GODAVARI INSTITUTE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

Approved by AICTE, Accredited by NBA & NAAC 'A' Grade, Recognized under 2(f) and 12(b) of UGC, Permanently Affiliated to JNTUK, Kakinada.

DEPARTMENT OF MINING ENGINEERING

4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

I Year — I Semester

S. No.	Subject Title	Subject Codes	Periods per week			C	Scheme of Examination Maximum Marks		
			L	T	P/D		Int.	Ext.	Total
1	English – I	17198101	3	1	-	3	40	60	100
2	Mathematics - I	17198102	3	1	-	3	40	60	100
3	Computer Programming	17195103	3	1	-	3	40	60	100
4	Engineering Physics	17198104	3	1	-	3	40	60	100
5	Environmental Studies	17198105	3	1	-	3	40	60	100
6	Engineering Drawing	17193176	1	-	3	3	40	60	100
7	English Communication Skills Lab. - I	17198111	-	-	3	2	50	50	100
8	Engineering Physics Lab.	17198112	-	-	3	2	50	50	100
9	Computer Programming Lab.	17195113	-	-	3	2	50	50	100
Total			**16**	**5**	**12**	**24**	**390**	**510**	**900**

L – Lecture T- Tutorial P – Practical C– Credits Int. – Internal Ext. - External

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DEPARTMENT OF MINING ENGINEERING

4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

I Year — II Semester

S. No.	Subject Title	Subject Codes	Periods per week			C	Scheme of Examination Maximum Marks		
			L	T	P		Int.	Ext.	Total
1.	English – II	17198201	3	1		3	40	60	100
2.	Mathematics – II	17198202	3	1		3	40	60	100
3.	Mathematics – III	17198203	3	1		3	40	60	100
4.	Engineering Chemistry	17198204	3	1		3	40	60	100
5.	Engineering Mechanics	17193205	3	1		3	40	60	100
6.	Professional Ethics and Human Values	17198206	2	1		1	40	60	100
7.	English Communication Skill Lab. - II	17198211	-	-	3	2	50	50	100
8.	Engineering Chemistry Lab.	17198212	-	-	3	2	50	50	100
9.	Engineering Workshop & IT Workshop	17198283	-	-	3	2	50	50	100
Total			**17**	**6**	**9**	**22**	**390**	**510**	**900**

L – Lecture T- Tutorial P – Practical C– Credits Int. – Internal Ext. – External

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DEPARTMENT OF MINING ENGINEERING

4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

II Year I Semester

S. No.	Subject Title	Subject Codes	Periods per week			C	Scheme of Examination Maximum Marks		
			L	T	P/D		Int.	Ext.	Total
1.	Fluid Mechanics & Hydraulic Machinery	17160301	3	1		3	40	60	100
2.	Mine Surveying	17160302	3	1		3	40	60	100
3.	Introductory Geology	17160303	3	1		3	40	60	100
4.	Dev. Of Mineral Deposits	17160304	3	1		3	40	60	100
5.	Drilling & Blasting	17160305	3	1		3	40	60	100
6.	CAD for Mining	17160376	1	-	3	3	40	60	100
7.	Soft Skills - I	17169307	1	2	-	1	40	60	100
8.	Fluid Mechanics & Hydraulic Machinery Lab.	17160311	-	-	3	2	50	50	100
9.	Mine Surveying Lab.	17160312	-	-	3	2	50	50	100
Total			**17**	**7**	**9**	**23**	**380**	**520**	**900**

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DEPARTMENT OF MINING ENGINEERING

4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

II Year — II Semester

S. No.	Subject Title	Subject Codes	Periods per week			C	Scheme of Examination Maximum Marks		
			L	T	P		Int.	Ext.	Total
1.	Basic Mechanical Engineering for Mining	17163401	3	1	-	3	40	60	100
2.	Basic Electrical & Electronics Engineering	17162402	3	1	-	3	40	60	100
3.	Advanced Mine Surveying	17160403	3	1	-	3	40	60	100
4.	Surface Mining	17160404	3	1	-	3	40	60	100
5.	Underground Coal Mining	17160405	3	1	-	3	40	60	100
6.	Engineering Geology	17160406	3	1	-	3	40	60	100
7.	Basic Electrical & Electronics Engineering Lab.	17162411	-	-	3	2	50	50	100
8.	Mining Geology Lab.	17160412	-	-	3	2	50	50	100
Total			**18**	**6**	**6**	**22**	**340**	**460**	**800**

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DEPARTMENT OF MINING ENGINEERING

4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

III Year **I Semester**

S. No.	Subject Title	Subject Codes	Periods per week			C	Scheme of Examination Maximum Marks		
			L	T	P/D		Int.	Ext.	Total
1	Mine Systems Engineering	17160501	2	1	0	3	40	60	100
2	Industrial Engineering Management	17169502	2	1	0	3	40	60	100
3	Underground Metal Mining	17160503	2	1	0	3	40	60	100
4	Mine Ventilation	17160504	2	1	0	3	40	60	100
5	Mine planning and design	17160505	2	1	0	3	40	60	100
6	RS & GIS for Mining	17160506	2	1	0	3	40	60	100
7	Soft Skills - II	17169507	1	0	0	1	40	60	100
8	Mine Ventilation Lab.	17160511	0	1	2	2	50	50	100
9	Mine planning and design Lab.	17160512	0	1	2	2	50	50	100
10	Technical Seminar	17160521	0	1	2	2	100	-	100
Total			**13**	**9**	**6**	**25**	**480**	**520**	**1000**

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DEPARTMENT OF MINING ENGINEERING

4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

III Year **II Semester**

S. No.	Subject Title	Subject Codes	Periods per week			C	Scheme of Examination Maximum Marks		
			L	T	P/D		Int.	Ext.	Total
1	Rock Mechanics	17160601	2	1	0	3	40	60	100
2	Mineral Processing	17160602	2	1	0	3	40	60	100
3	Mine Strata Control	17160603	2	1	0	3	40	60	100
4	Mining Machinery	17160604	2	1	0	3	40	60	100
5	Mine Construction Engineering	17160605	2	1	0	3	40	60	100
6	Open Elective	17160666	2	1	0	3	40	60	100
7	Rock Mechanics Laboratory	17160611	0	1	2	2	50	50	100
8	Mineral Processing Laboratory	17160612	0	1	2	2	50	50	100
Total			**12**	**8**	**4**	**22**	**340**	**460**	**800**

L – Lecture T- Tutorial P – Practical C– Credits Int. – Internal Ext. - External

Open Electives:

a) Total Station & GPS Surveying (17160666 a)
b) Industrial Hydraulics and Pneumatics (17160666 b)
c) Social Network analysis (17160666 c)
d) Internet of Things (17160666 d)
e) Renewable Energy Sources and Systems (17160666 e)
f) Hybrid Vehicles (17160666 f)
g) Principles of Management (17160666 g)

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DEPARTMENT OF MINING ENGINEERING

4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

IV Year **I Semester**

S. No.	Subject Title	Subject Codes	Periods per week			C	Scheme of Examination Maximum Marks		
			L	T	P/D		Int.	Ext.	Total
1	Mine Legislation	17160701	3	0	0	3	40	60	100
2	Mine hazards & Rescue	17160702	2	1	0	3	40	60	100
3	Advanced Mining Machinery	17160703	2	1	0	3	40	60	100
4	Mineral Economics	17160704	2	1	0	3	40	60	100
5	IPR & Patents	17169705	1	0	0	1	40	60	100
6	Elective- I	17160761	2	1	0	3	40	60	100
7	Elective- II	17160762	2	1	0	3	40	60	100
8	Mining Machinery Laboratory	17160711	0	1	2	2	50	50	100
9	Mine hazards & Rescue Laboratory	17160712	0	1	2	2	50	50	100
10	Mini Project	17160721	0	0	2	1	100	-	100
Total			**13**	**8**	**6**	**24**	**480**	**520**	**1000**

L – Lecture T- Tutorial P – Practical C– Credits Int. – Internal Ext. - External

Elective – I

a) Environmental Impact Assessment in Mines (17160761 a)
b) Disaster Management (17160761 b)
c) Rock Slope Engineering (17160761 c)
d) Mine Safety and Health Engineering (17160761 d)

Elective – II

a) Geo Statistics (17160762 a)
b) Rock Fragmentation Engineering (17160762 b)
c) Deep Sea Mining (17160762 c)
d) Tunneling Engineering (17160762 d)

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IV Year **II Semester**

S. No.	Subject Title	Subject Codes	Periods per week			C	Scheme of Examination Maximum Marks		
			L	T	P/ D		Int.	Ext.	Total
1	Environmental Pollution & Control in Mines	17160801	2	1	0	3	40	60	100
2	Computer Applications in Mining	17160802	3	0	0	3	40	60	100
3	Elective- III	17160861	2	1	0	3	40	60	100
4	Project	17160841	0	3	12	9	60	140	200
Total			**7**	**5**	**12**	**18**	**180**	**320**	**500**

L – Lecture T- Tutorial P – Practical C– Credits Int. – Internal Ext. - External

Elective – III

a) Planning of Surface Mines (17160861 a)
b) Planning of Underground Coal Mines (17160861 b)
c) Planning of Underground Metal Mines (17160861 c)
d) Tailing and & Overburden dump Management (17160861 d)

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

I Year B.Tech. (Mining Engg).-I Semester

ENGLISH-I

Course Objectives:

- Improve the exposure to universal happenings
- Communicate the necessity to exercise humor in the daily life
- Take inspiration by reading autobiographical issues
- Achieve high quality of life, strength and sovereignty of a developed nation

Unit-I

Objective: To develop human resources to serve the society in different ways
From English for Engineers and Technologists.
Detailed Text: 'Human Resources': from English for Engineers and Technologists (C.O.1)
Objective: To develop extensive reading skill and comprehension for pleasure and profit.
Non-Detailed Text: 'An Ideal Family' by Katherine Mansfield

Unit-II

Objective: To highlight road safety measures whatever be the mode of transport.
Detailed Text: Transport: Problems and Solutions' (C.O.1)
Objective: To develop extensive reading skill and comprehension for pleasure and profit
Non-Detailed Text: ''War' by Luigi Pirandello from 'Panorama: A Course on Reading''

Unit-III

Objective: To highlight the advantages and disadvantages of technology.
Detailed Text: 'Evaluating Technology' from English for Engineers and Technologists. (C.O.2)
Objective: To develop extensive reading skill and comprehension for pleasure and profit.
Non-Detailed Text: 'The Verger' by Somerset Maugham from Panorama: A Course on Reading'

Unit–IV

Objective: To bring into focus different sources of energy as alternatives to the depleting sources.
Detailed Text: 'Alternative Sources of Energy' from English for Engineers and Technologists. (C.O.3)
Objective: To develop extensive reading skill and comprehension for pleasure and profit.
Poetry: ' The Scarecrow' by Satyajit Ray from Panorama: A Course on Reading Frost

Unit – V

Objective: To highlight the fact that animals must be preserved because animal life is precious
Detailed Text: 'Our Living Environment' from English for Engineers and Technologists. (C.O.4)
Objective: To develop extensive reading skill and comprehension for pleasure and profit.
Non-Detailed Text: 'A Village Host to Nation' from Panorama: A Course on Reading

Detailed textbook:
ENGLISH FOR ENGINEERS AND TECHNOLOGISTS, Published by Orient Blackswan Pvt Ltd.

Non-detailed textbook:
PANORAMA: A COURSE ON READING, Published by Oxford University Press India.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

I Year B.Tech. (Mining Engg).-I Semester

MATHEMETICS-I

Course Objective(s):

- To apply Laplace Transforms to solve Initial Value Problems and evaluate Infinite Integrals.
- To solve first and higher order ordinary differential equations (ODE) with applications by various techniques.
- To apply Partial Differentiation to find Maxima and Minima.
- To solve First and Higher order PDE with their applications to Heat equation, Wave equation, Laplace equation

UNIT I : : Differential equations of first order and first degree
Objective: Solution of First order and First degree ODE with applications (CO2)
Linear-Bernoulli-Exact-Reducible to exact.
Applications: Newton's Law of cooling-Law of natural growth and decay-orthogonal trajectories.

UNIT II : Linear differential equations of higher order
Objective: Solution of Higher order Linear ODE with applications. (CO2) Non-homogeneous equations of higher order with constant coefficients with RHS term of the type e *ax* , Sin ax, cos ax, polynomials in x, e *ax* V(x), xV(x). Applications: LCR circuit, Simple Harmonic motion.

UNIT III: Laplace transform
Objective: Application of Laplace Transform to Solution of IVP and Evaluation of Integrals (CO1)
Laplace transforms of standard functions-Shifting Theorems, Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Inverse Laplace transforms– Convolution theorem (with out proof). Applications: Solutions of ordinary differential equations using Laplace transforms

UNIT IV: Partial differentiation
Objective: Applications of Partial Differentiation to find Maxima and Minima (CO3) Introduction- Total derivative-Chain rule-Generalized Mean Value theorem for single variable (without proof)-Taylors and Mc Laurent series for two variables– Functional dependence- Jacobian. Applications: Maxima and Minima of functions of two variables with constraints, without constraints(Lagrange's Methods)

UNIT V: First order & Higher order Partial differential equations
Objective: Formation, Solution& application of First & Higher order PDE .(CO4)
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations. Classification of II order PDE- Method of separation of Variables Applications: One-dimensional Wave, Heat equations - two-dimensional Laplace Equation

Text Books: 1.**UM. Swamy, P.Vijaya Lakshmi, R.V.G.Ravi Kumar, M.Phani Krishna Kishore ,** Engineering Mathematics 1st Edition, Anurag Jain for Excel Books
2. **Dr.T.K.V.Iyengar, Dr.B.Krishna Gandhi, S.Ranganatham, M.V.S.S.N.Prasad,** 1st Edition, S.Chand Publication
3. **B.S.GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers

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Reference Books:

1. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
3. **GREENBERG,** Advanced Engineering Mathematics, 2nd edition, Pearson edn
4. **DEAN G. DUFFY,** Advanced engineering mathematics with MATLAB, CRC Press
5. **PETER O'NEIL** advanced Engineering Mathematics, Cengage Learning.

Weblinks : WWW.NPTEL.COM

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

I Year B.Tech. (Mining Engg).-I Semester

COMPUTER PROGRAMMING

Course Objective(s):

- To impact adequate knowledge on the need of programming languages and problem solving techniques.
- To develop programming skills using the fundamentals and basics of C language.
- To enable effective usage of arrays,strings,functions,pointers.
- To teach the basics of pre-processors available with C Compiler.

Unit-I: Introduction to Programming

Objective: To identify the basic operation of CPU by using different number system, notion of algorithm, flowchart, program, and different languages in computer programming. (CO1, CO2)

Introduction to Computers: Introduction to computer programming,Algorithm,flow chart,Program development steps.

Computer languages: Machine level, Assembly level and High-level language.

Number System:conversions- decimal, binary, octal, hexadecimal.

'C' Fundamentals: Structure of a C-program,C-character set, C Tokens- variables, constants, identifiers, data types and sizes, operators.

Unit-II:Control Structures

Objective:To Understanding the concept of various control structures, branchingand different decision making techniques. (CO3)

I/O Functions: Header files, Standard I/O library functions-formatted I/O functions.

Decision making statements: simple if, if-else, nested if-else, else-if ladder, switch-case statements and sample programs.

Iterative Statements: for, while, do-while. Jump Statements-break, continue, goto

Unit-III: Introduction toArray, Structure and Pointer

Objective:Toidentify the concept of array, structure and use of pointers for accessing the values of memory allocation in the program.(CO4)

Arrays- declaration, initialization, storing and accessing elements of 1-D, 2-D and multi-dimensional arrays. **Array Applications**- addition, multiplication, transpose, symmetry of a matrix.

Structure: Declaration, initialization, storing and accessing elements by using structure and union.

Pointers: Introduction to pointers, defining a pointer variable, Pointer to Pointer, Examples of pointers, using pointers in expressions, pointers and arrays.

Unit-IV: Strings

Objective: To understanding the data representation by using String.(CO4)

Strings- declaration, initialization, reading and writing characters into strings, string operations, character and string manipulation functions.

Unit-V: Functions & Preprocessors

Objective: To understanding the concept of Modular programming and use of Pre-Processors in program.(CO5)

Functions- declaration, definition, prototype, function call, return statement, types of functions, parameter passing methods, and function recursion.

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Preprocessor: #define, #include Statement, #ifdef, #endif, and storage classes.

Course Outcomes:

After successful completion of this course, a successful student will be able to:

CO-1. To obtain the knowledge about different languages used in computer programming and also about the number systems which will be very useful for bitwise operations and basic terminology used in the computer programming.

CO-2. To obtain knowledge about algorithm, flow chart, and structure of C program and different C tokens used inside C program.

CO-3. To develop program by using Control structure,different looping and Jump statement.

CO-4. To obtain knowledge about the application and implementation of 2-dimentionalArray and string inside the program.

CO-5. To obtain knowledge about different functionalities of Preprocessors and also to develop the program by using different type of function calls.

Text Books

1. "Programming in ANSI C" by E.Balagurusamy,McGraw Hill Publications.
2. "Programming in C" by Ashok N. Kamthane, 2/e Pearson, 2013.
3. "The C – Programming language" B.W.Kernighan, Dennis M. Ritchie.PHI.
4. "Let Us C", 12th Edition by Yashavant P. Kanetkar online in India.

Reference Books

1. Programming in C by Ajay Mittal, Pearson.
2. Programming with C, Bichkar, Universities press.
3. Programming in C, ReemaThareja, OXFORD.

Course Code : Computer Programming-1 (16199205)

Course designed By:Department of Computer Science and Engineering

	Program Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Course Outcomes	CO1	✓											
	CO2			✓									
	CO3					✓							
	CO4					✓							
	CO5	✓		✓		✓							

Category	General Humanities	Basic Sciences	Engineering Sciences and Technical	Professional Subjects
			✓	

Mode of Evaluation:Quiz, Assignment, Seminar, Written Examination.

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DEPARTMENT OF MINING ENGINEERING
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I Year B.Tech. (Mining Engg).-I Semester
ENGINEERING PHYSICS

Course Objectives:

Physics curriculum is re-oriented to the needs of all branches of graduate engineering courses that serves as a transit to understand the specific advanced topics.

The course is designed to:

1. Impart Knowledge of Physical Optics phenomena like Interference, Diffraction involving to design instruments with higher resolution.
2. Analyze the concept of Polarization, Coherent sources, its realization and utility in optical instrumentation.
3. Study the concepts regarding the bulk response of Magnetic materials and their analytical properties.
4. Electrical or Electronic gadgets are designed basing on the response of naturally abundant and artificially made materials, while their response to E- or H- fields controls their performance.
5. Familiarise with Basic Elements of Quantum Theory and knowledge about dual nature of wave function and applications of Schrodinger wave equation.
6. The discrepancy between classical estimates and laboratory observations of physical properties exhibited by materials would be lifted out through the understanding quantum picture of sub-atomic world dominated by electron and its presence.
7. Impart the knowledge of materials with characteristic utility in appliances.
8. Apply the knowledge of physics of electronic transport at underlying mechanism for Semiconducting devices

Unit-I

Objective: To introduce basic concepts of Optical Interference and Diffraction to design instruments with higher resolution and apply the concepts of coherent sources, its realization and utility optical instrumentation. **(CO1, CO2)**

INTERFERENCE:
Principle of Superposition – Coherence – Interference in thin films (reflection geometry) – Newton's rings - working principle of Interferometer.
DIFFRACTION:
Fraunhofer diffraction single slit, Circular Aperture (Qualitative treatment only) - Grating spectrum – Resolving power of a grating, Telescope, Microscope.

Unit-II

Objective: To knowledge the basical physics of polarization and lasers that are trusted Non-linear coherent sources establishing for the fitness of Instrumentation, establishing a structure property relationship for materials. **(CO2)**

POLARIZATION:
Types of Polarization – Malu's law - Brewester's law- double refraction - Nicol Prism- Polarimeter.

SOURCES OF COHERENT RADIATION:
Properties of lasers - absorption, spontaneous and stimulated emissions- Einsteins coeffecients, Population inversion - Ruby laser, He-Ne laser, Semiconductor Laser.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Unit-III

Objective: To knowledge the designing of Electrical and Magnetic response of naturally abundant and artificially made materials. Electrical or Electronic gadgets are designed basing on the response of naturally abundant and artificially made materials, while their response to E- or H-fields controls their performance **(CO3, CO4)**

MAGNETIC PROPERTIES:
Basic definitions, Relation between B,H,I - Classification of magnetic materials – origin of magnetic moment – Weiss theory of Ferromagnetism - Hysteresis- Soft and Hard magnetic materials.

DIELECTRIC PROPERTIES:
Polarization - Internal field - Clausius Mosotti equation - Ferro Electricity.

Unit-IV

Objective: The discrepancy between classical estimates and laboratory observations of physical properties exhibited by materials would be lifted out through the understanding quantum picture of sub-atomic world dominated by electron and its presence. **(CO5, CO6)**

QUANTUM MECHANICS:
Introduction – Schrodinger time independent and dependent Equations- Particle in a box.

FREE ELECTRON THEORY:
Classical free electron theory-drawbacks, Quantum free electron theory- Concept of Fermi level-Density of states.

Unit-V

Objective: To Gain knowledge about structure of solids and crystal lattices of semiconductors. To Compare the energies of the conduction bands and valence bands in metals, insulators, and semiconductors in understanding the physics of electronic transport as underlying mechanism for appliances. **(CO7, CO8)**

BAND THEORY OF SOLIDS:
Bloch's theorem (qualitative)–Kronig Penney model(qualitative) – energy bands in crystalline solids – classification of crystalline solids– effective mass of electron & concept of hole.

SEMICONDUCTOR PHYSICS:
Introduction- Density of carriers in Intrinsic and Extrinsic semiconductors – Drift & Diffusion - relevance of Einstein's equation- Hall effect in semiconductors.

Text books:

1. A Text book of Engineering Physics – by P.K.Palanisamy, Scitech publications
2. Engineering Physics by Dr. M.N.Avadhanulu and Dr.P.G.Kshira sagar, S.Chand & Company Ltd., (2014)
3. Engineering Physics by D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

Reference Books:

1.Solid State Physics by A.J.Dekker, Mc Millan Publishers (2011)
2. Lasers and Non-Linear optics by B.B.Laud, New Age International Publishers (2008).
3. Engineering Physics by M. Arumugam, Anuradha Publication (2014)

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Web links: 1. www.physics org.com, 2.www. Optics.net, 3. www.nptel.com, Free online courses and education.

Virtual lab: www.vlab.co.in

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

I Year B.Tech. (Mining Engg).-I Semester

ENVIRONMENTAL STUDIES

Course Objectives:

1. Understand fundamental physical and biological principles that govern natural processes.
2. Demonstrate an integrative approach to environmental issues with a focus on sustainability of natural resource utilization.
3. Basic understanding of the ecosystem diversity and its conservation.
4. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
5. Integrate and apply perspectives from across the natural sciences, social sciences, and the humanities in the context of complex environmental problems.
6. Provide students with technical and analytical skills that enable them to find employment in federal and state resource agencies, consulting firms, community-based education, and industrial firms tasked with environmental compliance.

Unit-I

Objective: Understand fundamental physical and biological principles that govern natural processes.

Multidisciplinary Nature of Environmental Studies: Definition, Scope and Importance – **Sustainability: Stockholm and Rio Summit–Global Environmental Challenges:** Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

Ecosystems: 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 Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.(CO1 & CO3)

Unit-II

Objective: Demonstrate an integrative approach to environmental issues with a focus on sustainability of Natural resource utilisation.

