

UNIT I INTRODUCTION (12 Hrs)

Compressed air – transmission and distribution in mines – compressed air drills – Elements of the transport system – Classification and techno-economic indices – Wire ropes - classification, construction, fields of application, rope capping and splicing, deterioration of rope in use and its prevention.

UNIT II ROPE HAULAGE (12 Hrs)

Rail track and tubs – gauge, layout, curves, turnouts and cross-over – track maintenance – main features of rolling stock like tubs, mine cars, man riding cars and tripplers – Types of rope haulages – merits, demerits and fields of application, constructional features, safety appliances and rope haulage calculations.

UNIT III TRANSPORT SYSTEMS (12 Hrs)

Locomotives – diesel, trolley-wire, battery locomotives, constructional features and safety devices and comparison of different types – underground and surface battery charging stations and safety measures– locomotive calculations – shuttle cars, underground trucks, load-haul dumpers, SDL vehicles, aerial rope ways, gravity transport, principles of hydraulic & pneumatic transportation and their field of application, electric layouts, man-riding systems.

UNIT IV PUMPING & CONVEYING (12 Hrs)

Different types of drives – installation and maintenance of pumps and pipes in shafts and roadways, electrical layouts, various sources of water in mines, design of sumps – Face haulage and conveyors – Various types of conveyors – Scraper chain conveyors, AFCs, belt conveyor, cable belt conveyor, shaking and vibrating conveyors, armoured flexible conveyors, high angle conveying, electrical layouts.

UNIT V MINE ELECTRICAL ENGINEERING (12 Hrs)

Distribution of electrical power in mines – types of mine cables and their fields of applications – mining switch gears and their installation in hazardous atmosphere, flame proof enclosures, intrinsically safe circuits, safety aspects and signalling – Mine telephone system and latest development in mine communications.

(Total: 60 Hrs)

TEXT BOOKS

1. Cherkassky, B.M., Pumps, Fans, Compressors, MIR Publishers, 1980.
2. Walker, S.C., Mine Winding and Transport, Elsevier, 1988.

REFERENCES:

1. Karelin N.T., Mine Transport, Orient Longmans, N. Delhi.

Mining, Vol. I, II, III and IV, Caxton Eastern Agencies, Calcutta

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering

Course Code: UBMN604	COURSE NAME: MINE LEGISLATION AND SAFETY	**L**	**T**	**P**	**C**
		4	0	0	3

Year and Semester	III Year (VI SEMESTER)	Contact hours per week (4Hrs)
Prerequisite course	NIL	

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
			✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective	1. To study various acts, rules and regulations relating to the mineral industry 2. To study in-depth about mine legislation. 3. To study in particular about the laws applicable to mining. 4. To study about accidents and diseases 5. To learn about mine safety.
Course Outcome	At the end of the course the student will be able to: 1. Briefly explain the laws imposed by government on mining 2. Discuss the acts passed towards coal &amp; metal mining 3. Explain the laws which passed towards the benefits of workers 4. Describe the possibilities of accidents &amp; diseases caused to mining workers. 5. Describe the safety procedure for safe mining Illustrate the legal &amp; safety aspects in mining operation 6. Explain the role of mine safety.

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2		3		1				1	1	1	3	2
CO2	2	2		2		1		2		1			2	2	
CO3	2		1		3				1			2	1	3	2
CO4	2			2							1		1	2	
CO5	3				3				1			1	2	3	2
CO6	2		2	1		2	1	2		1	2	2	1	1	1
Average	2.33	0.50	0.83	0.83	1.50	0.50	0.33	0.67	0.33	0.33	0.67	1.00	1.33	2.33	1.17
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ;
PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome

UNIT I INTRODUCTION (10 Hr)

General principles of mining laws- development of mining legislation of India – Enactment of various statues and by- laws

UNIT II MINE LIGISLATION (10 Hr)

The Mines Act, 1952 – The Coal Mines Regulations, 1957 – The Metalliferous Mines Regulations, 1961 – The Mine Rules, 1955

UNIT III LAWS APPLICABLE TO MINING (10 Hrs)

Indian electricity rules – coal mines conservation and development act – Workman’s compensation act – General provisions of Mines and Mineral Regulation and Development Act – Mineral Concession rules – Vocational training rules – Creche rules – Maternity benefit Act – Payment of Wages Act – Gratuity and P.F. Rules – Explosives act – Rescue Rules – Factories Act.

UNIT IV ACCIDENTS AND DISEASES (10 Hrs)

Accidents – classification, causes and prevention – Statistics of fatal and serious accidents – Frequency and severity rates of accidents – Place-wise and Cause-wise analysis – Investigations into accidents and accident reports – Cost of accidents **-** Occupational hazards of mining and miner’s diseases and their social effects.

UNIT V MINE SAFETY (10 Hrs)

Role of management – labour and government – Safety audit – Instrumentation – Safety management system – Risk identification and management – Organisation for disaster Management in mines Safety measures.

(Total: 50 Hrs)

TEXT BOOKS:

1. Coal Mines Regulations, 1961, Lovely Prakashan, Dhanbad, 1995.
2. Metal Mines Regulations, 1961, Lovely Prakashan, Dhanbad, 1995.

REFERENCES

1. Mines Act 1952, Lovely Prakashan, Dhanbad, 1995.
2. DGMS Circulars, By National Council of Safety in Mines, Dhanbad, 1995.
3. Mines rules, 1955, Lovely Prakashan, Dhanbad, 1995.
4. The Mines Rescue Rules, 1986, Lovely Prakashan, Dhanbad, 1995.
5. The Indian Electricity Rules, 1995, Lovely Prakashan, Dhanbad, 1995.
6. The Payment of Wages Act, 1936, Ram Narain Lal Beni Prasad, 1995.
7. Vocational Training Rules, Lovely Prakashan, Dhanbad, 1995.
8. The Workmen’s compensation Act, 1923, Ram Narainlal Beni Prasad, Allahabad, 1995.

Designed by: Department of Mining Engineering

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBMN605	COURSE NAME: ADVANCED ROCK BLASTING TECHNOLOGY	**L** 3	**T** 0	**P** 0	**C** 3
Year and Semester	III Year (VI SEMESTER)	Contact hours per week (3Hrs)			
Prerequisite course	NIL				

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
			✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective	1. Describe the methods and growth in rock excavation systems 2.Describe the tools employed in excavation process 3.Describe the Rock properties related to excavation process 4.Undestand rock excavation by cutting action 5.Understand the Rock cutting tool materials
Course Outcome	At the end of the course the student will be able to: 1. Explain the methods and growth in rock excavation systems 2. Describe the properties related to rock excavation process 3. Briefly explain the various methods used in the cutting of rocks 4. Explain the tools employed in excavation process 5. Describe the tools employed in excavation process 6. Explain the Rock cutting tool materials.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSC
	3	1	2		3		1				1	1	3		2
	2	2		2		1		2		1			3		
	2		1		3				1			2	3		2
	2			2							1		3		
	3				3				1			1	3		2
	2		1		1	2	2		1	2	1	2		1	
age	2.33	0.50	0.67	0.67	1.67	0.50	0.50	0.33	0.50	0.50	0.50	1.00	2.50	0.17	

elation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ;
Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome

UNIT I EXPLOSIVES AND ACCESSORIES (10 Hrs)
Emerging trends in explosives, initiating system and blasting techniques; Bulk Blasting agents & Mode of Bulk Delivery Sy Performance testing of explosives and accessories; Scattering in Delay timing of delay detonator.

UNIT II TRENDS IN SURFACE AND UNDERGROUND BLASTING TECHNIQUES (10 Hrs) Theories of rock breaka Mechanics of rock fragmentation due to blasting; Recent advances in blasting techniques in both underground and surface min Cast blasting for improved mine economics; Blast optimization in surface mines. Blasting in opencast coal mines of developed galleries. Economic evaluation of blasting operations. Tunnel blast designs, Tunnel breakthrough under water.

UNIT III INSTRUMENTATION FOR BLAST PERFORMANCE MONITORING (10 Hrs)
Fragmentation prediction and assessment, Instrumentation and software application for design of blast round, Deep hole blasti Hot hole blasting. Instrumentation in Blasting – V.O.D probe, Laser Profiler, Vibration monitoring, High speed video ca Stemming plug etc.

UNIT IV ENVIRONMENTAL CONTROL AND SAFETY IN BLASTING (10 Hrs)
Blasting damages – Micro and macro level damages due to blasting; Ground vibrations, flyrock and air over pressure. Influe Blasting on surface structures and underground workings; Safety during blasting

UNIT V EMERGING BLASTING TECHNIQUES (10 Hrs)
Special Blasting techniques – Road Construction, Dimension stone blasting, Underwater Blasting; Air-Decking & Baby- techniques; Novel Blasting Techniques in Surface and underground construction; Demolition blasting; Shaft sinking in Popula (City), Underground storage construction. Intelligent blast design, blast economics, computer applications in blasting.

(**TOTAL: 50 Hrs**)

TEXT BOOKS:

1. Pal Roy, Piyush,(2015), Rock Blasting: Effects and Operations, CRC Press, 380p, 3rd Edition, 2015.
2. Johansen, John and Mathiesen, C.F., (2000), Modern Trends in Tunnelling and Blast Design, AA Balkema, 154p, 2000.

REFERENCES:

1. William A, Hustrulid, (1999), Blasting Principles for Open pit mining, A.A.Balkema.
2. Bhandari S., (1997), Engineering Rock Blasting Operations, AA Balkema Rotterdam, Netherlands, p.375.
3. Per-Anders Persson, Roger Holmberg, Jaimin Lee, (1993), Rock blasting and explosives Engineering, CRC Press, p.560.
4. Ghose, A.K and Joshi, A (Ed), (2013), Blasting in Mining – New Trends, CRC Press, 2013.

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering			
Course Code: UBMN607	**COURSE FILE:** FUNDAMENTALS OF DRILLING TECHNOLOGY	**L** 3	**T** 0	**P** 0
Year and Semester	II Year (IV Semester)	Contact hours per week (3 Hrs)		
Prerequisite course	NIL			
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elec**
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**
			✓	

Course Objective

1. Explain the physical and chemical properties of water
2. Describe the types of wells and its limitations
3. Illustrate the rock properties obtained from core samples
4. Discuss the methods used to produce oil from well
5. Explain the non-technical operations performed in well
6. Describe the exploration and exploitation of petroleum reserve

Course Outcome

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

1. Describe about Mining industry
2. Explain about Surface mining
3. Summarize about Underground mining
4. Illustrate about machines used in mining industry
5. Identify the potential environmental impacts

6. To impart basic, comprehensive knowledge about the various facets of PetroleumEngineering.

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	1		2		3		1		2		3	2		3
CO2	1		2		2		3	2		2	1		3	2	
CO3		2		3	2		1		2		3	2	1		3
CO4	2		3		2		3		2		3		2	2	
CO5	1	2		3		2		2		3		2	3		2
CO6	2		1		3			2		3		2	2	2	
Average	2	1.6	2	2.6	2.2	2.5	2.3	2.3	2	2.5	2.3	2.2	2.2	2	
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:
CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION **(10 Hrs)**

Chemistry of petroleum. Structure of petroleum compounds. Types – alkanes, Naphthenes, paraffi aromatics. Physical and chemical properties of oil, gas and formation water.

UNIT II DRILLING A WELL **(10 Hrs)**

Drilling – History, types of drilling –cable tool, rotary, drilling rigs and components. Types of wells exploratory, delineation, development wells. Vertical, deviated, inclined, horizontal and ERD wells. Drilling flui casing and cementation. Planning – GTO.

UNIT III FORMATION EVALUATION (10 Hrs) Formation Evaluation – cutting, cores, mud logging unit. W logging, types of well logs their use. Sub surface correlation.

and

UNIT IV WELL ACTIVATION

(10 Hrs)

Well Testing, perforation, testing methods, well completion production. Stimulation methods, recovery methods, Material balance, reserves estimation

UNIT V WELL SITE OPERATIONS **(10 Hrs)**

Wellsite operations, roles of drilling, reservoir and production hazards, environmental concerns, transportation of oil and gas, oil pollution and control, petroleum economics. (**TOTAL: 50 Hrs**)

TEXT BOOKS:

1. Geology of Petroleum – Leverson, A.L
2. Formation Evaluation – Lynch
3. Drilling Manual – ONGC
4. Principles of oil Production – T.E.W. Wind

REFERENCES

1. Introduction to Petroleum Engineering – Geltin

Designed by “ Department of Petroleum Engineering”

AMET
ACADEMY OF MARITIME EDUCATION AND TRAINING
DEEMED TO BE UNIVERSITY
(Under Section 3 of UGC Act 1956)

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE - Mining Engineering				
Course Code	Course Name :	**L**	**T**	**P**	**C**
UBMN608	MARINE GEOLOGY	3	0	0	3
Year and Semester	III Year (VI Semester)	Contact hours per week (3 Hrs)			
Prerequisite course	NIL				

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**
			✓	

Course Outcome	At the end of the course the student will be able to: 1. Understand the laws imposed by government on mining in sea 2. Understand the acts passed towards coal &amp; metal mining at sea 3. Understand the laws which passed towards the benefits of workers at sea 4. Understand the possibilities of accidents &amp; diseases caused to mining workers. 5. Describe the safety procedure for safe mining Illustrate the legal &amp; safety aspects in mining operation at sea
Instructional	Students will be able to 1. Briefly explain the ocean sedimentology & physical parameters of sea 2. Describe the physical & chemical properties of sea water 3. Discuss the tectonic activities of sea floor 4. Describe the sedimentation process of ocean 5. Explain the role of sea in climate change 6. Illustrate the marine environment and bathymetry

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO 5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO1 0**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**	**PS**
CO1	2	1		22	1								1	2	22
CO2	1		2		3								2	3	11
CO3	1	2		3		2	2						1	2	33
CO4	2	2	3	2			3						2	3	22
CO5	2		3		2			2					3	1	22
CO6	1	1	2	2						2		3	2	2	22
Average	1.5	1.5	2	2.2	2	2	3	2		2		3	1.8	2.1	

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:
CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION (10 Hrs)

Overview of physical ocean environment, geotechnical aspect – sea floor marine soils - Sea Level, Near-sh Processes.

UNIT II PROPERTIES OF MARINE ENVIRONMENT (10 Hrs)

Physical and chemical properties of seawater – overview of marine mineral deposits – deep-sea bed mineral resou
– polymetallic nodules – sulphate nodules – chemicals from the ocean – dissolved and undissolved mineral deposi
sea water as resource and beach placers.

UNIT III OCEAN BASIN MORPHOLOGY (10 Hrs)

Continental drift – Sea floor Spreading – plate tectonics – tectonic history of oceans - Oceanic Lithosph
Mid-Ocean Ridges - Passive Continental Margins - Active Continental Margins - Continental Shelves.

UNIT IV MARINE SEDIMENTS (10 Hrs)

Global Cycle of Elements - Sediment Classification, Oceanic Circulation - Seawater Chemistry - Biochemical Processes in Seawater - Biogenic Oceanic Sediments - Biogenic Sediments, CCD - Terrigenous Sediments - Turbidites, Submarine Fans.

UNIT V OCEANOGRAPHY (10 Hrs)

Paleoceanography - Climate Change - Cenozoic Paleoceanography - Orbital Forcing - Deep Sea Cl
Authigenic Sediments - Deep Biosphere, Methane Hydrates.

(TOTAL: 50 Hrs)

TEXT BOOKS:

1. Parbin Singh. Geology for Engineers, IBH Publications, N. Delhi. 1991.
2. Arthur Holemess, Principles of Physical Geology, Thomas Nelson and Sons, USA, 1964.

REFERENCES:

1. Blyth F.G.H. and de Freitas M.H. Geology for Engineers, 7th edition, Elsevier Publications, 2006.
2. Bell F.G. Engineering Geology, Elsevier Publications, 2007.
3. Ford, W.E. Dana's Textbook of Minerology (4th edition), Wiley Eastern Ltd., N. Delhi, 1989.
4. Winter, J.D. An Introduction to Igneous and Metamorphic Petrology, Prentice Hall, N. Delhi, 2001.
5. Billings, M.P. Structural Geology, Prentice Hall Ino., N. Jersey, USA, 1972.

Krishnan M.S. Geology of India and Burma, 3rd Edition, IBH Publishers, N. Delhi, 1984.