Natural Resources: Natural resources and associated problems Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people. Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by non-agriculture activities-effects of Modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced Landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. (CO2)

Unit-III

Objective: Basic understanding of the ecosystem diversity and its conservation.

Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity-classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at

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national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats **to biodiversity:** habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – **Conservation of biodiversity:** Conservation of biodiversity. (CO3)

Unit-IV

Objective: Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution. Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.

Solid Waste Management: Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products. (CO4)

Unit-V

Objective: Integrate and apply perspectives from across the natural sciences, social Sciences, and the humanities in the context of complex environmental problems. Provide students with technical and analytical skills that enable them to find employment in federal and state resource agencies, consulting firms, community-based education, and industrial firms tasked with environmental compliance.

Social Issues and the Environment: Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns.

Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act - Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism The student should submit a report individually on any issues related to Environmental Studies course and make a power point presentation. (CO5 & CO6)

Text Books:

1. Environmental Studies by R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
2. A Textbook of Environmental Studies by Shaashi Chawla, TMH, New Delhi
3. Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

Reference Books:

1. Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada
3. Environmental Studies by Benny Joseph, Tata McGraw Hill Co, New Delhi
4. Environmental Studies by Piyush Malaviya, Pratibha Singh, Anoop singh: Acme Learning, New Delhi

Weblink:

1. www.NPTEL.com

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

I Year B.Tech. (Mining Engg).-I Semester

ENGINEERING DRAWING

Course Objectives: Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

UNIT I

Introduction to drawing Instruments and uses. Lettering.

Polygons : Construction of regular polygons using given length of a side; Curves used in Engineering Practice, conic sections, construction of conics by different methods, cycloidal curves, epi and hypo-cycloids. Involutes.

UNIT II

Scales : Vernier and Diagonal scales.

Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane. Projections of straight lines inclined to both the planes, determination of true lengths and angle of inclinations and traces.

UNIT III

Projections of planes: Regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT IV

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT V

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Course Outcomes:

CO1. To understand the concepts and use of drawing Instruments and Curves used in Engineering Practice.

CO2.To understand the concepts of Vernier and Diagonal scales and concepts of orthographic projections.

CO3.To understand the concepts of Projections of isometric views to orthographic views.

TEXT BOOKS:

1. Engineering Graphics by PI Varghese, McGraw Hill Publishers
2. Engineering Drawing by N.D. Bhatt, Chariot Publications
3. Engineering Drawing by K.L.Narayana & P. Kannaiah , Scitech Publishers.

REFERENCE BOOKS:

1. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers
2. Engineering Drawing by Shah & Rana, Pearson Publishers
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age Publishers

Useful Web-links : http://nptel.ac.in/courses.php
http://mit.espe.edu.ec/courses/mechanical-engineering/

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

I Year B.Tech. (Mining Engg).-I Semester

ENGLISH COMMUNICATION SKILLS LAB-I

OBJECTIVES:
To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

UNIT 1:
1. WHY study Spoken English?
2. Making Inquiries on the phone, thanking and responding to Thanks
   Practice work.

UNIT 2:
1. Responding to Requests and asking for
Directions Practice work.

UNIT 3:
1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
2. Apologizing, Advising, Suggesting, Agreeing and Disagreeing
   Practice work.

UNIT 4:
1. Letters and Sounds
   Practice work.

UNIT 5:
1. The Sounds of English
2. Pronunciation
3 Stress and Intonation

UNIT 6:
Movie Reviews

PRESCRIBED LAB MANUAL FOR SEMESTER I:
'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd

Reference Books:
1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. A Practical Course in effective english speaking skills, PHI
5. Word power made handy, Dr shalini verma, Schand Company
6. Professional Communication, Aruna Koneru, Mc Grawhill Education

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4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

I Year B.Tech. (Mining Engg).-I Semester

ENGINEERING PHYSICS LAB

List of Experiments

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence
2. Newton‟s rings –Radius of Curvature of a Plano_Convex Lens.
3. Determination of thickness of a thin object using parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
6. Melde's experiment – Transverse and Longitudinal modes.
7. Verification of laws of stretched string – Sonometer.
8. Determination of velocity of sound – Volume resonator.
9. L C R Series Resonance Circuit
10. Study of I/V Characteristics of Semiconductor diode
11. I/V characteristics of Zener diode
12. Thermistor characteristics – Temperature Coefficient
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
14. Energy Band gap of a Semiconductor p-n junction.
15. Hall Effect for semiconductor.
16. Determination of dielectric constant of a liquid using digital LCR meter.
17. Determination of dielectric constant of a solid using digital LCR meter.
18. Determination of wavelength of Laser light by using diffraction grating

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

I Year B.Tech. (Mining Engg).-I Semester

COMPUTER PROGRAMMING LAB

Course Objective(s):

- To impact adequate programming skills to solve mathematical problems
- To develop programming skills using the fundamentals and basics of C language.
- To enable effective usage of arrays, strings, functions, pointers and files.

1. Write a C Program to
   a) Calculate the area of triangle using the formula
   Area = (s (s-a) (s-b) (s-c)) 1/2, where s= (a+b+c)/2
   b) To find the largest of three numbers using ternary operator.
   c) To swap two numbers without using a temporary variable.
2. Write a C program that uses functions to perform the following operations using Structure:
   a) Reading a complex number
   b) Writing a complex number
   c) Addition of two complex numbers
3. Write a C program to
   a) 2"s complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2"s complement of 11100 is 00100. Write a C program to find the 2"s complement of a binary number.
   b) Find the roots of a quadratic equation.
   c) Take two integer operands and one operator form the user,
   Performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
4. Write a C Program to
   a) Check whether the given number is Armstrong number or not.
   b) Check whether the given number is palindrome or not.
5. Write a C program to
   a) Find the sum of individual digits of a positive integer and find the reverse of the given number.
   b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
   c) Generate all the prime numbers between 1 and n, where n is a value supplied by the user.
6. Write a C Program to
   a) Print the multiplication table of a given number n up to a given value, where n is entered by the user.
   b) Enter a decimal number, and calculate and display the binary equivalent of that number.
   c) Enter a binary number, and calculate the decimal equivalent of that number.
7. Write a C program to
   a) Interchange the largest and smallest numbers in the array.
   b) Implement a liner search.
   c) Implement binary search.

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8. Write a C program to
   a) Examples which explore the use of structures, union and other user defined variables.
   b) Declare a structure for calculating the percentage achieved by 3 students, by considering the structure elements as name, pin no, mark1, mark2, mark3.
9. Write C Programs
   a) For the following string operations without using the built in functions
      i. to reverse a strings
      ii. to append a string to another string
      iii. to compare two strings.
   b) Write C Programs for the following string operations without using the built in functions
      i. to find the length of a string
      ii. To find whether the given string "MADAM" is palindrome or not.
10. Write a C program
    a) Use functions to perform the following operations:
       i. To insert a sub-string in to given main string from a given position.
       ii. To delete n Characters from a given position in a given string.
    b) To replace a character of string either from beginning or ending or at a specified location
11. Write C Programs for the following string operations with and without using the built in functions
    a) Write C Program to reverse a string using pointers.
    b) Write a C program to concatenate two strings by using pointer.
12. Write C programs that use both recursive and non-recursive functions for the following
    a) To find the factorial of a given integer.
    b) To find the GCD of two given integers.
    c) To find Fibonacci sequence.
13. Write C programs to
    a) Find the area of triangle by using call by value and call by reference concepts.
    b) Pointer based function to exchange value of two integers using passing by address.
    c) Compare two strings by using call by address.
    d) Separate the even and odd elements of an array into two different arrays by using call by value.

Course Outcomes:
After successful completion of this course, a successful student will be able to:

CO-1. To know the structure and syntax of a programming language.
CO-2. To develop code for simple mathematical problems.
CO-3. To write the programs using arrays, structures and pointers

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DEPARTMENT OF MINING ENGINEERING

4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code : Computer Programming Lab													
Course designed By: Department of Computer Science and Engineering													
	Program Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
Course Outcomes	**CO1**	✓											
	CO2			✓									
	CO3					✓							
	CO4					✓							
	CO5	✓		✓		✓							

Category	**General Humanities**	**Basic Sciences**	**Engineering Sciences and Technical**	**Professional Subjects**
			✓	

Mode of Evaluation: Quiz, Assignment, Seminar, Written Examination.

I Year B.Tech. (Mining Engg).-II Semester

ENGLISH-II

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

UNIT I:

Objective: Schumacher describes the education system by saying that it was mere training, something more than mere knowledge of facts where intuitive experience inspires learning
Detailed Text:' The Greatest Resource- Education' from English Encounters

Course Objectives:

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
- To develop the communication skills of the students in both formal and informal situations.

Objective: The lesson highlights Abdul Kalam's contributions to Indian science and the awards he received
Non-Detailed Text: ' A P J Abdul Kalam' from The Great Indian Scientists.

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UNIT II:

Objective: The lesson centres on the pros and cons of the development of science and technology
Detailed Text:' A Dilemma' from English Encounters
Objective: The lesson highlights the dedicated research work of C V Raman and his achievements in Physics
Non-Detailed Text: 'C V Raman' from The Great Indian Scientists.

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UNIT III:

Objective: The lesson depicts of the symptoms of Cultural Shock and the aftermath consequences
Detailed Text: 'Cultural Shock': Adjustments to new Cultural Environments from English Encounters.
Objective: The lesson highlights Homi Jehangir Bhabha's contributions to Indian nuclear program me as architect.

Non-Detailed Text: 'Homi Jehangir Bhabha' from The Great Indian Scientists.

UNIT IV:

Objective: The lesson highlights insightful commentary on cultural traditions.
Detailed Text: 'The Lottery' from English Encounters.
Objective: The lesson gives an account of the unique discoveries and inventions of Jagadish Chandra Bose in Science.

Non-Detailed Text: 'Jagadish Chandra Bose' from The Great Indian Scientists.

UNIT V:

Objective: The essay presents several health disorders that spring out due to environmental changes Generations.

Detailed Text :' The Health Threats of Climate Change' from English Encounters.
Objective: The lesson given an account of the experiments and discoveries in Pharmaceuticals of Prafulla Chandra Ray

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Non-Detailed Text: ' Prafulla Chandra Ray' from The Great Indian Scientists.

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DETAILED TEXTBOOK: English Encounters Published by **Maruthi Publishers**.
DETAILED NON-DETAIL: The Great Indian Scientists Published by **Cenguage learning**

I Year B.Tech. (Mining Engg).-II Semester

MATHEMATICS-II

Course Objective(s):

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- To apply Numerical Techniques to solve Algebraic and Transcendental Equations and also Initial Value Problems and ODE.
- To interpolate the tabulated data at the given values using various interpolation techniques
- To solve the IVPs in ODE using numerical techniques.
- To learn and apply C-R equations.
- Express a given function satisfying certain conditions in Fourier series and Use finite and infinite Fourier Integral Transforms to solve BVPs.

UNIT I: Solution of Algebraic and Transcendental Equations

Objective: To enable the student to solve Algebraic and Transcendental equations by Numerical Methods. (CO1)

Introduction- Bisection Method – Method of False Position – Iteration Method – Newton-Raphson Method.

UNIT II: Interpolation

Objective: To enable the student to use Interpolation Techniques for a given tabulated data (CO2)

Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences-Backward differences –Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton‟s formulae for interpolation – Interpolation with unevenly
spaced points - Lagrange‟s Interpolation formula.

UNIT III: Numerical solution of Ordinary Differential equations

Objective: To enable the student to use Numerical Techniques to solve IVPs in ODE (CO3)

Solution by Taylor‟s series-Picard‟s Method of successive Approximations-Euler‟s Method-
Runge-Kutta Methods.

Unit-IV: Functions of a complex variable

Objective: To enable the student to learn and apply C-R equations (CO4)

Complex function , Real and Imaginary parts of Complex function,(Cartesian and polar form), Limit**,** Continuity and Derivative of complex function, Cauchy-Riemann equations (Cartesian and polar form) , Analytic function, entire function, singular point, conjugate function**,** Harmonic functions, Milne-Thomson method.

UNIT V: Fourier Series & Transforms

Objective: To enable the student to expand a function in Fourier Series& to use Fourier Integral Theorem and Transforms. (CO5)

Introduction- Determination of Fourier coefficients – even and odd functions –change of interval– Half-range sine and cosine series

Fourier integral theorem (only statement) – Fourier sine and cosine integrals - sine and cosine
transforms – properties – inverse transforms.

Text Books:

1. **Dr.T.K.V.Iyengar, Dr.B.Krishna Gandhi, S.Ranganatham, M.V.S.S.N.Prasad,** 1st Edition, S.Chand Publication

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2. **UM. Swamy, P.Vijaya Lakshmi, R.V.G.Ravi Kumar, M.Phani Krishna Kishore**
Engineering Mathematics 1st Edition, Anurag Jain for Excel Books
3. **B.S. GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers.

Reference books:

1. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
2. **V.RAVINDRANATH and P. VIJAYALAXMI,** Mathematical Methods, Himalaya Publishing House
3. **ERWYN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
4. **DEAN G. DUFFY,** Advanced Engineering Mathematics with MATLAB, CRC Press

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I Year B. Tech. (Mining Engg).-II Semester

MATHEMATICS-III

Course Objective(s):

1. To use matrix theory to solve linear system of equations

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2. To find eigen values and Eigen vectors and use Clayey Hamilton theorem to find Inverse and Powers of a Matrix and also reduce a given Quadratic form to Canonical form.
3. To learn applications of Integration and evaluation of Multiple Integrals.
4. To use Beta, Gamma functions to evaluate Improper Integrals.
5. To use vector differentiation and integration with vector integral theorems

UNIT I: Linear systems of equations

Objective: To enable the student to use Matrix theory to solve linear system of equations**.** Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods- Gauss Elimination - Gauss Jordon and Gauss Seidal Methods.
Application: Finding the current in a electrical circuit. (CO1)

UNIT II: Eigen values - Eigen vectors and Quadratic forms

Objective: To enable the student to find Eigen values and Eigen vectors of a matrix and apply Cayley Hamilton theorem.
Eigen values - Eigen vectors– Properties – Cayley-Hamilton Theorem – **without proof** Inverse and powers of aMatrix by using Cayley-Hamilton theorem- Quadratic forms- Reduction of quadratic form to Canonical form – Rank - Positive, negative definite - semi definite - index – signature.Application: Free vibration of a two-mass system.(CO2)

UNIT III: Multiple integrals

Objective*:* To enable the student to apply integration to find length, volume and surface areas. Also the student will learn evaluations of multiple integrals. Review concepts of Curve tracing (Cartesian - Polar and Parametric curves)- **No question from this part**Applications of Integration to Lengths, Volumes and Surface areas of revolution in Cartesian and Polar Coordinates. Multiple integrals - double and triple integrals – change of variables – Change of order of Integration Application: Moments of inertia.(CO3)

UNIT IV: Special functions

Objective: To enable the student to evaluate improper integrals using Beta, Gamma functions**.** Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals Application: Evaluation of integrals.(CO4)

UNIT V: Vector Differentiation & Integration

Objective: To enable the student to apply vector differentiation & Integration to physical and engineering situations**.** Gradient- Divergence-Curl - Laplacian and second order operators - Vector identities (without proof) Application: Equation of continuity, potential surfaces
Line integral – work done – Potential function – area- surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems .application: work done, Force.(CO5)

Text Books:

1. **UM. Swamy, P.Vijaya Lakshmi, R.V.G.Ravi Kumar, M.Phani Krishna Kishore ,**Engineering Mathematics 1st Edition, Anurag Jain for Excel Books
2. **Dr.T.K.V.Iyengar, Dr.B.Krishna Gandhi, S.Ranganatham, V.S.S.N.Prasad,** 1st Edition, S.Chand Publication

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3. **B.S.GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers

Reference books:

1. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
2. **GREENBERG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
3. **B.V. RAMANA,** Higher Engineering Mathematics, Tata McGraw-Hill
4. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
5. **PETER O'NEIL,** Advanced Engineering Mathematics, Cengage Learning

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

I Year B.Tech. (Mining Engg).-II Semester

ENGINEERING CHEMISTRY

Course Objectives:

1. For prospective engineers knowledge about water used in industries (boilers etc.) and for drinking purposes is useful; hence chemistry of water of hard water, boiler troubles and modern methods of softening hard water is introduced.
2. Knowledge of galvanic cells, electrode potentials is necessary for engineers to understand corrosion problem and its control. The problems associated with corrosion are well known and the engineers must be aware of these problems and also how to counter them.
3. Plastics are materials used very widely engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics / elastromers helps in selecting suitable materials for different purpose.
4. A board understanding of the more important fuels employed on a large scale is necessary for all engineer to understand energy – related problems and solve them.
5. With the knowledge available now, future engineers should know at least some of the advanced materials that are becoming available. Hence some of them are introduced here.

Unit-I
Objective: "For prospective engineers knowledge about water used in industries (boilers etc.) and for drinking purposes is useful; hence chemistry of water of hard water, boiler troubles and modern methods of softening hard water is introduced." (CO1)

Water technology: Hard water-Estimation of hardness by hardness by EDTA method – Potable water – Sterilization and Disinfection – Boiler feed water – Boiler troubles – Priming and forming, scale formation, corrosion, caustic embrittlement, turbine deposits – Softening of water – Lime soda, Zeolite processes and Ion exchange process – Reverse osmosis – Electro Dialysis,

Unit-II
Objective: "Knowledge of galvanic cells, electrode potentials is necessary for engineers to understand corrosion problem and its control, the problems associated with corrosion are well known and the engineers must be aware of these problems and also how to counter them". (CO2)

Electrochemistry & Corrosion: Galvanic cells - Conductometic titrations–Elctrode potentials– Nernst equation – electrochemical series – Potentiometric titrations.Causes and effects of corrosion – theories of corrosion (dry, chemical and electrochemical corrosion) – Factors effecting corrosion – Corrosion control methods – Cathodic protection – Sacrificial Anodic, Impressed current methods – Surface coating – Methods of application on metals (Hot dipping, Galvanizing, tinning, Cladding, Electroplating, Electro less, plating,), Organic coatings-Paints.

Unit-III
Objective: "Plastics are materials used very widely engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics / elastromers helps in selecting suitable materials for different purpose ". (CO3)

High polymers: Types of Polymerization – Stereo Polymers – Physical and mechanical properties of polymers – Plastics – Thermoplastics and thermo setting plastics – Compounding and Fabrication of plastics – preparation and properties of Polyethylene, PVC and Bakelite – Elastomers – Rubber and Vulcanization – Styrene butadiene rubber – Thiokol – applications.

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Unit-IV

Objective: "A board understanding of the more important fuels employed on a large scale is necessary for all engineer to understand energy – related problems and solve them". (CO4)

Fuels: Coal – Proximate and ultimate analysis – Numerical problems based on analysis – Calorific value – HCV and LVC – Problems based calorific values; petroleum – Refining – Cracking – Petrol – Diesel knocking: Gaseous fuels – Natural gas – LPG, CNG – Combustion – Problems on air requirements.

Unit-V

Objective: "With the knowledge available now, future engineers should know at least some of the advanced materials that are becoming available"(CO5)

Chemistry of advanced materials: Nanomaterials– Properties of nanomaterials –Engineering applications) – Liquid crystals (Types – Application in LCD and Engineering Applications) – Fiber reinforced plastics – Biodegradable polymers – Conducting polymers –Green chemistry and Applications. Cement- Constituents, manufacturing, hardening and setting, deterioration of cement

Text Books:

1. Jain and Jain (Latest Edition), Engineering Chemistry, Dhanpat Rai Publishing company Ltd.,
2. N. Y. S. Murthy, V. Anuradha, K. RamaRao, "A Text Book of Engineering Chemistry" Maruthi Publications.
3. C. Parameswara Murthy, C. V. Agarwal, Adhra Naidu (2006) Text Book of Engineering Chemistry, B. S. Publications.
4. B. Sivasankar (2010), Engineering Chemistry, McGraw-Hill companies.
5. Ch. Venkata Ramana Reddy and Rama devi (2013), Engineering Chemistry, Cengage Learning.

Reference Books:

1. S. S. Dara (2013) Text Book of Engineering Chemistry, S. Chand Technical Series.
2. K. Sesha Maheswaeamma and Mridula Chugh (2013), Engineering Chemistry, Pearson Publications.
3. R. Gopalan, D. Venkatappayya, Sulochana, Nagarajan (2011), Text Book of Engineering Chemistry, Vikas Publications.
4. B. Viswanathan and M. Aulice Scibioh (2009), Fuel cells, Principals and applications.

Weblink:

1. www.NPTEL.com
2. chem.tufts.edu
3. www.chem1.com

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Objectives: The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

UNIT – I
Introduction to Engg. Mechanics – Basic Concepts.
Systems of Forces : Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems. Introduction**,** limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction.

UNIT II
Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium.

UNIT – III
Centroid : Centroids of simple figures (from basic principles) – Centroids of Composite Figures.
Centre of Gravity : Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, pappus theorem.
Area moments of Inertia : Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. Mass Moment of Inertia : Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies

UNIT –IV
Kinematics : Rectilinear and Curvilinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics:** Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

UNIT – V
Work – Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.
Torsional vibration- The compound pendulum- General case of moment proportional to angle of rotation- D'Alembert's principle in rotation.
Course Outcomes:

CO1. To understand the concepts of forces and its resolution in different planes.
CO2. To understand the concepts of Equilibrium of Systems of Forces, law of Triangle of forces and converse of the law of polygon of forces.
CO3. To understand the concepts of Area moments of Inertia, Mass Moment of Inertia.
CO4. To understand the concepts of Equations for Translation, D'Alembert's principle in rotation.

TEXT BOOKS:

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1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4th Edn - , Mc Graw Hill publications.
2. Engineering Mechanics statics and dynamics:A Nelson , Mc Graw Hill publications
3. Engineering Mechanics: GS Sawhney, PHI Learning Pvt. Ltd.
4. Engineering Mechanics: Basudeb Bhattacharyya, Oxford University Press

REFERENCES:

1. Engineering Mechanics: statics and dynamics – I.H.Shames, – Pearson Publ.
2. Mechanics For Engineers, dynamics: - F.P.Beer & E.R.Johnston –5th Edn Mc Graw Hill Publ.
3. Engineering Mechanics: Fedinand . L. Singer , Harper – Collins

Useful Web-links : http://nptel.ac.in/courses.php
http://mit.espe.edu.ec/courses/mechanical-engineering/

I Year B.Tech. (Mining Engg).-II Semester
PROFESSIONAL ETHICS AND HUMAN VALUES

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Objectives:

1. The aim of this subject is to equip the students with moral values which help them in engineering profession.
2. It help them to discover set of justified moral principles and ideals to be endorsed by the engineers
3. To develop reasoning and analytical skills among engineering students.
4. To make the engineering students aware of the safety measures, risk factors and risk analysis.
5. To make the students to identify issues in engineering and management areas

UNIT I:

(To understand the moral values that ought to guide the Engineering profession. It is intended to developed a set of beliefs, attitudes, and habits that engineers should display concerning morality.)

Human values

Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

UNIT II:

(Important goal of engineering ethics is the discovery of the set of justified moral principles of obligation, rights and ideals that ought to be endorsed by the engineers and apply them to concrete situations.)

Engineering ethics:

The History of Ethics-Purposes for Engineering Ethics-Engineering Ethics-Consensus and Controversy –Professional and Professionalism –Professional Roles to be played by an Engineer –Self Interest, Customs and Religion-Uses of Ethical Theories-Professional Ethics-Types of Inquiry – Engineering and Ethics-Kohlberg"s Theory – Gilligan"s Argument – Heinz's Dilemma.

UNIT III:

(To impart reasoning and analytical skills need to apply ethical concept to engineering decisions and to Provide an understanding of interface between social technological and natural environments on global issues)

Engineering as social experimentation:

Comparison with Standard Experiments – Knowledge gained – Conscientiousness – Relevant Information – Learning from the Past – Engineers as Managers, Consultants, and Leaders – Accountability – Role of Codes – Codes and Experimental Nature of Engineering.

Globalization- Cross-culture Issues-Environmental Ethics-Computer Ethics-computers as the Instrument of Unethical behaviour-computers as the object of Unethical Acts-autonomous Computers-computer codes of Ethics-Weapons Development-Ethics and Research-Analysing Ethical Problems in Research-Intellectual Property Rights.

UNIT IV:

(To make the students aware of the safety concepts, risk factors and risk benefit analysis)

Engineers' responsibility for safety and risk:

Safety and Risk, Concept of Safety – Types of Risks – Voluntary v/s Involuntary Risk- Short term v/s Long term Consequences – Expected Probability - Reversible Effects- Threshold Levels for Risk-Delayed v/s Immediate Risk – Safety and the Engineer - Designing for Safety – Risk - Benefit Analysis-Accidents

UNIT V:

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(To identify the moral issues involved in both management and engineering areas, An understanding of the Engineer's Rights such as collegiality, Conflict of interest, Collective Bargaining.)

Engineer's responsibilities and rights:

Collegiality - Techniques for Achieving Collegiality –Two Senses of Loyalty-obligations of Loyalty – misguided – Loyalty - professionalism and Loyalty- Professional Rights –Professional Responsibilities – confidential and proprietary information-Conflict of Interest-solving conflict problems – Self Interest , Customs and Religion- Ethical egoism-Collective bargaining Confidentiality Acceptance of Bribes/Gifts-when is a Gift and a Bribe-examples of Gifts v/s Bribes-problem solving-interests in other companies-Occupational in other companies-Occupational - price fixing-endangering lives- Whistle Blowing-types of whistle blowing-when should it be attempted-preventing whistle blowing.

TEXT BOOKS

1. "Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009
2. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana - Maruthi - Publications
3. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications
4. "Professional Ethics and Human Values" by Prof.D.R.Kiran-
5. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication

Reference:

1. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill – 2003.
2. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.

I Year B.Tech. (Mining Engg).-II Semester

ENGLISH COMMUNICATION SKILL LAB-II

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OBJECTIVES:
To enable the students to learn demonstratively the communication skills of listening, speaking, reading and writing.

UNIT I:
1. Debating
   Practice work

UNIT II:
1. Group Discussions
   Practice work

UNIT III:
1. Presentation Skills
   Practice work

UNIT IV:
1. Interview Skills
   Practice work

UNIT V:
1. Email,
2. Curriculum Vitae
   Practice work

UNIT VI:
1. Idiomatic Expressions
2. Common Errors in English Practice work

PRESCRIBED LAB MANUAL FOR SEMESTER II:

'**INTERACT**: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.

Reference Books:
1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna
   Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company

I Year B.Tech. (Mining Engg).-II Semester
ENGINEERING CHEMISTRY LAB

List of Experiments:

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1. Introduction to chemistry laboratory - Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.,
2. Trial experiment – Estimation of HCl using standard Na_2CO_3 solution.
3. Estimation of $KMnO_4$ using standard Oxalic acid solution.
4. Estimation of Ferric ion using standard $K_2Cr_2O_7$ solution.
5. Estimation of Copper using standard $K_2Cr_2O_7$ solution.
6. Estimation of Total Hardness water using standard EDTA solution
7. Estimation of Zinc using standard EDTA solution.
8. Estimation of pH of the given sample solution using pH meter.
9. Conductometric Titrations between strong acid and strong base.
10. Conductometric Titrations between strong acid and weak base.
11. Conductometric Titrations between weak acid and strong base.
12. Conductometric Titrations between weak acid and weak base.
13. Estimation of Vitamin - C

I Year B.Tech. (Mining Engg).-II Semester
ENGINEERING WORKSHOP & IT WORKSHOP

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Course Objective: To impart hands-on practice on basic engineering trades and skills.
Note: At least two exercises to be done from each trade.

Trade:

Carpentry	1. T-Lap Joint 2. Cross Lap Joint 3. Dovetail Joint 4. Mortise and Tennon Joint
Fitting	1. Vee Fit 2. Square Fit 3. Half Round Fit 4. Dovetail Fit
Black Smithy	1. Round rod to Square 2. S-Hook 3. Round Rod to Flat Ring 4. Round Rod to Square headed bolt
House Wiring	1. Parallel / Series Connection of three bulbs 2. Stair Case wiring 3. Florescent Lamp Fitting 4. Measurement of Earth Resistance
Tin Smithy	1. Taper Tray 2. Square Box without lid 3. Open Scoop 4. Funnel

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

I Year B.Tech. (Mining Engg).-II Semester

IT WORKSHOP

Course Objective(s):

- To impact the knowledge of various hardware components of a computer
- To provide the skill of assembling the computer.
- To impact the knowledge and usage of various Microsoft tools such as Power Point ,Word and Excel

1. Identify the components of a computer, components in a CPU and its functions. Every student must draw block diagram of the CPU along with the configuration of each peripheral.
2. Every student should disassemble and assemble the PC back to working condition.
3. Every student should individually install windows 7 (professional) on the personal computer. He/She must install the device driver's software, and basic application software's viz., adobe reader, ms-office etc.
4. Each student must able to configure the basic computer management settings of windows components. Each student must familiar to work with MS-DOS command prompt and basic DOS commands.
5. Every student should install Linux on the computer. This computer should have windows installed .The system should be configured as dual boot with both windows and Linux.
6. Several mini tasks would be that covers basic commands in Linux and basic system administration in Linux which includes: Basic Linux commands in Bash, Create hard and symbolic links .Text processing, using wildcards.
7. Web Browsers and Surfing the web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and popup blockers. Also, plug-in like Macromedia Flash and JRE for Applets should be configured.
8. Search Engines and Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google.
9. Cyber Hygiene: Students would be exposed to the various threats on internet and would be asked to configure their computer to be safe on the internet. They need to first install antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block popup, block activeX downloads to avoid virus and/or worms.
10. Each student will familiar with Microsoft word and different templates of it for design a RESUME. Creating Project Abstract features to be covered: Formatting styles, inserting table, bullets and numbering, changing text direction, cell alignment.
11. Excel orientation: The student must know the importance of Ms-Excel as a spreadsheet tool, give the details of the four tasks and features that would be covered in each using Excel- Accessing, Overview of toolbars, saving Excel files, using help and resources.
12. Students will be working on basic power point utilities and tools which help them create a basic power point presentation.

Course Outcomes:

After successful completion of this course, a successful student will be able to:

CO-1. Identify various hardware components of a system
CO-2. Assemble the computer.
CO-3. Use various Microsoft tools.

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DEPARTMENT OF MINING ENGINEERING

4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code : IT Workshop

Course designed By: Department of Computer Science and Engineering

	Program Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Course Outcomes	CO1	✓											
	CO2			✓									
	CO3					✓							
	CO4					✓							
	CO5	✓		✓		✓							

Category	General Humanities	Basic Sciences	Engineering Sciences and Technical	Professional Subjects
			✓	

Mode of Evaluation: Quiz, Assignment, Seminar, Written Examination.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

II Year B.Tech. (Mining Engg).-I Semester

FLUID MECHANICS & HYDRAULIC MACHINERY

Course objective:
The applications of the conservation laws of flow through pipes and hydraulic machines are studied .To understand the importance of dimensional analysis. To understand the importance of various types of flow in pumps and turbines.

UNIT I
Fluid Properties:
Units and dimensions- Properties of fluids- mass density, specific weight, specific volume, Specific gravity, viscosity, compressibility, capillarity and surface tension.
Fluid Flow Phenomena: Types of fluids, Concept of stream lines, stream tubes, types of fluid flow, turbulence and its nature, flow in boundary layers.

UNIT-II
Pressure and its measurements of liquids:
Pressure, atmospheric pressure, gauge and absolute pressure. Simple manometers – piezometer, U-tube manometer, single column manometer. Differential manometers- U-tube differential manometer, Inverted U-tube differential manometer. Bourdon's pressure gauge, Diaphragm pressure gauge and Dead weight pressure gauge.
Basic Equations of fluid flow: Continuity, Momentum and Bernoulli's equations.

UNIT III
Flow Through Circular Conduits:
Hydraulic and energy gradient - Laminar flow through circular conduits and circular annuli- Boundary layer concepts – types of boundary layer thickness – Darcy Weisbach equation – friction factor- Moody diagram- commercial pipes- minor losses – Flow through pipes in series and parallel.

UNIT IV
Air compressors:
Single stage and multi stage reciprocating air compressors. Expression for work done during single stage air compression with and without clearance volume. Volumetric efficiency. Simple problems on single stage compressors.

UNIT V
Pumps:
Impact of jets - Euler's equation - Theory of rotodynamic machines – various efficiencies – velocity components at entry and exit of the rotor- velocity triangles. Types of pumps - Centrifugal pumps – working principle - work done by the impeller. Reciprocating pump - working principle – indicator diagram - work saved by fitting air vessels. Rotary pumps – classification – comparison of working principle with other pumps – advantages.

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Outcomes:

- Upon completion of this course, the students can able to apply mathematical knowledge to predict the properties and characteristics of a fluid.
- Can critically analyse the performance of pumps and turbines.

Text books:

1**. Hydraulics and fluid mechanics including hydraulics machines -** Dr. P.N. Modi, S.M. Seth, Rajsons publications Pvt.Ltd.
2. **A Text book of Fluid Mechanics and Hydraulic Machines -** Bansal, Laxmi publications 2006.
3. "**Fluid Mechanics**" Streeter, V. L. and Wylie E. B., McGraw Hill Publication
4. "**Engineering Fluid Mechanics"** Kumar K. L., Eurasia Publishing House (p) Ltd. New Delhi (2004)

Reference books:

1. "**Hydraulics and Fluid Mechanics**", Midi P.N. and Seth, S.M., Standard publishers New Delhi, 1999.
2. **"Fluid Mechanics and Machinery",** Robert W.Fox, Alan T. McDonald, Philip J.Pritchard,
3. **A Text book of Fluid Mechanics and Hydraulic Machines -** Bansal, Laxmi publications 2006.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

II Year B.Tech. (Mining Engg).-I Semester

MINE SURVEYING

Course Objective:
To determine relative positions of objects below or above the earth surface and to calculate the areas and angles by using various instruments in mines & also to determine various surveying instruments using in their fields.

UNIT-I
Introduction of surveying:
Plane and geodetic survey, Classifications of survey, conventional signs, conventional instruments, Linear measurements, principles, instruments, methods, obstacles, offsets, error in chaining, booking and plotting, problems, Compass Surveying: Types of bearing, calculation of angles and bearings, prismatic and surveyor compass, trough compass, tabular compass, local attraction and declination, errors, problems.

UNIT-II
Theodolite:
Definition and terms, parts, temporary adjustments, permanent adjustments, horizontal and vertical angles, miscellaneous operation, errors. Methods of theodolite traversing-Checks, plotting, closing error, balancing, coordinate calculation, degree of accuracy, problems.

UNIT-III
Levelling and contouring:
Principles and definition, types of levels, adjustments, reduction of levels, curvature and refraction, sensitivity of bubble, problems. Contour- Contour interval and charecteristics, methods, interpretation of contours and uses of contours. Methods of plane table, radiations. Intersection, traversing and resection. 2-point and 3-point problem. Adjustment and common error in plane table surveying.

UNIT-IV
Plane table survey:
Accessories, working operation, precise plane table equipment, methods of plane tabling, intersection (graphic triangulation), traversing, resection, three point problem, two point problem, errors, advantages and disadvantages

UNIT-V
Modern surveying techniques:
Types of modern surveys, Total station & its application, Global positioning system & its application in mining, introduction to geographies information system (GIS), Remote sensing and its application in mining industry.

Course outcome: By completion of this course the students able to handle the surveying instruments, the students will be to use advanced surveying techniques of total station.

Text books:

1. **Surveying Vol I -** B. C. Punmia, Laxmi Publication, 1999 16TH edition.
2. **Surveying Vol II-** B. C. Punmia, Laxmi Publication, 1999 15TH edition
3. **Mine Surveying Vol I, II&III** – S. Ghatak, Coal Field Publishers, 2008, 7th edition

Reference books:

1. **Surveying Vol I -** S. K. Duggal, Tata McGraw Hill Publications, New Delhi, 2000
2. **Elementary plane and mine surveying -** V. Borshch, Kom Powets, BFederar M. Kolesnikova, Mir Publications, Moscow, 1986.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

II Year B.Tech. (Mining Engg).-I Semester

INTRODUCTORY GEOLOGY

Course Objective: To lay emphasis on the study of minerals, rocks and structures. At the end of the course the students will have an understanding of the sciences of ores and minerals.

UNIT-I

Introduction to Geology:

Definition of Geology, Branches of Geology, Importance of Geology in Mining, Interior of the earth, Weathering, Erosion, Denudation. Geological processes. Ground water Origin and occurrence, Hydrological cycle, Sources of water in Mines. Classification of rocks based on porosity and permeability Water table and types of ground water. Geological controls on ground water movement in mines.

UNIT-II

Introduction to Mineralogy:

Definition of mineral, Classification of minerals, Physical and chemical properties of minerals, Study of Silicate structures of individual minerals.

Study of individual silicate groups- Quartz, Feldspar, Pyroxenes, Amphiboles, Micas, Aluminum silicates, Garnets, Olivine

UNIT-III

Optical Mineralogy:

Ordinary light and Polarized light, reflection, refraction, double refraction. Polarizing and Ore microscopes, Polarizer and analyzer, thin sections and polished sections, Examination of the minerals under the microscope, Optical properties, pleochroism, Extinction, Interference colors.

UNIT-IV

Petrology:

Igneous petrology, Rocks three folds classification- Origin, form, structures, textures and classification of igneous rocks. Bowen's reaction principle, Study of rocks, Granite., syenite, gabbro, pegmatite, dolerite.

UNIT-V

Sedimentary and metamorphic Petrology:

Sedimentary Petrology- Formation, structures, textures and classification. Petrographic characteristics of conglomerate, breccia, sandstone, shale, limestone. Metamorphic petrology- Formation, structures, textures and classification of metamorphic rocks, Petrography of gneiss. schist, slate, marble,quartzite, charnockite.

Outcome: The students will able to use is knowledge in identifying the minerals, rocks and structures. They will also learn about stratigraphy, petrology and structural

Text books:

1. "**Engineering Geology**", Parbin Singh
2. **"Principles of Engineering Geology",** K.M.Bangar
3. **"A text book of Geology" ,** G.B.Mahapathra

Reference Books:

1. RUTLE'S Elements of mineralogy, 27th EDITION Revised by C.D. Gribble
2. The PRINCIPLES of Petrology, an Introduction to the science of Rocks- By G.W. TYRRELL

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

II Year B.Tech. (Mining Engg).-I Semester

DEVELOPMENT OF MINERAL DEPOSITS

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

UNIT-I
Introduction of Mining Engineering:
Introduction to mining industry, role of ME in national economy and infrastructure building, Basic mining terminologies, sequence in opening out a deposits, prospecting and geotechnical investigations in brief. Selection criteria for underground or open cast mining methods. Classification of mining methods.

UNIT-II
Opening up of deposits:
Types, size and location of entries for underground mine. Introduction to surface mining methods. Box cut and formation of benches in mine.

UNIT-III
Shaft Sinking operations:
Preliminary geo-technical investigations for a shaft sinking project. Surface arrangements for sinking shafts, apparatus and equipment. Unit operations of drilling, blasting, mucking, defuming, temporary and permanent lining, construction of insets and shaft stations. Methods of sinking shaft in water-logged, pressurized strata in loose and running soils, mechanized sinking, multi-deck platforms, and shaft borers , blind shaft boring and pilot shaft boring. Drop raise method, Need for widening and deepening of operating shafts.

UNIT-IV Development of workings : Drivage of cross-cut, drifts, inclines and raises by conventional and mechanized methods. Ventilation, supporting, lighting and transporting arrangements

UNIT-V
Mine supports:
Need of supports in excavation. Types of support- Timbers, stone, concrete, steel, hydraulic supports, Powered Supports. Yielding and rigid supports. Roof stitching, roof bolting. Supports for roadways, faces and junctions.

Course outcome:
The students will gain exposure in field of mining activities along with concept relating to history of mining, drilling methods, shaft sinking, along with drifting and tunneling technology.

Text books:
1. "**Elements of Mining Technology, Vol-I**", D. J. Deshmukh, Vidyasewa prakashan, Nagpur.
2. "**Introductory Mining Engineering**", Hartman H.L., John Wiley sons.

Reference books:
1. "**Underground Mining Methods Handbook**", W. A. Hustrulid, Published by S. M. E of the American institute of Mining , Mettalurgical & Petroleum Engineers Inc., New York,
2. "**Universal Mining School Volumes**", Cardiff Gt. Britain,

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

DRILLING & BLASTING

Course Objectives:
To impart the exploratory and production drilling skills in mines. To study the explosives and blasting agents, accessories and tools. To expose study the various theories of rock fragmentation. To enable the design of blasting in underground and surface mines.

UNIT-I
Principles of Drilling:
Principles of rock drilling, Drilling methods- Percussive, Rotary, Rotary-Percussive, applicability, advantages and disadvantages, drillability studies, factors effecting drillability, mechanics of drilling. Selection of drills, maintenance of drills. Various types of drill bits and their design aspects. Study of bit life, factors effecting bit life. Thrust/feed and rotation, alignment and deviation in drilling.

UNIT-II
Explosives & blasting of explosives:
Historical development, Types of explosives, properties of explosives, low and high explosives, liquid oxygen explosive (LOX), ANFO, slurries, emulsion explosives, heavy ANFO, permitted explosives, testing of permitted explosives, bulk explosive system-PMS, SMS, Safety fuses, detonating cord and accessories, detonators, exploders, electric firing and non-electric firing, electronic detonators, NONEL blasting.

UNIT-III
Handling of explosives:
Surface and underground transport of explosives, bulk transport in opencast mines. Magazines, accidents due to explosives. Precautions and safety measures during transportation of explosives.

UNIT-IV
Blasting methods in underground and surface mines:
Pattern of Blasting, Preparation of charge, stemming and short firing. Choice and economical use of explosives, miss fires, blown out shots, incomplete detonation, their causes and prevention and remedies.

UNIT-V
Mechanics of blasting and environmental impacts:
Factors affecting rock breakage, Mechanism of rock blasting, Coupling, shock waves impedance, critical diameter etc. Calculation of charge and powder factor, Ground vibrations due to blasting and damage criteria, Controlled blasting methods, Design of blasting rounds, Noise and air overpressure, fly Rock, dust and fumes, Economics of blasting .

Course outcome:
The students will design on drilling and blasting operations in underground and surface mines. They will also know to design blasting pattern for mines, dimensional stones, road constructions, oil and ground water.

Text books:

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1. "**Explosives and blasting practices in mines**", S. K. Das, Lovely Prakashan, Dhanbad, 1993.
2. "**Explosives and blasting techniques**", G. K. Pradhan, MineTech Publication, 1996.
3. Hustrulid, W. A. Blasting Principles of Open Pit Mining, Vol. 1- General Design Concept, A.A. Balkema, Rotterdam, 1999.

Reference books:

1. "**Rock Fragmentation**", B. Mohanty, Chapter-4, A. A. Balkema, Rotterdam, 1996 .
2. "**Advances in drilling and blasting**", V. R. Sastry, Chapter-1 & 2, Alied Publishers Ltd., 1993.
3. "**Principles of Rock drilling**", U. M. Rao Karanam & B. Mishra, Chapter-1 & 2, Oxford & IBH, 1998.
4. Jimeno, C.L., Jimeno, E.L, Carcedo, E.J. Drilling and Blasting of Rocks, A.A.Balkema, Rotterdam, 1995.

II Year B.Tech. (Mining Engg).-I Semester

COMPUTER AIDED DESIGN FOR MINING

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Course objective:

- To familirise the students with various machine components so as to prepare assembly drawings both manually and using standard CAD packages.
- To familiarize the students with Indian Standards on drawing practices and standard Components.

UNIT I

Drawing Standards

Code of practice for Engineering Drawing, BIS specifications – Welding symbols, riveted joints, keys, fasteners – Reference to hand book for the selection of standard components like bolts, nuts, screws, keys etc.

UNIT II

Fits And Tolerences

Limits, Fits – Tolerancing of individual dimensions – Specification of Fits – Preparation of production drawings and reading of part and assembly drawings, basic principles of geometric dimensioning & tolerancing.

UNIT III

Introduction To Drafting Package

Drawing, Editing, Dimensioning, Plotting Commands, Layering Concepts, Matching, Detailing, Detailed drawing, Basic principles of geometric dimensioning & tolerancing.

UNIT IV

Assembly Drawing

(Preparation of 2D assembled views for the given part details)
Preparation of assembled views, both manually and using software package, given part details for components such as Shaft couplings – Plummer block – Screw jack – Lathe Tailstock – Universal joint – Machine Vice – Stuffing box – Crosshead – Safety Valves – Non-return valves – Connecting rod – Piston and crank shaft – Multi plate clutch – Preparation of Bill of materials and tolerance data sheet. TOTAL: 20% of classes for theory classes and 80% of classes for practice
Note: 50% of assembly drawings must be done manually and remaining 50% of assembly drawings must be done by using any 2D drafting package)

UNIT V

3d Views

Computer aided Solid Modeling: Isometric projections, orthographic projections of isometric projections, modeling of simple solids, Modeling of Machines & Machine Parts, How to draw mine plans by using coordinate system.

Outcomes

Ability to develop engineering drawing for the industrial component using Indian Standard code of practice.

Text Books

1. Gopalakrishna K.R., "Machine Drawing", 17th Edition, Subhas Stores Books Corner, Bangalore, 2003

References Books:

1. N. D. Bhatt and V.M. Panchal, "Machine Drawing", 45th Edition, Charator Publishers,

2010
2. Goutam Pohit and Goutam Ghosh, "Machine Drawing with AutoCAD", 1st Edition, Pearson Education, 2004
3. Junnarkar, N.D., "Machine Drawing", 1st Edition, Pearson Education, 2004
4. N. Siddeshwar, P. Kanniah, V.V.S. Sastri, "Machine Drawing" , published by Tata Mc GrawHill,2006
5. S. Trymbaka Murthy, "A Text Book of Computer Aided Machine Drawing", CBS Publishers, New Delhi, 2007

II Year B.Tech. (Mining Engg).-I Semester

FLUID MECHANICS & HYDRAULIC MACHINERY LAB

A. Flow Measurement

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1. Calibration of Rotometer
2. Flow through Venturimeter
3. Flow through a circular Orifice
4. Determination of mean velocity by Pitot tube
5. Verification of Bernoulli's Theorem

B. Losses in Pipes

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

C. **Pumps**

8. Characteristics of Centrifugal pumps
9. Characteristics of Reciprocating pump

D. Air Compressor

10. Determination of volumetric efficiency of an Air compressor

II Year B.Tech. (Mining Engg).-I Semester

MINE SURVEYING LAB

List of experiments:

1. Triangulation survey.
2. Study of theodolite in detail- practice for measurement of horizontal and vertical angles.

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3. Measurement of horizontal angles by method of repetition and reiteration.
4. Trigonometric levelling- heights and distance problem.
5. Heights and distance using principles of tachometric surveying.
6. Curve setting – different methods.
7. Determine of area using surveying instruments.
8. Traversing & Contouring using surveying instruments .
9. Determination of remote height using total station.
10. Distance, gradient, Diff., height between tow inaccessible points using theodolite .