Designed by	" Department of Mining Engineering"

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE- Mining Engineering				
Course Code:	**REMOTE SENSING FOR NATURAL RESOURCES**	**L**	**T**	**P**	**C**
UBMIO10		3	0	0	3
Year and Semester	III Year (VI SEMESTER)	Contact hours per week (3Hrs)			
Prerequisite course	NIL				
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**	
			✓		
Course Objective	1. To provide exposure to students in gaining knowledge on concepts and applications leading to modeling of earth resources management using Remote Sensing 2. To acquire skills in storing, managing digital data for planning and development. 3. To acquire skills in advance techniques such as hyper spectral, thermal and LiDAR scanning for mapping, modeling and monitoring. 4. To acquire knowledge about mineral corridor and mining information system. 5. To elaborately study about planning in transportation.				
Course Outcome	At the end of the course the student will be able to: 1. Discuss the concepts, methodologies and applications of Remote Sensing Technology. 2. Prepare the candidates for National and Global Employability 3. Explain handling instruments, tools, techniques and modeling while using Remote Sensing Technology 4. Discuss theEmpowers the candidate with confidence and leadership qualities. 5. Explain Mining Information system and its utility 6. Explain Transport planning				

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2		3		1				1	1	3		2
CO2	2	2		2		1		2		1			3		
CO3	2		1		3				1			2	3		2
CO4	2			2							1		3		
CO5	3				3				1			1	3		2
CO6															
Average	2.00	0.50	0.50	0.67	1.50	0.17	0.17	0.33	0.33	0.17	0.33	0.67	2.50	0.00	1.00
Correlation Levels			1.Slight(Low)					2.Moderate(Medium)			3.Substantial(High)				

KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ;
PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome

UNIT I: Introduction **(9 Hrs)**

Introduction to Remote Sensing, Mineral , structural, geomorphic Anomaly Mapping, Resource Estimation

UNIT II: Survey of mines **(9 Hrs)**

Remote Sensing survey for Mine planning, Mine Monitoring, Identification of Illegal mining and Mining environmental Mapping and monitoring.

UNIT III : GIS **(9 Hrs)**

Creation of Mining maps thru GIS, creation of resource analysis thru GIS software. Systematic retrieval, updation and Modification of mine plans and sections.

UNIT IV : Mineral Corridor **(9 Hrs)**

Mining Information system and its utility, introduction to Mineral Corridor.

UNIT V : Transportation Planning **(9 Hrs)**

Transport planning, effective mine productivity MIS system creation through information and communication systems; ICT Linking of various intra and inter mining companies, central repository system

Total :(45 Hrs)

.

TEXT BOOKS

1. Satheesh Gopi, Rasathishkumar, N.Madhu, – Advanced Surveying, Total Station GPS and Remote Sensing – Pearson education , 2007 ISBN: 978-81317 00679 52.
2. Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 3rd Edition, 2004.
3. Jie Shan and Charles K. Toth, Topographic Laser Ranging and Scanning – Principles and Processing, CRC Press, Taylor & Francis Group, 2009.

REFERENCES:

1. Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 1996.
2. Michael Renslow, Manual of Airborne Topographic LiDAR, The American Society for Photogrammetry and Remote Sensing , 2013.
3. R.Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-MINING Engineering				
Course Code: UBMN6PA	COURSE NAME: ROCK MECHANICS LAB- II	Contact Hours	**T**	**P**	**C**
		2	0	2	1
Year and Semester	III Year (VI SEMESTER)	Contact hours per week (2Hrs)			
Prerequisite course	NIL				
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**	
				✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**	
Course Objective	1. Explain the physical and chemical properties of water 2. Describe the types of wells and its limitations 3. Illustrate the rock properties obtained from core samples				
Course Outcome	At the end of the course the student will be able to: 1. Explain the the properties of rock 2. Illustrate young’s modulus and poisson’s ratio 3. Describe the types of wells and its limitations 4. Discuss shear strength & tri-axial strength of soil 5. Explain internal friction angle 6. Describe the ground control instruments .				

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	2	1		2	1								1	2	2
CO2	1		2		3								2	3	1
CO3	1	2		3		2	2						1	2	3
CO4	2	2	3	2			3						2	3	2
CO5	2		3		2			2					3	1	2
CO6	1	1	2	2						2		3	2	2	2
Aver age	1.5	1.5	2	2.2	2	2	3	2		2		3	1.8	2.1	2
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:
CO-Course Outcome :PSO-Programe Specific Outcome

List of Experiments:

1. Time dependent properties of rocks
2. Drillability index of rocks.
3. Stress and fracture patterns around underground model openings

4. Young’s Modulus of Elasticity and Poisson’s ratio.
5. Rock anchorage capacity of a rock bolt
6. Roof convergence and other ground control instruments
7. Post Failure Behaviour of Rocks
8. Angle of Internal Friction
9. Measurement of vibration generated by blasting and operation of machines
10. Stowing/ shrinkage Characteristics
11. Study of flat Jack.
12. Study of creep of rocks.
13. Study of strata monitoring instruments.
14. Determination of shear strength of soil

Determination of tri-axial strength of soil

TEXT BOOKS:

Geology of Petroleum – Leverson, A.
Formation Evaluation – Lynch
Drilling Manual – ONGC
Principles of oil Production – T.E.W. Wind

REFERENCES:

1. Vutukuri, V.S., and Lama, R.D., Handbook on Mechanical Properties of Rocks, Vol. I, II, III and IV, Transtech Publication, Berlin, 1974/78.
2. Peng, S.S., Ground Control, Wiley Interscience, New York, 1987.
3. Hoek, E .,Underground Excavations in Rocks, Institute of Mining Metallurgy, London, 1980

Designed by“ Department of Mining Engineering”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering				
Course Code: UBMN6PB	COURSE NAME: **MINING MACHINERY LAB-1**	**L**	**T**	**P**	**C**
		0	0	2	1
Year and Semester	III Year (VI SEMESTER)	Contact hours per week (2Hrs)			
Prerequisite course	NIL				
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**	
			✓		
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**	
Course Objective	1. Explain various types of wire ropes 2. Illustrate types of gear 3. Describe the safety procedure in mining 4. Learn about the power consumption & distribution in mining industry 5. Study rope ways used in transportation of minerals 6. Learn about the safety devices implanted in transportation equipment				
Course Outcome	At the end of the course the student will be able to: 1. Explain various types of wire ropes 2. Explain Illustrate types of gear 3. Explain the safety procedure in mining 4. Explain the power consumption & distribution in mining industry 5. Explain rope ways used in transportation of minerals 6. Explain the safety devices implanted in transportation equipment				

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		2			3				1			3	1	2
CO2		2			2			3			2		2		1
CO3	1		2		2		1		2		3		3		1
CO4		1								2			2	2	1
CO5			2		2		1		3				3		1
CO6		2			2		2	2	2			2		1	
Average	0.33	0.83	1.00	0.00	1.33	0.50	0.67	0.83	1.17	0.50	0.83	0.33	2.17	0.67	1.00

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ;
PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome

OF EXPERIMENTS

Study and construction of different types of wire ropes and types of rope carpels used for rope haulages& winding, safety hooks used in winding.

Construction of compressed air operated drill

Tensioning arrangement in endless haulage and different types of haulage clips and other means

achment of tubs to the rope.
Study of haulage track, curves, diamond crossing, construction of mine tubs and cars along with
couplings.
Study of safety devices provided on rope haulage roads and locomotives, roadways.
Exhaust conditioner and flame traps & underground battery charging station layout.
Electrical power distribution in mines, electrical layout for rope haulages and pumps,
rical and hydraulic layouts for longwall faces.
Study of aerial rope ways – driving/tensioning/loading/unloading and angle stations
carriages and tightness.
Study of various types of head gear, fleet angle, study of shaft fittings, suspension gear
Safety dogs and protective roofing, study of arrangements.

Text Books:

1.Jayanth Bhattacharya, Principles of Mine Planning-Allied Publishers, Delhi 2003.
2.Hustrulid, W. and Kuchta, M., (eds)., Fundamentals of Open pit Mine Planning and Design, Elsevier, 1995.