Equipment to be used:

1. Theodolites, and levelling staffs.
2. Tachometers.
3. Total station.
4. Dumpy level.

II Year B.Tech. (Mining Engg).-II Semester

BASIC MECHANICAL ENGINEERING FOR MINING

Course objectives:

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

To expose the students to the thrust areas in mechanical engineering and their relevance by covering the fundamental concepts.

UNIT-I

Simple stress & strain:

Elasticity and plasticity, types of stresses and strain, Hooke's law, stress-strain diagram for mild steel, working stress, factor of safety, lateral strain-poisons ratio and volumetric strain, elastic module and the three different relationship between them, bars of varying section, composite bars, temperature stresses.

Shear force and bending moment:

Definition of beam, types of beam, concept of shear force and bending moment, SF and BM diagram for cantilever, simply supported beam and over hanging beams, subjected to point load, UDL, UVL, and combination of these loads, point of contra flexure, relation between SF & BM.

UNIT-II

Cast irons and steel:

Structure and properties of white cast iron, malleable cast iron, grey cast iron, spheroidal graphite cast iron, alloy cast irons, classifications of steels, structure and properties of plane carbon steels, low alloy steels, had field manganese steels, tool and die steels, effect of various alloying element in steels

Non-ferrous materials alloys:

Structure and properties of copper and its alloys, Aluminum and its alloys, titanium and its alloys.

UNIT-III

Mechanisms:

Elements or Links, Classification, Rigid Link, flexible and fluid link, Types of kinematic pairs, sliding, turning, rolling, screw and spherical pairs - lower and higher pairs, closed and open pairs, constrained motion - completely, partially or successfully constrained and incompletely constrained. Khubralrs criteria, Grashoff's law, Degrees of freedom, Kutzbac criterian for planar mechanisms, Mechanism and machines - classification of machines, kinematic chain, inversion of mechanism , inversion of mechanism, inversions of quadric cycle, chain- single and double slider crank chains.

UNIT-IV

CAMs:

Definitions of cam and followers - their uses — Types of followers and cams — Terminology —- Types of follower motion: Uniform velocity, Simple harmonic motion and uniform acceleration and retardation. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases.

Analysis of motion of followers:

Roller fo11ower— circular cam with straight, concave and convex flanks.

UNIT V

Gears :

Higher pairs, friction wheels and toothed gears- types, law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles.

Velocity of sliding, phenomena of interferences, Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for are of contact and path of contact. Introduction to Helical, Bevel and worm gearing.

Power Transmissions:

Introduction, Belt and rope drives, selection of belt drive- types of belt drives,V-belts, materials

used for belt and rope drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains- length, angular speed ratio, classification of chains. Introduction to gear Trains, Train value, Types- Simple and reverted wheel train, Epicyclic gear Train. Methods of finding train value or velocity ratio, Epicyclic gear trains. Selection of gear box- Differential gear for an automobile.

Outcomes:
The students will be able to utilize the inter dependence of the thrust areas in mechanical engineering and their significance leading to the development of products, processes and systems relevant to mining engineering .

Text Books:

1. "Strength of Material", S. S. BhaviKatti, Bikash Publication house, 2006.
2. "Engineering mechanics of solids", E. P. Popov, Pearson Education India, 1998.
3. "Essential of Materials science and Engineering", Donald R. Askeland, Thomson.
4. "Material science and Metallurgy for engineers", V.D. Kodgire, S.V. Kodgire, Everest Publishing house.
5. "Mechanism and Machine Theory", Ashok G. Ambekar, PHI Publishers
6. "Theory of Machines" R.S. Khurmi, J.K. Gupta, S. Chand Publication

Reference Books:

1. "**Strength of materials**", Jindal, Umesh Publication.
2. "**Analysis of structures**", Vazirani and Ratwani.
3. "**Science of Engineering materials**", Agarwal.
4. "**Engineering Materials and metallurgy**" Er.R.K.Rajput, S. Chand
5. "**Theory of Machines**", Sadhu Singh Pearsons Edn
6. "**Theory of machines and Machinery**" ,Nickers /Oxford .
7. "**Theory of Machines**", Thomas Bevan/ CBS

II Year B.Tech. (Mining Engg).-II Semester

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Course Objectives:
1. To learn the basic principles ol electrical law's and analysis of networks.
2. To understand the principle of operation and construction details of DC machines.

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3. To learn the principle of operation and constructional details of transformers, alternator and induction motors.
4. To study the operation of PN junction diode, half wave, full Wave rectifiers and OP-AMPS and the operation of PNP and NPN transistors and various amplifiers.

UNIT-I
Electrical Circuits:
Basic definitions, Types of network elements, Ohm's Law, Kirchhoff's Laws, inductive networks, capacitive networks, series, parallel circuits, star-delta and delta-star transformations.

UNIT-II
DC Machines:
Principle of operation of DC generator- emf equation, types, DC motor types, torque equation, applications, three point starter, swinburn's Test, speed control methods.

UNIT-III
AC Machines:
Principle of operation of single phase transformers, e.m.f. equation, efficiency and regulation. Principle of operation of alternators, Principle of operation of 3-Phase induction motor- slip-torque characteristics,efficiency .

UNIT IV
Rectifiers & Linear ICs:
PN junction diodes, diode applications - Half wave and bridge rectifiers. Characteristics of operation amplifiers (OP-AMP) - application of OP-AMPS (inverting, non inverting, integrator and differentiator).

UNIT V
Transistors:
PNP and NPN junction transistor, transistor as an amplifier, single stage CE amplifier, frequency response of CE amplifier, concepts of feedback amplifier.

Course Outcomes

After successful completion of the course, a successful student will be able to

1. Able to analyse the various electrical networks.
2. Able to understand the operation of DC generators,3-point starter and conduct the Swinbume's Test.
3. Able to analyse the performance of transformer, operation of 3-phase alternator and 3-phase induction motors.
4. Able to analyse the operation of half Wave, full wave rectifiers, op-amps and explain the single stage CE amplifier and concept of feedback amplifier.

Text books:

1. "**Electronic Devices and Circuits**", R.L. Boylestad and Louis Nashelslcy, 9th edition, PEI/PHI 2006.
2. "**Electrical Technology**", Surinder Pal Bali, Pearson Publications.
3. "**Electrical Circuit Theory and Technology**", John Bird, Routledge Taylor &Francis Group.

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Reference books:

1. "**Basic Electrical Engineering**", M.S.Naidu and S.Karnakshiah,TMI-I Publications.
2. "**Fundamentals of Electrical Engineering**" Rajendra Prasad, PHI Publications, 2nd edition.
3. "**Basic Electrical Engineering**", Nagsarkar,Sukhija, Oxford Publications,2nd edition.
4. "**Industrial Electronic**s", GK. Mittal, PHI.

II Year B.Tech. (Mining Engg).-II Semester

ADVANCED MINE SURVEYING

Course Objective:

To determine the horizontal & vertical angles by using different surveying instruments and to delineate the ore bodies in underground mines and learn to estimate the amount of ore and waste.

Unit 1

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Tachometric Survey:
Definition and different systems of tachometric methods, Determinations of Tachometric constants (K &C) - The stadia system - principle of stadia method. Fixed Hair method - Distance and elevation formulae. Movable hair method Staff Normal, Staff Vertical. Subtense Method — Principle of subtance (or movable Hair) method, The tangential method.

Unit II
Curves:
Definitions and Notations, Designation of Curves, Elements of Simple Curves, Setting out simple curves - By ordinates from the long chord, By successive bisections of arcs and chords, By offsets from the tangents, By deflections distances, Rankin's method of tangential angles, Two theodolite method, Tachometric method. Transition curves (Brief)

Unit III
Areas and Volumes:
Areas - General methods of determining areas, Areas computed by sub division into triangles, Areas from offsets to a base line, Area by double meridian distances, Area by coordinates, Area by plan meter. Volumes - Measurements from cross- sections, The prismoidal formula, The trapezoidal formula (Average and area method), Volumes from spot levels, Volumes from contours,

Unit IV
Mine Plans & Theory of Errors:
Various methods of plotting survey, Survey office, Storage of survey instruments, Scales and its classifications, Kinds of errors, Definitions, Laws of accidental errors, Probability Curve, Probable errors of an average, Probable error of sum, Most probable value, Mean square error, Average error, General Principle of Least squares, Law of weights, Determination of probable errors, Distribution of error of the field measurement, Determination of most probable values.

Unit V
Correlation & Stope Survey:
Definition, purpose & classification of Correlation Survey, Correlation of surface and U/G surveys, Direct traversing through adits or inclined shafts/ drifts, Direct transference of azimuth down the shaft, Correlation by plumb wires in two shafts, Correlation by plumb wires in single shaft, Co-Planation or Exact Alignment method, Weisbach Triangle or Approximate Alignment method, Weiss Quadrilateral method. Stope Surveying: Purpose of stope surveying, Classification of stop surveying methods, Tape triangulation method, Ray method.

Course Outcome:
By this course the student able to survey surface or underground mines by using instruments & calculate the areas & volume of ore and waste.

Text books:
1. **Surveying Vol I -** B. C. Punmia, Laxmi Publication, 1999 16TH edition.
2. **Surveying Vol II-** B. C. Punmia, Laxmi Publication, 1999 15TH edition
3. **Mine Surveying Vol I, II&III** – S. Ghatak, Coal Field Publishers, 2008, 7th edition

Reference books:
1. **Surveying Vol I** - S. K. Duggal, Tata McGraw Hill Publications, New Delhi, 2000

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2. **Elementary plane and mine surveying -** V. Borshch, Kom Powets, BFederar M. Kolesnikova, Mir Publications, Moscow, 1986

II Year B.Tech. (Mining Engg).-II Semester

SURFACE MINING

Course objectives:

1. To gain an understanding of surface mining equipments and its operations in a surface mine.
2. To achieve the ability to classify and select surface mining .methods.
3. To analyse the slope failures in a surface mine and study the concept of waste dump

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

formations.

UNIT-I
Introduction:
Introduction of surface mining, status of opencast mining in India, Advantages over underground mining, General consideration for the applicability of opencast mining, limits of open cast mining Method of opening box cut, selection of site for box cut.

UNIT-II
Design of Open pit:
Optimum dimensions of open pit mines. Removal of over burden and disposal, opencast benchs, height, width and slope angle of the bench and overall pit slope angle, Factors affecting the stability of the slope.

UNIT-III
Design of drilling and blasting methods in opencast mining: Design of bench blasting principles of fragmentation in open cast mines. Design of blasting with special reference to heavy blasting, air deck blasting, ground vibration, fly rocks, novel methods of drilling, smooth blasting and pre-splitting, case study of opencast mine drilling and blasting patterns.

UNIT-IV
Surface Mining Methods:
Types of Surface Mining Methods- Casting, strip, quarrying and Placer Mining and Modern Methods Excavation and loading, Types of Surface Mining Machinery- Shovels, Dragline, Front-end loader, Stackers, Graders. Non-Cyclic Surface Mining: Bucket Wheel Excavators and Continuous surface miners.

UNIT-V
Transport Equipment:
Types of Transport Machinery-Dumpers, Aerial ropeways-monocable and bicable types and their constructional details. Shovel, dumper combination, Belt Conveyors, high angle conveyor and in-pit crusher. Selection of equipments/Machinery.

Course outcome:
The students will have ability to classify and select the suitable surface mining methods and equipment based on site conditions. They will also able to design of waste dump formations and safe slopes in surface mines.

Textbooks:
1. "**Surface Mining Technology**", S. K. Das, Lovely Prakashan, Dhanbad, 1994.
2. "**Surface Mining**", G. B. Mishra, Dhanbad Publishers, 1978.
3. **Hartman H.L., Introductory Mining Engineering**, John Wiley and Sons, 2002.

Reference books:
1. "**Elements of Mining Technology**", Vol.-I, D. J. Deshmukh, 6th Edition, Central Techno Publications, Nagpur, 1998.
2. "**Opencast Mining**", R. T. Deshmukh, M. Publications, Nagpur, 1996.
3. "**Latest Development of Heavy Earth Moving Machinery**", Amithosh De, Annapurna Publishers, Dhanbad, 1995.

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4. "**Rock Slope Engineering**", Hock and Bray, The Institution ofMining and Metallurgy, 1981.
5. "**Introductory Mining Engineering**", Hartman, John Wiley and Sons, 1987.

II Year B. Tech. (Mining Engg).-II Semester

UNDERGROUND COAL MINING

Course Objectives: To understand coal growth in India and all over the world and different terminology used in coal mining. To study the development of panels and extraction of coal in Board and Pillar method .To study the Longwall advancing and retreating methods.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

UNIT - I

Introduction: Present situation and future growth of coal mining industry in India and abroad. Factors affecting selection of different possibilities of entry: Adit, shaft, incline etc. Different terminologies used in coal mining, mine development and process, Different coal mining methods, factors influencing choice of coal mining methods.

UNIT - II

Bord and Pillar Mining: applicability, limitations, advantages and disadvantages of Bord and pillar mining method, development and depillaring sequence of operations in Bord and Pillar mining, and local fall, main fall, air blast. Problems associated with Bord & Pillar method and precautions. Case study with layouts and its related calculations; Manpower; machinery; production & output per man-shift.

UNIT – III

Long-wall Mining: Applicability, limitations, merits and demerits, different long wall mining methods; advancing , retreating , factors influencing selection of long wall method, method of development and extraction of panels; Case study with layouts and its related calculations; Manpower; machinery; production & output per man-shift.

UNIT - IV

Thick Seam and deep seam Mining: Problems associated with thick and deep seam Mining, selection of mining method, caving and stowing methods, limitations and applicability: different slicing methods-(Inclined Slicing, Horizontal Slicing, Diagonal Slicing; Factors to be considered for Slicing methods, and Caving methods; Blasting Gallery Method, Descending Shield Method of Mining; Layouts of inclined slicing methods; descending order with caving.

UNIT – V

Modern coal mining methods: applicability, limitations, merits and demerits of Horizon Mining, Hydraulic Mining, method of extraction of contiguous seam; working underneath surface features, extraction of multi seams, problems and issues: Surface/Underground arrangements for stowing.

Course Outcome: The students able to design the methods of mining and depillaring of coal in both conventional and advanced techniques of underground coal mines.

Text Books:

1. Principles and Practices of Modern Coal Mining: R. D. Singh, New Age International, 1997.
2. Modern Coal Mining Technology: S. K. Das, 2nd edition, Lovely Prakashan Publishers, 1994.
3. Elements of Mining Technology: Vol-I; D.J. Deshmukh
4. Singh T.N., Dhar, B.B. Thick Seam Mining, Problems and Issues, Oxford & IBH Publishers, 1992.

Reference Books:

1. Underground Coal Mining Methods: J. G. Singh, Braj Kalpa Publishers, Varanasi, 2000.
2. Coal Mining – I.C.F. Statham, Vol. I, II, III &Vol IV. The Caxton Publishing Company Ltd. Inc. 1958.
3. Winning and working coal: R. T. Deshmukh
4. Underground winning of coal: T.N Singh

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

II Year B.Tech. (Mining Engg).-II Semester

ENGINEERING GEOLOGY

Course Objectives: The attitude of beds & structures of rocks are important while deciding mining operations. The different processes are responsible for the formation of different economic minerals give clue for mining method to be adopted. The geological, geophysical and geochemical methods give knowledge in finding the ore deposits.

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UNIT-I

Structural Geology : Stratified rocks and their structures - Attitude of beds; Strike and Dip; Thickness of beds; Folds; genesis, classification, identification in field, impact on-landscape, mineral deposits and mining ; Unconformities: Types, importance and identification ; Faults : Definition, mechanism of faulting, classification, impact of faulting on topography, significance of faults in mining ; Joints: definition and characteristics, classification, occurrence of joints in igneous, sedimentary and metamorphic rocks; Differences between joints and faults.

UNIT-II

Economic Geology: Ore minerals and gangue minerals; Syngenetic and epigenetic deposits; Processes of ore formation: Magmatic concentration, Sublimation, Contact metasomatism, hydrothermal processes, Sedimentation, Evaporation, Residual and mechanical concentration; oxidation and supergene enrichment, Metamorphism.

UNIT-III

Economic Mineral deposits: Origin, Occurrence, distribution & uses of minerals of Iron, Manganese, Chromites, Gold, Lead, Zinc, Copper, Beach sands, Bauxite, Uranium & Coal.

UNIT- IV

Mineral economics: Introduction to Estimation of Ore reserves-Definition, classification and importance: Introduction to Sampling: Definition, types- Mineral wealth of India: Mineral wealth of Andhra Pradesh; Industrial uses of different minerals.

UNIT- V

Mineral exploration: Introduction to different methods of prospecting for mineral deposits- geological, geophysical, gravity, magnetic, seismic, electrical, geochemical, aerial photography and remote sensing, GIS.

Course outcome:

At the end of the course students will know how to find a mineral, the processes responsible for the formation economic minerals, their distribution in India and their reserve estimation.

Text books:

1. Principles of Engineering Geology- Parbin Singh
2. Principles of Engineering Geology- K.M.Bangar
3. A text book of Geology- G.B.Mahapathra

Reference Books:

1. Courses in Mining Geology - R.N.P. Arogyaswamy
2. Textbook of engineering geology – By N. Chenna Kesavulu

II Year B.Tech. (Mining Engg).-II Semester

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

Any Five Experiments are to be conducted from each section.

Section A-Electrical Engineering:

1. Swinbume's test on D.C. Shunt machine (Predetermination of efficiency of a given D.C. Shunt machine working as motor and generator).
2. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors).

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3. Brake test on 3-phase Induction motor (Determination of performance characteristics)
4. Regulation of alternator by Synchronous impedance method.
5. Speed control of D.C. Shunt motor by
   a) Armature Voltage control b) Field flux control method
6. Brake test on D.C. Shunt Motor.

Section B- Electronics Engineering:

1. PN junction Diode characteristics A. Forward bias, B. Reverse bias.(Cut in voltage & Resistance calculations)
2. Transistor CE Characteristics (Input and Output).
3. Full wave Rectifier with and without filters.
4. CE Amplifiers.
5. RC Phase Shift Oscillator.
6. Class A Power Amplifier.

II Year B.Tech. (Mining Engg).-II Semester

MINING GEOLOGY LAB

Course objectives: To make the students aware on how to identify minerals based on their various properties, characters etc.

List of Experiments:

1. Study of important geomorphological models;

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2. Finding of attitude of beds by using clinometers/Brunton compass;
3. Identification of different types of folds/faults from block models;
4. Simple geometrical problems on strike and dip
5. Study of physical properties of Rock forming minerals
6. Study of physical properties of Ore-forming minerals
7. Megascopic studies of Igneous, Sedimentary and Metamorphic rocks
8. Microscopic studies of common rock forming and ore forming minerals.
9. Microscopic studies of Igneous, Sedimentary and Metamorphic rocks
10. Demonstration of Crystal models.

Course outcome: The students will be independently able to identify different rocks and minerals.

Course Code: 17160501 **Credits: 3**

B. Tech – V Semester

MINE SYSTEMS ENGINEERING

Pre-Requisite: Mathematics (Random variables, Matrices)

Objectives:

1. Introduce the concept of operational research models and allocation.
2. Impart the knowledge of transportation, assignment, sequencing and replacement concepts.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

3. Enumerate the concept of games, waiting lines, inventory and break even analysis.
4. Impart knowledge of dynamic programming and simulation concepts.

UNIT – I

Development – Definition– Characteristics and Phases – Types of models – operation Research models– applications.
Allocation: Linear Programming Problem Formulation – Graphical solution – Simplex method – Artificial variables techniques -Two–phase method, Big-M method – Duality Principle.

UNIT – II

Transportation Problem – Formulation – Optimal solution, unbalanced transportation problem. **Assignment problem** – Formulation – Optimal solution - Variants of Assignment Problem-Salesman problem.
Sequencing: – Introduction – Flow –Shop sequencing – 'n' jobs through two machines – 'n' jobs through three machines – Job shop sequencing – two jobs through 'm' machines.
Replacement: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely, group replacement.

UNIT – III

Theory of Games: Introduction – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points – 2 X 2 games – dominance principle – m X 2 & 2 X n games -graphical method.
Waiting Lines: Introduction – Single Channel – Poisson arrivals – exponential service times – with infinite population and finite population models– Multichannel – Poisson arrivals – exponential service times with infinite population single channel Poisson arrivals.

UNIT – IV

Break even analysis : Different types of costs, fixation of selling price, breakeven point, break even analysis.
Inventory : Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks – shortages are not allowed.

UNIT – V

Dynamic Programming: Introduction – Bellman's Principle of optimality – Applications of dynamic Programming- capital budgeting problem – shortest path problem – linear programming problem.
Simulation: Definition – Types of simulation models – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages – Simulation Languages.

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Course Outcomes:

The student will be able to

CO1: Solve the real life problems on Linear programming and allocation.
CO2: Comprehend and analyze transportation, assignment, sequencing and replacement concepts.
CO3: Comprehend the concept of games, waiting lines, inventory and break even analysis.
CO4: Solve dynamic programming problems and understand the concept of simulation.

TEXT BOOKS:

1. **Operations Research:** S.D.Sharma-Kedarnath
2. **Introduction to Operations Research:** R.Hiller & Libermann (TMH).

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17169502 **Credits: 3**

B. Tech – V Semester

INDUSTRIAL ENGINEERING & MANAGEMENT

Pre-Requisite: NIL

Objectives:

1. To introduce the skills required in the Industrial Engineering.
2. To introduce Plant layouts and its applications.
3. To impart knowledge in Productions and techniques of work measurement.
4. To train in Innovative Industrial Engineering Techniques and Project Management.

UNIT – I

Introduction:
Industrial Engineering- Role of Industrial Engineer- IE Applications – Productivity – Scope of Industrial Engineering.
Management – Concepts, Origin, Importance, functions, Henry Fayol's Management Principles, F W Taylor's Scientific Management, Mc Gregor's theory- System's approach to Management – Human Resource Management.

UNIT – II

Plant - Facility Location & Lay-out
Factors governing plant location, Location Economics, Plant layout types of plant layout - computer aided layout design techniques.
Plant maintenance – Types - Preventive Maintenance – Reliability - Maintainability, and Availability concepts - Employee Health & Safety.
Production –Types of Production- Advantages and disadvantages - Aggregate Production Planning.

UNIT – III

Work study – Method Study and Motion Study – Work measurement - Procedure – micro-motion study - Concept of normal time; allowances. Work sampling - Technique of work measurement **- PMTS -** Role of work study in improving productivity – Therbligs.
Quality – DMAIC Cycle – Quality costs- Inspection - TQM basic Concepts -Zero Defects – Quality Circles – ISO Quality Systems, 5S, Six Sigma.

UNIT – IV

Control Charts:
Control Charts – Numerical Examples on X Bar – R Charts, C Charts and P Charts - Seven QC tools.
Innovative Industrial Engineering Techniques
Materials Management - Inventory Management – Selective Inventory Control techniques –ABC-VED-FSN - Supply Chain Management - Value Engineering.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

UNIT – V

Project Management

Introduction to Network Diagrams - CPM and PERT - Critical Path Analysis, Crashing - Activity times and floats, Project completion times.

PERT and three Time Estimates, critical path analysis of a PERT network, Probability of completion of project - Simple Numerical Examples on CPM & PERT. Introduction to GERT & Q-GERT.

Course Outcomes:

The student will be able to:

CO:1 Comprehend and analyze the skills required in the Industrial Engineering
CO:2 Design the Plant layouts.
CO:3 Comprehend and analyze production techniques of work measurement
CO:4 Analyze Industrial Engineering Techniques and Project Management.

Text Books:

1. Industrial Engineering and Management OP Khanna – Khanna Publishers & Co.
2. Industrial Engineering – Banga & Sharma, Khanna Publishers & Co.

Reference Books:

1. Introduction to Work Study, I.L.O., 3rd Revised Edn., 1986
2. Operations Management by J.G Monks, McGraw-Hill Publishers.
3. Production Management by Buffa,
4. Industrial Engineering and Management: A New Perspective, Philip E. Hicks McGraw-Hill
5. Industrial Engineering and Production management – Martand Telsang – S Chand & Co New Delhi.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160503 **Credits: 3**

B. Tech – V Semester

UNDERGROUND METAL MINING

Pre-Requisite: Development of mineral deposits

Objectives:

1. To communicate the mode of formation and Genesis of ore deposits.
2. To enumerate the modes of entry and development of ore deposit.
3. To explain the classification, method of working and operations in metal mines.
4. To illustrate the special metal mining methods.

UNIT – I

Introduction to Metal Mining:
Metal mining terminologies; Mode of formation; Genesis of ore deposits; Peculiarities of metalliferous deposit; Scope and limitations of underground mining.

UNIT – II

Mine & Stope Developments:
Primary openings– shaft, incline, decline and adit; Selection of a suitable mode of entry of deposit; Secondary openings – Levels, Selection of level intervals; Raises and raising methods; Winzes, Haulage drifts, Cross-cuts drifts; Ore pass; Shaft station and their positions relative to ore body.

UNIT –III

Unsupported Stoping Methods:
Classification of stoping methods; Factors affecting choice of stoping methods; Unsupported methods – Room & Pillar, Stope and pillar, Shrinkage stoping, Sublevel stoping.

UNIT –IV

Supported Stoping Methods:
Supported stoping methods– Cut and Fill stoping, Stull Stoping, Square-Set stoping; Caving methods– Sublevel caving, Block caving, Top slicing method.

UNIT – V

Special Metal Mining Methods:
Vertical crater retreat method(VCR); Over-hand stoping; Underhand stoping & Breast stoping methods; Blast hole open stoping methods; Novel mining methods like Hydraulic mining & Transport; Ocean mining; Automation & Robotics; Application of tunnel & shaft boring machines.

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Course Outcomes:

The student will be able to:

CO1: Comprehend and analyze the mode of formation and Genesis of ore deposits.
CO2: Design the development and operations of metal mines.
CO3: Design the methods and operations in stoping.
CO4: Comprehend and analyze the special stoping methods and deep sea mining.

Text Books:

1. Elements of Mining Technology, Volume-II, D.J. Deshmukh, Denett & Co.
2. Introductory Mining Engineering, H. Hartman, John Wiley and sons;

Reference Books:

1. Mining Engineers Hand Book – Volume I &II; SME
2. Underground Metal Mining Method-Hustrulid, SME
3. Cummins & Givens. SME Mining Engineering Handbook, Vol. I & II, Pub: A.I.M.M. New-York.
4. A study of metalliferous mining methods- Y.P.Chacharkar, Lovely Prakashan

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160504 **Credits: 3**

B. Tech – V Semester

MINE VENTILATION

Pre-Requisite: UCM, UMM

Objectives:

1. To illustrate the atmosphere of underground mine, types of gases and its related detectors.
2. To explain the effects of heat, humidity and types of ventilation systems in mine.
3. To brief about the types of mechanical ventilators and its application in mine.
4. To enumerate ventilation planning, design and surveys in different UG mines.

UNIT - I

Mine Gases:

Atmospheric air composition; Mine air composition and comparison; Mine gases- origin, occurrence, physiological effects, detection, monitoring and control, limitations and various damps; Methane layering; Degasification of coal seams; Sampling and testing of different gases using different detectors.

UNIT - II

Psychrometry:

Mine heat load sources, heat stress and heat stress indices, design of mine cooling system.

UNIT - III

Natural and Mechanical Ventilation:

Production of natural Ventilation; Motive Column; Computation of NVP from air density; Centrifugal and axial flow fans- Construction, pressure developed, characteristic curves, series and parallel operation; Fan laws; Selection of mine fans; Evasee; Auxiliary ventilation; Booster fans.

UNIT - IV

Ventilation Survey:

Importance of ventilation survey; Air quantity survey; Van Anemometer; Standard of ventilation and permissible air velocities; Location of air measuring stations; Pressure quantity survey by U tube manometer and inclined manometer.

UNIT-V

Ventilation planning:

Mine Ventilation Planning; Factors influencing the Mine ventilation; Location & size of ventilation shafts; Calculation of roadway resistance and pressure losses; size of main fan; Computer assisted Mine ventilation analysis & design.

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Course Outcomes:

The student will be able to:

CO1: Comprehend and analyze atmosphere, types of gases and its related detectors in UG mine.
CO2: Comprehend the effects of heat, humidity and plan the types of ventilation systems in mines.
CO3: Plan and design the types of mechanical ventilators and its application in mines.
CO4: Plan and design the ventilation systems and its survey in UG mine.

Text Books:

1. Elements of Mining Technology, Vol II- D. J. Deshmukh, Denett & Co.
2. Mine Environment and Ventilation – G. B. Mishra, Oxford University Press

References Books:

1. Mine ventilation and air conditioning – Howard L. Hartman.
2. Environmental Engineering in Mines – Vutukuri& Lama, Cambridge University Press, Cambridge.
3. Mine Ventilation Vol. – II, S. Ghatak, Coalfield Publishers, 1993.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160505 **Credits: 3**

B. Tech – V Semester

MINE PLANNING & DESIGN

Pre-Requisite: UCM, UMM

Objectives:

1. To explain the process of planning and stages of planning new mines.
2. To impart the knowledge of preparation of plan reports.
3. To illustrate ventilation and infrastructure planning.
4. To enumerate the reclamation, rehabilitation and corporate social responsibility of mining.

UNIT-I

Introduction to mine planning:

Classification of industries, process of planning, cautions and essentials in planning, Mining industry in comparison to other industries, planning adjusting to mineral policy, Selection of method of mining, mine site and entries; Stages of planning of new mines;

UNIT-II

Preparation of plan reports and considerations in planning:

Different types of plans- long range, short range, conceptual plan etc.; Feasibility Report, Detailed project report, Conceptual plan report, Bankable feasibility report; Technical considerations in Planning; Socio-Economic considerations; Restructuring planning; Issues & challenges; Future considerations.

UNIT-III

Infrastructure Planning:

Planning sequence; Mineral development process; geological aspects, division of mine lease area into mining units; development of open cast and underground mines_ Surface layouts, pit bottom layout; planning of Mineral handling plant; Introduction to ventilation planning.

UNIT-IV

Open pit Design:

Concepts of mineral inventory: Block economic modeling; Concept of ultimate pit design: 2-Dimensional moving cone algorithm, Lerchs- Grossmann Algorithm;

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UNIT-V

Mine Reclamation & Corporate Social Responsibility:

Introduction to corporate social responsibility; Project Affected People (PAP); Reclamation & Rehabilitation; Socio-Economic Impact of Mining; Suggest ways and means for improving the Living Standard of locals; Corporate Social Responsibility (CSR), Initiatives & Ways to Improve Corporate Image in the Mining Sector.

Course Outcomes:

The student will be able to:

CO1: Comprehend the process of planning and design new mines.
CO2: Comprehend and prepare different plan reports.
CO3: Plan and design ventilation and infrastructure in mines.
CO4: Comprehend the process of reclamation and rehabilitation.

Text Books:

1. Principles of Mine Planning; J. Bhattacharya, Allied Publishers Private Limited.
2. Principles and Practices of Modern Coal Mining; R D Singh.

Reference Books:

1. Mine Planning for Coal; S. P. Mathur, , M. G. Consultants,
2. Open Pit Mine Planning and Design; W. Hustrulid and M. Kuchta,
3. SME Mining Engineering Handbook H. L. Hartman, , Vol. I & II, SME
4. Open Cast Mining Unit Operations by Rzhevsky, V.V., Mir publishers

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160506 **Credits: 3**

B. Tech – V Semester

REMOTE SENSING AND GIS FOR MINING

Pre-Requisite: Surface mining, Mining geology.

Objectives:

1. To introduce the basic principles of Remote Sensing and GIS techniques.
2. To impart knowledge in various types of sensors and platforms.
3. To communicate the concepts of visual and digital image analysis.
4. To train how to apply the knowledge of RS and GIS in mining.

UNIT – I

Introduction to remote sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces characteristics of remote sensing systems.

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT. Advanced sensors and its applications.

UNIT – II

Image analysis: Introduction, elements of visual interpretations, digital image processing- image pre-processing, image enhancement, image classification, supervised classification, unsupervised classification.

UNIT – III

Geographic Information System: Introduction, key components, application areas of GIS, map projections.

Data entry and preparation: Spatial data input, raster data models, vector data models.

UNIT – IV

Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing.

UNIT – V

RS and GIS applications General: Land cover and land use pattern, forestry, geology, geomorphology and mining operations.

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Course Outcomes:

The student will be able to:

1. Comprehend the basic principles of Remote Sensing and GIS techniques.
2. Comprehend and apply various types of sensors and platforms.
3. Understand and apply the concepts of visual, digital image analyses.
4. Comprehend and analyse the spatial analysis.

Text Books:

1. Remote sensing and GIS, Bhatta B, Oxford University Press, 2008.
2. Remote Sensing and its Applications, Narayan LRA, Universities Press, 2012.

Reference Books:

1. Remote Sensing and Image Interpretation, Lilles and, T.M, R.W. Kiefer and J.W. Chipman, Wiley India Pvt. Ltd., New Delhi, 2013.
2. Concepts and Techniques of Geographical Information System, Chor Pang Lo and A K W Yeung, Prentice Hall (India), 2006.
3. Introduction to Geographic Information Systems, Kand Tsung Chang, McGraw Hill Higher Education, 2009.
4. Fundamentals of Remote Sensing, George Joseph, Universities Press, 2013.
5. Fundamentals of Geographic Information Systems, Demers, M.N, Wiley India Pvt. Ltd, 2013.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17169507 **Credits: 3**

B. Tech – V Semester

SOFT SKILLS-II

(Title: Professional Communication and Employability skills)

Pre-requisite: Learner should be consistent with global employment scenario and professional communicative skills

Objectives: To help the students to

1. Participate in group discussions with confidence and to make effective presentations.
2. With- resume packaging, preparing and facing interviews.
3. Build an impressive personality through effective time management and goal setting, self-confidence and assertiveness.
4. Understand, what constitutes proper grooming and etiquette in a professional environment.

UNIT – I

Communicative Competence – The Art of Communication, basic grammar, personal SWOT Analysis, Analyzing audience, role of emotions and body language in communication-Effective listening skills, using English in different situations.

UNIT – II

Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence-Elements of effective presentation – Structure of presentation – Presentation tools.

UNIT – III

Interview Skills – Resume' writing – structure and presentation, planning, defining the career objective, projecting strengths and skills-pre-interview planning, opening strategies, answering strategies, mock interviews.

UNIT – IV

Personality Development Through Soft Skills – Effective Time Management, setting realistic goals, Decision making, self confidence and assertiveness, stress management, moral values, success stories of great business people, Steve Jobe, Chanda Kocher, Warren Buffet, Indra Nuyi.

UNIT – V

Technical Communication: Report writing: Importance, structure, drafting of reports, Business Writing: Sales letters, notices, agenda and minutes of the meeting.

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Course Outcomes:

The students will be able to

1. Be effective communicators and participate in group discussions with confidence. Also be able to make presentations in a professional context.
2. Write resumes, prepare and face interviews confidently.
3. Be assertive and set short term and long term goals. Also learn to manage time effectively and deal with stress.
4. Make the transition smoothly from campus to corporate.

Text Books:

1. English and Soft Skills by Prof. Dhanvel, Orient Blackswan, 2012.
2. Soft Skills by Alex Ben, S Chand Publications.

Reference Books:

1. Personality Development and Soft Skills - Barun K Mithra, Oxford Publications.
2. Technical Communication – Principles and Practice by Meenakshi Raman, Sangeeta Sharma, Oxford Publications.
3. Effective Technical Communication – Ashraf Rizvi, Mc. Grawhill Publications.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160511 **Credits: 2**

B. Tech – V Semester

MINE VENTILATION LABORATORY

Objectives:

1. To illustrate the atmosphere of underground mine, types of gases and its related detectors.
2. To explain the effects of heat, humidity and types of ventilation systems in mine.
3. To brief about the types of mechanical ventilators and its application in mine.
4. To enumerate ventilation planning, design and surveys in different UG mines.

LIST OF EXPERIMENTS:

1. Study the multi gas detector for measuring mine gasses.
2. Detection of Carbon monoxide (CO) by CO detector.
3. Detection of Carbon monoxide (CO) by multi gas detector.
4. Detection of Methane (CH_4) by Methanometer.
5. Detection of Methane (CH_4) by multi gas detector.
6. Detection of Carbon dioxide (CO_2) by multi gas detector
7. Detection of Hydrogen sulphide (H_2S) by multi gas detector.
8. Detection of Oxygen (O_2) by multi gas detector.
9. Detection of methane by flame safety lamp.
10. Detection of Carbon dioxide (CO_2) by flame safety lamp.
11. Determination of Air quantity by Vane anemometer.
12. Determination of Air pressure (Mine & Duct) by Inclined Manometer.
13. Determination of Air pressure (Mine & Duct) by Pitot tube.

EXTRA EXPERIMENTS

1. Determination of relative humidity of mine air by Whirling Hygrometer.
2. Determination of relative humidity of mine air by Digital Hygrometer.
3. Determination of mine atmospheric temperature using digital thermometer.
4. Determination of cooling power by Kata thermometer.
5. Determination of fan characteristics for axial flow fan.
6. Determination of fan characteristics for centrifugal fan.
7. Study of resistance in underground mines.

Course Outcomes:

The student will be able to:

CO1: Comprehend and analyze atmosphere, types of gases and its related detectors of in UG mine.
CO2: Comprehend the effects of heat, humidity and plan the types of ventilation systems in mines.
CO3: Plan and design the types of mechanical ventilators and its application in mines.
CO4: Plan and design the ventilation systems and its survey in UG mine.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160512 **Credits: 2**

B. Tech – V Semester

MINE PLANNING & DESIGN LABORATORY

Objectives:

1. To explain the principles of mine planning.
2. To illustrate feasibility and detailed project report (DPR)
3. To impart the knowledge of planning the mine entries and infrastructure in mines
4. To illustrate mine ventilation plan.

LIST OF EXPERIMENTS:

1. Finding out stripping ratio for the given data in OC
2. Finding out powder factor for underground mine
3. Finding out powder factor for OC mine.
4. Study of Production operations for opencast excavators (shovels)
5. Study of Production operations for opencast excavators (Dragline)
6. Study of Production operations of LHD in UG mines
7. Study of Production operations of SDL in UG mines
8. Study of ventilation systems for Board & Pillar method
9. Study of pillar load and Factor of safety
10. Preparation of feasibility reports of coal mine

EXTRA EXPERIMENTS

1. Study of feasibility reports for metal mine
2. Assessment of Shovel-dumper combination for the given target production
3. Planning of Production for Continuous Miner in UG mines
4. Planning of Production for long wall panel in UG
5. Preparation of OC plan in auto CAD
6. Preparation of ventilation systems for LW panel in UG.
7. Design of pit angle for OC mine
8. Planning of Production for Surface miners in OC mine
9. Planning of Productivity of OC mine

Course Outcomes:

The student will be able to:

CO1: Comprehend and design mine plans.
CO2: Study and analyze the feasibility and detailed project report (DPR)
CO3: Plan and design mine entries and infrastructure in mines
CO4: Comprehend and design the mine ventilation systems.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160521 **Credits: 2**

TECHNICAL SEMINAR

Objectives:

1. To impart the knowledge on mining operations and power point presentation.
2. To impart the knowledge on mining operations and poster presentation.
3. To impart the knowledge on mining operations and model development.
4. To promote the skill of technical communication.

Course Contents:

1. Power Point Presentation on the recent developments & Advances in the field of Mining; Geology & Earth Sciences.
2. Poster presentation on recent developments & advances in the field of Mining; Geology & Earth Sciences.
3. Models of Bord & Pillar; Long wall; Opencast; Metal mines; Shafts; Inclines; mine equipments etc.

Course Outcomes:

The student will be able to:

CO1: Comprehend the knowledge on mining operations and make a power point presentation.
CO2: Comprehend the knowledge on mining operations and make a poster presentation.
CO3: Comprehend and development models on mining activities.
CO4: Acquire the skill of technical communication.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160601 **Credits: 3**

B. Tech – VI Semester

ROCK MECHANICS

Pre-Requisite: UCM, UMM

Course objectives:

1. Introduce the concept of Rock Mechanics.
2. Introduce the principles of stress-strain and their relation.
3. Impart knowledge in the Physico-Mechanical properties of rock.
4. Enumerate various rock failure theories.

UNIT-I

Introduction: Definition and importance of Rock Mechanics, Application of rock mechanics in mining, Definition of important terms used in Rock mechanics, Rock properties, Physio-mechanical properties of rock, Preparation and testing of specimen in the laboratory, ISRM standards, Determination of Physio-mechanical properties of rock as per ISRM standard testing procedures, Strength indices and their importance.

UNIT - II

Stress-Strain Analysis : Analysis of stress and strain in two & three dimensions, principal stresses and strain, stress ellipsoid and stress directors surface; principal stress strain invariants Determination of maximum shear stress, Octahedral stresses Differential equilibrium equations; Compatibility equation of stress and strains. Theories of failure of rock.

UNIT – III

Rock Mass classification: Classification of rock mass, Parameters of rock mass classification, Objective & Importance of rock mass classification, RQD, Q –system and Bieniaswski's Geo-mechanics classification of rock mass., RSR system, CMRI-ISM, Geo-mechanics, Classification, Terzaghi Rock load theory. Rock as an elastic medium, Principle of elastic analysis

UNIT-IV

Ground control and in-situ stress measure instruments: In-situ stress, various methods of stress measurement, Hydro fracturing technique, Flat jack technique, Over coring technique; Field shear test, Deformability tests in rock mass, State of stress in the ground. Dynamic properties of rocks, Anisotropy and Creep.

UNIT –V

Slope stability analysis: Introduction, Mode of slope failure. Plane failure, wedge failure, toppling failure, circular failure. Stabilization and protection methods.

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Course Outcomes:

The student will be able to:

CO1: To understand the rock mechanics techniques in field .
CO2: Comprehend and apply the principles of stress-strain.
CO3: Comprehend and apply the Physico-Mechanical properties of rock
CO4: Synthesis and apply various slope failures.

Text Books:

1. Rock Mechanics & Ground control by Dr. B.S. Velma
2. Fundamentals and Application of Rock Mechanics-Debasis Deb, Abhiiram Kumar Verna

Reference Books:

1. Rock Mechanics by Obert & Dual , US Bureau of Mines
2. Coal Mine & Ground control by S. Peng

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160602 **Credits: 3**

B. Tech – VI Semester

MINERAL PROCESSING

Pre-Requisite: NIL

Course objectives:

1. Introduce the various operations of mineral engineering.
2. To train in the beneficiation operations.
3. Impart knowledge in properties of bulk solids.
4. Expose on the coal beneficiation.

UNIT – I

Introduction to Mineral Engineering – Sampling and sampling methods; Particle size determination – Test sieves, Laboratory sizing methods, Graphical representation, Sub sieve Sizing; Industrial screening, screen surfaces, types of industrial screens; Dry and wet screening, factors effecting rate of screening; screen efficiency; Liberation; Communition – Laws of communition; Reduction ratio; Classification of Crushers, description and characteristics; Grinding – Ball, rod, tube mills; Methods of feeding and discharge; Theory of ball mill, Critical speed; Open and closed circuit grinding; Circulating load; Wet and dry grinding.

UNIT-II

Density – Pulp density, percentage of solids, dilution ratio, settling of solids in fluids, stoke's and newton's laws , terminal velocity, free and hindered settling, equal settling particles Settling ratio; Principles of Classification – Sizing and sorting classifiers; Hydro cyclone Construction and operation, d50 – Design and operating variables; Classification as a means of concentration.

UNIT – III

Beneficiation Operations – Gravity concentration, Concentration Criterion, Float and sink, HMS, Heavy Media Cyclone; Jigging, principles and methods, Types of Jigs, Applications, Flowing film concentration; Basic principles Tabling, Shaking tables, Operation and applications; Flotation, Natural and acquired floatability, Frothers, Collectors, Modifying agents and their action in flotation; Froth flotation and its mechanism, factors effecting the flotation, Flotation applications.

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UNIT – IV

Magnetic separation, types of separators, dry and wet, low and high intensity magnetic separators , HGMS, Applications; Electrical separation, Electrostatic and High tension separators; Separation of solids from fluids, flocculation; Thickening, Industrial thickeners; Filtration and its mechanism, types of filters, dust control.

UNIT – V

Properties of Bulk solids, materials handling operations, Storage; Ore testing; Role of Ore microscope in Mineral Processing, Processing flow sheets for common minerals; ratio of concentration; ratio of enrichment; Recovery, rejection losses ; Efficiency of a concentrating operation, metallurgical efficiency.

Course Outcomes:

The student will be able to:

CO1: Understand the techniques in operations of mineral engineering.
CO2: Analyze the techniques in beneficiation operations
CO3: Comprehend and analyze the properties of bulk solids.
CO4: Comprehend and analyze the techniques in coal beneficiation operations.

Text Books:

1. Mineral Beneficiation – A Concise Basic Course, Dr. D.V.SUBBARAO.
2. Mineral Processing Technology, B.A.WILLS.

Reference Books:

1. Coal – Its Beneficiation, Dr. D.V.SUBBA RAO.
2. Elements of Fuels, Furnaces & Refractoriness, O.P.GUPTA.
3. Operational Hand book of Mineral Processing, V.V.Ramana murthy, Denett& Co. Publication.
4. Mineral Processing Technology**,** Barry A. Wills and James Finch ,Elsevier Publications.
5. Mineral Processing, E.J.Pryor, Elsevier applied science publishers.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160603 **Credits: 3**

B. Tech – VI Semester

MINE STRATA CONTROL

Pre-Requisite: UCM, UMM

Course objectives:

1. To impart knowledge in the pre and post mining stresses, strata behavior in mines.
2. To introduce types of support systems in UG mines.
3. To impart knowledge in the different methods of stowing in development and depillaring operations.
4. Enumerate the theories of ground movement and subsidence in mines.

UNIT I

Concept of Strata Control:

Definition and concept of ground control in mines; Constraints on ground control; Characteristics of coal measures strata. Pre and Post mining stresses in the rock; Effect of mining parameter on strata control.

UNIT II

Roof Support:

Types of Supports-Timber & steel supports, Roof bolting, roof stitching, Powered Support; Examination of roof; Method of supporting roadways-Supporting under different conditions - widened areas, crossing, junctions, faulted area, long wall faces, depillaring areas and stoping areas; SSR; Withdrawal of supports.

UNIT III

Stowing:

Concept of stowing; Types of stowing- hand packing, caving, hydraulic, pneumatic and mechanical; Hydraulic profile and H/L ratio; Wear in pipes; Underground stowing arrangements and operations pipe; Rate of stowing; Pipe jams; Depillaring with stowing.

UNIT IV

Theories of Strata control:

Arch or Dome theory; Beam or Plate theory; Soil mechanics theory; Pseudo plastic theory; Dynamic rock pressure theory; Modern concept of strata pressure redistribution-long wall workings and bord&pillar workings; Manifestation of strata pressure.