Designed by“ Department of Mining Engineering”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-MINING Engineering				
Course Code: UBMN6PC	COURSE NAME: MINE DESIGN PRACTICAL	Contact Hours	**T**	**P**	**C**
		2	0	2	1
Year and Semester	III Year (VI SEMESTER)	Contact hours per week (2Hrs)			
Prerequisite course	NIL				

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
			✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**

Course Objective	1. Understanding the mathematical and design parts of mining planning and scheme
Course Outcome	At the end of the course the student will be able to: . Understanding the mining resource estimation 2. Understanding reserve estimation by 3-D geological block method 3. Prepare the mine planning scheme 4. Apply the knowledge to prepare the design of waste slope 5. Understand and prepare the pit design layout 6. Applying the concept of cash flow calculation and profits

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO 5**	**PO6**	**PO7**	**PO 8**	**PO9**	**PO1 0**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**	**PSO3**
CO1	2	1		2	1								1	2	2
CO2	1		2		3								2	3	1
CO3	1	2		3		2	2						1	2	3
CO4	2	2	3	2			3						2	3	2
CO5	2		3		2			2					3	1	2
CO6	1	1	2	2						2		3	2	2	2
Average	1.5	1.5	2	2.2	2	2	3	2		2		3	1.8	2.1	2

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:
CO-Course Outcome :PSO-Programe Specific Outcome

LIST OF EXPERIMENTS

1. Vertical cross section method of ore reserve estimation
2. Ore reserve estimation by 3-D geological block method
3. Development of economic block model
4. Design of Pit layout
5. Cash flow calculations

6. Design of road width
7. Design of drainage system in surface mines
8. Design of waste dumps storage

(Total: 24 Hrs)

Reference books:

1. Walker, S.C., Mine Winding and Transport, Elsevier, 1988.
2. Statham, I.C.F., Coal Mining, Vol. I, II, III and IV, Caxton Eastern Agencies, Calcutta.
3. Deshmukh, D.J., Elements of Mining Technology, Vol. I, II and III, EMDEEE Publishers, Nagpur, 1979.

Designed by “ Department of Mining Engineering”

PROGRAM	BE - Mining Engineering				
Course Code UBMN701	Course Name : MINE ENVIRONMENTAL ENGINEERING	**L** 3	**T** 0	**P** 0	**C** 3

Year and Semester	IV Year (VII Semester)	Contact hours per week (3 Hrs)
Prerequisite course	NIL	

Course category	General	Foundation	Core / Professional	Elective
	-	-	C-25	-

Learning outcome	a	b	c	d	e	f	g	H	i	j	k
	☐				☐				☐		
Mapping of instructional Objectives with learning Outcome	1-5				1-5				1-5		

Aim / Purpose of the course	To study about spontaneous heating, mine fires, inundation and explosions and to study about mine rescue, first aid and illumination.	
Instructional objective of the course	Students will be able to	
	1	Describe the areas prone to fire and its preventive measures
	2	Discuss the explosions in a mine and its report
	3	Illustrate the water storing structures in mines
	4	Explain the rescue equipments used during emergency situations
	5	Describe the lightning source in underground mines
	6	Explain the fire prevention methods in mining industry

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3									3	2	
CO2	2	3	2	3									2	3	
CO3	2	2	2	2									3	3	2
CO4	1	1	2	1									3	2	3
CO5	1	1	1	3									2	2	
CO6	1	1	1	1									2	1	
Average	1.66	1.83	1.83	2.16									2.5	2.16	2.5

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ;
PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome

UNIT I INTRODUCTION (10 Hrs)

Mine fires – Causes and classification of mine fires – Spontaneous combustion – mechanism, stages of spontaneous combustion – susceptibility indices – factors affecting spontaneous combustion – detection and prevention of spontaneous heating and accidental fires – dealing with mine fires – direct and indirect methods, fire stopping – Re-opening of sealed-off areas – Fires in quarries – Coal stacks and waste dumps.

UNIT II MINE EXPLOSIONS (10 Hrs)

Fire damp and coal dust explosions – causes and prevention, explosive limits – Stone- dust and water barriers – Explosion in quarries over developed pillars – Investigation after an explosion.

UNIT III INUNDATION (10 Hrs)

Causes and prevention – Precautions and techniques of approaching old workings – Dewatering of waterlogged working – safety boring apparatus – pattern of holes – Design and construction of water dams and barriers.

UNIT IV RESCUE AND RECOVERY (10 Hrs)

Rescue equipment and their uses – Classification of rescue apparatus – Resuscitation

– Rescue stations and rescue rooms – Organization of rescue work – Emergency preparedness and response system.

UNIT V – ILLUMINATION (10 Hrs)

Cap lamps – Layout and organization of lamp rooms – Standards of illumination – Photometry and illumination survey – Lighting from main and other sources.

(**TOTAL: 50 Hrs**)

TEXT BOOKS:

1. Kaku L.C., Fires in Coal Mines, Oriental Publishers, II Edition, 1985.
2. Ramlu, M.A., Mine Disasters and Mine Rescue, Oxford and IBH Publishers, 1991.

REFERENCES:

1. Ramlu, M.A., Mines Fires, Explosion, Rescue, Recovery and Inundations, Mukhertu Publishers, Kharagpur, 1989
2. Misra, G.B., Mine Environment and Ventilation, Oxford University Press, 1993.
3. McPherson, M.J., Subsurface Ventilation and Environmental Engineering, Chapman & Hall
4. Publication, London, 1993.
5. Sarkar, S.K. and Sarkar, S., State of Environment and Development in Indian Coalfields, Oxford and IBH, 1996.
6. Classified Circulars by D.G.M.S., Dhanbad.

Designed by “ Department of Mining Engineering”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE - Mining Engineering										
Course Code UBMN702	Course Name : MINING MACHINERY II				**L** 3		**T** 1		**P** 0		**C** 4
Year and Semester	IV Year (VII Semester)				Contact hours per week (4 Hrs)						
Prerequisite Course	MINING MACHINERY I										
Course category	General		Foundation		Core / Professional			Elective			
	-		-		C-26			-			
Learning outcome	a	b	c	d	e	f	g	h	I	j	k
	☐				☐				☐		
Mapping of instructional Objectives with learning Outcome	1-5				1-5				1-5		
Aim / Purpose of the course	To understand the functioning of winding engines, winding accessories, surface and pit bottom layouts, various coal face machinery, design and construction details of Excavating & transporting equipment used in surface mines.										
Instructional objective of the Course	Students will be able to 1Describe the various types of engines used in mining 2Discuss the auxiliary equipment used in engines 3Explain the machineries involved in coal mining 4Describe the working principle and operation of various types of excavators 5Discuss the transportation equipment needed in mining industry 6 Explain the machineries & auxiliary equipment used in mining										

POS / COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	1		2		3		2			1		2		1
CO2		2	2		1	2		2		1		2		2	2
CO3	2	2		3		1	2		2	3		2	2		2
CO4	2		3		2		2		1		1	2		2	2
CO5	1		3		2		2			2		2		2	
CO6	1	2		1		3			2		2		3		2
Average	1.6	1.7	2.6	2	1.6	2.2	2	2	1.6	2	1.3	2	2.3	2	1.8
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:
CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION (10 Hrs)

Winding Engines – Winding systems – drum winders – drives – mechanical braking of winders – safety devices in winding – overwind and overspeed protection – Koepe and multi-rope friction winding – electrical layouts – Duty cycles of drum winders of different drum cross-sections – Special problems of deep shaft winding.

UNIT II WINDING ACCESSORIES AND LAYOUTS (10 Hrs)

Head gear and its design – head sheave – cages and skips – suspension gear – shaft fittings and appliances – guides – keps – signalling systems – winding calculations relating to rope size & numbers – capacity & power requirement for cages, skips, drum and Koepe winding systems

UNIT III COAL FACE MACHINERY (10 Hrs)

Construction – salient electrical and mechanical features and operations of coal drills and their control panels – coal cutters – different types of mechanical loaders – coal ploughs, cutter loaders, continuous miners – development road headers in face mechanization – longwall mining equipment – electrical and hydraulic layouts – modern concepts in underground mine mechanization.

UNIT IV EXCAVATION AND LOADING MACHINERY IN SURFACE MINES (10 Hrs)

Classification – hydraulic system diagram – under carriage – design and constructional details of front end loaders – hydraulic excavators and electric rope shovel – backhoe – dragline – bucket wheel excavator – bucket chain excavator and surface miners.

UNIT V OTHER MACHINERY IN SURFACE MINES (10 Hrs)

Classification of transport equipments – Understanding of construction and technical specifications of dumpers of different types including multi-axial dumpers – Tractors – trailers – dump trucks – rippers – motor graders – bull dozers – rock breakers – road compactors – water tankers.

(**TOTAL: 50 Hrs**)

TEXT BOOKS:

1. Amitosh Dey, Heavy Earth Moving Machinery, Lovely Prakashan Publications, Dhanbad, 2000.
2. Walker, S.C., Mine Winding and Transport, Elsevier, 1988.
3. Ramlu, M.A. Mine Hoisting, CRC Press, 1996

REFERENCES:

1. Hartman, H. L. (Editor), SME Mining Engineering Handbook, 3rd edition, Vol I & II, Society of Mining Engineers, New York, 2011.
2. Cherkassy, B.M., Pumps, Fans, Compressors, MIR Publishers, 1980.