UNIT V

Subsidence:

Theories of subsidence; Engineering parameters of subsidence- angle of draw and angle of fracture; Magnitude of subsidence; Prediction of subsidence; Subsidence damage; Prevention of subsidence.

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Course Outcomes:

Student will be able to :

CO1: Comprehend and analyze pre and post mining stresses.
CO2: Design support systems in UG mines.
CO3: Design different methods of stowing.
CO4: Comprehend and analyze the theories of ground movement and subsidence in mines.

Text Books:

1. Principle and practices of modern coal mining by R.D. Singh, New Age International Publishers
2. Finite Element methods: Concepts and Applications in Geomechanics:Debasis Deb, PHI Learning Pvt Ltd: New Delhi

Reference Books:

1. Peng, S.S. Ground Control, Wiley Publications, New York, 1987
2. Brady, B.H.G. and Brown, S.T. Rock Mechanics for Underground Mining, Chapman and Hall, 1993
3. Hoek, E. and Brown, S.T. Underground Excavations in Rocks, Institute of Mining Metallurgy, London, 1980.
4. Element of Mining Technology, Vol-1, by D.J. Deshmukh, Denett&Co.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160604 **Credits: 3**

B. Tech – VI Semester

MINING MACHINERY

Pre-Requisite: Underground Coal Mining, Underground Metal Mining

Course objectives:

1. Introduce the concept of rope and its application in mines.
2. Impart knowledge in various modes of mine transport system and its applications in mines.
3. Impart knowledge in various locomotive haulage system and its applications.
4. Expose to various winding systems and its applications in mines.

UNIT -I

Wire Ropes: Construction of wire ropes; various types of rope used in mining ; factor of safety (FOS) of rope; care and maintenance of rope in use and also in storage; splicing of haulage rope; calculation of size of winding rope; examination of rope; life of rope and norms for discarding a rope; Rope capel and recapping.

UNIT-II

Mine Transport systems: Different types of Rope Haulage - description with suitability of these haulages and their applications & limitations, merits and demerits ; Different types of safety devices on rope haulages including tub re-railer , Back catch, Spring catch, Drop warrick, Inter-coupled stop block & runway switch, Drags, tub retarder. Different types of rope clips, tub couplings. Size of rail sleepers & rail fastening, fish plates, ballast, Jim crow, Super elevation, Diamond crossing, Rope Haulage Calculations.

UNIT-III

Locomotive haulage: types of locomotive; battery diesel electric compressed air driven locomotives; Construction, limitation, operational & safety features; Hazards and their prevention, locomotive haulage calculation. Different types of locomotive haulage systems their application merits and demerits. Safety devices of Diesel locomotives including flame trap and exhaust conditioner box.

UNIT-IV

Winding system: Function of headgear- height of headgear - different factors, design of headgear, headgear pulley, constructional features, and angle of fleet.

Cage - constructional features, cage suspension gear, detaching hook and its function, safety catches at head gear; keps-props & guides used in mine shafts; rigid and flexible guides, guide shoes, guide rope suspension & tensioning arrangement ;guide rope & winding rope changing.

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UNIT -V

Skip & Koepe Winding: Skip types & construction, pit top & pit bottom arrangements, advantages and disadvantages; Types of Koepe Winder, Koepe wheel; Two winders working in the same shaft; Different profile of winding drum- merits & demerits, attachment of winding rope to drum; Winding brakes - mechanical-post and calliper brake; Various safety devices on winding system including automatic contrivances for Over wind.

Course outcomes:

The student will be able to:

CO1: Comprehend and apply the various types of rope in mine.
CO2: Comprehend and plan the types of mine transportation system.
CO3: Comprehend and apply various locomotive haulage systems.
CO4: Design various types of winding systems in mine.

Text Books:

1. Elements of Mining Technology: Vol - I; II; III - D.J Deshmukh
2. Mine Pumps Haulage and Winding- S.Ghatak

Reference Books:

1. Mine transport - N.T. Karelin.
2. Modern coal mining Technology: S.K. Das.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160605 **Credits: 3**

B. Tech – VI Semester

MINE CONSTRUCTION ENGINEERING

Pre-requisites: DMD

Course objectives:

1. To introduce the concept of openings in different rock strata.
2. To impart knowledge in the mechanization of mines
3. Communicate about the construction of inlets and drivage of roads in rock strata and coal seam.
4. To impart knowledge in the infrastructure facilities at mine.

UNIT I

Size of mine. Environment and ecology, selection criteria for site of the openings geological investigations. Mine shaft, shaft sinking methods through alluvium, soft and hard rock.

UNIT II

Mechanization; consolidation of loose ground shaft lining; ground pressure, thickness of lining, design and procedure of laying the lining. Construction of shaft collar heap stead.

UNIT III

Design and construction of insets; shaft bottom, excavation for mechanized decking of cages; skip loading, pit bottom lay outs, installation of main haulages. Main sump size, construction underground substation; first aid room and office.

UNIT IV

Surface inclines; drivage through soft and hard rock, construction of portals and lining of inclines, lateral and vertical pressures. Underground developments, drivage of roads in stone and coal, mechanization support systems opening of faces. Surface layouts pit top circuits and coal handling and coal preparation plant, railway siding and weigh bridges, surface and underground coal bunkers winding house substation, lamp room.

UNIT V

Pit head bath, crèche dispensary: office, work-shop; material handling. Stowing installation, bunkers, water tanks, mixing chamber.

Course Outcomes:
The student will be able to:

CO1: Design the openings in different rocks
CO2: Comprehend and analyse the mechanisation in mines
CO3: Design the construction of inlets and drivage of roads in stone and coal.
CO4: Comprehend and analyse the infrastructure facilities at mine.

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Text Books:

1. Pazdziora J. "Design of Underground hard coal mine".
2. Popov "Working of Mineral Deposits".

Reference Books:

1. Building Construction and Materials (SI Units) by Gurucharan Singh
2. Handy book of Construction Professionals & Services Hyderabad 18-19 Edition by
3. Unit operations in open cast mines. "Rzhevsky"

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160666 a **Credits: 3**

B. Tech – VI Semester

TOTAL STATION AND GPS SURVEYING (OPEN ELECTIVE)

Pre-Requisite: Mine surveying, Advanced mine surveying

Course objectives:

1. To introduce the working of Total Station and GPS equipment.
2. To expose the relative positions of objects below or above the earth surface.
3. To communicate the advantages of electronic surveying over conventional surveying methods.
4. To train the various GNSS surveying methods and processing techniques.

UNIT-I

Fundamentals

Methods of Measuring Distance, Basic Principles of Total Station, Classifications, applications and comparison with conventional surveying. Global Navigation System, Regional Navigation System and SBAS - Basic concepts of GNSS, Geoid and Ellipsoid- satellite orbital motion - Keplerian motion.

UNIT-II

Electromagnetic Waves

Classification - applications of Electromagnetic waves, Propagation properties, wave propagation at lower and higher frequencies- Refractive index (RI) - factors affecting RI-Computation of group for light and near infrared waves at standard and ambient conditions-Computation of RI for microwaves at ambient condition.

UNIT-III

Electro Optical and Micro Wave System

Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser Total Station instruments. Microwave system: Measuring principle, working principle, Sources of Error, Microwave Total Station instruments. Comparison between Electro-optical and Microwave system. Care and maintenance of Total Station instruments– Applications of COGO functions -Traversing and Tri-lateration.

UNIT-IV

GPS Satellite System

GPS - Different segments - space, control and user segments - satellite configuration - GPS signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment - GPS receivers.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

UNIT-V

GPS Data Processing

GPS observables - code and carrier phase observation - linear combination and derived observables - concept of parameter estimation – downloading the data -data processing – software modules - solutions of cycle slips, ambiguities, RINEX format. Concepts of rapid, static methods with GPS.

Course Outcomes:

The student will be able to:

CO1: Understanding the concepts of Electromagnetic waves and impact of Refractive Index.
CO2: Comprehend and use electro optical and microwave Total Station.
CO3: Comprehend and analyze the working principle of GNSS, it's components.
CO4: Comprehend various areas of GNSS applications and new developments.

Text Books:

1. Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 4th edition, 1996
2. Satheesh Gopi, rasathish kumar, N.madhu, " Advanced Surveying, Total Station GPS and Remote Sensing " Pearson education , 2007 isbn: 978-81317 00679

Reference Books:

1. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1993.
2. Guocheng Xu, GPS Theory, Algorithms and Applications, Springer - Verlag, Berlin, 2003.
3. Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 3rd Edition, 2004.
4. Seeber G, Satellite Geodesy, Walter De Gruyter, Berlin, 1998

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160666 b **Credits: 3**

B. Tech – VI Semester

INDUSTRIAL HYDRAULICS AND PNEUMATICS (OPEN ELECTIVE)

Pre-Requisite: Fluid Mechanics and Hydraulic Machines

Course objectives:

1. To introduce the industrial hydraulics and pneumatics, their parts, functions and their structure.
2. To give the required information about hydraulics and pneumatics.
3. To teach the Accumulators & Intensifiers and Its Applications.
4. To teach the hydraulic and pneumatic automation and basics of PLC controls.

UNIT-I

Fundamentals of fluid power systems: Introduction-types advantages, disadvantages & applications-fluid characteristics-terminologies used in fluid power-hydraulic symbols-hydraulic systems and components-sources- pumping theory-gear, vane & piston pumps.

UNIT-II

Fluid power actuators: Introduction-hydraulic actuators-hydraulic cylinders- types, construction, specifications and special types. hydraulic motors- working principle-selection criteria for various types-hydraulic motors in circuits- formulae-numerical problems.

UNIT-III

Hydraulic elements in the design of circuits: Introduction-control elements- direction control valve-check valve-pressure control valve-relief valve- throttle valve-temperature & pressure compensation-locations of flow control valve.

UNIT-IV

Accumulators & intensifiers: Types, size & function of accumulators- application & circuits of accumulators- intensifiers-circuit & applications.

Pneumatic systems: Introduction-symbols used-concepts & components- comparison-types & specifications of compressors-arrangement of a complete pneumatic system-compressed air behavior- understanding pneumatic circuits-direction control valves.

UNIT-V

Electro-pneumatics: Introduction-Pilot operated solenoid valve-electrical connections to solenoids-electro pneumatic circuit switches-relays-solenoids- P.E converter-concept of latching. Applications-servo systems-introduction-closed loop, hydro-mechanical and electro hydraulic – conventional and proportional valves-characteristics of proportional and servo valves- PLC applications in fluid power – selected pneumatic / electro pneumatic circuit problems – failure and trouble shooting in fluid power systems.

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Course Outcomes:

The student will be able to:

CO1: Describe general concepts associated with Hydraulic and Pneumatic equipment.
CO2: Predict the failure and trouble shooting in fluid power systems.
CO3: Design and draw hydraulic circuits.
CO4: Analyze electro pneumatic valves, circuits switches and accumulators and intensifiers**.**

Text Books:

1. Introduction to Hydraulics and Pneumatics, S. Ilango and V. Soundararajan, PHI, 2012.
2. Applied hydraulics and pneumatics, T. Sunder Selwyn & R. Jayendiran, Anuradha Publications.

Reference Books:

1. Oil Hydraulics Systems- Principles and Maintenance, Majumdar, S.R, Tata McGraw Hill,2001
2. Pneumatic Systems – Principles and Maintenance, Majumdar, S.R., Tata McGraw Hill, 2017.
3. Basic Fluid Power, Dudelyt, A Pease and John J Pippenger, Prentice Hall, 1987.
4. Hydraulic and Pneumatic controls, Shanmugasundaram.K, S.Chand, 2013.
5. Fluid Power with Applications, Anthony Esposito, PHI / Pearson Education, 4 ed.., 2005.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160666 b **Credits: 3**

B. Tech – VI Semester

SOCIAL NETWORK ANALYSIS (OPEN ELECTIVE)

Pre-Requisite: Fundamental knowledge about Operating System and Computer network.

Course Objectives:

- Understand the concept of semantic web and related applications.
- Learn knowledge representation using ontology.
- Understand human behaviour in social web and related communities
- Learn visualization of social networks.

UNIT-1

Introduction to Semantic Web: Limitations of current Web – Development of Semantic Web – Emergence of the Social Web – Social Network analysis: Development of Social Network Analysis – Key concepts and measures in network analysis – Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities – Web-based networks – Applications of Social Network Analysis.

UNIT-II

Modelling, Aggregating and Knowledge Representation-Ontology and their role in the Semantic Web: Ontology-based knowledge Representation – Ontology languages for the Semantic Web: Resource Description Framework – Web Ontology Language – Modelling and aggregating social network data: State-of-the-art in network data representation – Ontological representation of social individuals – Ontological representation of social relationships – Aggregating and reasoning with social network data – Advanced representations.

UNIT-III

Extraction and Mining Communities in Web Social Networks- Extracting evolution of Web Community from a Series of Web Archive – Detecting communities in social networks – Definition of community – Evaluating communities – Methods for community detection and mining – Applications of community mining algorithms – Tools for detecting communities social network infrastructures and communities – Decentralized online social networks – Multi-Relational characterization of dynamic social network communities.

UNIT-IV

Predicting Human behavior and Privacy Issues - Understanding and predicting human behavior for social communities – User data management – Inference and Distribution – Enabling new human experiences – Reality mining – Context – Awareness – Privacy in online social networks – Trust in online environment – Trust models based on subjective logic – Trust network analysis – Trust transitivity analysis – Combining trust and reputation – Trust derivation based on trust comparisons – Attack spectrum and countermeasures.

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UNIT-V

Visualization and Applications of Social Networks- Graph theory – Centrality – Clustering – Node-Edge Diagrams – Matrix representation – Visualizing online social networks, Visualizing social networks with matrix-based representations – Matrix and Node-Link Diagrams – Hybrid representations – Applications – Cover networks – Community welfare – Collaboration networks – Co-Citation networks.

Text Books :

1. Peter Mika, "Social Networks and the Semantic Web", , First Edition, Springer 2007.
2. BorkoFurht, "Handbook of Social Network Technologies and Applications", 1st Edition, Springer, 2010.

Reference Books :

1. GuandongXu,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition Springer, 2011.
2. Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.
3. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling", IGI Global Snippet, 2009.
4. John G. Breslin, Alexandre Passant and Stefan Decker, "The Social Semantic Web", Springer, 2009.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160666d **Credits: 3**

B. Tech – VI Semester

INTERNET OF THINGS (OPEN ELECTIVE)

Pre-Requisite: Knowledge of Logic Gates, Relays, Registers, Counter, Microcontroller, Microprocessor, Sensors Interfacing, Digital Communication basic operations and Internet Basics.

Course objectives:

1. Understand the Concepts of IOT Development Infrastructure.
2. Understand the principles of wired and wireless communication protocols
3. Understand the Threats and Securities issues in the development of IOT.
4. Understand the types of measurement errors and sensors.
5. Understand design and development of IOT Platform.

UNIT-I

Fundamental of IoT

Internet of things definition, IoT Functional view Internet of things today, Internet of things tomorrow, potential success factors, internet of things vision, future communication challenges-5G scenario, fundamental characteristics of IoT, IOT Layered Architecture, detailed IoT layered architecture, IoT Enabling technologies, IoT Smart Environment and smart space creation. IoT Applications and use case scenarios. Resource management for IoT,.

UNIT-II

Communication Protocols for IoT

Wired Communication Protocols: I2C, SPI, One Wire, RS232, Ethernet, RS 485, UART, USART, USB,

Wireless Communication Protocols: Blue tooth, ZigBee, Z-Wave, LoWPAN, WiFi-ah, NFC, RFID), Application Protocols MQTT, CoAP, HTTP.

UNIT-III

Threats, Security, Privacy and IoT Cloud

IoT as Interconnection of Threats: Phase attach, Attack as per Architecture, Attach based on Components.

Security Engineering for IOT Development: Building Security into design and development, Secure Design: Safety and Security Design, Processes and Agreements, Technology Selection.

Mitigating to Privacy Concern: Privacy Challenges introduced by IoT, Guide to perform PIA, PbD Principles, Privacy Engineering Recommendations

IOT Cloud: Concepts of Cloud, Your Organization and Cloud Computing, Cloud Computing Services (IaaS, PaaS , SaaS).

Case Study: ThingSpeak Cloud, Blynk Cloud, MQTT Cloud

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

UNIT-IV

Measurement Errors and Sensors

Measurement Errors: Gross Error, Systemic error, Absolute Error, Relative Error, Accuracy, Precision, Resolution, Significant Figure, Measurement Error Combinations, Basics of Statistical Analysis.

Sensors and Transducers: Passive and Active Sensors, Resistive Sensors, Capacitive Sensors and Inductive Sensors, Temperature Sensor, Humidity Sensor, Ultra-Sonic Sensor, IR Sensor, PIR Sensor, Vibration Sensor, Gas Sensor, Hall Effect Sensor.

UNIT-V

Development Platform: Hardware, Software, Programming Language

Hardware: Arduino Uno Board, NodeMCU Board

Software Tools: Arduino IDE, Compilers, Cross-Compilers, Linkers, Libraries, Debuggers, Simulators, Emulators, Serial Monitor, Intel Hex File and Motorola Hex File Format.

Programming Language: Arduino Programming Structure, Data Types, Operators, Control Statements (IF, IF-ELSE, WHILE, DO-WHILE, FOR, SWITCH-CASE, SWITCH-CASE-BREAK, SWITCH-CASE-CONTINUE) and Precompiled Functions.

Case Studies: Home Automation, Agriculture 3.0, Health Care, Industry 4.0

Course Outcomes:

The student will be able to:

CO1. Learn about the IOT Development cycles, Challenges and Requirements.
CO2. Learn about the Wired and Wireless Communication Protocols implementation.
CO3. Learn about Privacy, Threats and Security challenges present in IOT and IoT Clouds.
CO4. Learn about types of measurement errors and its impact on measurement and various sensor operation and construction mechanism.
CO5. Learn about Development platform " Arduino IDE", Sensors Libraries and Programming. .

Text Books:

1. O.Vermesan, P.Friess, " Internet of Things-From Research and Innovation to Market Deployment", River Publishers, 2014.
2. B. Russell and D.VanDuren, "PracticalInternetofThingsSecurity", -PacktPublishing, 2016.
3. A. T. Velte, T. J. Velte, R.Elsenpeter, "Cloud Computing – A Practical Approach" Mg-Graw Hill, 2010.
4. R. B. Northrop, " Introduction to Instrumentation and Measurement" Second Edition, CRC Taylor and Francis 2005.
5. J.Balye, " C Programming for Arduino" Packt Publication, 2013.
6. K.V. Shibu, " Introduction to Embedded Systems", Tata Mg-Graw Hill, First Edition, 2009.

Web Links:

1. https://thingspeak.com
2. https://www.blynk.cc/getting-started
3. https://www.arduino.cc
4. https://mqtt.org
5. https://coap.technology

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160666 e **Credits: 3**

B. Tech – VI Semester

RENEWABLE ENERGY SOURCES AND SYSTEMS (OPEN ELECTIVE)

Pre-Requisite: Power Systems

Course objectives:

UNIT–I

Fundamentals of Solar Energy Systems
Energy conservation principle – Energy scenario (world and India) – Solar radiation**:** Outside earth's atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

UNIT–II

Solar Photovoltaic Systems: Balance of systems – IV characteristics – System design**:** storage sizing – PV system sizing – Maximum power point techniques**:** Perturb and observe (P&O) technique – Hill climbing technique, Incremental conductance method.
Solar Thermal Systems: Liquid flat plate collections**:** Performance analysis – Transmissivity – Absorptivity product, collector efficiency factor – Collector heat removal factor – Numerical problems. Introduction to solar air heaters – Concentrating collectors and solar pond.

UNIT–III

Wind Energy: Wind patterns – Types of turbines – Kinetic energy of wind – Betz coefficient – Tip–speed ratio – Efficiency – Power output of wind turbine – Selection of generator(synchronous, induction) – Maximum power point tracking.

UNIT–IV

Hydro and Tidal Power Systems: Hydro systems**:** Basic working principle –Large, small, micro – measurement of head and flow – Energy equation – Types of turbines – Numerical problems.
Tidal power – Basics – Kinetic energy equation – Numerical problems – Wave power – Basics – Kinetic energy equation.

UNIT–V

Biomass, Fuel Cells and Geothermal Systems: Biomass Energy**:** Fuel classification – Pyrolysis – Direct combustion of heat– Different digesters and sizing.Fuel cell**:** Classification – Efficiency – VI characteristics.
Geothermal**:** Classification – Dry rock and acquifer – Energy analysis.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Outcomes

The student will be able to:

After successful completion of this course, a student will be able to:

CO-1. Analyze solar radiation data, extraterrestrial radiation, radiation on earth's surface.

CO-2. Design solar thermal collections.

CO-3. Develop maximum power point techniques in solar PV and wind

Text Books:

1. Solar Energy**:** Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis -second edition, 2013.
3. Energy Science**:** Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160666f **Credits: 3**

B. Tech – VI Semester

HYBRID VEHICLES (OPEN ELECTIVE)

Pre-Requisite:

Objectives:

1. Analyzing various aspects of hybrid and electric drive trains such as their configuration, types of electric machines that can be used, energy storage devices, etc.
2. Get exposed to research and development challenges involved in various types of fuel cells.

UNIT I

FUELCELL TECHNOLOGY

Structures, Operations and properties of Fuel cells – (Phosphoric Acid Fuel cell, Proton Exchange membrane Fuel cell, Direct Methanol fuel cell Alkaline Fuel Cells, Solid Oxide Fuel Cell, Molten Carbonate Fuel Cell) -Characteristics. Electrochemical energy conversion – Theoretical efficiency – Factors affecting electrochemical energy conversion- Helmholtz double layer model

UNIT II

FUEL CELL BASED VEHICLES STRUCTURE

PEMFC: Operating principle (membranes, electrodes and electrolysis, optimization of membrane and electrode assembly, impurities) – Technology development (single cell and stacks, composite plates) – Fuel processing – Modeling studies (membrane, electrode, membrane-electrode assembly, fuel cell, stack and system) – Technology development and applications. DMFC: Operating principle – Noble metal issue – Electro-oxidation of methanol (Catalysts, oxygen electroreduction, electrolyte, non-catalytic aspects) - Methanol crossover.

UNIT III

HYBRID ELECTRIC TECHNOLOGY

Impact of modern drive-trains on energy supplies. Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

ELECTRIC DRIVETRAINS

Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis. Electric Propulsion unit: Introduction to electric components used in electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency**.**

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

UNIT IV

HYBRID ELECTRIC VEHICLES

Principles of Hybrid Electric Drivetrains, Architectures – Electrical distribution, Hybrid control Strategies – Parallel Hybrid, Series Hybrid - (Charge Sustaining, Charge Depleting), Practical Models – Toyota Prius, Honda Insight. Hybridization Effects. 42 V System for Traction Applications - Lightly Hybridized vehicles, Low –Voltage Storage System, Low –Voltage main system with High voltage bus for propulsion. Heavy Vehicles Hybrid Electric Heavy Duty Vehicles, Fuel cell Heavy
duty vehicles.

UNIT V

HYBRID VEHICLE TECHNOLOGY

Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems. Energy Management Strategies in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies. Case Studies: Design of a Hybrid Electric Vehicle (HEV), Design of a Battery Electric Vehicle (BEV).

Text Books:

1. Basu .S, "Recent Trends in Fuel cell Science and Technology", Anamaya Publishers, New Delhi.,2007.
2. Viswanathan, B. and Aulice Scibioh, M., "Fuel Cells Principles and Applications", Universities Press (India) Pvt. Ltd., Hyderabad, 2006.
3. Hoogers, G., Edr. "Fuel Cell Technology Handbook", CRC Press, Washington D. C., 2003.

Reference Books:

1. Larminie, J. and Dicks, A., "Fuel Cell Systems Explained" John Wiley & Sons, Ltd., New York, 2001.
2. Ali Emadi, Mehrdad Ehsani, John M. Muller, "Vehicular Electric Power Systems", Marcel Dekker, Inc., 2004.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160611 **Credits: 2**

ROCK MECHANICS LABORATORY

Course Objectives:

1. Introduce the concept of Rock Mechanics.
2. Introduce the principles of stress-strain and their relation.
3. Impart knowledge in the Physico-Mechanical properties of rock.
4. Enumerate various rock failure theories.

LIST OF EXPERIMENTS

1. Determination of point load index of the given rock sample.
2. Determination of Preparation of Rock Samples.
3. Determination of rock quality designation.
4. Determination of Density (wet and dry).
5. Determination of porosity and void ratio.
6. Determination of uniaxial compressive strength.
7. Determination of tensile strength.
8. Determination of Protodakonov strength index.
9. Determination of slake durability index of the give sample.
10. Determination of Impact Strength Index (ISI) of coal.
11. Determination of shear strength of given rock specimen by Single shear method
12. Determination of shear strength of given rock specimen by Double shear method.

EXTRA EXPERIMENTS

1. Determination of Schmidt Rebound Hammer Number and compressive strength of rock specimen.
2. Determination of the P & S wave velocity and the dynamic properties of a given rock specimen.
3. Determination of cohesive strength & angle of internal friction for rock specimen by tri-axial testing.
4. Determination of drill-ability index of rocks
5. Determination of Subsidence and its prediction.
6. Determination of rock mass rating.
7. Study and design of mine pillar.
8. Study of roof bolts used in Bord and Pillar mining method.

Course Outcomes:

The student will be able to:

CO1: To understand the rock mechanics techniques in field .
CO2: Comprehend and apply the principles of stress-strain.
CO3: Comprehend and apply the Physico-Mechanical properties of rock
CO4: Synthesis and apply various slope failures.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160612 **Credits: 2**

MINERAL PROCESSING LABORATORY

Course Objectives:

1. Introduce the various operations of mineral engineering.
2. To train in the beneficiation operations.
3. Impart knowledge in properties of bulk solids.
4. Expose on the coal beneficiation.

LIST OF EXPERIMENTS:

1. Selection of sample through Coning & Quartering.
2. Crushing of iron ore using primary jaw crusher
3. Verification of Comminution laws for jaw crusher.
4. Study the effect of Grinding with Grinding Time in Ball Mill.
5. To find Critical speed of Ball mill.
6. To determine size distribution using Sieve analysis.
7. To determine size distribution using Vibratory Sieve Shaker.
8. Separation of Iron ore using Electromagnetic separation.
9. Separation of particles using Tabling equipment.
10. To study separation performance of Cyclone Separator.
11. Determination of size distribution of Iron Ore using sieve analysis.
12. Verification of Comminution laws for Roll Crusher.

EXTRA EXPERIMENTS:

1. Determination of Screen effectiveness using vibratory Sieve Shaker.
2. Crushing of coal using primary jaw crusher.
3. Determination of Grindability index of coal by hard grove machine.
4. Separation of mixture using sink and float method.
5. Determination of minimum thickener area required for continuous thickening using Batch sedimentation.
6. Determination of Grinding time in a Ball mill.
7. Determination of Effectiveness of Trommel.
8. Determination of percentage recovery of coal in froth from coal sand mixture using Froth flotation.

Course Outcomes:

The student will be able to:

CO1: Understand the techniques in operations of mineral engineering.
CO2: Analyze the techniques in beneficiation operations
CO3: Comprehend and analyze the properties of bulk solids.
CO4: Comprehend and analyze the techniques in coal beneficiation operations.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160701 **Credits: 3**

B. Tech – VII Semester

MINE LEGISLATION

Pre-Requisite:

Course Objectives:

1. To explain the history of mining legislation in India, MMDR Act 1957, and MCDR rules etc.
2. To illustrate Mines Act 1952, Mine rules 1955, MVT rules 1966, Pit head Rules, and Mineral concession rules.
3. To explain the ID Act, MR Rules 1985, IE Rules 1956.
4. To illustrate the CMR 2017, MMR 1961 and DGMS circulars.
5. To brief about Maternity Benefit Act and Rules, Payment of Wages Act, CMPF Act and Rules etc.

UNIT - I

General principles of mining laws; History and development of mining Legislation in India; Mines & Minerals (Regulation & Development), Act 1957;

UNIT - II

Coal mine regulation 2017, Metalliferous Mines Regulation 1961.

UNIT-III

The Mines Act, 1952; the Mines Rules 1955; Pit Head Bath Rules.

UNIT – IV

Mines Vocational Training Rules, 1966; The Mines Rescue Rules, 1985.

UNIT - V

The Maternity Benefit Act and Rules; Payment Of Wages Act; National Coal Wage Board Agreement; Coal Mines Provident Fund Act And Rules.

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Course Outcomes:

CO1: Comprehend and analyze history of mining legislation in India, MMDR Act 1957, and MCDR rules etc.

CO2: Comprehend and analyze the Mines Act 1952, Mine rules 1955, MVT rules 1966, Pit head Rules, and Mineral concession rules.

CO3: Comprehend and analyze the ID Act, MR Rules 1985, IE Rules 1956.

CO4: Comprehend and analyze the CMR 2017, MMR 1961 and DGMS circulars.

CO5: Comprehend and analyze the Maternity Benefit Act and Rules, Payment of Wages Act, CMPF Act and Rules etc.

Text Books:

1. The Mine Act, 1952 ; The Mines Rules, 1955; The Mines Rescue Rules, 1985; Mines Vocational training Rules, 1966- Govt. of India Publication
2. Coal Mines Regulations, 1957; Metalliferous mines Regulation, 1961; DGMS Circulars- Govt. of India Publication

Reference Books:

1. Indian Electricity Rules, 1956; The Maternity Benefit Act and Rules; Payment of Wages Act; National Coal Wage Board agreement; Coal Mines Provident Fund Act and Rules - Govt. of India Publication
2. Mines & Minerals (Regulation & Development), Act 1957; Mineral conservation and Development rules; Mineral concession rules- Govt. of India Publication.
3. Legislation in Indian Mines - Critical Appraisal by Prasad & Rakesh

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160702 **Credits: 3**

B. Tech – VII Semester

MINE HAZARDS & RESCUE

Pre-Requisite: Mine Environment Engineering

Course Objectives:

1. To illustrate the mechanism of spontaneous heating in mines and Graham's Index.
2. To explain about mine fires including classification of mine fires and preventive measures.
3. To illustrate various types of explosion and inundation in mines.
4. To impart the knowledge of the methods of illumination and mine rescue operations

UNIT – I

Mine Fires:
Classification of fires-causes, detection, monitoring and control of surface and underground fires; Preventive Measures-Firefighting and inertization; Monitoring of atmosphere behind sealed off areas; Reopening of sealed- off areas.

Spontaneous Heating:
Mechanism; Factors governing spontaneous heating; Stages of spontaneous heating; Detection and prevention of Spontaneous heating; Graham's index.

UNIT – II

Explosions: Types of explosions; Coward's diagram; Ignition temperature; lag on ignition; Inflammability limits of fire damp and coal dust explosion; Causes and preventive measures of firedamp and coal dust explosion; Stone dust and water barriers; Investigation after explosion; Regulation of Explosion.

UNIT – III

Inundations: Causes; Precautionary measures; Precautions to be taken while approaching old workings; Burnside boring apparatus; Design and construction of water dams; Recovery of flooded mines; Dewatering of old working; Regulation of Inundation.

UNIT – IV

Mine Rescue & Recovery: Mine rescue and equipment; Short distance apparatus; Self-contained breathing apparatus; Reviving apparatus; Self rescuers; Rescue stations; Rescue organization; Reopening of Mines; Rescue and recovery work in connection with fire, explosions, and gases.

UNIT-V

Mine Illumination: Photometric terminologies; General lighting arrangements; Standards for underground and surface mine lighting; Factors affecting visual environment; Types of glare and its reduction; Mine lighting and its effect on accidents, production and health; Law of illumination; Type of light sources used in mines- incandescent lamp, fluorescent tube, metal halide lamps, sodium vapour lamps, compact fluorescent lamp and LED; Electric Cap lamp.

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Course Outcomes:

CO1: To apply the techniques to control spontaneous heating and mine fires in mines.
CO2: To comprehend and apply the techniques to prevent explosion and inundation.
CO3: To comprehend and apply the techniques of mine rescue and recovery work.
CO4: To comprehend and analyze the requirements of illumination and mine rescue operations.

Text Books:

1. Elements of Mining Technology-Volume-II- D.J. Deshmukh
2. Mine Disasters and Mine Rescue - M.A. Ramlu

Reference Books:

1. Mine fire and spontaneous heating- S.P. Banarjee
2. Fires in Coal Mines L.C Kaku
3. Mine Ventilation – Dr. G.B. Mishra
4. Mine Ventilation – Penman

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160703 **Credits: 3**

B. Tech – VI Semester

ADVANCED MINING MACHINERY

Pre-Requisite: Mine Machinery

Course Objectives:

1. To illustrate the principles, operations and application of conveyors and pumps.
2. To explain the electrical and telecommunication systems in mines.
3. To demonstrate various types of surface mining equipment operations and applications.
4. To demonstrate coal face machinery operations and its applications

UNIT - I

Conveyors

Different types of conveyors- shakers conveyor, belt conveyor, scraper chain conveyor, & armoured flexible conveyor; their principles of operation, application, merits and demerits; Capacity calculation; recent developments- High Angle conveyors.

UNIT-II

Mine Pumps

Sources of mine water; Classification of mine pumps; Basic definition of head, suction, lift, suction head, discharge head; Friction of water in pipes; Location and size of Mine Sumps; Constructional features ;working principles; Single stage and multistage pumps; application & uses of Centrifugal and reciprocating Pumps. Arrangement of different valves and other components in Centrifugal & reciprocating pumps; Pump design calculation calculations - numerical problems; special types of pumps used in mines

UNIT-III

Electrical Systems in Mines

Mining cables -classification, constructional features and use of each type - armoured, pliable armoured and trailing cable; Installation of cable in shaft & in roadways; General working principles of gate end box, Drill Panels; mining switch gears; Safety & protective devices - function of Pilot core protection & earth leakage protection. Flame proof & intrinsically safe apparatus- application, features & safety aspects.

UNIT-IV

Telecommunication Systems in Mines

Underground signaling arrangement - haulage signals, shaft signals and use of telephone systems in underground; latest developments in mine communications.

Introduction to Surface Mining Equipments

Blast Hole Drill, Shovel, Dozer, Front End Loader & Dumper, —their basic Constructional features; Working Principles and Applications.

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UNIT - V

Coal face machinery Electric coal drills - its operation, constructional features, specifications & use, drill rod, drill bits. Different types of Mechanical loader used in Bord & Pillar heading; Application & operation of Continuous miner; Long wall face equipment: Shearer, plough: their construction and operation; power supports, stage loader; safety devices.

Course Outcomes:

CO1: Apply the techniques in operations and application of conveyors and pumps.
CO2: Comprehend and plan the electrical and telecommunication systems in mines.
CO3: Apply the techniques in operations and application of mining equipment in a surface mine.
CO4: Apply the techniques in operations and application of coal face machinery in an underground mine.

Text Books:

1. Mine pumps haulage and winding. S. Ghatak.
2. Theory of Machines R.S Khurmi & J.K Gupta.

Reference Books:

1. Elements of Mining Technology vol-III. D.J. Deshmukh.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160704 **Credits: 3**

B. Tech – VII Semester

MINERAL ECONOMICS

Pre-Requisite: Underground Coal Mining, Underground Metal Mining

Course Objectives:

1. To impart the knowledge of National Mineral Policy, mineral conservation.
2. To illustrate the mineral taxation laws and pricing mechanism of minerals.
3. To impart knowledge of different sampling methods and mineral resource estimation.
4. To explain different parameters to be considered in mine finance.

UNIT-I

Mineral resources and policies:
Classification of mineral resources: indicated, inferred, proved; various mineral classification systems National mineral resources; National mineral policy; Strategies for a development of mining industry; resource conservation;

UNIT-II

Trade and taxation on minerals:
Mineral taxation, District Mineral Fund (DMF), royalty and subsidies; Mineral Imports & Exports; supply–demand of minerals; pricing mechanism of minerals;

UNIT-III

Mine Sampling : Theory of sampling, method of sampling employed in different cases, precaution to be taken; Reduction, Calculation of average reef values and widths; estimation of average-tonnages, sampling procedure and precaution during sampling of alluvial deposits and dumps, estimation of reserves.

UNIT-IV

Mineral Resource Estimation: Introduction to Resource estimation; **methods of resource estimation:** Distance weighing methods- Inverse distance, Inverse distance square; Area of influence methods- polygonal method, triangular method; application of computers in mineral resource estimation;

UNIT-V

Mining Finance: Depreciation – concepts; methods of depreciation; financial and tax implications; preparation of cash flow statements; Discounted cash flow (DCF); Internal Rate of Return; Time value of money; Net Present Value (NPV); determination of optimum size of mine; Mine life.

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Course Outcomes:

CO1: Comprehend and analyze various policies, acts and conservation rules on minerals.
CO2: Comprehend and analyze mineral taxation laws and pricing mechanism of minerals.
CO3: Comprehend and plan sampling methods, estimation of reserves and grade techniques.
CO4: Comprehend and plan mine finance and optimum size of mine.

Text Books:

1. Mineral and Mine Economics; R. T. Deshmukh, Myra Publ., Nagpur, 1986.
2. Mineral Economics; R. K. Sinha and N. L. Sharma, Oxford & IBH.
3. Mine & Mineral Economics; I. N. Sinha, Subhash C. Ray.

Reference Books:

1. Industrial Engineering and Management, O. P. Khanna.
2. Courses in Mining Geology, R. N. P. Arogyaswamy, Oxford and IBH Pub.
3. Financial management, P. K. Jain, Tata McGraw Hill, 1981.
4. India's Mineral Resources, S. Krishnaswamy, Oxford & IBH pub., 2nd Ed, 1972.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160761a **Credits: 3**

B. Tech – VII Semester

ENVIRONMENTAL IMPACT ASSESSMENT (Elective-I)

Pre-Requisite: Mine Environment

Course Objectives:

1. To introduce the concept of environmental impact assessment.
2. To explain the environmental management planning for mining projects.
3. To illustrate the environmental laws and Rules.
4. To explain the statutory requirement for mine environment management.

UNIT-I

Introduction: Environmental Impact Assessment (EIA) - Environmental Impact Statement - EIA in Project Circle, Legal and regulatory aspect in India according to Ministry of Environment and Forests.

UNIT-II

Types and limitations of EIA - Cross sect oral issues and terms of reference in EIA - Participation of Public and Non - Governmental Organizations in environmental decision making.

UNIT-III

Components And Methods: Components of EIA - Processes - Screening - Scoping - Setting - Analysis - mitigation. Matrices - Networks - Checklists - Connections and combination of processes - Cost benefit analysis - Analysis of alternatives - Software packages fro EIA- Expert systems in EIA.

UNIT-IV

Prediction, Assessment of Impacts and Reporting: Prediction tools for EIA - Mathematical modeling for impact prediction - Assessment of impacts - Air - Water - soil - noise - biological - socio - cultural environments. . Case Studies: Case studies related to the following sectors - Infrastructure - Mining - Industrial - Thermal Power - River valley and Hydroelectric - Nuclear Power.

UNIT-V

Environmental Management Plan - preparation, implementation and review - Mitigation and Rehabilitation Plans. Policy and guidelines for planning and monitoring programmers - Post project audit - Ethical and Quality aspects of Environmental Impact Assessment.

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Course Outcomes:

CO1: Comprehend and analyze the knowledge to generate the awareness on mining and its implications on environment

CO2: Comprehend the basic information required for the preparation of environmental impact assessment

CO3: Develop the concept of applying the statutory provisions related to preparation of impact assessment reports in mining project.

CO4: Comprehend the environmental law and rules.

Text Books:

1. Lawrence D.P., Environmental Impact Assessment - Practical solutions to recurrent problems, Wiley - Interscience, New Jersey.2003
2. Petts, J.Handbook of Environmental Impact Assessment, Vol - I and II, Blackwell Science London 1999.

Reference Books:

1. Environmental Impact Assessment Paperback – Import, 1 Jan 2014 by N. S. Raman (Author), A. R. Gajbhiye (Author), S. R. Khandeshwar
2. Environmental Studies: Third Edition by R. Rajagopalan (Author)
3. Ecology, Equity and the Economy by Gurudas Nulkar (Author)

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160761b **Credits: 3**

B. Tech – VII Semester

DISASTER MANAGEMENT

Prerequisites: Mine Hazard and Rescue

Course Objectives:

1. To explain the importance of the disaster phenomenon.
2. To illustrate the different contextual aspects of disaster management.
3. To impart the knowledge of impacts of disaster management on public health.
4. To illustrate the design and implement disaster mitigation measures.

UNIT I

CONCEPT OF HAZARDS AND DISASTERS

Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology – Landscape, Ecosystem and Perception approach - Human ecology & its application in geographical researches. Natural hazards and Disasters – Man induced hazards & Disasters - Natural Hazards- Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards

UNIT II

CLASSIFICATION OF HAZARDS

Volcanoes- Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes – Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions – Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - Human adjustment, perception & mitigation of earthquake, Landslides- causes and impacts, Avalanches -causes and impacts. Infrequent events: Cyclones – Lightning – Hailstorms, Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms [causes , distribution human adjustment, perception & mitigation], Cumulative atmospheric hazards/ disasters : Floods- Droughts- Cold waves- Heat waves Floods:- Causes of floods- Flood hazards India- Flood control measures [Human adjustment, perception & mitigation], Droughts:- Impacts of droughts- Drought hazards in India- Drought control measures, Extra Planetary Hazards/ Disasters-Man induced Hazards /Disasters- Physical hazards/ Disasters- Soil Erosion Soil

UNIT III

Approaches And Measures in Disaster Management A: Emerging Approaches; Pre- disaster stage [preparedness], Emergency Stage, Post Disaster stage- Rehabilitation Provision of Immediate relief measures to disaster affected people; Prediction of Hazards & Disasters; Measures of adjustment to natural hazards

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UNIT IV

DISASTER MANAGEMENT

Meteorological observatory; Seismological observatory; Volcanological institution; Hydrology Laboratory; Industrial Safety inspectorate; Institution of urban & regional planners; Chambers of Architects; Engineering Council; National Standards Committee; Integrated Planning- Contingency management Preparedness –Education on disasters; Community involvement; The adjustment of Human Population to Natural hazards & disasters Role of Media Monitoring Management- Discuss the programme of disaster research & mitigation of disaster of following organizations.

UNIT V

DISASTER MANAGEMENT IN INDIA

Ecological planning for sustainability & sustainable development in India- Sustainable rural development: A Remedy to Disasters -Role of Panchayats in Disaster mitigations; Environmental policies & programmes in India- Institutions & National Centers for Natural Disaster reduction, Environmental Legislations in India, Awareness, Conservation Movement, Education &training.

Course Outcomes:

CO1: Awareness on disaster management and its consequences.
CO2: Analyze, evaluate and manage the environmental cultural, economical factors influencing disasters.
CO3: Learn the statutory provisions related to prevention of disaster management.
CO4: Assess the different public health aspects at local and global levels as a result of disaster.

Text Books:

1. Jagbirsingh, "Disaster management–Future challenges and opportunities", I.K. International publishing house, 1st edition, 2005.
2. Coppala P Damon, "Introduction to International Disaster management", ABD publishers, 2007.

Reference Books:

1. R.B.Singh [Ed],"Environmental Geography", Heritage Publishers, New Delhi, 1st edition, 1990.
2. Kates, B.I& White. G.F, "The Environment as Hazards", oxford publishers, 5th edition, New York, 1978.
3. R.B. Singh [Ed],"Disaster Management", Rawat Publication, New Delhi,1st edition, 2000.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160761c **Credits: 3**

B. Tech – VII Semester

ROCK SLOPE ENGINEERING

Pre-Requisite: Rock Mechanics

Course Objectives:

1. To explain the mechanism of slope failure and slope stability
2. To illustrate the remedial measures for slope stability.
3. To illustrate the instrumentation and monitoring techniques.
4. To impart the knowledge of numerical analysis of slope stability.

UNIT- I

Introduction economic implications. Geological investigation; data interpretation for slope stability analysis.

UNIT-II

Basic mechanisms of slope failure: planar, wedge, rotational shear, toppling, and rock fall; Remedial measures for slope stabilization

UNIT-III

Mechanism of failure of jointed rock mass. Determination of shear strength of Discontinuities. Influence of ground water on slope and techniques of depressurization, remedial and corrective measures.

UNIT- IV

Monitoring and instrumentation techniques of rock slopes. Investigation of failed slopes.

UNIT- V

Numerical analysis of slopes, Use of FLAC; ANSYS; Phase-II software

Course Outcomes:

CO1: Comprehend and analyze the mechanism of slope failure and slope stability.
CO2: Comprehend and analyze the remediation measures for slope stability.
CO3: To apply instrumentation and monitoring techniques.
CO4: To apply the numerical analysis of slope stability.

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Text Books:

1. R. N. Chowdury, Slope Analysis, Elsevier, 1978
2. E. Hoek and J. Bray, Rock Slope Engineering, The Inst. of Mining
3. & Metallurgy, London, pp. 358, 1981

Reference Books:

1. Rock Slope Engineering Duncan C. Wyllie, Chris Mah Mining Engineering
2. Finite Element methods: Concepts and Applications in Geo mechanics: Debasis
3. Deb; PHI Learning Pvt Ltd : New Delhi.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160761d **Credits: 3**

B.Tech – VII Semester

MINE SAFETY AND HEALTH ENGINEERING

Pre-Requisite: Mine Environmental Engineering

Course Objectives:

1. To illustrate accidents in Indian mines.
2. To explain the Risk management, Risk identification in mines.
3. To demonstrate training and accidents in opencast mines
4. To demonstrate Accident occurrence in Underground mines.

UNIT-I

Introduction to accidents prevention and health and safety in industry
Terminology, reason for preventing accidents – moral, cost, legal. Safety scenario in Indian mines, Accidents in Indian mines, Measurement of safety performance, Statistical analysis of mine accidents.
Causes of Accidents, accident report, accident analysis and control, cost of accidents, statistical and economical analysis of accident data.

UNIT-II

System engineering approach to safety, Techniques used in safety analysis, Internal Safety management and organization, Risk management, Risk identification, Risk estimation and evaluation, Risk minimization techniques in mines. Risk analysis using FTA, HAZOP, ETA etc; Risk analysis softwares; health risk assessment and epidemiological studied.

UNIT-III

Training, Human Behavioral approach in Safety, safety polices safety audit and safety management. Mines emergency organization for disaster management.

UNIT-IV

Accidents in UG mines, Accidents due to explosives, Common causes and measures for prevention.
Accidents due to electricity: Common causes and measures for prevention. : Falls of roof and sides in underground coal mines Accidents due to rope haulage: Common causes and measures for prevention.
Types of Accidents in opencast mines
Common causes, measures for prevention, Accidents due to ground movement, safety precautions in already developed pillars.

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UNIT-V

Factors affecting the Occupational health and safety, precautions to be taken in mines.

Course Outcomes:

1. Comprehend the Accidents in Indian mines
2. Comprehend the Risk management, Risk identification in mines
3. Comprehend the training and Accidents in opencast mines
4. Comprehend the Accidents in UG mines.