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE - Mining Engineering				
Course Code UBMN704	Course Name : SUBSEA MINERAL EXPLORATION	**L**	**T**	**P**	**C**
		3	1	0	4

Year and Semester	IV Year (VII Semester)	Contact hours per week (4 Hrs)
Prerequisite course	NIL	

Course category	General	Foundation	Core / Professional	Elective
	-	-	-	E-11

Learning outcome	a	b	c	d	e	f	g	h	i	j	k
	✓				✓				✓		
Mapping of instructional Objectives with learning Outcome	1-5				1-5				1-5		

Aim / Purpose of the course	To introduce the marine geology, exploitation techniques and equipment's involved in marine exploration.	
Instructional objective of the course	Students will be able to	
	1	Define the types of marine environment
	2	Discuss the status of subsea mining in India
	3	Differentiate the physical and chemical properties of seawater
	4	Describe the reserve estimation of marine sediments
	5	Discuss the technologies used to unearth the marine minerals
	6	Explain the estimation & production of minerals from ocean environment

UNIT 1 INTRODUCTION (10 Hrs)
Marine Environment – Bathymetry, isobaths – Marine sediments – terrigenous, pelagic – Lithogenous, Biogenous, Hydrogenous, Cosmogenous.

UNIT II STATUS OF INDIAN MARINE RESOURCES (10 Hrs)
Development and status of ocean resources of mining in India and other parts of the world – Ocean profile – ocean floor topography – economic exclusive zone – fundamentals of law of the sea – coastal zone & its characteristics.

UNIT III MARINE GEOLOGY AND RESOURCES (10 Hrs)

Physical and chemical properties of seawater – overview of marine mineral deposits – deep-sea bed mineral resources – polymetallic nodules – sulphate nodules – chemicals from the ocean – dissolved and undissolved mineral deposits – sea water as resource and beach placers.

UNIT IV EXPLORATION OF MARINE DEPOSITS (10 Hrs)
Shallow and deep sea bed – Oceanographic instruments – ocean bottom samplers – ocean bathymetry – temperature measurement systems – water samplers - ocean dynamic analysis – beach placer

mining – underwater photographs.

UNIT V EXPLOITATION OF MARINE DEPOSITS (10 Hrs)

Deep sea drilling methods – drag buckets – grab buckets – coring systems – beach placer mining – vehicles and transportation – offshore oil platform.

(**TOTAL: 50 Hrs**)

TEXT BOOKS:

1) Chatterjee, S.K., An Introduction to Mineral Resources, Wiley Eastern Ltd., 1983.

REFERENCES

1) Shepherd, F.P., Sub-marine Geology, Harper and Row, New York, 1963.
2) Graff, W.J., Introduction to Offshore Structures: Design, Fabrication and Installation, Gulf Publishing Company, London, 1961.
3) Herbich, J.B., Coastal and Deep Ocean Dredging, Gulf Publishing Co. Houston, 1975.
4) Murthy, T.K.S., Mining the Ocean, CSIR Golden Jubilee Series, CSIR Publications, New Delhi, 1995.

Designed by “ Department of Mining Engineering”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE - Mining Engineering				
Course Code	Course Name :	**L**	**T**	**P**	**C**
UBMN705	MINING ECONOMICS	3	0	0	3

Year and Semester	IV Year (VII Semester)	Contact hours per week (3 Hrs)
Prerequisite course	NIL	

Course category	General	Foundation	Core / Professional	Elective
	-	-	C-29	-

Learning outcome	a	b	c	d	e	f	g	h	i	j	K
	✓				✓				✓		
Mapping of instructional Objectives with learning Outcome	1-5				1-5				1-5		

Aim / Purpose of the course	Study of finance and accounting, estimation and valuation of mineral deposits and project appraisal
Instructional objective of the course	Students will be able to 1Describe the role of minerals in developing Indian economy 2Discuss the sampling methods and reserve estimation procedure 3Illustrate the project is viable or not by using economic calculations 4Describe the cash flow in mining industry 5Discuss the source of fund to develop a mining 6 Explain the finance management in mining industry

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO 1	1							1				3			
CO 2			1				1				2				
CO 3		1					1			1		3			
CO 4			1					1			3				
CO 5			1								3				
CO 6												3			
Avg.	**1.00**	**1.00**	**1.00**	**0**	**0**	**0**	**1.00**	**1.00**	**0**	**1.00**	**2.67**	**3.00**	**0**	**0**	**0**

UNIT I INTRODUCTION (10 Hrs)

Mineral Economics – Special features of mineral and mining industry – statistics of important and strategic minerals of India – Grading and pricing of coal, limestone, bauxite and iron ore – Pricing of metals – concentrates and ores – Conservation of minerals – National mineral policy – Global mineral marketing.

UNIT II SAMPLING AND ESTIMATION OF RESERVES (10 Hrs)

Methods of sampling during exploration – mining and dispatch – Records and analysis of core sampling data – Tenor, grade and specification – Classification of reserves – Estimation of reserves – Applications of geostatistics.

UNIT III ECONOMIC EVALUATION (10 Hrs)

Break-even analysis– Economic appraisal of capital investments by NPV and IRR methods– Comparison of investment alternatives– Feasibility studies– Critical variables, price forecasting and sensitivity analysis.

UNIT IV ORGANISATIONAL AND FINANCIAL MANAGEMENT (10 Hrs)

Forms of business organizations– Sources of finance– Winding up of companies– Wage systems and incentives– Cost accounting and budgetary control.

UNIT V FINANCE AND ACCOUNTING (10 Hrs)

Source of mine funds – shares, debentures, fixed deposits, sinking fund, capital gearing, P&L account, balance sheet, typical case studies of mine feasibility – Cost estimation of individual mining operations and overall mining cost – cost control methods.

(Total: 50 Hrs)

TEXT BOOKS:

1. Deshmukh, R.T., Mineral and Mine Economics, Mira Publications, Nagpur, 1986.
2. Arogyaswamy, R.N.P. Courses in Mining Geology, Oxford and IBH Publishing Co., 1994.

REFERENCES

1) Sloan, D.A., Mine Management, Chapman and Hall, London, 1983.
2) Chatterjee, K.K., Mineral economics, Wiley Eastern, 1992.
3) Park, R.J., Examination and Valuation of mineral property
4) How to read a balance sheet ILO 1992.
5) Indian Mining Year Book 1994 – MMRD Act and Mineral Concession Rules.

Designed by “ Department of Mining Engineering”

PROGRAM	BE - Mining Engineering				
Course Code UBMN706	Course Name : UNDERGROUND SPACE TECHNOLOGY	**L** 3	**T** 0	**P** 0	**C** 3

Year and Semester	III Year (VII Semester)	Contact hours per week (3 Hrs)
Prerequisite course	NIL	

Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**
			✓	

Instructional objective of course

1Define the types of underground excavations
2Describe various methods of tunneling techniques
3Explain the methods of drilling and blasting of subsurface
4Discuss the machineries used for convenience of mine workers
5Describe the equipments employed in supporting the tunnels
6 Illustrate the process of subsurface mining and equipment used

Course Outcome

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

1. Explain the types of underground excavations
2. Describe various methods of tunneling techniques
3. Explain the methods of drilling and blasting of subsurface
4. Discuss the machineries used for convenience of mine workers
5. Describe the equipment's employed in supporting the tunnels
6. llustrate the process of subsurface mining and equipment used

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2		3		1				1	1	3		2
CO2	2	2		2		1		2		1			3		
CO3	2		1		3				1			2	3		2
CO4	2			2							1		3		
CO5	3				3				1			1	3		2
CO6															
Average	2.00	0.50	0.50	0.67	1.50	0.17	0.17	0.33	0.33	0.17	0.33	0.67	2.50	0.00	1.0

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember, K2—Understand ,K3-Apply, K4-Analyse, K5-Evaluate, K6-Create ;
PO-Programme Outcome; CO-Course Outcome ;PSO-Programme Specific Outcome

UNIT I INTRODUCTION

Scope and application – historical development – art of tunneling, tunnel engineering

(10 Hrs)

– future tunnelling considerations – Types of underground excavations – Tunnel, adit, decline, shaft, parameters influencing – location, shape and size, geological aspects – planning and site investigations.

UNIT II UNDERGROUND EXCAVATIONS (10 Hrs)

Tunnelling methods – Types and purpose of tunnels – factors affecting choice of excavation technique – soft ground tunnelling, hard rock tunnelling, shallow tunnelling, deep tunnelling – Shallow tunnels- cut and cover, cover and cut, pipe jacking, jacket box excavation – techniques, method of muck disposal, supporting – problems encountered and remedial measures.