Text Books:

1. Mine Safety and Legislation, Samir Kumar Das, Lovely Prakashan.
2. Safety in Mines, B.K. Kejriwal, Lovely Prakashan.

Reference Books:

1. DGMS CIRCULARS: MINES ACT
2. Occupational Safety and Health in Industries and Mines by C.P. Singh, Black Diamond Publishers
3. Indian Mining Legislation – A Critical Appraisal by Rakesh & Prasad, Tara Book Agency.
4. System Safety Engineering and Risk Assessment: A Practical Approach, N.J. Bahr, Taylor and Francis, NY, 1997.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160762 a **Credits: 3**

B. Tech – VII Semester

GEO-STATISTICS (Elective-II)

Pre-Requisite: NIL

Course Objectives:

1. To illustrate the concept of statistics.
2. To explain about the theorem of statistics.
3. To demonstrate various methods or ore estimation by geo-statistics.
4. To impart the knowledge of application of statistics on ore body.

UNIT – I

Arithmetic mean; Median; Mode; Standard deviation; Mean deviation or the average deviation; coefficient of variance; coefficient of correlation; Rank correlation.

UNIT – II

Probability distribution function; Normal distribution function; Poisson distribution function; Exponential distribution; Expectation of a variance.

UNIT – III

Skewness; Additional theory of probability; Theorem of total probability for compound events; Bay's theorem; Mean square error; Cramer Rao theorem for evaluating estimator.

UNIT – IV

Tonnage factor; Determination of average grade of ore in a vertical section; Determination of average grade of ore in a horizontal section- Triangular method, Polygons method, Constant distance weighting technique, Inverse distance weighting technique.

UNIT – V

Application of statistics on the ore body; Global and Local estimation; Point and Block estimates; Random variables; Random function; Variogram; Quantification of deposits through variogram

Course Outcomes:

CO1: Apply the techniques to solve the basic statistical problem.
CO2: Comprehend the various theorems of statistics.
CO3: Comprehend and apply the techniques to estimate the ore reserve by geo-statistical approach.
CO4: Comprehend and apply the techniques to understand the application of statistics on ore body.

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Text Books:

1. Geo-informatics & Geo-statistics- N.M. Naidu
2. Applied Geo-statistics–Isaaks, Edward H.

Reference Books:

1. A complete guide for mining engineering- Dr. A.K. Gorai
2. Nonparametric Geo-statistics by S. Henley (Author)

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160762 b **Credits: 3**

B. Tech – VII Semester

ROCK FRAGMENTATION ENGINEERING (Elective-II)

Pre-Requisite: Drilling & Blasting

Course Objectives:

1. To illustrate the theory of rock breaking
2. To explain the mechanism of rock fragmentation by using various types of rock drilling.
3. To illustrate the effect of controlled blasting on rock fragmentation.
4. To explain blast design on rock fragmentation.

UNIT- I

General theory of rock cutting, Selection of cutting tools for optimum penetration and wear characteristics; Mechanics of rotary, percussive and rotary - percussive drilling; different types of bits, bit wear, drilling in difficult formations, drill-ability of rocks, drilling performance and costs.

UNIT-II

Mechanics of rotary, percussive and rotary - percussive drilling, Mechanism of Rock breaking mechanism; short and long hole drilling equipment; pneumatic and Hydraulic rock hammers; Mechanics of rock fragmentation and fracture by explosive action, explosives.

UNIT-III

Blasting accessories, blasting parameters, design of blasting rounds for opencast and underground mines, blast ability of rocks, blasting efficiency, mean fragment size.

UNIT- IV

Computational models of blasting; transient ground motion, misfires, blown out shots, incomplete detonation - their causes and remedial measures.

UNIT- V

Controlled blasting techniques, perimeter blasting, safety precautions, ground vibrations and air over pressure from blasting. Instrumentation in blasting, Borehole pressure transducer, V.O.D Probe, vibration monitor, high speed Video Camera. Impact of ground vibration and sound on the neighboring structures and communities, and mitigative measures.

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Course Outcomes:

CO1: Develop the concept of rock breaking theory.
CO2: Comprehend and analyses the mechanism of rock fragmentation.
CO3: Comprehend the techniques of controlled blasting in rock fragmentation.
CO4: Comprehend and analyses techniques of the blast design.

Text Books:

1. Rock Slope Engineering Duncan C. Wyllie, Chris Mah Mining Engineering
2. Finite Element methods: Concepts and Applications in Geo-mechanics: Debasis Deb; PHI Learning Pvt. Ltd: New Delhi.

Reference Books:

1. R. N. Chowdury, Slope Analysis, Elsevier, 1978
2. E. Hoek and J. Bray, Rock Slope Engineering, The Inst. of Mining & Metallurgy, London, pp. 358, 1981

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 1760762 c **Credits: 3**

B. Tech – VII Semester

DEEP SEA MINING (Elective-II)

Pre-Requisite: NIL

Course Objectives:

1. To impart the knowledge of mining shallow and deep-sea mineral resources.
2. To explain the nature of continental shelf, slope sea floor, and mining conditions.
3. To illustrate the mining of minerals from sea.
4. To brief about the production of oil and natural gas from off-shore areas.

UNIT - I

Introduction to Marine environment, Characteristics of the ocean floor.

UNIT - II

Profile of the sea. Shelf, slope and raise Nature of the deposits of environments.

UNIT - III

Exploration and characterization of inland water. Mineralogical studies of marine sediments and continental slope. Continental shelf and deep sea bed mineral resources. Exploration systems of dissolved and un dissolved mineral deposits;

UNIT - IV

Off shore exploration of oil and gas and subsea systems.

UNIT - V

Deep sea bed Mining, Wells and algae for extraction of minerals, Economic & Technologies.

Course Outcomes:

CO1: Develop the knowledge of mining of shallow and deep-sea mineral resources
CO2: Comprehend and analyze the nature of continental shelf, slope sea floor, and mining conditions
CO3: Develop the concept of sea mining mineral.
CO4: Comprehend and analyze the production of oil and natural gas from sea mining.

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Text Books:

1. Hartman HL "Introductory Mining Engg" Willey Eastern.
2. Issues of "MARINE MINING" Manjula R.Shyam "Metals from sea bed Prospects of mining poly metallic nodules of India "Oxford & IBH".

Reference Books:

1. Deep-Sea Mining: Resource Potential, Technical and Environmental Considerations edited by Rahul Sharma, Springer publication.
2. Marine Mammal Research: Conservation Beyond Crisis Book by Timothy J. Ragen

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160762 d **Credits: 3**

B. Tech – VII Semester

TUNNELING ENGINEERING (Elective –II)

Pre-Requisite: Drilling & Blasting, UMM

Course Objectives:

1. To explain the importance of tunnel engineering technology in underground openings.
2. To illustrate the geology and geotechnical properties of rock mass.
3. To brief about the rock mass behavior, size of the excavation, which plays a major role in tunnel.
4. To explain the mechanism involved during tunneling engineering.

UNIT-I

Introduction to tunneling geological concept of tunneling. Influence of geological aspects on design and construction of tunnels.

UNIT-II

Tunneling methods: soft ground, drill and blast, roadways drivage machines, tunnel boring machine (TBM). Stress and displacements associated with excavating tunnels, ground control or treatment in tunneling and drivages.

UNIT-III

Design of support in tunnels steel supports, rock enforcements, new Australian tunneling methods (NATAM)

UNIT-IV

Design of tunnel rock condition RMR, Q-system, RSR, Rock mass behavior, stress strain behavior, and stress analysis of tunnels.

UNIT-V

Maintenance: Dewatering, ventilation and illumination of drivages and tunnels.
Numerical techniques, introductory use of FLAC; ANSYS; Phase-II software.

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Course Outcomes:

CO1: Develop the knowledge of tunneling engineering in underground openings.
CO2: Comprehend and analyze the mechanism tunneling engineering technology.
CO3: Comprehend and analyze the rock mass behavior, which plays a major role in tunnel.
CO4: Comprehend and analyze the geology and geotechnical properties of rock mass.

Text Books:

1. Tunnel Engineering - Hand book - Thomas R.Kuesel, EleynH.King,
2. Harbor, Dock and Tunnel Engineering - by R.Srnivasam

Reference Books:

1. Finite Element methods: Concepts and Applications in Geomechanics: Debasis Deb; PHI Learning Pvt. Ltd: New Delhi.
2. Handbook of Tunnel Engineering I: Structures and Methods Book by Bernhard Maidl and Markus Thewes.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160711 **Credits: 2**

B. Tech – VII Semester

MINING MACHINERY LABORATORY

Objectives:

1. To impart the knowledge of different types of wire ropes & rope capels.
2. To explain different transport systems and safety devices.
3. To demonstrate different types of drill machines and uses.
4. To impart the knowledge different types of support systems.

LIST OF EXPERIMENTS

1. Identify and sketch the different types of wire ropes.
2. Sketch the different types of rope capping.
3. Sketch the different types of cables used in mines.
4. Sketch the direct rope haulage system and observe the types of motors & braking system used.
5. Sketch the endless rope haulage system and various attaching devices like small man clip.
6. Sketch the various safety devices used in haulage system.
7. Draw the circuit diagram of signalling system used in Haulages.
8. Sketch the tandem drive (Tensioning arrangement) system used in conveyor haulage system.
9. Sketch the electrical coal drill used in mine.
10. Sketch and know the working of sun and planet gear used in coal drill.
11. Sketch the different types of drill rods used in mining.
12. Sketch and know the Chock shield supports used in Long wall mining.
13. Know about principle of working of road headers.

EXTRA EXPERIMENTS

14. Draw the diagram of DOSCO road header used in mine.
15. Sketch and know about principle of working of DERD & SERD.
16. Know the constructional features of Flame proof apparatus.
17. Draw the diagram of Flame proof apparatus.
18. Sketch and know the principle of working of gate end switchgear and its safety features.
19. Know various methods of connecting cables to gate end box.
20. Sketch and know the principles of mine pumps.

Course Outcomes: Student will be able to,

CO1: Comprehend and design different types of wire ropes & rope capels.
CO2: Comprehend and plan transport systems and safety devices.
CO3: Comprehend and plan different types of drill machines and uses.
CO4: Plan and design different types of support systems.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160712 **Credits: 2**

B. Tech – VII Semester

MINE HAZARD & RESCUE LABORATORY

Objectives:

1. To explain the mechanism of spontaneous heating in mines and Graham's Index etc.
2. To enumerate mine fires including classification of mine fires and preventive measures.
3. To impart the knowledge of various types of explosion and inundation in mines.
4. To explain the methods of illumination and mine rescue operations.

LIST OF EXPERIMENTS

1. Monitoring the gasses in sealed off areas.
2. Study the behavior of Soda acid fire extinguishers and its application.
3. Study the behavior of CO_2 snow fire extinguishers and its application.
4. Study the Dry chemical fire extinguishers and its application.
5. Determination of the methane-air mixture percentage in simulated mine environment.
6. Draw and analyze the Coward's diagram under simulated mine environment.
7. Study the constructional feature of noise dosimeter.
8. Determination of noise level at different locations in mines by using noise dosimeter.
9. Designing of stone dust barrier & water barrier in underground mines.
10. Study and maintenance of mine cap lamp.
11. Different type of light sources used in mines.
12. Study the operational behavior of lux meter.
13. Illumination survey at different work places.

EXTRA EXPERIMENTS

14. Study the constructional behavior of supplied air respirators (SCBA apparatus).
15. Self-contained compressed-oxygen breathing apparatus.
16. Testing and maintenance of Filter self-rescuer.
17. Operational behavior of self-contained self-rescue device.
18. Implementation of gas mask during rescue operation.
19. Working of rescue team during rescue operation.
20. Measurement of dust concentration by personal dust sampler.

Course Outcomes: The students will be able to,

CO1: Apply the techniques to control spontaneous heating in mines.
CO2: Comprehend and apply the techniques to prevent and control mine fires.
CO3: Comprehend and apply the techniques to prevent explosion and inundation.
CO4: Comprehend and analyze the requirements of illumination and mine rescue operations.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160801 **Credits: 3**

B. Tech – VIII Semester

ENVIRONMENTAL POLLUTION & CONTROL IN MINES

Pre-Requisite: Mine Environment Engineering

Course Objectives:

1. To explain the mechanism of spontaneous heating in mines and Graham's Index etc.
2. To illustrate about mine fires including classification of mine fires and preventive measures.
3. To brief about various types of explosion and inundation in mines.
4. To explain the methods of illumination and mine rescue operations.

UNIT I

Air Pollution

Definition; Atmospheric consideration; Basic of metrology; Ozone layer and green house effect; Contaminant dispersion; Sources of air pollution in mines; Effect of air pollution; Preventive Measures of air pollution in mines.

UNIT II

Water Pollution

Sources of water pollutants; Effect of water pollution; Water Pollution Modeling -Surface Water; Biological oxygen demand Modeling; Oxygen Demanding Waste in Streams; Chemical oxygen demand; Ground Water and its Contamination; Acid mine drainage; Waste Water Treatment.

UNIT III

Noise Pollution

Sources of noise pollution in mines; Effect of noise pollution; Measurement of noise; Noise standard and guidelines; Control measures of noise pollution; Noise induced hearing loss; Sound pressure and sound pressure level; Noise dose.

UNIT IV

Land Degradation

Causes of land degradation; Impact of mining activities on land; Land reclamation method-Rehabilitation, Reclamation, Restoration; Factor affecting the land restoration; Land reclamation planning.

UNIT V

Socio Economics Impact

Impact on society; Case studies on socio economics impact; Legislation relating to environmental protection; Visual impact due to mining; Environmental impact assessment.

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Course Outcomes:

Student will be able to:

CO1: To apply the techniques to control spontaneous heating in mines.
CO2: To comprehend and apply the techniques to prevent and control mine fires.
CO3: To comprehend and apply the techniques to prevent explosion and inundation.
CO4: To comprehend and analyze the requirements of illumination and mine rescue operations.

Text Books:

1. Principles of Mine Panning by Jayant Bhattacharya
2. Principle and practices of modern coal mining by R.D. Singh, New Age International Publishers

Reference Books:

1. Peng, S.S. Ground Control, Wiley Publications, New York, 1987
2. Brady, B.H.G. and Brown, S.T. Rock Mechanics for Underground Mining, Chapman and Hall, 1993
3. Hoek, E. and Brown, S.T. Underground Excavations in Rocks, Institute of Mining Metallurgy, London, 1980

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160802 **Credits: 3**

B. Tech – VIII Semester

COMPUTER APPLICATIONS IN MINING

Pre-Requisite: UCM, UMM, SURFACE MINING

Course Objectives:

1. To illustrate the computers application in exploration, blasting, ground vibration, subsidence etc.
2. To brief about the numerical methods and basics of simulation in mining.
3. To explain different tools and techniques like LIDAR and communication systems.
4. To brief about the application of numerical modeling, computers in ventilation.

UNIT-I

Introduction:
Standard application of software (FLAC, SURPAC, MINEX, GALENA etc.,); MS-Office, File handling, Introduction to CAD; Algorithms, Flow Charts for mining activities; **Computer application in** field exploration, blasting, ground vibration, GPS.

UNIT-II

Numerical methods:
Finite Element Method; Finite Difference Method; Boundary Element methods; Discrete Element method and their applications in mining.

Simulation:
Introduction to simulation and basics of simulation methods.

UNIT-III

Tools & Techniques:
Un-manned Aerial Vehicles, drones, LIDAR systems, Slope Stability Radar (SSR), Communication systems in mines.

UNIT –IV

Application of Numerical modeling:
Bord & Pillar Mining method; Long wall mining method; Continuous Mining method; Open-Pit slopes; Dump slopes.

UNIT-V

Applications in Ventilation and strata monitoring:
subsidence analysis; subsidence prediction in Bord & Pillar Mining method, Long wall mining method; Computer applications in Ventilation, Strata monitoring.

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Course Outcomes:

By the end of this course, students will be able to:
CO1: Comprehend and apply softwares in exploration, blasting, vibration and subsidence.
CO2: Comprehend different numerical methods and basics of simulation.
CO3: Comprehend different tools and techniques like LIDAR and communication systems.
CO4: Comprehend and apply numerical modeling, computers in ventilation.

Text Books:

1. Finite Element methods: Concepts and Applications in Geo-mechanics: Debasis Deb, PHI Learning Pvt Ltd : New Delhi
2. Application of computer methods in the mineral industry; R.V. Ramani

Reference Books:

1. Computer Applications in Mining Industry by Ali Wassan.
2. Advances in Applied Strategic Mine Planning 1st ed. 2018 Edition by Roussos Dimitrakopoulos (Editor)

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160861a **Credits: 3**

B. Tech – VIII Semester

PLANNING OF SURFACE MINES (Elective – III)

Pre-Requisite: Surface Mining

Course Objectives:

1. To brief about planning inputs of surface mining.
2. To illustrate the estimation of mine life/Ultimate pit limit.
3. To brief about the equipment/manpower selection, Maintenance,
4. To illustrate the design of haul roads/dump yards etc.

UNIT I

Planning requisites – Planning Inputs, Prospecting, Exploration, Planning Process, Planning essentials, Stages of planning, Types of Mine Plans, Feasibility Report,

UNIT II

Estimation of mine life – Factors affecting the mine life, Empirical Methods – Taylor's Rule, Modified Taylor's rule. Open pit Slope angels, Ultimate pit limit, Interrelation of unit operations.

UNIT III

HEMM and man power selection, Maintenance, manpower selection, Infrastructure Planning, Transport and dumping systems in OC mines, Layouts and Case Studies of OC mine.

UNIT IV

Design of haul roads, ramps, drainage system, design of dumps, Slope stability of mine dumps.

UNIT V

Extraction of developed coal seams, Selective mining, Ore blending/ processing, Estimation of profitability, Productivity and quality control, Monitoring and control of Projects.

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Course Outcomes:

CO1: Comprehend Planning inputs of surface mining.
CO2: Plan & design estimation of mine life/Ultimate pit limit.
CO3: Plan & design equipment/manpower selection, Maintenance,
CO4: Plan & design of haul roads/dump yards etc.

Text Books:

1. Surface mining by TN singh, lovely prakashan
2. Advanced Surface Mining by G.Kumaraswamy, Planet Publishing House.

Reference Books:

1. Open Cast Mining Unit Operations by Rzhevsky, V.V., Mir publishers.
2. Opencast Mining Technology and Integrated Mechanizations by Rzhevsky, V.V., Mir publishers.

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160861b **Credits:3**

B. Tech – VIII Semester

PLANNING OF UNDERGROUND COAL MINES (Elective –III)

Pre-Requisite: UCM

Course Objectives:

1. To illustrate the selection criteria of underground transportation equipment.
2. To explain about the strata control problems during conducting mining operations.
3. To study the design concepts of different mining methods.
4. To enumerate the concept of deep seam mining.

UNIT-I

Objective and stages of planning, Planning Process & Planning Essentials, Determination of Technical factors in Mine Planning, planning of exploitations by Board and pillar and long wall mining, Classification of planning information.

UNIT-II

Selection of face and underground transport equipment, Exploitation of thick coal seams. Planning and design layouts for ventilation, drainage and power ventilation management.

UNIT-III

Mine Surface Layout: Planning & Design, Mine Access design, Productivity and quality control, planning of deep underground coal mines.

UNIT-IV

Preparation of Plan Reports- Conceptual Plan Report, Feasibility Report, Automation in underground coal mines, coal seams gas; coal bed methane (CBM), Global energy scenario.

UNIT-V

SPECIAL METHODS: coal bed methane, underground gasification of coal, Methane Drainage – Applicability, limitations, Merits, Demerits.

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Course Outcomes:

1. Comprehend and analyze the problem of working the coal seams with weak strata.
2. Comprehend and analyze the components in the extraction process.
3. Develop the concept of design concepts of designing different mining methods.
4. Develop the concept of deep seam mining.

Text Books:

1. Coal Mining by S.P.Mathur.
2. Principle of Mine planning by Jaynath Bhatacharaya.

Reference Books:

1. Long wall mining by Peng.S.S

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160861c **Credits: 3**

B. Tech – VIII Semester

PLANNING OF UNDERGROUND METAL MINES (Elective –III)

Pre-Requisite: UMM

Course Objectives:

1. To illustrate the planning of underground metal mining.
2. To explain the design concepts of different metal mining methods.
3. To explain the selection of man, machinery and material for UG metal mining projects.
4. To brief about ventilation planning for underground metal mining projects.

UNIT I

Planning and scheduling of insets, shaft bottoms. Winding and transport system.

UNIT II

Surface layouts including mill and concentrator plants.

UNIT III

Determination of number and dimensions of stopes, Planning and scheduling of a cycle of operations.

UNIT IV

Concept of ore blending. Overall planning and scheduling of activities in metal mining and processing.

UNIT V

Ventilation planning for underground metal mine, Case studies of planning of Mining operations.

Course Outcomes:

CO1: Comprehend the planning of underground metal mining.
CO2: Comprehend and design different metal mining methods.
CO3: Comprehend the importance of man, machinery and material for UG metal mining projects
CO4: Plan and design ventilation for underground metal mining projects.

Text Books:

1. Agoshkov M., et al., Mining of ores and non-metallic minerals, Mir publishers, Moscow.
2. Elements of Mining Technology-Volume-II- D.J. Deshmukh

Reference Books:

1. Mining Engineers Hand Book – Volume I &II; SME
2. Underground Metal Mining Method-Hustrulid, SME
3. Cummins & Givens. SME Mining Engineering Handbook, Vol. I & II, Pub: A.I.M.M. New-York.
4. Introductory Mining Engineering, H.Hartman, John Wiley and sons;

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DEPARTMENT OF MINING ENGINEERING
4 Years B. Tech. (Mining Engineering) Course Structure: (2017-18)

Course Code: 17160861d **Credits: 3**

B. Tech – VIII Semester

TAILINGS & OVERBURDEN MANAGEMENT (ELECTIVE –III)

Pre-Requisite: Surface Mining, UCM, UMM

Course Objectives:

1. To impart the knowledge of collection and optimization of collection routing of solid waste.
2. To illustrate the principles of treatment of municipal solid waste.
3. To explain the impact of solid waste on the health of the living beings.
4. To illustrate the criterion for selection of landfill and its design.

UNIT – I

Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste - Factors Influencing generation of solid waste - sampling and characterization –Future changes in waste composition, major legislation, monitoring responsibilities.

UNIT – II

Basic Elements In Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste **Collection of Solid Waste**: Type and methods of waste collection systems, analysis of collection system - optimization of collection routes– alternative techniques for collection system.

UNIT – III

Transfer and Transport: Need for transfer operation, compaction of solid waste - transport means and methods, transfer station types and design requirements.

UNIT – IV

Separation and Transformation of Solid Waste: unit operations used for separation and transformation: shredding - materials separation and recovery, source reduction and waste minimization.

UNIT – V

Processing and Treatment: Processing of solid waste – Waste transformation through combustion and composting, anaerobic methods for materials recovery and treatment – Energy recovery – biogas generation and cleaning– Incinerators.

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Course Outcomes:

CO1: Design the collection systems of solid waste of a town.
CO2: Develop the concept of design treatment of municipal solid waste and landfill.
CO3: Comprehend and analyze the criteria for selection of landfill.
CO4: Comprehend and analyze the solid waste and design a composting facility.

Text Books:

1. George Techobanoglous "Integrated Solid Waste Management", McGraw Hill Publication, 1993.

Reference Books:

1. Vesilind, P.A., Worrell, W., Reinhart, D. "Solid Waste Engineering", Cenage learning, New Delhi, 2004
2. Charles A. Wentz; "Hazardous Waste Management", McGraw Hill Publication, 1995.