UNIT III DRILLING AND BLASTING UNDERGROUND SPACE (10 Hrs)

Drilling – drilling principles, drilling equipment, drill selection, specific drilling, rock drillability factors – Blasting - explosives, initiators, blasting mechanics, types of cuts- fan, wedge and other – blast design, tunnel blast performance - powder factor, parameters influencing, methods of predictions – mucking and transportation equipment selection.

UNIT IV UNDERGROUND SPACE MECHANISATION (10 Hrs)

Tunnelling by Roadheaders and impact Hammers – Cutting principle – method of excavation, selections, performance, limitations and problems – Tunnelling by tunnel boring machines – Boring principles, method of excavation, selection, performance, limitation and problems – TBM applications.

UNIT V UNDERGROUND SPACE SERVICES (10 Hrs)

Supports in tunnels – Principle types of supports and applicability – Ground Treatment in Tunnelling – Adverse ground conditions and its effect on tunnelling – Excavations of large and deep tunnels – cavers – Tunnel Services – Ventilation, drainage and pumping – Tunnelling Hazards.

(**TOTAL: 50 Hrs**)

TEXT BOOKS:

1) Hudson, J.A., Rock Engineering Systems – Theory and practice, Ellis Horwood.
2) Clark, G.B., (1987), Principles of Rock Fragmentation, John Wiley and Sons, New York.

REFERENCES:

Legget, R.F., Cities and Geology, McGraw-Hill, NewYork, 624 p., 1973.

Designed by“ Department of Mining Engineering”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE- Mining Engineering				
Course Code: UBMN707	Advanced Mining Technology	L	**T**	**P**	**C**
		3	0	0	3
Year and Semester	IV Year (VII SEMESTER)	Contact hours per week (3Hrs)			
Prerequisite course	NIL				
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**	**Professional Elective**	
				✓	
	Basic Science	**Engineering Science**	**Open Elective**	**Mandatory**	
Course Objective	1. Describe the methods and growth in rock excavation systems 2. Describe the properties related to rock excavation process 3. Describe the various methods used in the cutting of rocks 4. Describes the tools employed in excavation process 5. Describes the tools employed in rock excavation process				
Course Outcome	At the end of the course the student will be able to: 7. Understand the economic block model in manual and computer methods 8. Explain about various the geotechnical parameters role in slope stability 9. Describe the production and equipment planning opencast mines 10. Realize the importance of various explosives, initiators and significance of initiation sequence. 11. Discuss the modern trends in opencast mines. Explain recent advancement in rock excavation				

POS/ COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			1			1			3						
CO2	1						1								
CO3		1			1			2							
CO4			1				1		2						
CO5		1					1								
CO6															
Average	0.1	0.3	0.3	0	0.1	0.1	0.5	0.3	0.8	0	0	0	0	0	0

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION (9 Hrs)

Concepts, historical developments in rock excavation systems, factors affecting the rock fragmentation, mechanism of rock breakage and fracture; their application to rock fragmentation methods– explosive action, cutting, ripping and impacts.

UNIT II ROCK PROPERTIES (9 Hrs)

Rock properties related to excavation process; application of compressive, tensile and tri- axial strengths, index tests and abrasivity, anisotropy, elasticity, porosity, laminations, bedding and jointing in rock fragmentation process.

UNIT III ROCK CUTTING TECHNOLOGY (9 Hrs)

Mechanism of drilling – rotary, percussive, rotary percussive, mechanics of rock cutting, theory of single tool rock cutting, crack initiation and propagation, breakage pattern, rock excavation by cutting action – picks, discs, roller cutters, water jet cutting, methods of evaluation of drillability and cuttability index of rocks.

UNIT IV ROCK CUTTING TOOLS (9 Hrs)

Rock cutting tool materials, different types, relative applications and their choice, tool shape and size, specific energy consumption, tool wear, effect of operational parameters on tool performance, maintenance and replacement of cutting tools of excavating machines.

UNIT V ROCK EXCAVATING MACHINES (9 Hrs)

Excavating machines, principles, operation, applicability and technical indices of road headers, TBM'S Coal face machines and bucket wheel excavators.

(Total: 45 Hrs)

TEXT BOOKS:

1. Hartman, H.L., Introductory Mining Engineering, John Wiley and Sons, New York, 1987.
2. Clark, G.B., Principles of Rock Fragmentation, John Wiley and Sons, New York, 1987.

REFERENCES

1. Hartman, H. L. (Editor), SME Mining Engineering Handbook, 3rd edition, Vol I & II, Society of Mining Engineers, New York, 2011.
2. Chugh, C.P., Diamond Drilling, Oxford-IBH, 1984.

Designed by " Department of Mining Engineering"

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE - Mining Engineering				
Course Code UBMN708	Course Name : Advanced Surface Mining Technology	**L**	**T**	**P**	**C**
		3	0	0	3

Year and Semester	IV Year (VII Semester)	Contact hours per week (3 Hrs)		
Prerequisite Course	NIL			
Course category	General	Foundation	Core / Professional	Elective
	-	-	C-25	-

Learning outcome	a	b	c	d	e	f	g	H	i	j	k
	☐				☐				☐		
Mapping of instructional Objectives with learning Outcome	1-5				1-5				1-5		

Aim / Purpose of the course	1. Study about Ore and economic block model and ultimate pit limit calculations. 2. Students must know about Ore reserve estimation techniques and different drilling techniques during exploration. 3. Students should have basic knowledge about break even analysis and economic appraisal of mining projects during feasibility studies. 4. Students enhance their knowledge on different explosives, initiators, initiation sequence and blast design calculations. 5. Recent developments in surface mining methods and their applicability in different scenarios are studied briefly.
Instructional objective of the course	At the end of the course the student will be able to: 1. Understand the economic block model in manual and computer methods 2. Explain about various the geotechnical parameters role in slope stability 3. Describe the production and equipment planning opencast mines 4. Realize the importance of various explosives, initiators and significance of initiation sequence. 5. Discuss the modern trends in opencast mines. 6. Students learn about recent advancement.

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	-	1	-	2	2	3	-	-	2	3	2	2	1	1
CO2	3	2	2	1	2	-	2	-	-	-	2	1	1	2	1
CO3	-	-	2	-	-	-	2	-	-	2	2	2	2	2	2
CO4	-	-	-	-	-	2	2	-	-	-	3	2	2	1	1
CO5	-	-	2	1	1	1	2	-	-	2	2	2	2	1	1
CO6	2	1	2	1	2	3	2	-	-	2	3	2	2	2	2
Average	1.1	1.5	2.25	1	2	2	2.22	-	-	2	2.5	2.1	1.8	1.5	1.3
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)			3.Substantial(High)				

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNIT – I- Surface Mining System

Classification of surface mining equipments vis-à-vis unit operation- main components, layout, function and operations

Unit – II – Equipment Selection

Equipment selection criteria and procedures, application and selection

UNIT – III – Equipments utilization

Types, basic operations, maintenance and capacity utilization, applicability and selections

UNIT – IV – surface blast explosives

Types of explosives for surface blast, explosives properties, explosives performance testing, selection criteria

UNIT – V – Production planning in surface mine – Round production

Overview of surface blast design, selection of explosives, primer, booster; Types of initiations, selection; Initiation sequences; blast production calculation; Production and productivity assessment

TEXT BOOKS :

6. W. Hustrulid, M. Kuchta and R. Martin, Open Pit Mine Planning & Design.
7. Fundamentals of Open Pit Mine Planning & Design: Hustrulid, W. and Kuchta, M.
8. Surface Mining : Kennedy, B.A., 2nd Edition, SME, New York, 1990.
9. Surface Mining Technology, : Das, S.K., Lovely Prakashan, Dhanbad, 1994.
10. SME Mining Engg. Hand book Vol.I and II: Cummings, A.B. and Given, I.V., New York

REFERENCES:

3. SME Mining hand book I,II
4. S. k. Das Surface mining technology.

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE - Mining Engineering				
Course Code	Course Name :	**L**	**T**	**P**	**C**
UBMN7PA	MINING MACHINERY LAB - II	0	0	2	1

Year and Semester	IV Year (VII Semester)	Contact hours per week (2 Hrs)
Prerequisite course	NIL	

Course category	General	Foundation	Core / Professional	Elective
	-	-	C-30	-

Learning outcome	a	b	c	d	e	f	g	h	i	j	k
	☐				☐				☐		
Mapping of instructional Objectives with learning Outcome	1-5				1-5				1-5		

Aim / Purpose of the course	To study the various mining machineries, ropes, conveyors and different types of machines used in underground mines
Instructional objective of the course	Students will be able to 1 Illustrate the cages, skips & their fittings and brakes of winders & haulers 2 Explain the different types of conveyors components & safety devices 3 Illustrate the coal drill and its electrical panel/gate end box 4 Describe the different types of loading machines, cool plough and shearer 5 Explain the continuous miner and road headers. 6 Design a working model of the equipment used in mining

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	1	1	-	2	2	3	-	-	2	3	2	2	1	1
CO2	3	2	2	1	2	-	2	-	-	-	2	3	1	2	1
CO3	-	-	2	-	-	-	2	-	-	2	2	2	2	2	2
CO4	-	-	-	-	-	2	2	-	-	-	3	2	2	1	1
CO5	-	-	2	1	2	3	2	-	-	2	2	2	2	1	1
CO6	2	1	2	1	2	3	2	-	-	2	3	2	2	2	2
Average	1.1	1.5	2.25	1	2	2	2.22	-	-	2	2.5	2.1	1.8	1.5	1.3

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

LIST OF EXPERIMENTS

1) Construction of cages, skips & their fittings and brakes of winders & haulers
2) Study of different types of conveyors (components & safety devices) like armoured face conveyors, belt conveyors, gate belt conveyors, shaker & vibrating conveyors, high angle conveyors
3) Study of coal drill and its electrical panel/gate end box
4) Study of pit top & pit bottom layouts in shaft and inclines.
5) Study of different types of loading machines
6) Study of cool plough and shearer.
7) Study of continuous miner and road headers.

(Total: 24 Periods)

REFERENCES:

1) Walker, S.C., Mine Winding and Transport, Elsevier, 1988.
2) Statham, I.C.F., Coal Mining, Vol. I, II, III and IV, Caxton Eastern Agencies, Calcutta.
3) Deshmukh, D.J., Elements of Mining Technology, Vol. I, II and III, EMDEEE Publishers, Nagpur, 1979.

Designed by “Department of Mining Engineering”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE - Mining Engineering				
Course Code UBMN7PB	Course Name : PROJECT WORK PHASE-I	**L**	**T**	**P**	**C**
		0	0	6	3
Year and Semester	IV Year (VIII Semester)	Contact hours per week (6 Hrs)			
Prerequisite course	NIL				
Course category	General	Foundation	Core / Professional	Elective	
	-	-	C-35	-	

Learning outcome	a	b	c	d	E	f	g	h	i	j	k
	☐				☐				☐		
Mapping of instructional Objectives with learning Outcome	1-5				1-5				1-5		

Aim / Purpose of the course	To carry out a study or to solve a problem of the mining industry.	
Instructional objective of the course	Students will be able to understand	
	1	Define the problem
	2	Discuss the factors influencing it
	3	Illustrate the principles involved
	4	Describe the problem solving procedure
	5	Explain the remedial methods.
	6	Discuss the result of the project

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
-	2	-	1	-	-	2	1	-	-	2	3	2	2	1	1
CO2	1	2	2	1	2	-	2	-	-	-	2	3	1	2	1
CO3	-	-	2	-	-	-	2	-	-	2	2	2	2	2	2
CO4	-	-	-	-	1	2	2	-	-	-	3	2	2	1	1
CO5	-	-	2	1	2	1	2	-	-	2	2	2	2	1	1
CO6	2	1	2	1	2	3	2	-	-	2	3	2	2	2	2
Average	1.1	1.5	2.25	1	2	2	2.22	-	-	2	2.5	2.1	1.8	1.5	1.3

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

Designed by	“Department of Mining Engineering”

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE-Mining Engineering					
Course Code: UBMN7PD	Course Name: Internship-II		**L** 0	**T** 0	**P** 0	**C** 1
Year and Semester	IV Year (VII SEMESTER)		Contact hours per week (0Hrs)			
Prerequisite course	NIL					
Course category	**Humanities and Social Sciences**	**Management courses**	**Professional Core**		**Professional Elective**	
			✓			
	Basic Science	**Engineering Science**	**Open Elective**		**Mandatory**	
Course Objective	Will learn about the upstream and downstream related company works					
Course Outcome	1. Explains the problem 2. Discover the factors influencing it 3. Categorize the principles involved 4. Illustrate the problem solving procedure 5. Explain the remedial method 6. Dissect the result of the project					

POS/ COS	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1		2		3		1		2		3	2		2
CO2	1		2		2		3	2		2	1		3	2	
CO3		2		3	2		1		2		3	2	1		2
CO4	2		3		2		3		2		3		2	2	
CO5	1	2		3		22		2		3		2	3		2
CO6			1		3			2		3		2	2	2	2
Average	2	1.6	2	2.6	2.2	2.5	2.3	2.3	2	2.5	2.3	2.2	2.2	2	2
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:

CO-Course Outcome :PSO-Programe Specific Outcome

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE - Mining Engineering				
Course Code	Course Name :	**L**	**T**	**P**	**C**
UBMN801	MINE MANAGEMENT	3	0	0	3

Year and Semester	IV Year (VIII Semester)	Contact hours per week (3 Hrs)
Prerequisite course	NIL	

Course category	General	Foundation	Core / Professional	Elective
	-	-	C-32	-

	a	b	c	d	e	f	g	h	i	j	k
Learning outcome	✓				✓				✓		
Mapping of instructional Objectives with learning Outcome	1-5				1-5				1-5		

Course objectives	To develop modern concepts of Industrial Management

Course outcomes	Students will be able to	
	1	Describe the Management theory and system approach
	2	Explain the Organizational management process
	3	Infer the information system and management
	4	Explain the personal management and industrial relations
	5	Describe the financial management and its analysis
	6	Discuss the role of management in mining industry

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	-	-	1	-	-	2	1	-	-	2	-	2	2	1	1
CO2	1	2	2	1	2	-	2	-	-	-	-	2	1	2	1
CO3	-	-	1	-	-	-	2	-	-	2	2	1	2	2	2
CO4	-	1	-	-	1	1	3	-	-	-	1	3	-	1	1
CO5	-	-	2	1	2	1	2	-	-	2	-	2	2	1	1
CO6	2	1	2	1	2	3	2	-	-	2	3	2	2	2	2
Average	1.1	1.5	2.21	1	2	2	2.22	-	-	2	2.5	2.1	1.8	1.5	1.3
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION (10 Hrs)

Evolution of management theory – Classical theory – Scientific Management Administrative theory – Behavioral approach – Neo classical theory – Modern theory – Systems approach

UNIT II CHARACTERISTICS AND IMPORTANCE OF MANAGEMENT

Meaning of management, Definition of management, Nature of management, Productivity concept of Management, Attaining Objectives

UNIT III MANAGEMENT PROCESS (10 Hrs)

Planning – Organizing – Directing – Motivating – Controlling – Coordinating and communicating – Staffing – Manpower planning and recruitment – Performance appraisal – Human resource development and planning.

UNIT IV MANAGEMENT PLANNING

Planning process, Types of planning, procedures of planning, programming for planning, advantages of planning, importance of Planning, projet and budjecting, importance of planning

UNIT V SKILLS AND ROLES OF MANAGAMENT PROFESSIONALS (10 Hrs)

Tasks of professionals' managers, managing survival and growth, challenges, building human organization, balance maintaining between creativity and conformity

(10 Hrs)

(**TOTAL: 50 Hrs**)

TEXT BOOKS

1. Herald Koontz and Heinz Weihrich, 'Essentials of Management', McGraw Hill Publishing Company, Singapore International Edition, 1980.
2. M.Govindarajan and S.Natarajan, Principles of Management, Prentice Hall of India Pvt.Ltd. New Delhi 2007

REFERENCES

1. S.Chandran, Organizational Behaviors, Vikas Publishing House Pvt., Ltd, 1994
2. Ties, AF,Stoner and R.Edward Freeman, 'Management' Prentice Hall of India Pvt. Ltd. New Delhi 110011, 1992
3. Joseph J,Massie, 'Essentials of Management' Prentice Hall of India. Ltd. 1985

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SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE - Mining Engineering				
Course Code UBMN802	Course Name : COMPUTER APPLICATIONS IN MINING	**L**	**T**	**P**	**C**
		3	0	0	3

Year and Semester	IV Year (VIII Semester)		Contact hours per week (3 Hrs)	
Prerequisite course	NIL			
Course category	General	Foundation	Core / Professional	Elective
	-	-	C-33	-

Learning outcome	a	b	c	d	e	f	g	h	i	J	k
	✓				✓				✓		
Mapping of instructional Objectives with learning Outcome	1-5				1-5				1-5		

Aim / Purpose of the course	To impart knowledge on hardware and software issues concerned with computers in mining industry and to develop algorithms and programs on various mining related problems.	
Instructional objective of the course	Students will be able to understand	
	1	Define the operating systems, servers, MIS and data analysis
	2	Describe the Programming & DBMS Concepts
	3	Explain the Mine planning and design
	4	Determine the Mining Problem using TDS, FEM and CFD
	5	Explain the recent trends in Mining Software
	6	Describe the advantages in mine design using computer applications.

POS / COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	1		2		3		1		2		3	2		2
CO2	1		2		2		3	2		2	1		3	2	
CO3		2		3	2		1		22		3	2	1		2
CO4	2		3		2		3		22		3		2	2	
CO5	1	2		3		2		2				2	3		2
CO6			1		3			2		3		2	2	2	2
Average	2	1.6	2	2.6	2.2	2.5	2.3	2.3	2	2.5	2.3	2.2	2.2	2	2
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome:
CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION (10 Hrs)

Configuration of computers and servers – Evolution of operating systems – Networking Concepts – MIS

Concepts – Cloud computing / grid computing in mining, Big Data analytics.

UNIT II PROGRAMMING & DBMS CONCEPTS (10 Hrs)

Algorithm – Flow charts and Programming of mining application like pillar design – blast design – subsidence – Database and Relational database – development of software packages for mining companies – forms, queries and reports – Enterprise resource planning for material managements.

UNIT III COMPUTERISED MINE PLANNING (10 Hrs)

Introduction of Geostatistics – Reserve Estimation – kriging – block modelling and ore body modelling – Optimization and mine design – mine scheduling.

UNIT IV PROBLEM SOLVING – APPLICATIONS IN MINING (10 Hrs)

Ventilation network analysis – Support design – Application of CAD in mining – GIS in mining – online and offline monitoring and control – TDS, FEM and CFD concepts and basics of modelling and simulation.

UNIT V RECENT TRENDS IN MINING SOFTWARE (10 Hrs)

Artificial intelligence – expert system – neural networks – robotics and its application in mining – Functionalities of mine planning software – fragmentation software and numerical software applicable to mining – Case studies of mining applications.

(**TOTAL: 50 Hrs**)

TEXT BOOKS:

1. KadriDagdelen, Editor, Computer Applications in the Minerals Industries, Colorado School of Mines, 1999.
2. Ramani R.V., et al. Computers in Mineral Industry, Oxford and IBH Publishers, 1994.

REFERENCES:

1. R.V.Ramani – Editor, APCOM Proceedings Application of Computers and Operations Research in the Mineral Industry, The Society of Mining, Metallurgy and Exploration, Inc.,1996.

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SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE - Mining Engineering				
Course Code	Course Name :	**L**	**T**	**P**	**C**
UBMN803	MINE SYSTEM ENGINEERING	3	0	0	3

Year and Semester	IV Year (VIII Semester)	Contact hours per week (3 Hrs)
Prerequisite course	NIL	

Course category	General	Foundation	Core / Professional	Elective
	-	-	C-34	-

Learning outcome	a	b	c	d	e	f	G	h	i	j	k
	✓				✓				✓		
Mapping of instructional Objectives with learning Outcome	1-5				1-5				1-5		

Aim / Purpose of the course	To know basic of system engineering concept and analysis and to study the various techniques of operations research, simulation and network analysis.	
Instructional objective of the course	Students will be able to	
	1	Explain the basics of system engineering
	2	Determine the solution of mining problems using Linear Programming
	3	Describe the transportation and assignment problems for mining
	4	Explain the Project Management with PERT & CPM
	5	Infer the Network Models & Mining Simulation
	6	Describe the application of softwares in mining industry

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	1	-	-	2	1	-	-	2	-	2	2	1	1
CO2	1	2	2	1	2	-	2	-	-	-	2	3	1	2	1
CO3	-	-	1	-	-	-	2	-	-	2	2	1	2	2	2
CO4	-	1	-	-	1	2	2	-	-	-	1	2	-	1	1
CO5	-	-	2	1	2	1	2	-	-	2	2	2	2	1	1
CO6	2	1	2	1	2	3	2	-	-	2	3	2	2	2	2
Average	1.1	1.5	2.21	1	2	2	2.22	-	-	2	2.5	2.1	1.8	1.5	1.3

Correlation Levels	1.Slight(Low)	2.Moderate(Medium)	3.Substantial(High)

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

UNIT I INTRODUCTION 10 Hrs

System Engineering – Concept of system, sub-system and system environment – Classification of system – System analysis – Creative aspects of planning and design – Factors influencing creativity, techniques and alternative solutions.

UNIT II LINEAR PROGRAMMING 10 Hrs

Linear Programming models – Assumptions of Linear Programming, Graphical and simple method of solving Linear Programming problems – Basic and Basic feasible solutions, optimal solutions, interpretation of SIMPLEX table. Primal and Dual problem – Application of Linear programming for solutions of mining related problems of production planning, scheduling and blending.

UNIT III TRANSPORTATION AND ASSIGNMENT PROBLEMS 10 Hrs

Transportation models – Variations on Classical Transportation models, Solution – Algorithm for Transportation problem – Assignment model, Variations on Classical Assignment model – Solution algorithm for assignment problems – Application to mining problems.

UNIT IV PROJECT MANAGEMENT WITH PERT & CPM 10 Hrs

Assignment of PERT & CPM – Methods of drawing network – Redundancy and identification of redundant jobs – Critical path calculation – Criticality index – Statistics related to PERT – Probability of completing a project by a due date – Lowest cost Schedule – Case studies.

UNIT V NETWORK MODELS & SIMULATION 10 Hrs

Introduction and concept – shortest route and minimal spannial tree problems – application to mining problems – Simulation – Introduction and concept – scope and limitation – System type versus simulation technique – Generating input data – Monte-Carlo simulation – Simulation of equipment maintenance and inventory systems in mines.

(**TOTAL: 50 Hrs**)

TEXT BOOKS:

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Zambo, J., and Kiado, A., Optimum Location of Mining facilities, Springer Verlag, Budapest, 1968.

REFERENCES

Syal, I.C., and Gupta, B.P., Computer Programming and Engineering Analysis, A.B., Wheeler and Company, Madras 1986.

Designed by “ Department of Mining Engineering”

AMET
ACADEMY OF MARITIME EDUCATION AND TRAINING
DEEMED TO BE UNIVERSITY
(Under Section 3 of UGC Act 1956)

SYLLABUS FOR UNDER GRADUATE IN ENGINEERING AND TECHNOLOGY
B.E – MINING ENGINEERING
ACADEMIC YEAR 2016-2020 (BATCH - I)

PROGRAM	BE - Mining Engineering				
Course Code UBMN8PA	Course Name : PROJECT WORK & SEMINAR COMPREHENSIVE VIVA-VOCE	**L**	**T**	**P**	**C**
		0	0	18	8

Year and Semester	IV Year (VIII Semester)	Contact hours per week (18 Hrs)
Prerequisite course	NIL	

Course category	General	Foundation	Core / Professional	Elective
	-	-	C-35	-

Learning outcome	a	b	c	d	E	f	g	h	i	j	k
	☐				☐				☐		
Mapping of instructional Objectives with learning Outcome	1-5				1-5				1-5		

Aim / Purpose of the course	To carry out a study or to solve a problem of the mining industry.

COURSE OUTCOMES	Students will be able to understand	
	1	Define the problem
	2	Discuss the factors influencing it
	3	Illustrate the principles involved
	4	Describe the problem solving procedure
	5	Explain the remedial methods.
	6	Discuss the result of the project

POS/ COS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	-	1	-	-	2	1	-	-	2	3	2	2	1	1
CO2	1	2	2	1	2	-	2	-	-	-	2	3	1	2	1
CO3	-	-	2	-	-	-	2	-	-	2	2	2	2	2	2
CO4	-	-	-	-	1	2	2	-	-	-	3	2	2	1	1
CO5	-	-	2	1	2	1	2	-	-	2	2	2	2	1	1
CO6	2	1	2	1	2	3	2	-	-	2	3	2	2	2	2
Average	1.1	1.5	2.25	1	2	2	2.22	-	-	2	2.5	2.1	1.8	1.5	1.3
Correlation Levels				1.Slight(Low)				2.Moderate(Medium)				3.Substantial(High)			

KL-Knowledge Level:K1-Remember,K2--Understand,K3-Apply,K4-Analyse,K5-Evaluate,K6-Create : PO-Programe Outcome: CO-Course Outcome :PSO-Programe Specific Outcome

Designed by	“Department of Mining Engineering”